CONFERENCE
ON THE ETHICS OF
SCIENCE & TECHNOLOGY
AND SUSTAINABLE DEVELOPMENT

BANGKOK, THAILAND
5-6 July 2019

Official Website: www.stethicsconference2019.net

CONFERENCE ON THE ETHICS OF SCIENCE & TECHNOLOGY AND SUSTAINABLE DEVELOPMENT

FOREWORD

THE ETHICS OF SCIENCE & TECHNOLOGY AND SUSTAINABLE DEVELOPMENT

The Conference on the Ethics of Science & Technology and Sustainable Development (http://www.stethicsconference2019.net/) was held on 5-6 July 2019, in conjunction with the 26th Session of IBC and the 11th Session of COMEST, at the Centara Grand in Bangkok, Thailand. Organized jointly by the Thai Government and UNESCO, it was a landmark international conference which drew attention to various issues in ethics concerning science and technology, especially in the context of global issues in the quest for sustainable development.

The objectives of the Conference are to provide an open forum for the exchange of idea and information on the ethics of science and technology and its implications to sustainable development and to create public awareness on the issue. The meeting also provides an opportunity for networking and future collaboration among participants and observers. The themes of the Conference include ethics concerning development and use of genomic technologies, artificial intelligence, robotics, big data, climate change and building up of the culture of research integrity. It also devotes a session to the younger generation with discussions on reproductive technology and parenthood. The conclusion of the Conference was marked by declaration of the Bangkok Statement on the Ethics of Science and Technology and Sustainable Development, which encourages countries and communities to pay more attention to issues concerning ethics of science and technology especially in the context of sustainable development, to try to produce common best practice guidelines for new technologies which impact lives of people and the state of the environment, to ensure ethical practice and integrity of researchers, and to encourage members of the younger generation to pay more interest to ethical issues in science and technology.

The products of science and technology lead to our well-being and improvement of our living standards, which can be generally called development. However, such development may not be sustainable. Sustainable development is a goal which cannot be achieved through science and technology alone, although they may be important ingredients. Furthermore, sometimes science and technology appear to threaten sustainable development, as it can be argued, for example, that climate change is largely due to fuel consumption of machines which are products of science and technology. In order to achieve sustainable development with the help of science and technology, we need to adopt ethics as a guiding light. This guiding light should help us to find moral principles in dealing with new technical advances from laboratories and supercomputers. This guiding light will be essential in our future development of such topics as neurotechnology, big data, genomics and energy science, so as to contribute not only to fleeting, but to sustainable development. The world needs to make an effort to find that guiding light. The Conference on Ethics of Science and Technology for Sustainable Development is hopefully a significant contribution to that effort.

Yongyuth Yuthavong
Adviser to the Conference Organizing Committee
and Member of the UNESCO International Bioethics Committee (IBC)

CONTENTS

CONFERENCE ON THE ETHICS OF SCIENCE & TECHNOLOGY AND SUSTAINABLE DEVELOPMENT
BANGKOK, THAILAND
5-6 July 2019

Conference Summary

1. **Name of Session/Plenary**
   Opening Ceremony and Keynote Addresses

2. **Date and venue**
   5 July 2019, Centara Grand at Central Plaza Ladprao, Bangkok

3. **Brief of session/plenary background**
   This session serves as the introductory session of the Conference on the Ethics of Science & Technology and Sustainable Development. Apart from introducing the aims of the conference, all speakers emphasize the importance of ethical considerations in science, technology and innovation, in order to support the achievement of the United Nations' Sustainable Development Goals.

4. **Main conclusions from each speaker/panelist + favorite quotes**
   Opening Ceremony
   Assoc. Prof. Soranit Siltharm, Permanent Secretary of the Ministry of Higher Education, Science, Research and Innovation, Thailand introduced the overview of the Conference on the Ethics of Science & Technology and Sustainable Development which aims to facilitate discussion in ethical, legal and political implementations of science and technology in the context of sustainable development, and invited HRH Princess Maha Chakri Sirindhorn to deliver the opening remarks.

   HRH Princess Maha Chakri Sirindhorn delivered the opening remarks where she aligned the United Nations' Sustainable Development Goals (SDGs) with the Philosophy of Sufficiency Economy of His Majesty the late King Rama IX. She was also glad that the conference provided the opportunity to discuss ethical aspects of innovations in science and technology, namely genomic technology, artificial intelligence, robotics, big data, and measures to address the global climate change.

Keynote Address
UNESCO and the Sustainable Development Goals (SDGs)
Mr. Xing Qu, Deputy Director-General of UNESCO

Mr. Xing Qu expressed his gratitude to the Kingdom of Thailand for hosting the conference, as well as the 26th Session of UNESCO's International Bioethics Committee (IBC) and the 11th Session of UNESCO's World Commission on the Ethics of Scientific Knowledge and Technology (COMEST). He emphasized the importance of this conference in raising awareness on bioethics and ethics of science and technology, and addressing them in a global debate which includes the participation of local intellectual communities. This ethical debate will help ensure that science and technology serve as assets for the common good and sustainable development, instead of deepening inequalities or being used for detrimental purposes.

UNESCO is in its commitment to the Sustainable Development Goals collectively set out by the United Nations, and is determined to ensure the best possible use of science and technology to contribute to these goals. As a multilateral institution working with government and partners to build peace, UNESCO contributes to *SDG 17: Partnerships to Achieve the Goal*.

With its transdisciplinary mandate, UNESCO is involved in all 17 goals, and particularly in the following:
- *SDG 4: Quality Education*: UNESCO is acting as lead agency in coordination and implementation of this goal to guarantee quality education for all. Not only it has to be inclusive and equitable, but education also has to be more innovative, relevant and flexible. It is essential to take into account both opportunities and challenges raised by new technologies in education. Education is also a key factor in achieving *SDG 5*: *Gender Equality*.
- *SDG 17: Partnerships to Achieve the Goal*, UNESCO promotes international cooperation in Science, Technology, Engineering and Mathematics (STEM). The International Training Centre in Astronomy in Chiang Mai he visited the day before is a good example of an efficient way to foster cooperation in the Asia Pacific region. UNESCO also recognizes the crucial role of science for sustainable development and promotes Open Science as a way to bridge inequalities between countries by offering a knowledge sharing platform.

- *SDG 15: Life on Land*: UNESCO has more than 30 programmes contributing to creating knowledge and raising awareness about consequences of climate change. One example is the Global Assessment Report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services which warned of the dire consequences on biodiversity (IPBES, 2019).
- *SDG 14: Life below Water*: The preparation of the Ocean Science Decade for Sustainable Development (2021-2030) proclaimed by the United Nations General Assembly is coordinated by the Intergovernmental Oceanographic Commission (IOC) of UNESCO.
- *SDG 6: Clean Water and Sanitation*: UNESCO's International Hydrological Programme (IHP) is devoted to water research, water resource management, education and capacity building. Sustainable water management also contributes to *SDG 2: Zero Hunger* by solving the issues at the nexus of water with food and agriculture.
- *SDG 16: Peace and Justice Strong Institutions*: Peace is at the heart of UNESCO's mandate, and a condition for true sustainable development. UNESCO also leads UN Plan of Action on the Safety of Journalists and the Issue of Impunity which contribute to SDG 16's target 10 on ensuring public access to information and protecting fundamental freedoms.
- *SDG 11: Sustainable Cities and Communities*: UNESCO promotes inclusiveness and sustainability of cities through International Coalition of Inclusive and Sustainable Cities, of which several conferences were held in Bangkok, and the network of UNESCO's Creative Cities. Calling on the international community to protect and safeguard the world's cultural and natural heritage also corresponds to this goal. UNESCO's "Revive the Spirit of Mosul" initiative made use of drone images analyzed by artificial intelligence in rehabilitating Mosul's heritage in Iraq.

To conclude the keynote address, he emphasized the necessity of the ethical considerations surrounding scientific and technological innovations by referring to the quote of Julian Huxley, the first Director-General of UNESCO: "*in order for science to contribute to peace, security and human welfare, it is necessary to relate the applications of science to a scale of values.*" Finally, he ended the talk by introducing a preliminary study on the ethics of artificial intelligence by an Extended Working Group of COMEST (COMEST, 2019) which will be put on the provisional agenda of the 40th General Conference of UNESCO in November 2019, as an example to show that UNESCO will continue to be at the forefront of promoting and strengthening bioethics and ethics in science and technology at the international level.

Keynote Address

Ethics of Science and Technology in the Context of Sustainable Development
Prof. Yongyuth Yuthavong, Member of the UNESCO International Bioethics Committee (IBC) and Former Chairperson of UNESCO Intergovernmental Bioethics Committee (IGBC)

Prof. Yongyuth Yuthavong started his keynote address by pointing out that ethics of science and technology involves not only keeping the motto "do good, don't do bad", but also complex decisions on what is good and what is bad, depending on the complex nature of science and technology issues.

We are now in the age of disruption, in which there are "good" disruptions and "bad" disruptions. Good disruptions, e.g. online communication, social network, require adjustments in our way of living to accommodate benefits from science, technology and innovation. On the other hand, our ways of living lead to bad disruptions, e.g. climate change, pollution, in which science and technology share a big part of the blame.

In the midst of these disruptions, we are attempting to achieve sustainable development. The sustainability we look for might be called *disruptive-age sustainability*. It should be a *disruptive-proof sustainability* which can deal with bad effects of disruptions, and a *disruptive-fed sustainability* which can thrive on the benefits coming with the disruptions.

Gene editing technology, internet of things, and other disruptive technologies bring us closer to the goals of sustainable development, but also bring new threats from their dark sides. New ethical considerations are needed in order to deal with the dark sides of these disruptions, leading to resolutions toward sustainability.

UN, in particular UNESCO, has confirmed the principles of ethical values in a number of declarations, namely the 1948 UN Universal Declaration of Human Rights (UN, 1948), the 1997 UNESCO Universal Declaration on Human Genome and Human Rights (UNESCO, 1997) and the 2005 UNESCO Universal Declaration on Bioethics and Human Rights (UNESCO, 2005). Although the core values do not change, we need to constantly review the practice to which we comply with the core values because science and technology are always changing. We need to continue redefining and reinterpreting the good and the bad, and encourage dialogues between scientists/technologists and society. UNESCO needs

to ensure that ethics catches up with scientific and technical advances, and developing countries catch up in both ethical and technical advances.

Finally, noting that this conference serves as a platform for the world experts in ethics of science and technology who are members of IBC and COMEST to share discussions with noted members in science and technology from ASEAN and other international communities, he introduced the Bangkok Statement, prepared by the Organizing Secretariat and encouraged its adoption. The Bangkok Statement urges stakeholders to:
- Ensure constructive use of genomic technology, AI and other new scientific achievements (good disruptions);
- Promote principles of climate change ethics (bad disruptions);
- Foster research integrity and open exchange on ethics of S&T; and
- Encourage participation of the younger generation.

5. Panel discussions with participants/stakeholders + favorite quotes
N/A

6. Feedback/opinions from participants
N/A

7. Overall considerations
- United Nations' Sustainable Development Goals (SDGs) can be well aligned with the Philosophy of Sufficiency Economy of His Majesty the late King Rama IX.
- Ethical consideration shall not be left out during the advancement of science and technology.
- Without ethical consideration, it is difficult to achieve true sustainable development.

8. Recommendations for actions
- Promote ethical debates (i.e. dialogues between scientists/ technologists and society) to ensure ethical advancement of science and technology.
- Adopt the Bangkok Statement and put recommendations into actions.

9. Conclusion of session/plenary
Conference on the Ethics of Science & Technology and Sustainable Development aims to facilitate discussion in ethical, legal and political implementations of science and technology in the context of sustainable development. Science and technology, when ethically implemented, significantly contribute to the sustainable development, as seen in

various activities of UNESCO. Therefore, it is important for all stakeholders to ensure that ethics catches up with scientific and technical advances. Additionally, we have to confirm that developing countries catch up in both ethical and technical advances, in order to pave our way toward true sustainable development.

10. Session Rapporteurs

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11. Sources to further study/references

- COMEST. 2019. Preliminary study on the Ethics of Artificial Intelligence. Online. Available at: https://unesdoc.unesco.org/ ark:/48223/pf0000367823
- IPBES. 2019. Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science- Policy Platform on Biodiversity and Ecosystem Services. E. S. Brondizio, J. Settele, S. Díaz, and H. T. Ngo (editors). IPBES Secretariat, Bonn, Germany.
- UN. 1948. The Universal Declaration of Human Rights. Online. Available at: https://www.un.org/en/universal-declaration-human-rights/
- UNESCO. 1997. Universal Declaration on the Human Genome and Human Rights. Online. Available at: http://portal.unesco.org/en/ ev.php-URL_ID=13177&URL_DO =DO_TOPIC&URL_SECTION= 201.html
- UNESCO. 2005. Universal Declaration on Bioethics and Human Rights. Online. Available at: http://portal.unesco.org/en/ ev.php-URL_ID=31058&URL_DO=DO_ TOPIC&URL_SECTION =201.htm
- www.stethicsconference2019.net

Conference Summary

Name of Plenary

"Plenary 1: Ethics of S&T and Sustainable Development - From Policy to Practice"

Date and venue:
5 July 2019
Vibhavadee Ballroom, Centara Grand at Central Plaza Ladprao, Bangkok, Thailand

Brief of Plenary:
The plenary is an intellectual forum including talks and discussions encompassing multidisciplinary and multicultural, which addressed the emerging ethical challenges in sciences and technology, focusing on Sustainable Development Goals (SDGs) in different contexts.

Main conclusions from each speaker:
Moderator: **Prof. Hervé Michel Chneiweiss (France)**
Director, Research Center Neuroscience Paris Seine-IBPS
Chairperson, Ethics Committee, National Institute of Health and Medical Research (INSERM)
Former Member, National Advisory Ethics Committee for the Life Sciences

Dr. Dafna Feinholz (Mexico)
Chief of Bioethics and Ethics of Science, UNESCO

How does bioethics bridge discovery in science and technology (S&T) and impact to human?
The roles that ethics can play in the field of science and technology are discussed. Ethics takes a key role and is embedded in S&T development, which allows human, environment, and ecosystem to flourish. We are

always making choices because of their values. This applies also to policy making. Ethics is <u>not</u> new. It's a notion to think what is right or wrong. Discussion about ethics in S&T is very important. It is the deliberation of moral values behind decision making.

"Ethics is at the heart of questions in humanity and society." Science gives information to decide on: what are the risks? and what are the potential solutions?. These decisions are framed by moral values. S&T plays an important role in achieving SDGs. It also aligns with market-oriented economy. The transformation in global scale of a set of values towards global ethics can protect the planet and affect all stakeholders.

Prof. Johannes van Delden (Netherlands)
Former Chairperson, UNESCO International Bioethics Committee (IBC)

Technology and ethics
The standard view of the development of technology is a sequential flow of knowledge or technology created or developed in the lab and then to be brought into the society. The society has two options; either accept or reject. However, it is difficult to reject. Accepting seems to be the option as even if you don't use the technology, there are others who will. At most, you can only tweak the acceptance by modifying the technology. Independent geniuses view: "**technology is <u>not</u> the problem, it's the use of technology.**" Ethic is only afterthought in S&T. You can't stop the advancement of S&T. For example, someone says "Guns don't kill people; people do." But can you really separate them? Technology influences society, <u>not</u> the other way around.

Deterministic attitude believes that the positive outcome is that S&T will solve all problems. However, the negative effect is that humans have become the slave of technology. In the constructivist view, ethics needs to be integrated in development of S&T in a circular feedback loop. There need to be consideration of what humans do with S&T prior to its development and further development.

Standard view

Science
↓
Technology
↓
Ethic and society

Constructivist view

Science → Technology → Ethic and society → (circular)

Prof. Marie-Hélène Parizeau (Canada)
Chairperson, UNESCO World Commission on the Ethics of Scientific Knowledge and Technology (COMEST)

There is a different way of seeing how ethics can be a part of S&T. Until now, the synergy among government, companies and universities resulted in S&T acting as services to the economy. There is social and political tension that comes with this model; for example, genetic modification or genetically modified organisms (GMO) in corn and crop. This has sparked public debate and protest. Gene editing technology is also a controversial innovation. New innovation can affect environment, such as contributing to climate change.

Now, the public is not just a consumer, but also a contributor in public participation. There are several questions raised by the public: what are the purposes? who is profiting? is it sustainable? and does it affect the environment? These ethical questions are important, and the government has to take into account of them. Public participation has started to be more common with examples including co-construction in a research project; and privacy/ethical by design in artificial intelligence (AI). The public must be involved in any political discussion regarding technology. We should also inform and educate: 1) the public in forum; or 2) consortiums, on advanced technology such as gene editing, which then can trigger public debates and result in the collection of public feedback to government. Thus, putting ethics at the heart of political discussion regarding technology.

Dr. Kitipong Promwong (Thailand)
President, Office of National Higher Education Science Research and Innovation Policy Council

From a policy making agency's point of view, an ethical framework is needed to ensure that STI will have positive impacts to people. Science should: 1) benefit people and humanity; 2) should not harm people; 3) should not violate rights of people; and 4) should result in fair outcome for all parties. In Thailand, we need to think about ethics because we are changing from labor-intensive to knowledge-based investment, which is made possible by S&T and the rapid increase of approximately 400% in private R&D investment in the past decade.

Thai government is promoting S&T development since the past 10 years. The R&D infrastructure has been increased, such as the number of

innovation parks and science parks. The government also promotes knowledge-based investment policy. This will bear fruits in the near future, and will bring about a lot of advantages and issues. If we don't take ethics seriously, it will start to impede the sustainable development of the country, bringing to question on how to make growth sustainable.

Hence, to consider ethics issues at the policy level, we have enacted a law related to the promotion of sciences and technology, which allows for the setting up of sandboxes to contain and address unforeseen undesirable effects from innovation.

Dr. Somsak Chunharas (Thailand)
Chairperson of Thai National Ethics Committee for Science and Technology; Former Deputy Minister of Public Health (Thailand); and Former Member of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST)

Ethics in S&T for SDG − reflection and actions from Thai context
The Millennium Development Goals (MDGs) are about global development with focus on developing countries, while the SDGs call for actions from all countries with a paradigm shift.
All SDGs are inter-related; for example, health relates to 10 goals, 21 targets, and 45 indicators. All SDGs demand new thinking and actions in S&T. In the age of disruptive technology, we have to minimize negative consequences. Ethics in S&T for SDGs is very important. There is a need for new knowledge and technology, and global well-being. However, a new cancer treatment that costs $2 million is <u>not</u> ethical. It cannot ensure inclusivity. Using AI to perform existing human tasks may lead to people losing their jobs. **"Ethics is the must for those with more power and influences over others",** especially in business, government, scientists, and professionals.

Sufficient economy philosophy by our late King Bhumibol is a model of development to achieve SDGs for Thais. Appropriate technology is the key: to meet the needs of the underprivileged; to mitigate environmental degradation; to minimize global environmental impact; and to enable collaborative practices in development. Priorities for actions need to be identified.
1. Priorities set for the country: Researchers must have research integrity. New technologies such as gene editing or digital technologies (e.g. AI) should be done in consideration of ethical, legal, and social implication. Ethics in environmental issue such as climate change is another great concern.

2. Going beyond ethical debates: **"Ethics is more fundamental than law."** Discussion is <u>not</u> enough. There must be a call for action, which is <u>not</u> only from scientists and research community but also from business sector, government and professionals.
3. Learning from actions: Public debates beyond expert groups are encouraged and social communication is the key.

Panel discussions with participants:
- Kannika Chen (NSM): Ethics and public engagement of S&T. Promoting public awareness of science
  - Would like to hear more on how to engage public in ethical debates, especially, for the younger generation; any examples?
- Former member of IBC: Priority of introduction of ethics
- Maha Chulalongkorn University: Vijjã-carana-sampanno
  - Buddhism: Vijjã & Carana are applied in the studies together. How is this done in the society and applied in S&T?

Responses
- (Dr. Somsak) We do not start with debates, we start with problems/ examples; for example, Dr. Sorapop Kiatpongsan tried to engage public by creating documentary about designer baby, and talked about potential impacts in different scale. This will be an example to encourage ethical debates.
  - Young generation will think that ethical debate is linked to religion, and old people influencing the youth.
  - Have ethical debates without using the word ethics.
- (Dr. Kitipong) Social media facilitates ethical debates. It can start discussion.
- (Prof. Johannes) Technology development is never neutral. Therefore, others need to be engaged.
  - Public needs to be engaged.
  - Initially, researchers do not like engaging the public, but they begin to appreciate engagement since it can emphasis social values.
- (Prof. Marie) Exhibition (in museum) on scientific controversy to exhibit the ethical questions and organize open discussion.
  - This can engage children and family.
  - An interdisciplinary conference may also help (but it has to be on the controversy).
- (Dr. Dafna) UNESCO engages people through national IBC/COMEST committees.
  - It really depends on the cultural and societal context of the countries.
  - Should have a framework of what you want to achieve from the public engagement.

- o Nothing is neutral. Question: what is the agenda behind?
  - o Public debates must have objectives behind. They are sometimes not structured. We may need to learn how these happen. Critical thinking for development is needed.
- (Prof. Hervé) Move from ancient views to new views (e.g. ethical by design).

Feedback/opinions from participants:
- The talks did not address the "ethics in science" with deeper information or comments.
- Public engagement, especially younger generation is encouraged.

Overall considerations:
- Ethics is a driving force to flourish a future and it makes us more responsible for what we do.
- In order to address the emerging ethical challenges in advanced sciences and technology, public engagement/ public debates as well as social communication play an important role for success in sustainable development.

Recommendations for action:
- In addition to discussion among experts, public debates about ethics of S&T are also important and to be encouraged. These comments should also be valued in decision making.
- The ethics priority in advanced technologies should be set by the country and all stakeholders in all sectors including scientists, research community, business sector, government and professionals who should be involved in the discussion and actions.
- Collaborative platform at global level is important to implement all actions needed.

Conclusion of plenary:
The plenary was dedicated to discussion, knowledge and experiences sharing in ethics of S&T in different contexts. There's no doubt that advanced researches and technologies such as gene editing or AI showed huge beneficial impact for mankind. If these technologies are used appropriately and ethically, SDGs will be achieved. In the forum, several approaches were proposed and exchanged. To conclude, ethics consideration in S&T is crucial to maximize benefits as well as to prevent and minimize negative consequences. More importantly, we should all work together at national, regional, and global levels to address the emerging ethical challenges in S&T to achieve sustainable development and better universal governance.

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Sources to further study/references:

COMEST. 2019. Follow-up to the recommendations of the open-ended working group on governance, procedures and working methods of the governing bodies of UNESCO as related to

COMEST. Online. Available at: https://unesdoc.unesco.org/ark:/48223/pf0000368662

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Conference Summary

Name of session: "Ethical and Societal Challenges toward Genome Technology"

5 July 2019
Vibhavadee Ballroom A
Centara Grand at Central Plaza Ladprao, Bangkok

Plenary Background
Modern medicine is now gearing towards utilizing multidisciplinary technology to analyze genetic information obtained from omics technology. Such technologies allow us to develop preventive and prediction medicine which is based on patient's individual profile. The term precision medicine has entered the mainstream suggesting an in-depth analysis of genetic information for an individual diagnosis instead of making the diagnostic decision based on observations and standard medical testing. Precision medicine uses genetic variations obtained from whole genome sequencing data from patients and identifies association with different traits for three main purposes, namely risk prediction of diseases, accurate diagnosis and disease treatment selection. For instance, a diagnosis for rare diseases to identify causative genetic factors or mutations, genetic testing for adverse drug reactions in pharmacogenomics or even choosing suitable/effective drugs for cancer patients. Thus, precision medicine offers medical doctors better treatment options in which patients shall benefit more from the diagnosis and precision choice of treatments.

Corroborating evidences show promising trend which precision medicine could greatly improve public health as well as promoting new businesses based on genomics technologies. The concept of preventive measure in precision medicine lends itself to other health related businesses such as wellness center and medical tourism. Nonetheless, advancement in medicine is like a double-edged sword where ethical-related issues has

always been a major concern of the implementation. Patient privacy, genomic data management as well as access benefit sharing of such big data have been debatable points. Making advance yet costly genomic services accessible to public without compromising the underlying service quality is also a major challenge. Once the technology becomes common, direct-to-consumer products or service with over claimed advertisement is likely to be widespread. Measure to protect consumers from being deceived should be prepared. Precision medicine services require trained personnel from various fields including physicians, pharmacists, geneticists, genetic counselors and bioinformaticians. Public education on the new medicine must be carried out to improve basic genetic literacy enough to let the people to have awareness, pros and cons of precision medicine so that they can rationally decide for themselves.

Ethical and Regulatory Aspects of Genome Technology and the Challenge to Establish Norm in Developing Countries

Dr. Prasit Phowthongkum
Division of Medical Genetics and Genomics, Department of Medicine
Faculty of Medicine, Chulalongkorn University, Thailand

Genome technology has been used for different purposes such as;
1. Genome re-read: this is appropriate for diseases diagnostic and prediction;
2. Genome re-write: this is benefit for treatment and enhancement;
3. Genome re-build: this is suitable for the synthesis of cells, organoids, organs, or organisms.

The recent announcement of the creating gene-edited babies in China has raised a global concern about genomic ethic and regulation. The regulation aims to protect human being dignity as well as encourage the advent of science and technology, health science in particular. The impact on social and economic such as the aspect of discrimination or equality was also recognized. To address such issues, different forms of mechanism have been developed. This included legislation, standardization, professional society, granting body, public media and social media.

The regulation related to genome technology is more evidenced in developed countries comparing to developing countries. For example, the US enacted Genetic Information Nondiscrimination Act (GINA) which prohibits the use of genetic information in health insurance and employment. There is no such law in Thailand. In fact, the law or regulation related to genetic information has not been developed. The most relevant regulation addressing the use of genome technology in

health is the Medical Device Act (MDA), which is under the auspices of Food and Drug Administration (FDA), Ministry of Public Health. Section 4 of MDA defines the term medical device to include "diagnosis, prevention, monitoring, heal, palliation, or treatment of human or animal disorders". Another relevant tool for the use of genomic technology is the Guideline on Advanced Therapy Medicinal Products (ATMP) which provides guidelines (in terms of quality and manufacturing) for the registration of medicinal products. Under ATMP, medicinal products include cell therapy medicinal product, gene therapy medicinal product, tissue engineered product and combined ATMP.

The presenter introduced his own statement which has not been approved by Medical Genetics and Genomics Association. The statement aims to promote transparency which encourages genetic testing providers and consumers to make informed decisions about direct to consumer genetic testing (DTC). Companies that provide genetic testing services must disclose all relevant information relating to their offered tests in a user friendly manner, i.e. such information is easy to access with the language that lay-people can easily understand. In addition, companies offering DTC testing should keep the privacy of all genetic information. The following information should be available;
- The sensitivity, specificity, and predictive value of the offered genetic test;
- The populations for which this information is known, in a readily understandable and accessible fashion;
- The strength of scientific evidence on which any claims of benefit are based, as well as any limitations to the claimed benefits;
- All risks associated with testing, including psychological risks and risks to family members;
- The Clinical Laboratory Improvement Amendment certificate (CLIA) of the laboratory performing the genetic test;
- The company's privacy policies and the compliance with Health Insurance Portability and Accountability Act (HIPAA);
- The result of clinical test on the variation of treatment with the specific recommendation and indication.

Gene Editing in Early Human Development: Towards a Global Debate and Governance for Responsible Conduct

Prof. Dr. Iur. Dr. Med. Carlos María ROMEO CASABONA
Professor in Criminal Law. Director, Chair in Law and the Human Genome Research Group, University of the Basque Country, Bilbao, Spain
Member of the European Group on Ethics in Science and New Technologies, European Commission, Brussels
Member of the DH BIO (Committee of Bioethics), Council of Europe, Strasbourg

1. **The main ethical and legal concerns as related to gene editing in human:**

    1.1 Scope of modifying human germline: How can technology interfere with human germline? There are some issues to be taken into consideration; such as

    - Limitation on the use of CRISPRCas 9 in human gene modification
    - Action on human gametes and zygote/embryos
    - Experimentation on human germline/material

    1.2 Safety and biosafety
    Information as related to short term/long term side effects of gene editing techniques may have on the human beings intervened (in early phases: gametes and embryos and future children born) are not yet well known. As a result, the safety and security of these techniques cannot be guaranteed. This indicates that we might not be able to avoid risks of producing pathologies, malformations and other alterations harmful to gene-edited children.

    1.3 Issues on patent related to gene editing on human material
    Some restrictions should be set, e.g. the recent discussed moratorium in order to terminate this issue.

    1.4 Gene drives
    Gene editing could result in the change of biological characteristic of human being. There are some issues to be taken into consideration; these are 1) if this permanently changes human genetics; 2) what limit we could be in agreement with; and 3) whether we could go further to improve the attribute of human species.

    The above concerns have raised the ethical and legal question as to whether gene editing on human being is a new challenge or a revisiting of past discussion (i.e. ethical debate on gene therapy in germline). It is certain that this is related to the latter issue but it is also realized that

we are now facing with different technical, scientific and social context. As a result, some ethical values have to be adapted to new challenges.

2. **Responses to gene editing in human**:
   There had not been any consensus on the governance of gene editing in human during past 3-4 years. This might come from the lack of sufficient information on technology feasibility in short/medium and long term. The fear of effects on germline which might cause the permanent changes on human genome exists. As a result, the previous discussion and position on standard of genetic engineering has been adopted. It is also realized that the emerging of new technology, i.e. gene editing, has brought us to work in a broader framework. Some international organisations/ bodies and tools that deal with the ethical and legal aspects as related to human genetic were presented as follows:

   - **UNESCO's UDHGHR 1997.**
     Article24: "*The International Bioethics Committee of UNESCO* […] should make recommendations, in accordance with *UNESCO's statutory procedures*, addressed to the General Conference and give advice concerning the follow-up of this Declaration, in particular regarding *the identification of practices that could be contrary to human dignity, such as germ-line interventions*."
   - **The UNESCO Declaration on the Responsibility of the Present Generations Towards Future Generations (12 November 1997)**
     Article 6: "Human genome and bio-diversity: The human genome, in full *respect of the dignity of the **human person and human rights***, must be ***protected and biodiversity safeguarded.*** Scientific and technological progress should not in any way impair or compromise the preservation of the human and other species"
   - **UN, General Assembly**
     Declaration of 2005 Against Human Cloning and Genetic Modification:
     <u>prohibiting</u> "all forms of **human cloning** in as much as they are incompatible with human dignity and the protection of human life"; and "the **application of genetic engineering techniques** that may be contrary to human dignity"
   - **International Bioethics Committee (UNESCO) (2.X.2015):**
     Updating of human rights and human genome:
     - Respect for autonomy and privacy
     - Justice and solidarity
     - Understanding disease and health
     - The cultural, social and economic context of science
     - Responsibility towards future generations

- **Council of Europe**
  Parliamentary Assembly (2015):
  - No position has yet been defined
  DH BIO (Bioethics Committee):
  - Declaration on Genome Editing Technologies 2015(2.XII): the Oviedo Convention (1997)
  - *Restrictions and prohibitions on germ-line interventions* (**Art. 13 Oviedo Convention**)
  - Need for open debate (art. 28). Plenary session 2016: The issues were very technical and complex, it was questionable how this could be structured.
    - Strategic Group was established to further discuss the legal and ethical of emerging technologies related to genome publishing.
    - 2018-2019**:** the debate on Art. 13 CDHB was reopened. Working Group on Genetic Editing offered 3 main options; a) an open reinterpretation of art. 13; b) to clarify its sense at the Explanatory Report; c) to modify it by the way of Additional Protocol to the Oviedo Convention.
- **European Commission**
  European Group on Ethics in Science and New Technologies (EGE)
  Statement on Gene Editing (2016):
  - Inclusive deliberation is needed;
  - EGE members had different views on the various possibilities of gene editing on human being.
  New EGE members:
  - Currently working: Gene Editing on humans, animals, plants gene driver and their impact on environment.

3. **Is it time for universal governance on gene editing on human being?**
   Although some confusion still remains, several approaches for universal governance were proposed. These are;
   Transhumanistic approaches
   - There is a *moral duty* for improving human attributes and abilities
   Approaches by scientists (*Nature, Vol. 567, March 2019*):
   - a moratorium on germline genetic interventions (i.e. gene editing) needs to be reconsidered;
   - no binding obligation by international organisations on the ban on gene editing in germline;
   - which approaches regarding the prohibition on gene editing should be taken at the national level?

Some ethicist positions (*CRISPR Journal, Vol. 2, Nr. 3, 2019*):
- Find approach to achieve consensus on governance;
- Accepting on legitimacy and validity of human rights;
- Humans are not their germline.

The precautionary principle approach (*Bioethics2019:00, 1-11*):
- The orientation for to public authorities, law makers, researchers and practitioners on decision making and approving of new law/ regulation should be conducted;
- New approach in the precautionary principle which is in favour of gene editing in germline might be adopted.

The current status of gene edition in human germline
- It does not seek to cure or diminish very serious illnesses of born children or adults for which any efficient medical treatments does not exist;
- It aims to prevent couples carrying genetic diseases from transfer those diseases to their to-be-born children;
- It is **a matter of healthy reproduction**, i.e. to prevent pathologies or disabilities of future offspring through assisted human reproduction techniques.

It is realised that this issue is universal relevance as it relates to humankind, the integrity of humanity as a species. The issues effect different stakeholders, namely, scientists, industries, patients. All of them should participate in decision making procedure. Decisions on regulation and governance should be taken globally to prevent individual decision. International organisations (such as UN bodies, Council of Europe, European Union, ASEAN, etc.) and specialized bodies (such as IBC, DH BIO, EGE) should participate and take decisions. More importantly, consensus for defining governance is indispensable.

4. **Proposal for discussion**
   A set of tools to guide a Universal Governance on Gene Editing has been proposed;
   4.1 Moratorium: while prohibition is imposed, the following issues need to be clarified;
   - Impact that could have on human being in a medium term and long term;
   - Real benefit to mankind (i.e. future offspring);
   - Actual ability to anticipate and prevent damages on individual.

Moratorium is needed and a _national regulation_ could be useful, but both of them is not enough:
- This approach can generate inequalities among the scientific community, since the moratorium would be voluntary and the legal responses of the states would be various;
- These proposals do not ensure a universal response and leave it up to individuals or groups to make decisions that have effect to humankind.

4.2 In the meantime, to approve a temporal international legal binding tool/ regulation, the following recommendation should be adopted;
- Five years prohibition on any intervention of future offspring's germline;
- The State or Government should decide what the consequences would be if their people violate the regulation;
- The validity of this prohibition must be compulsorily reviewed by the international bodies which adopt this decision (in a term of five years) (similar to the so-called French "Bioethics Laws");
- Research conducted on human gametes, stem cells and embryos with no clinical application could be permitted under the examination and approval of national competent bodies.

4.3 In the middle-term;
- Assess the possibility to authorise the interventions in human germline that result in the prevention of serious grave pathologies and disabilities, provided that they are proved to be efficient and safe.

4.4 In the long-term;
Techniques of gene editing in germline with enhancement purposes should not be allowed due to the following reasons are;
- The failure in the future in term of technologies, data, perspectives, and particularly the ethical issues;
- We are not allowed to make decision on the matter that may cause irreversible outcomes for human species;
- Next generations should take their own decision on the issue of future humankind.

4.5 Establishment of an International independent and interdisciplinary body for:
- Advising public authorities;
- Control experiments that are applied to humans (gametes, stem cells and embryos with reproductive purposes): after the moratorium;
- To propose reactions against violators of regulations on the use of genetic engineering techniques on humans or in reproductive contexts.

How has Bioethics Responded to the New Biotechnology
Prof. Jonathan D. Moreno
Member of the IBC; Professor of Medical Ethics and Health Policy,
of History and Sociology of Science, and of Philosophy,
University of Pennsylvania

According to the post-WWII liberal international order (LIO), international relations are to be organized according to principles of open markets, liberal democracy, and multilateral organizations. These factors led to the establishment of the internationally known bodies such as UN, IMF, World Bank, WTO. It seems that LIO is now challenged by other emerging issues, one of which has been the ethical issue arisen from the advancement of biotechnology.

Modern biotechnology started from the success of Dr. Paul Berg in creating first recombinant DNA molecules in 1972. Biotechnology has grown rapidly and continuously since then. The advent of biotechnology has raised a lot of controversy particularly when it involved human genetic. This has been resulted in different forms of reaction such as the submission of the US President Commission report on "splicing life" in 1982, the adoption of the Universal Declaration on the Human Genome and Human Rights by UNESCO in 1997, the argument of using CrisprCas technology under the issue "Eugenics", and the strategic plan and blueprint for action towards Sickle Cell Anemia treatment.

The recent scandal in China where Chinese scientists, led by Dr.He, used CrisprCas to alter genome of human embryos has raised ethical concerns worldwide. Such concerns include:
- Enhancement
  - Fostering desirable traits (e.g. height, muscle strength; beyond "normal"?)
  - Would that rule out editing for, say, muscular dystrophy?
- Medical Benefit
  - Risk reduction, disease resistance (e.g. when there are no treatments for a serious disease)
- Unmet Medical Need
  - In rare cases, both parents may contribute to serious conditions (e.g., sickle cell, Huntington's)
  - Of interest due to high failure rate of IVF/PGD

It is also questionable if a change of gene was acceptable for somatic (body) cells, and whether this would be also acceptable with human germ-line. While these issues remain unresolved, consideration should be taken on risks, benefits, and unknowns. These include;

- Off-target risks
- Unknown germline effects/epigenetics
- Welfare maximization
- Issues about cultural diversity in attitudes toward restrictions of science
- "Transhumanist" arguments for the sake of equality
- Public understanding and acceptance
- Effect on perceptions of disability?
- A new form of eugenics?
- Others note that genetically modified people already here (i.e. mitochondria DNA)

Currently, various approaches to respond to bioethics concerns of gene editing were publicized. For example, China proposed regulation on new gene editing, WHO called for the registry of studies on human genome editing, scientists called for global moratorium on creating gene-edited babies. These led to unanswered questions as to; 1) if the international life science community can police itself (Asilomar model)?; 2) what should the community's position be?; 3) what is the role and interest of the State?; 4) if it is ILO relevant or the global order changing?

Although consensus on the governance of gene editing technology has not been met, it is realized that the issue involves many stakeholders, namely academic sector, public and private sector, as well as international relevant bodies. In addition, the advent of biotechnology has raised concern about biosecurity. Dual use research of concern must be taken into serious consideration, particularly the misuse of research that results in catastrophe, for example the use of pathogen or toxin as a biological weapon. It is concluded no matter which approaches would be adopted for the governance of new biotechnology, the most important mechanism is the collaboration, communication and participation among the stakeholders.

Report: Policy Research and Guideline Development for Genetic Testing in Thailand
Dr. Surakameth Mahasirimongkol
Department of Medical Science, Ministry of Public Health, Thailand.
The growth of the genetic testing markets have increased rapidly due to several factors which include; 1) the emergence of new diseases; 2) aging population; 3) age-related diseases; and 4) the popularity of health care in the form of point of care (POC). The main markets of genetic testing are oncology diagnostics, histopathology, and infectious diseases.

In the US where the market is fast growing, rules and regulation related to genetic testing have been put in place. Clinical Laboratory Improvement Amendment of 1988 (CLIA), under the authority of Centers for Medicare and Medicaid Services (CMS), regulates the operation of clinical laboratories. Food and Drug Administration (FDA) takes care of test kits through Medical Device Amendment of 1976 to the Federal Food Drug, and Cosmetic Act. Federal Trade Commission (FTC) monitors the issue of False and Misleading advertising which is governed by the Federal Trade Commission Act (FTCA). At the beginning, genetic testing service has only been operated through the form of "direct-to-physician advertising (DTPA)". However, it is observed that the service form of 'direct-to-consumer advertising (DTCA) has increased gradually.

In the EU countries, genetic testing kits are regulated under *in vitro* Diagnostic Medical Devices Directive 98/79/EC (IVD), and safety control of the products is ruled by Conformite European Mark (CE mark). Comparing to the US, there is no general restriction on the market of CE marked IVD. The genetic testing service in the form of "direct to consumer" is left in the hands of consumers. Regulation rigidity are different among EU member countries. For example, advertising of HIV testing kits to the UK public is prohibited under UK legislation. Advertising of "substances or articles" (IVD testing kits) for the diagnosis of diseases, like cancer & diabetes is also prohibited unless under the instruction of doctor.

In China, genetic testing service has become more popular and the market is fast growing. However, it was evidenced that the testing service caused another concern, i.e. genetic discrimination. The results of genetic testing were used as the criteria for recruitment. An applicant could be rejected for the job as the company learned from his genetic result regardless of the fact that he has not got the diseases but only has carrier gene.

Apart from what happened in China, genetic testing also creates the variety of ethical issues, e.g., standards of genetic testing (EQA/PT/ISO), privacy of genetic tests results, misuse of information (discrimination- insurance/ work related), invalid use, eugenics and discrimination.

In Thailand, there has been neither specific agency nor law to regulate genetic testing and service. The issue is left to the interpretation of relevant legislation. For example, National Standard Act B.E 2551 administers the standard of certification of national medical and public health laboratory. This implies that if a genetic testis available, the laboratory that conducts the test must comply with the Act. The medical

products (i.e. testing kits, solution for lab testing) are governed by Medical Device Act, under the auspices of Food and Drug Administration (FDA). Consumer protection in terms of products, services; and monitoring ads, labels, contracts, and harmful products are legislated under the Consumer Protection Act, under the auspices of the Office of the Consumer Protection Board. Medical services in hospitals is scrutinized by the Sanatorium Act B.E. 2541, administered by Department of Health Service Support.

A policy recommendation on ethical issues arisen from genetic testing and the use of its data was proposed. Rules or regulation related to medical genetic tests and consumer genetic tests should be developed at national level. Such regulation should support genetic test industry for health of Thais and prevent the adverse social effects that might occur. Thai Society of Human Genetic, a non- governmental organization that advocates the appropriate use of genetic technology in human should be set up to help operating the aforementioned recommendation.

Panel Discussion and Conclusions

The advent of new technology has great impact on quality of human life. New methods of treatment have been developed to treat current diseases more efficiently or even to cure the incurable diseases. This raises a question as to how the technology could be used for a better quality of human being with no or the least affect. In the past, we experienced the debate over new launched technology related to human being, for example the *in vitro* fertilization (IVF or so-called test tube baby). Such technology has become common today. It is highly recommended that not only economic benefit but also social responsibility must be taken into consideration when a new technology is to be adopted. The adoption must be transparency and accountability. In some cases, the establishment of rules and regulation might be far too slow to accommodate business. In other words, technology goes much faster than the law. Therefore, it might be more effective if all involved stakeholders of a new technology can take part in setting a measure that is mutually agreed.

Technology advancement can raise complicated ethical issues and social concerns. It is a matter of how an appropriate mechanism can be created. On the one hand, such mechanism should not be too rigid to let go the useful technology of humankind. On the other hand, it must not be against the social and moral norm. It is recognized that a key to the success of the establishment of the appropriate mechanism is the collaboration platform among countries, which should be built up gradually from local to global.
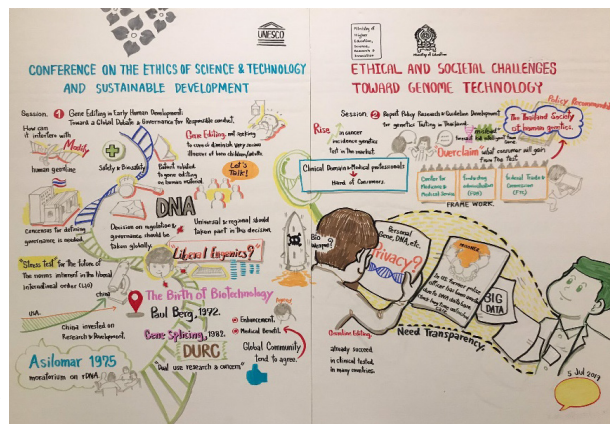
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CONFERENCE ON THE ETHICS OF SCIENCE & TECHNOLOGY AND SUSTAINABLE DEVELOPMENT
BANGKOK, THAILAND
5-6 July 2019

Conference Summary

Name of session: "AI, Robotics and Big Data: Giving Legitimacy to Homo Digitus"

5 July 2019
Vibhavadee Ballroom B
Centara Grand at Central Plaza Ladprao, Bangkok, Thailand

1. **Brief of Session/Plenary Background**
   The current development of artificial intelligence, robotics, and big data technologies is becoming increasingly rapid and ubiquitous. These technologies are now applied almost in all sectors and are altering many aspects of the human lives and societies, some in ways that are highly beneficial with predictable consequences, and others in quite incomprehensible ways with uncertain outcomes. Hence, it is crucial that effort be put into investigating and exploring the possibilities that such technologies promises and their consequences in order to establish a common ground for design considerations and implementations.

   This conference is part of the effort to stimulate discussion about where we want these technologies to lead us. The objective is to get a better understanding about the technologies and their ethical, legal and social implications, and contribute to the establishment of international guidelines for the coordination and development of the technologies.

2. Main Conclusion from Each Speaker

2.1. Ethical and Responsible AI: What Do We Need to Think About? by Mr. Michael Araneta, Head of Research and Advisory for IDC Financial Insights, Associate Vice President IDC Financial Insights Asia/Pacific, Singapore

While stating that he was "the enemy of ethicists" for he represented the private sector, and IDC Insights consulted corporates on how to utilize AI and realize its value, Mr. Araneta's talk raised many important points and questions. He explained that as we moved towards the "4th platform," i.e., from tech in office, home and pockets, to tech on and integrated with the human body such as wearables and direct neural interfaces, "technology becomes more intrinsic to human experience." Even though utilization of AI was still mostly for robotic process automation and semi-cognitive automation, these low-intelligent systems already brought about a significant number of job losses. Therefore, it was critical to think about the impact that could result from smarter systems, and what would happen if AI started to "know the intent or meaning" and could contribute to the surfacing of new knowledge.

Another major consideration as AI progressed was the concept of identity in the digital era. "What is identity?" Mr. Araneta provided some possible definitions such as an entity, a set of behavior, and personally identifiable information. The results from IDC's study showed that 54.5% of Thais expected their digital IDs to accurately represent their physical selves (compared to 32.6% from the global result) and 92.5% wanted their digital IDs to be shared across institutions. In addition, he compared population's trust in several institutions like government, banks, payment services and providers, and telcos in keeping safe their personal information, citing survey results from multiple countries in the Asia Pacific region. Thailand, as the data showed, had the highest trust in telcos in Asia.

Lastly, Mr. Araneta presented the five fundamental AI considerations, i.e., customer informed consent, data quality, bias, verifiability and governance. For customer informed consent, IDC had created a framework to ensure that the consent would be beneficial, dynamic and simple to understand for customers. The final conclusion was that in using AI, "just be good."

2.2. Philosophical Reflection on AI, Robotics and Big Data by Prof. Peter-Paul Verbeek, Member of COMEST, Professor of Philosophy of University of Twente, The Netherlands

Prof. Verbeek introduced a different way of thinking about the relationship between humans and technologies as a "new configuration." The old configuration was that humans used technology. New configurations included immersion, fusion, augmentation, interaction, cooperation and possibly replacement, with humans being replaced by technology.

In talking about homo digitus, Prof. Verbeek described how since ancient time newer technology had always outdated the previous ones, and had helped shape "new ways of being a human." He pointed out that technology was the medium between humans and the environment, "an infrastructure for relating to the world." It helped shape how we perceived and interpreted the world, and influenced how we acted or reacted towards our environment. Prof. Verbeek then proposed "homo ethico-digitus" to represent the fact that ethics should be considered in all forms of technological mediation. He presented examples of technologies that challenged us to think about our own notions of morality and human values.

Huggy Pyjama, for instance, allowed parents living far from their children to press buttons and the Huggy pajamas would hug the children according to the patterns pressed. Such device posed a question about how we defined and valued family relations, care and expression of affection. Smart cities that used monitoring systems to influence social behaviors and moral choices of citizens led to the questions about the notion of discipline since people might behave differently under surveillance. Telehealth expert systems that impacted doctors' diagnoses and interactions with patients could change the practice of medicine. Another example, feeding robots, should make us think about how we valued social care, dignity and autonomy. These examples showed that "technology affected us as moral beings." Prof. Verbeek emphasized the importance of initiating considerations about the possibilities of technological developments and consequences in establishing guidelines for UNESCO member states.

Finally, Prof. Verbeek spoke about "ethical locations" – of which ethical considerations should be an integral part. These locations comprised "use," which required literacy and critical thinking, "design," which required responsible design framework, and "implementation," which required good governance framework.

2.3. OECD's Policy and Role in Facilitating Ethical Development and Use of Big Data and AI
by Ms. Anne Carblanc, Head of the Digital Economy Policy Division (DEP) in the OECD Directorate for Science, Technology and Innovation, France

Ms. Carblanc shared a basic background of OECD and its role in facilitating ethical development and use of big data and AI. Some relevant work included, but was not limited to the Analytical Report: AI in Society and the Recommendation of the Council on Artificial Intelligence, both coming out in 2019. The most relevant work for the conference was the recommendation, which comprised 5 value-based principles and 5 recommendations for public policy. The principles for responsible stewardship of trustworthy AI were

- Inclusive growth, sustainable development and well-being
- Human-centred values and fairness
- Transparency and explainability
- Robustness, security and safety
- Accountability

The recommendations for national policies and international cooperation for trustworthy AI were

- Investing in AI research and development
- Fostering a digital ecosystem for AI
- Shaping an enabling policy environment for AI
- Building human capacity and preparing for labour market trans-formation
- International co-operation for trustworthy AI

Ms. Carblanc emphasized that OECD did not use the term "ethics," but chose the term "trustworthy AI" instead because ethics, unlike human rights, had no clear binding legal obligations and no authorized institutions existed to make decisions. Therefore, a trustworthy AI could be defined as ethical AI. A trustworthy AI should be lawful, ethical and robust with 7 key requirements

- Human agency and oversight
- Technical robustness and safety
- Privacy and data governance
- Transparency
- Diversity, non-discrimination and fairness
- Societal and environmental well-being
- Accountability

3. **Panel Discussion with Participants/Stakeholders**
   Topic: AI, Robot and Big Data: Threat or Cure for the Public and What Can We do?
   Panelists:
   - **Prof. Sang Wook Yi, Member of COMEST, Professor of Philosophy at Hanyang University, South Korea**
   - **Dr. Richard David Hames, Strategic Foresight Practitioner, Mentor, Philosopher, Australia**
   - **Dr. Nova Ahmed, Representative of the Global Young Academy, Computer Scientist, Bangladesh**
   Moderator: Dr. Nares Damrongchai, CEO of TCELS

Question 1: "What concerns you the most?"

Dr. Hames said he was worried about existential threat as humans were not sufficiently equipped with the level of consciousness required to deal with the progress of technology. Prof. Yi shared a more near-term view, saying that the public might have too much expectation from the technology, and a lot of AI supporters believed that big data was not biased, which was not true. Dr. Ahmed, on the other hands, shared a view from a developing country, saying that the citizens did not have learning curves and were not aware of privacy issues. Policy also did not catch up fast enough. Dr. Damrongchai agreed that Thailand might be facing a similar situation.

Question 2: "How do you see or anticipate the future?"

Dr. Hames pointed to the kind of dystopia that Elon Musk imagined, or the singularity described by Ray Kurzweil. Such scenario may result because of the competitive nature of humans whereas machines cooperated and could harness the capacity from the entire network. Prof. Yi argued that fast machines did not mean greater understanding or intellectual capacities. So far, we had seen only narrow AI and did not have a consensus on the definition of general intelligence yet. However, super intelligence was possible and potentially hazardous, and the long-term challenge would be how it would affect human life. Dr. Ahmed responded with her concerns on the unpredictability of a deep learning system, pointing that scientists did not quite understand how the system arrived at a certain decision. She emphasized that it was important to think about what could go wrong. Nevertheless, all panelists agreed on the possibility that AI would be inspired to improve itself or evolve since self-teaching algorithms already existed and the systems kept changing according to their environments.

Question 3: What are your opinions about job loss or unemployment due to AI?

Dr. Damrongchai expanded the question explaining that there were two schools of thoughts, one arguing that the phenomenon was normal and happened cyclically throughout history, and the other arguing that unemployment would be massive and have no historical precedence. Dr. Ahmed shared her view that some jobs now needed no human interventions and should be automated. The important thing was the transition phase. If the replacement happened too quickly, there would be negative side effects. Prof. Yi agreed that historical description was correct, but new technologies always created jobs in other areas. The more critical concern was whether the gap between the rich and the poor would get even wider. He was skeptical about mass unemployment since the public seemed to expect too much about what AI could do, and general intelligence was much more difficult to develop than narrow intelligence. Dr. Hames, on the other hand, saw the issue with a "different paradigm." He thought that "work could be removed, and, consequently, people would be more creative, happy and fulfilled." Dr. Damrongchai asked if we should make sure that people "keep reinventing themselves" before implementing the universal basic income (UBI) policy. On this topic, Dr. Hames referred to a pilot study in Africa showing that this was not the case.

Question 5: "Anything unethical if AI not deployed?"

Prof. Yi replied that in a dangerous situation, robots should be used, but was not sure if there existed cases where we were morally obliged to use AI. Furthermore, if there were cases where bias was intrinsic to human nature, maybe AI should be used instead. Dr. Ahmed added that the question brought up a lot of possibilities, especially for developing countries where they did not have enough research capacity to tackle issues like healthcare, disasters, etc. Dr. Hames described that AI should be used for anything that increased human wellbeing and supported all life, not just human life.

4. Feedbacks and Opinions from Participants

During the panel discussion, Ms. Carblanc mentioned that for implementation of UBI a research should be done regarding what jobs machines could or could not do, and what tasks could be replaced. Hopefully in the long run social companies would help implement UBI. An audience also voiced her concern that too much reliance on technology could affect the capability of the human brains.

From the survey results after the conference, an opinion would like to see a discussion on the topic of education for all or equity in education.

5. Overall Considerations

- AI has the potential to change us in many aspects, both as an individual human being and as a society. Some aspects are as fundamental as our professional practices, behaviors, values and morale. Therefore, it is critical to consider the possible consequences and implications throughout the technology development cycle.
- Big data and its use are likely to be biased. Biases are often times unintended or intrinsic to the nature of the data. Those working in analytics and developing AI using big data should be aware of the possibility of biases.
- AI can be of great benefit, especially in developing countries lacking resources to tackle public or societal issues. However, policies supporting public awareness of the implications of the technology should be developed and put in place at the same time.
- Job loss and wider income gap due to AI are some of the immediate concerns that should be addressed. Universal basic income is one possible solution, but more research and experiments should be done regarding appropriate implementation.
- Currently AI applications can be considered narrow intelligence. General and super intelligence are possible but are technically difficult to achieve.
- In developing AI technology, it is important to take into account the guidelines and recommendations for the development of ethical and trustworthy AI. Some relevant works have already been undertaken by COMEST and OECD. Regional and national level guidelines should also be considered.

6. Recommendations for Actions

- Establishment of common guidelines and recommendations as well as cooperative framework for the development of responsible and trustworthy AI are encouraged. Basic principles on human rights and societal impacts shall be taken into consideration in the process and human well-being should be prioritized. Stakeholders should be also involved in the study and development of such guidelines and policies.
- Discussions and dialogues to reflect upon and rethink about human rights and human values in living with the rapidly progressing digital technology (AI, robotics, big data, IoT) will have to continue. All population groups should be engaged in such discussions.

7. Conclusion of the Session

Humans are becoming more immersed and fused with the digital technology such as AI, robotics, big data and IoT. These technologies are getting more intrinsic to our experience and are shaping our societies in numerous aspects, both on the microscale level such as our behaviors, values and professions, which are reflected on the macroscale level in our economy, politics and industries. Because these technologies promise great benefits and have huge impacts, there are many ethical issues and implications to be considered in the design, development and implementation of their applications. It is important to think about our purposes and possible consequences, intended and unintended, in developing and using the technologies.

Relevant guidelines and recommendations have recently been published by many organizations at institutional, national, regional and international levels. They encompass key basic principles on legal considerations, human rights and governance for responsible development and application of the technologies. These principles should be further discussed, engaging all population groups, and adapted to the changing life of the twenty first century.

8. Session Rapporteur

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9. Further Study and References

- OECD:
    - Research Ethics and New Forms of Data for Social and Economic Research (report, 2016)
    - Enhanced Access to Publicly Funded Data for Science, Technology and Innovation (reports, 2018-19)
    - Enhanced Access and Sharing of Data (reports, 2018-19)
    - Council Recommendation on Artificial Intelligence (2019)
    - AI in Society (report, 2019)
- COMEST:
    - Preliminary Study on the Ethics of Artificial Intelligence (2019)
    - Robotics Ethics (2017)
- The IEEE Global Initiative on Ethics of Autonomous and Intelligent Systems: *Ethically Aligned Design*: A Vision for Prioritizing Human Well-being with Autonomous and Intelligent Systems, First Edition (2019)
- http://www.stethicsconference2019.net

CONFERENCE ON THE ETHICS OF SCIENCE & TECHNOLOGY AND SUSTAINABLE DEVELOPMENT
BANGKOK, THAILAND
5-6 July 2019

Conference Summary

Name of session: "Towards Climate Change Ethics Implementation"

5 July 2019
Centara Grand at Central Plaza Ladprao
Bangkok, Thailand

The special session on Climate Change Ethics was conducted as a parallel session to the Conference on the Ethics of Science & Technology and Sustainable Development on 5 July 2019 in Bangkok with the aim to enhance understanding climate change ethics situation and implementation. In addition, the session promoted experiences exchanging among relevant scientists including networking on climate change ethics stakeholders. In order to meet the session's objectives, there were two parts in this session: Part 1 Understanding Ethical Implication and Its Implementation on Climate Change, this part focuses on 3 presentation from distinguish experts and Part 2 Bringing Science to Public – The Ethical Aspect, this part focused on panel discussion with interactive response from audience.

Session background

It is clear in the special report of IPCC on impact of global warming of 1.5 $^\circ$ C above pre-industrial level launched in 2018 that we have 12 years to keep average mean surface temperature increase at the maximum of 1.5 degrees Celsius. Failure to meet this target may lead to worsen the risk to climate change and extreme event. Its degree of loss and damage may be double in comparison to the maximum of 2 degrees Celsius. The difference of half a degree target can save several hundred millions of people exposed to climate-related risks by 2050.

IPCC special report on impact of global warming of 1.5 $^\circ$ C also recognized that the collective pledges of NDC by PA member parties were insufficient to keep average mean surface temperature increase well below 2°C or limit the increase to 1.5°C. A pathway that would prevent a rise of temperature above the target require a reduction of annual emission by 50% between now and 2030 and reach zero by 2050. Therefore, urgent and unprecedented changes are needed to reach the target which is affordable and feasible although it lies at the most ambitious end of the Paris Agreement pledge.

Climate change ethics was reported since 2007 as a challenge to mitigate greenhouse gases reduction and fair responsibility. In addition, UNESCO has aware of this issue and request COMEST to develop reports in relation to climate change ethics. In 2009, the first summary report on the recommendations on the Ethical implications of Global Climate Change was issued in the 6th ordinary session of COMEST meeting in Kuala Lumpur. In recognition of its importance, COMEST has launched almost every year technical document on climate change ethics. In 2015, COMEST reported on Ethical principles for climate change: adaptation and mitigation acted as the white paper to implement ethical issues on climate change. It was in 2017, after Paris Agreement, that COMEST delivered 'Declaration of ethical principle in relation to climate change' which was adopted by the General Conference of UNESCO in November 2017. This declaration aims to integrate climate change ethics into everyday practices and into policy processes with all level of stakeholder. There are six principles of ethics in response to climate action including prevention of harm, precautionary approach, equity and justice, sustainable development, solidarity and scientific knowledge and integrity in decision-making

To achieve urgent and unprecedented change in the short term to meet the target of 1.5° C, an interpretation of ethical principles in relation to climate change need to be immediately promoted. The special session of Climate Change Ethics with the Theme: Towards Climate Change Ethics Implementation focus on the understanding the necessity of climate change ethics as the norm for climate action and how to synergize them into a real implementation. We are honored by distinguish expert on climate change ethics, representative form previous IBC members and famed scientists to deliver a talk that will increase our understanding and light up our idea on climate change ethics and why we need to have climate action integrated with ethics.

Part 1: Understanding Ethical Implication and Its Implementation on Climate Change

This part consisted of three presentations from honorable world class speakers including
1. Prof. Donald A. Brown, Widener School of Law, Harrisburg, Pennsylvania, United States of America presented the topic entitled Why Ethics can help Climate Change abatement?
2. Prof. Rainer Ibana, Former member of COMEST; Former chair, Philosophy Department, Ateneo de Manilla University, Philippines presented the topic entitled The application of the principle of climate change ethics in the ASEAN region: The case of haze pollution and
3. Prof. Johan Hattingh, Former member of COMEST; Professor of Philosophy, Department of Philosophy, University of Stellenbosch South Africa under the topic of Implementing Climate Change ethics as a global ethics: Prospects and constraints. Below are some key conclusions from these three presentations.

Fact of Ethics and Current Climate Change Actions
The session was performed well with active information exchange and discussion. Climate change ethic is mentioned as the issues that are left behind the advocative issues of immense suffering from devastating impact of climate change. The issues are not embedded neither into the fact of science analysis nor economic reason particularly in the scientific based assessment report of IPCC and in the Nationally Determined Contribution (NDC) to be pledged by UNFCCC parties. By introducing climate change ethics, it is believed that the awareness of nation will be shifted from the reason of economic rationality, that focuses on how to maximize human preferences, to the reason of ethics that asks different question of economic activity mainly what preferences humans should have. In addition, scientific reasons usually test hypotheses to determine what is, whereas moral philosophers believe that determining what is, which is the proper domain of science, cannot determine what ought to be, which is the domain of ethics.

Implementation of Climate Change Ethics
The biggest point on the Declaration of Ethical Principle in Relation to Climate Change need to be implemented on the level of primary decision makers (the most important body) working on climate change policy including the NDC. Ethical declaration needs to be used by all level of the decision makers. This is the starting point because under the urgent and limited of time declared in the special report of IPCC. Currently, the earth

system pathway is driven by human emissions of greenhouse gases and biosphere degradation toward a planetary threshold at ~2 °C, beyond which the system irreversible pathway. In this regard, global driven by intrinsic bio-geophysical feedbacks may occur. Implementation of Climate Change Ethics can guide to a quasi-stable earth pathway with the human-created feedback to the system.

Local Experience and Climate Change Ethics
An example of human-created feedback can be seen in the activities of haze pollution prevention. Burning rainforest for palm oil plantation contributes to reduction in carbon sink and loss of wildlife habitats. Although some efforts have driven substitution of biofuel from oil palm to fossil fuel to avoid emission, the precautionary principle of climate change ethics need to be applied to avoid reduction in carbon sink from oil palm plantation and production. In addition, the haze pollution also highlights the problems of inequity of knowledge (among local people and investor) and injustice in term of resilience capacity (which can be seen in the case of typhoon coming) where different capacities to response calamities are different among resilient and vulnerable population. The case of haze pollution reflects well on ethical principle related to climate change particular on the issues of inequity and injustice in both dimension of knowledge and resilience. This also leads to the unbalance capacity in respond to calamities.

Part 2: Bringing Science to Public: The Ethical Aspects

The panel discussion of part 2 is devoted to communication of ethical aspect to public using science basic of climate change. Panelist comprised of Prof. Donald A. Brown, Widener School of Law, Harrisburg, Pennsylvania, United States of America, Prof. Rainer Ibana, Former member of COMEST; Former chair, Philosophy Department, Ateneo de Manilla University, Philippines, Prof. Johan Hattingh, Former member of COMEST; Professor of Philosophy, Department of Philosophy, University of Stellenbosch South Africa and Dr. Suntariya Muanpawong, Research Judge, The supreme Court, Thailand. Associate Professor Dr. Sirintornthep Towprayoon form King Mongkut's University of Technology Thonburi moderates this session. The panel discussion focuses on key questions related to climate change ethics and convey opinions and messages among panelist and participants as seen below.

What is the next task for climate change ethics?

Messages from panelist are the need for social movement on the climate ethic issue to make people understand the climate change situation and the need to educate people understand what happen about the current situation on climate change and connect them to the climate change ethics that need to be implemented in all climate actions. Actions at local level are also important which can be done through community leader such as Mayer to promote responsibility in their responsible areas to manage community for their own environmental protection. Discussion is also mentioned the responsibility of fossil fuel company to help propaganda climate change issues into the right direction.

Can Climate Change ethics become the symbol to help meeting the target of 1.5 °C?

Climate Change Ethics need to be well educated among us first on their importance especially on the equity and equality issues before it becomes a symbol. The challenges are the understanding of climate change issues that cause catastrophe as well as the shifting of paradigm to the new way of lifestyle that support climate change abatement. Some discrepancies need to be clearly identified such as greenhouse gases and air pollution, environmental problem and global warming problem.

How did you see the importance of the pertinent actors and how can these issues be integrated in the national level to the local level?

Pertinent actors at local level are very important to contribute and start up action link to other level such as social entrepreneur. Examples are seen in using banana leave and bamboo in daily food packaging that can create the awareness of biomaterials used to the upper level of actors. However, local people need technical assistances and supports as well as encouragement and incentive mechanisms form the government that play the big role to abate climate change

How important of scientific knowledge and technology be integrated into climate change ethics?

Scientific knowledge and technology are essential to policy maker in term of fact to make decision on mitigation and adaptation action. Sharing of these knowledge and technology transfer should be transparent and equity with appropriate timing as technology change rapidly. In this regard, the role of scientist is important to assess science of climate change with the integration of ethics in its content which is absent in current climate change report. Precautionary science is one of the aspects that need to be concerned when integrate ethics issues into the science assessment and national policies.

How to share the climate data with equitable accessibility and receive equally information?

Data accessibility is the human rights. However, it is a controversial whether people pay attention to know the data. There are also the possessive issues on being the owner of climate data and climate information. Climate data need to be simplified to ease understand at different level. Government can play the role in term of enhancing accessibility to climate data. However, government sometime do not collect data but consume and utilize data. Collaboration among government and those who govern most update data and information is to be concerned.

How can we integrate the ethics in climate change action in all level either from national level, global level or local level? What should be the action and how to be integrate that?

Integration can be done through law and regulation in term of justice and fairness such as global justice, ecological justice and social justice. Punishment and incentive are key mechanisms to merge local level to national level.

Messages and recommendation

Ethical issues have not yet been promoted in pertinent stakeholders of climate change

- It is important that policy makers play the key role in implementing climate change ethics. Declaration of Nationally Determined Contribution (NDC) was not taken into account the equitable and ethical issues.
- Precautionary science as the ethical issue is not yet integrated into IPCC assessment report nor in the pathway of mitigation model.

Climate Change Ethics need to be fairly debated in public

- Climate change policy formation raises numerous obvious ethical issues which are rarely examined through the lens of ethics in public policy debates because of the successful framing and political power of the fossil fuel industry.
- The public debates on climate change has largely focused on scientific and economic facts but ignored obvious ethical issues including ethical issues about acceptable national behavior.

Understanding and responsibility

- Universities are part of the problem; scientific disciplines are not open to ethical analyses and academic environmental ethics is not helping policymakers and citizens spot and analyze dubious ethical positions on climate change while largely focusing on meta ethical issues.

- Governments and NGOs need enable understanding and respond to ethical issues.
- Getting nations to express response to their ethical obligations is likely indispensable to prevent catastrophic harm.

Policy is a key
- There is an urgent need for the international community to educate both nations and citizens about the ethical dimensions of climate change policy formation.

Challenges to UNESCO
- It is recommended that UNESCO to organize an international meeting on ethics of climate change with the design to educate civil society about how indispensable ethical consideration on climate policy controversies and climate policy formation is in order to avoid climate catastrophe.
- Design a strategy to educate the media on climate change ethics and its indispensable role in climate policy formation.
- It is a challenge that UNESCO organize side events on Climate Change Ethics issues in the future COP meeting.
- Request transparency rules under the Paris Agreement that require nations to explain as specific as possible how they quantitatively dealt with major ethical questions such equity, warming limit goal, which carbon budget they relied on, etc.
- Work with others to help citizens spot the ethical issues government response to climate change.

Conclusion

Create communication with meaningful dialogue for the unprecedented change
It is agreeable that communication and education are the urgent issues to increase understanding among pertinent sectors, pertinent stakeholders, including the policy makers, scientists and researcher both inter and intra pertinent sector. Improve, expand and convey meaningful dialogue between scientist (who know the seriousness of the problem) and public in order to perceive and aware of impact of climate change and coming catastrophe.

Learn from local
Existing climate actions from local people are good example of climate change ethics implementation as they see the real impact evidence from climate change. However, these people need support from government

and other related agency in term of knowledge and technology transfer. Governmental support as top down policy can be done but with carefully design not to disturb local flow of action and cause burden to the action. It is necessary to make smoothly bridge among bottom up actions to the top down policies.

Bring Science to public

Climate change is a scientific based evidence caused by anthropogenic activities with clear impact and large consequence to human and ecosystem. To solve problem and minimize impact of climate change, we need to use science and technology in reciprocal way. Understanding climate change phenomena is to understand the science of climate change. The use of science basis of climate change to communicate to public should be common and understandable language. Ethical issue related to climate change is also involved to hard science and soft science including precautionary science. Scientific assessment report and national pledge to international forum are weak to integrate ethical issue into their context. Bringing climate science to public, aiming for the holistic understanding and awareness raising, should demonstrate that ethical issues are integrated into climate science documents and technology implementation.

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Conference Summary

Name of session: "Building Up the Culture of Research Integrity in the Developing World"

5 July 2019
Bangkok, Thailand

Overview

This international panel was held together with the meetings of the UNESCO International Bioethics Committee and the World Commission on the Ethics of Scientific Knowledge and Technology in Bangkok, Thailand from July 2 to 7, 2019. The purpose of the workshop was to gather international scholars to think about the question of how to create, support and maintain research integrity in the context of the developing world or the Global South, construed broadly as non-Western countries. As research in scientific disciplines have been expanding rapidly across the globe, there have been tremendous pressures on universities and research institutions also within the developing countries to catch up and to find ways to utilize findings from home-based research and development effort to aid in economic growth. However, as these pressures grow, there is also a growing tendency to compromise the principles of research integrity in order to achieve the desired results quickly. Nonetheless, as is well known, such compromises lead not only to loss of reputation or 'bad press' for the countries involved, but they fundamentally jeopardize the effort of these countries to use research and development to achieve their aims. Examples of such well known cases such as the human stem cell cloning project in South Korea or similar cases in other countries show clearly that there is a need for a sustained effort at an international level to think deeply and clearly about how to build up the culture of research integrity. Moreover, research in science and technology has come relatively later in the developing world, the need for thinking about research integrity is felt more acutely there, especially when cultural

contexts are also taken into consideration because these contexts appear to play a more significant role in affecting the growth of scientific and technological research in the region.

Objectives

- To find ways to combat research misconduct and to search for explanations and causes of the practice in developing countries,
- To learn from the experiences of selected countries in the East and the West regarding their past practices of misconduct and their attempts to combat the problem,
- To promote research integrity in Thailand and other developing countries.

Meeting Report

The meeting was held at Ladprao Suite, Centara Grand Hotel at Central Plaza Ladprao, and was attended by around 80 people. This was a little surprising considering that research integrity is traditionally not among the most popular topics in either the IBC or the COMEST. However, recent scandals and concerns among scientists in the problems internal to the conduct of science itself, viz. the irreproducibility problem, perhaps played a role in the number of the turnout. As stated in the Overview Section, the overall objective of the panel is to find ways to build up the culture of research integrity in the developing countries. The main reason why this is necessary is that the conduct of science is taking place not only in the more economically advanced countries, but also in the developing economies. However, the root of awareness leading up to responsible conduct of research has not seemed to penetrated far and deep enough. This is a cause for concern because it translates directly into the quality of scientific knowledge produced in these countries. At first five scholars and scientists were invited, namely Zhai Xiaomei from China, Kim Ock-Joo from South Korea, Rosalyn Berne from the US, Patarapong Intrakumnerd, originally from Thailand but now working in Japan, and Anoja Fernando from Sri Lanka. Zhai Xiaomei is a well-known bioethicist from China. Kim Ock-Joo is a member of the IBC and is a professor in medical humanities and bioethics at Seoul National University. Anoja Fernanda is also a member of the IBC; she is medical professor and is a prominent member of the research ethics community there. Rosalyn Berne is a scholar of engineering ethics and bioethics, and is Director of the Center for Engineering Ethics at the National Academies of Science, USA. However, Rosalyn Berne could not come and sent her associate Lida Anestidou instead. And only a few days before the event Zhai Xiaomei could not come to Thailand for personal reasons, so the moderator, Soraj Hongladarom, talked about his project on research integrity in Thailand in her place.

The first paper was delivered by Soraj Hongladarom. After introducing the panel, he talked about the recently concluded project on "Developing the Culture of Research Integrity," which was supported by a grant from the Office of the Science, Technology and Innovation Policy Commission. Soraj reported on the main findings of the work, beginning with a brief theoretical overview including an overview of why research integrity is an important topic that needs to be seriously considered at all levels. He also talked about Robert Merton's familiar norms of science, and why the norms are not universally followed. Then he mentioned the famous cases of research misconduct both in Thailand and abroad. The well-known international cases included the Piltdown Man (fabrication), Yoshihiro Sato (fabrication), Andrew Wakefield (fabrication and falsification), Hwang Woo-suk (fabrication and abuse of power) and some others. Then the work suggested a number of policy recommendations in order to help solve the problem. Firstly, the ways future scientists are trained need to be revamped. This can start from training of the teachers and professors first. There is a way in which excellence in research and responsible conduct of research go together; in fact, the two need to go with each other because without research integrity there can be no quality assurance and reliability of scientific knowledge. Society as a whole suffers. Secondly, it is suggested that institutional mechanisms be established in both universities and research organizations which serve as a focal point for activities involving promotion of research integrity efforts as well as a listening post for "whistle blowers" to air their grievances and making sure that they are protected. Soraj also said that this work will also be written again in English as a research article to be disseminated widely in an academic journal.

After the talk there were a fair number of questions and quite a bit of time was spent on discussion. An IBC member from Iran talked about the situation in his country, which stimulated much further discussion. This had to be cut short, however, for the sake of time. The second paper was by Lida Anestidou. She talked about efforts in the US in promoting research integrity. The effort started with US scholar Vannevar Bush soon after the end of World War II calling for the use of federal funds to promote science and technology in the universities. Then in the 1980's a series of research misconduct scandals resulted in Congress legislating a law demanding that research carried out under federal funding be subject to scrutiny as to research integrity. The effort led to the establishment of the Office of Research Integrity, which has the jurisdiction over researchers all over the country who received federal funding. However, the procedure of the national ORI is very strict and once found guilty the career of researchers would be as good as over because their names and their misconducts will

be declared publicly on the website of the ORI. The ORI in the US defines 'misconduct' as consisting of only three components, namely plagiarism, fabrication and falsification. This leaves out some other components which many have regarded as misconduct too, such as authorship issues. Indeed, Anestidou mentions some other countries where authorship issues and misappropriation of research funds as some of the misconducts that are not covered in the US ORI. Then she talked about the roles that the National Academies of Science has played in promoting research integrity. Most notably perhaps is the website http://onlineethics.org which contains a large number of cases also allowing for participants to post comments and discussion points. There are also a lot of publications aimed at disseminating knowledge about the issue; most of the books are available for free online.

The third paper is about the situation in South Korea, which has gained a worldwide reputation in research misconduct following the trial of the famous scientist Hwang Woo-suk. Kim Ock-Joo mentioned that it was because of the scandals surrounding Hwang that the activities concerning research integrity took place in Korea. We can only hope that the scandal created by these cases should spark the same level of interest and commitment in Thailand too. Kim talked mainly about the history of the Hwang incident, which by now is rather well known. More significantly perhaps is that Kim talked about "ethical modernization in Korea." This is a very important topic and is very relevant to the Thai context because Thailand and South Korea have largely followed the same trajectory in development. Development in economics cannot be separated from development in science and technology, and since development in the latter is unthinkable without stringent effort in creating the culture of research integrity, which, as Kim argues, requires what she calls "ethical modernization," it is necessary that ethical modernization cannot be avoided. Kim's main point in this topic is that the Hwang scandal created a series of impacts that touched up almost every aspect of Korean society, not only those aspects related to knowledge creation. In her words, "the move for ethical reforms in Korean society after the Hwang Scandal, which started in the academic field, spread to economic, governmental, and public sectors, and then to the cultural and entertainment sector." What is interesting is that the ripples created through the scandal had an impact also in the entertainment sector. This means that all levels of culture were affected. This showed how profoundly the scandal went into the psyche of the Korean people. It is as if the source of national pride was suddenly taken away from the Korean people. The incident led to a lot of soul searching and the determination on the part of the people themselves not

to let such a thing ever occur again. Kim disagrees with Soraj, however, on what the priority on promoting the culture of research integrity lies. According to Soraj, as has been reported above, the priority should be creating a new genre of culture through education, discussion, the media, and so on, but according to Kim this is not enough, and hard law needs to be in place first so that the intractable criminals be rooted out first. Perhaps Kim is right. Korea has experienced this kind of thing before, and it is likely that their experience has taught them that educational campaign alone is not enough. Hard laws, those that impose criminal sentences and jail terms, must be in place and strictly enforced in order that the culture can change.

The next two papers may not look like they belong to the panel, especially the fourth paper, because the topic does not deal directly with promoting the culture of research integrity. However, the paper by Patarapong Intarakumnerd is relevant in that it discusses ways for Thailand to become more advanced economically through the role of research institutes. And obviously the works of the latter cannot be of any quality if responsible conduct of research is not observed. Patarapong talked about research institutes in many countries, such as in the EU and others, and pointed out how they were supported by the government and how they functioned in such a way that promotes the growth of the country. For example, in Germany there is the Fraunhofer Institute, which receives money through contract research and whose main function is to promote the working relation between industry and the university. There is a question from the audience concerning the accountability as well as the duty of these organizations to society at large, and Patarapong answered that since it is mostly contract research, the organization such as the Fraunhofer does not have to be answerable to the public. Nonetheless, the research they carry out can well be beneficial to the public in the long run.

The last paper in the panel is "A New Kind of Plagiarism" by Anoja Fernando. She talked about an incident when someone hears an idea being presented in a meeting, picking up on it and developing it and eventually getting recognition for it. When there is no mentioning of the original presenter of the idea, then the question is whether this does constitute plagiarism. On the one hand, this does sound like the one who picks up the idea from the meeting did not think of the idea at first, so this means he is taking up the idea from a source which is not his own and does not acknowledge it. On the other hand, the idea was not published anywhere—it was only presented orally. This presents a dilemma, and the audience were rather ambivalent about it. The audience spent quite a long

time discussing this issue. Some thought that this was an outright plagiarism, and Fernando herself seemed to think this way, judging from her title. However, some thought that it was not a case of plagiarism because this could happen to anybody. During a conference, for example, there is always a possibility for someone to talk about their own ideas to an audience, and a member of the audience picks up the idea and develops it on his own. In this case it is difficult to attribute idea to the original source because conference talk is quite informal. The discussion was inconclusive on this point. This is a good thing as the participants can work this out on their own later.

Recommendations

A number of policy recommendations emerged from the panel:

1. In building up the culture of research integrity, everything has to go at the same time. It does not make sense to focus on one particular aspect of change and expect the change to come about. That is, in focusing on promoting research integrity in Thailand so that high profile cases won't happen again, other aspects of the culture have to change too, such as the mindset of those in power that they always enjoy impunity and can do anything. So if we want such cases not to happen again, we also need to tackle this cultural problem too. Kim Ock-Joo said that hard laws must come first. That is, culture cannot be changed without the hard laws and hard enforcement. What she means by this is not only that the perpetrators of misconduct cases be dismissed from their jobs, their papers retracted, or their degrees revoked, but they have to face criminal charges. The question is whether this is suitable for the Thai context.

2. As pointed out by Lida Anestidou, an umbrella organization modelling on the American Office of Research Integrity should also be in order for Thailand. Legislation should be drafted specifically for this purpose. In the US, the authority of the ORI is connected with the provision of research funding by the federal government. Thus, in the Thai context the umbrella ORI should also be tied up with the organizations that oversee research funding for the country, such as the National Research Council. Since the trend now is to consolidate public research funding to only the NRCT, the umbrella ORI should be a part of the NRCT and has the authority to investigate and charge researchers for misconduct no matter where they work at.

3. There should also be a mandate, perhaps as part of the same legislation, that each university and research organization set up their own institutional ORI.

4. Kim Ock-Joo also mentioned that Korea had focused exclusively on economic development and unbridled charge toward scientific progress in the past, but the Hwang scandal has forced the Korean society to see the importance of moral values, such as integrity, honesty, respect for others, and so on. So her recommendation for other Asian societies would be that scientific and technological progress alone will come at a price. In order to forestall the disruptions that happened in Korea as a result of the Hwang scandal, these values should be concretized and put in place.

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Sources for Further Study

Sources from Kim Ock-Joo's presentation
In Jae, Lee. Recent Efforts and Tasks for the Korean Government to Secure Research Integrity. 6th World Conference on Research Integrity WCRI 2019. June 2-6. used with permission.

Herbert Gottweis. Presentation at the ESF-ORI First World Conference on on Research Integrity, Lisboa, September 16-19, 2007.

Jongyoung Kim, Kibeom Park. Ethical Modernization: Research Misconduct and Research Ethics Reforms in Korea Following the Hwang Affair. Sci Eng Ethics. DOI 10.1007/s11948-011-9341-8.

Chang-Sub Uhm. 2017 White Paper on Korea's Research Ethics Practice – Past, Present and Future. 2018. June

Sources from Soraj Hongladarom's research report

"ลอกการบ้าน ผลการเรียนเริด แต่การศึกษาไทยร่วง," ไทยรัฐออนไลน์ สืบค้นได้ที่
https://www.thairath.co.th/content/431562

กัญจนา บุณยเกียรติและประไพพิศ มงคลรัตน์, การลักลอกงานวิชาการและงานวรรณกรรม (Plagiarism).
กรุงเทพฯ: โรงพิมพ์แห่งจุฬาลงกรณ์มหาวิทยาลัย, 2556.

โกมาตร จึงเสถียรทรัพย์, ความรู้ อำนาจและระบบราชการ: บทวิเคราะห์วัฒนธรรมราชการสาธารณสุข กรุงเทพฯ:
สถาบันวิจัยระบบสาธารณสุข, 2545.

ศุภชัย หล่อโลหการและคุณาวุฒิ บุณยานพคุณ, ยุทธศาสตร์นวัตกรรมเกษตรอินทรีย์ไทย กรุงเทพฯ:
สำนักงานนวัตกรรมแห่งชาติ, 2552.

"A Fraud that Shook the World of Science," New York Times, November 1, 1981, available at https://www.nytimes.com/1981/11/01/magazine/a-fraud-that-shook-the-world-of-science.html [retrieved March 20, 2019].

"Escape from Thailand: A Simple Story about Plagiarism Forced Me to Free the Country I Love." Columbia Journalism Review. September 2, 2011. Available at https://www.scidev.net/global/farming/news/thai-phd-withdrawal-leads-to-calls-to-retract-article.html.

Alfredo, Katherine and Hillary Hart, "The University and the Responsible Conduct of Research: Who is Responsible for What?" Science and Engineering Ethics 17(2011): 447-457. https://doi.org/10.1007/s11948-010-9217-3.

Bornmann, Lutz. "Research Misconduct—Definitions, Manifestations and Extent," Publications 1.3(2013): 87-98. Available at https://www.mdpi.com/2304-6775/1/3/87.

Committee on Responsible Science and Committee on Science, Engineering, Medicine and Public Policy. Fostering Integrity in Research. Washington, DC: National Academies Press, 2017. Available at http://www.nap.edu/21896.

Committee on Science, Engineering, and Public Policy. On Being a Scientist: A Guide to Responsible Conduct of Research, 3rd Ed. Washington, DC: National Academie of Science, 2009. Available at http://nap.edu/12192

David, Shay. "Opening the Source of Accountability." First Monday 9.11(2004). Available at http://firstmonday.org/ojs/index.php/fm/article/view/1185/1105

Davis, Mark S. "The Role of Culture in Research Misconduct." Accountability in Research: Policies and Quality Assurance 10.3(2003): 189-201, DOI: 10.1080/714906092.

Davis, Mark S. Michelle Riske-Morris and Sebastian R. Diaz. "Causal Factors Implicated in Research Misconduct: Evidence from ORI Case Files." Science and Engineering Ethics 13(2007): 395-414.

Fanelli, D. "Redefine Misconduct as Distorted Reporting." Nature 494(2013): 149.

Fanelli, Daniele et al. "Misconduct Policies, Academic Culture and Career Stage, Not Gender or Pressures to Publish, Affect Scientific Integrity." PloS One 10.6 e0127556. 17 Jun. 2015. doi:10.1371/journal.pone.0127556

Farthing, Michael J. G. "Authors and Publication Practices." Science and Engineering Ethics 12(2006): 41-52.

Fenn, Mark. "Thailand's Culture of Impunity." The Diplomat. January 22, 2015. Available at https://thediplomat.com/2015/01/thailands-culture-of-impunity/.

Fuchs, S. and S. D. Westervelt. "Fraud and Trust in Science." Perspect. Biol. Med. 39(1996): 248–269.

Heckler, Nina and David Forde. "The Role of Cultural Values in Plagiarism in Higher Education." Journal of Academic Ethics 13.1(2015): 61-75.

Hunt, Morton. "A Fraud that Shook the World of Science." New York Times. November 1, 1981. Available at https://www.nytimes.com/1981/11/01/magazine/a-fraud-that-shook-the-world-of-science.html.

Koepsell, David. Scientific Integrity and Research Ethics: An Approach from the Ethos of Science. Springer, 2017.

Kuhn, Thomas. The Structure of Scientific Revolutions. Chicago, IL: University of Chicago Press, 1962.

Kupferschmidt, Kai. "Tide of Lies: Researcher at the Center of an Epic Fraud Remains an Enigma to Those who Exposed Him." Science Magazine. August 17, 2018. Available at https://www.sciencemag.org/news/2018/08/researcher-center-epic-fraud-remains-enigma-those-who-exposed-him?fbclid=IwAR04jnTbVFaoXkGdspSIRNetkicBN-PvPo2lJt398dJyFU3vf3USAr4UMX2E

Lorlowhakarn, S., S. Piyatiratitivorakul and W. Cherdshewasart. "Organic Asparagus, Production as a Case Study for Implementation of the National Strategies for Organic Agriculture in Thailand." Thai Journal of Agricultural Science 41.1/2(2008): 63-74.

Macan-Markar, Marwaan. "Thailand's Culture of Impunity for the Powerful Causes Backlash." Nikkei Asian Review. February 21, 2018. Available at https://asia.nikkei.com/Politics/Thailand-s-culture-of-impunity-for-the-powerful-causes-backlash2.

Mayntz, R. "Wissenschaftliches Fehlverhalten: Formen, Faktoren und Unterschiede zwischen Wissenschaftsgebieten," in Ethos der Forschung - Ethics of Research. Max-Planck-Gesellschaft, ed. Max-Planck-Gesellschaft: München, Germany, 1999.

Merton, Robert. The Sociology of Science: Theoretical and Empirical Investigations. University of Chicago Press, 1973.

Parrish, Debra M. "Scientific Misconduct and Findings against Graduate and Medical Students" Science and Engineering Ethics 10(2004): 483-491.

Patnaik, Pratap R. "Scientific Misconduct in India: Causes and Perpetuation." Science and Engineering Ethics 22(2016): 1245-1249.

Puengpipattrakul, Wilaiwan. An Investigation of Academic Plagiarism of Thai Postgraduate Learners from Interdisciplinary Studies. Chulalongkorn University Ratchadapiseksomphot Endowment Fund, 2015 – http://cuir.car.chula.ac.th/bitstream/123456789/58777/1/b21469350_Walaipun%20Pu.pdf.

Rao, T. S. Sathyanarayana and Chittaranjan Andrade. "The MMR Vaccine

and Autism: Sensation, Refutation, Retraction, and Fraud." Indian Journal of Psychiatry 53.2(2011): 95-96.

Resnik, David, et al., "Research Misconduct Definitions Adopted by U.S. Research Institutions." Accountability in Research 22(2015): 14-21.

Roberts, Glyn C., Maria Kavussanu, and Robert L. Sprague, "Mentoring and the Impact of the Research Climate." Science and Engineering Ethics 7.4(2001): 525–537.

Steen, R. Grant. "Retractions in the Scientific Literature: Do Authors Deliberately Commit Research Fraud?." Journal of Medical Ethics 2010. Doi:10.1136/jme.2010.038125.

Steneck, Nicholas H. ORI Introduction to the Responsible Conduct of Research, Revised Ed. Department of Health and Human Services, USA, 2007. Available at https://ori.hhs.gov/ori-intro.

Sthapitanonda, Nithi and Brian Mertens. Architecture of Thailand, 1st Ed. London: Thames & Hudson, 2006.

Taylor, I. "Academia's 'misconduct' is Acceptable to Industry." Nature 436(2005): 626

van der Heyden, M. A. G., T. van de Ven, and T. Opthof, "Fraud and Misconduct in Science: The Stem Cell Seduction: Implications for the Peer-Review Process." Neth Heart J. 17.1(2009): 25–29.

Verfaellie, Mieke and Jenna McGwin. "The Case of Diederik Stapel: Allegations of Scientific Fraud by Prominent Dutch Social Psychologist Are Investigated by Multiple Universities." Psychological Science Agenda. December 2011. Available at https://www.apa.org/science/about/psa/2011/12/diederik-stapel.

Wager, E., E. A. Field, and L. Grossman, "Good Publication Practices for Pharmaceutical Companies." Curr Res Med Opin 19(2003): 149-154.

Watthanasurorot A., Guo E, Tharntada S, Lo C-F, Söderhäll K, Söderhäll I., "Retraction for Watthanasurorot et al., Hijacking of Host Calreticulin is Required for the White Spot Syndrome Virus Replication Cycle." J Virol 90(2016):1155, doi:10.1128/JVI.02629-15.

Watthanasurorot A., Jiravanichpaisal P, Söderhäll I, Söderhäll K. "Retraction for Watthanasurorot et al., A gC1qR Prevents White Spot Syndrome Virus Replication in the Freshwater Crayfish Pacifastacus Leniusculus." J Virol 90(2016): 1154. doi:http://dx.doi.org/10.1128/JVI.02628-15.

Watthanasurorot A., Saelee N, Phongdara, A, Roytrakul S, Jiravanichpaisal P, Söderhäll K, et al, "Retraction: Astakine 2—the Dark Knight Linking Melatonin to Circadian Regulation in Crustaceans." PLoS Genet 11.4(2015): e1005222. doi:10.1371/journal.pgen.1005222.

"Why do Scientists Commit Misconduct?." Available at https://retractionwatch.com/2016/08/29/why-do-scientists-commit-misconduct/

Wright, David E., Sandra L. Titus, and Jered B. Cornelison, "Mentoring and Research Misconduct: An Analysis of Research Mentoring in Closed ORI Cases." Science and Engineering Ethics 14(2008):323–336. Doi: 10.1007/s11948-008-9074-5.

Yuthavong, Yongyuth. Sparks from the Spirit: From Science to Innovation, Development, and Sustainability. Singapore: Pan Stanford Publishing, 2018.

Zaki, Syed Ahmed. "Gift Authorship - A Cause for Concern." Lung India 28.3(2011): 232–23.

CONFERENCE ON THE ETHICS OF SCIENCE & TECHNOLOGY AND SUSTAINABLE DEVELOPMENT

BANGKOK, THAILAND
5-6 July 2019

Conference Summary

Session 6: "Bridging Science and Society: Consequences of Scientific Developments in Reproduction"

Date: 6 July 2019
Venue: Centara Grand at Central Plaza

1. **Background**

   Science and technology have long been a substantial part of modern lives. In the 21st century, we have witnessed breakthrough technologies and innovations (Schwab, 2016). Emerging technological advancements in different fields have profoundly altered individual lives, interpersonal relationships and the underlying mechanisms of the society. Specifically, biological advancements actualized by biotechnology, have altered our perceptions towards life and life itself. Reproductive technology (RT) emerged in the 19th century, beginning as a field that assisted infertile couples in realizing their desire of childbearing (Kamel, 2013). This resulted in the innovation and utilization of various types of assisted reproductive technologies (ARTs).

   Technology and innovation in the field of medical reproduction transcends science. We must approach this issue with a multifaceted approach that engages issues of ethics and morals. Therefore, it is of utmost importance to initiate a conversation and build an understanding among the public, especially the youth about the world's most updated, controversial and groundbreaking biotechnologies.

   This session aimed to build conversations between science and society on how reproductive technologies have the ability to transform the lives of the average human; from the way we are made to the very essence of who we are. Every day, what begins as a scientific breakthrough realized amongst a small team of scientists has the potential become a

household technology adopted by ordinary families all over the world to replace what is considered the most intimate function of humankind: procreation. Yet science and society are often divorced from one another in regard to their visions of the future and of how technology could and should play a part in daily lives, particularly when it has the ability to redefine what it means to be human. This session offered an opportunity for an exchange between the creators and the users of such reproductive technologies and provides the space to foster a mutual understanding going forward. The plenary session ended with a brief summary of a youth engagement project, which will present voices from Thai youth on the subject of reproductive technologies.

Section 1: Panel discussion on "Assisted Reproductive Technologies and Parenthood in the 21st Century" Moderated by Sorapop Kiatpongsan, MD, PhD.
Panelists
1. Budi Wiweko, Professor of Department of Obstetrics and Gynecology, Faculty of Medicine Universitas Indonesia, represents the scientists and the researchers in this field.
2. Henry Greely, Professor at Stanford Law School and author of *The End of Sex and the Future of Human Reproduction* (2016), represents the bioethicists and lawyers.
3. Maria Arlamovsky, creator and director of the documentary *Future Baby* (2016), represents the users and the media.
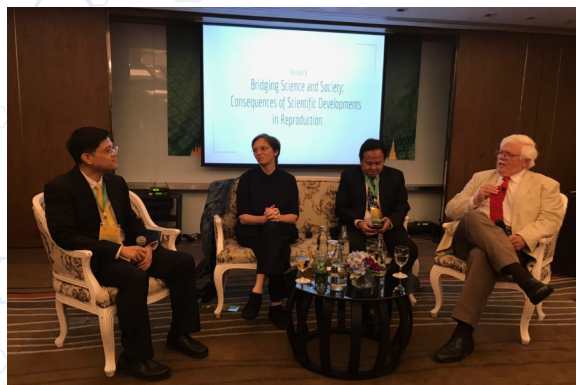
Section 2: Lessons learnt from Public communication, consultation and participation through art and media: Youth engagement in science, technology and innovation. Presented by Raweena Pawa and Parima Suwannakarn

2. **Main conclusions from each panelist**
   Question. How can the use of reproductive technologies redefine the meaning of family and alter family formation now and in the future?

Professor Greely focused on the point that there isn't one definition of family – there never has been. We have always lived in a society with different kinds of family, for example, families that adopt and single-parent families. As for his insight as to how reproductive technologies redefine the meaning of family, his response was *"the revolution of reproductive technologies is allowing. Everyone now will be able to become a family. There is an opening up of parenthood".* The current capabilities of reproductive medicine can overcome biological limitations to parenthood. However, he is concerned about use of reproductive technologies with disregard to ethical considerations, specifically mentioning 'consent and privacy'. In ending, Professor Greely emphasized the importance of acknowledging cultural and individual differences when discussing the 'meaning of family'.

Professor Wiweko stated that reproductive technologies have *"improved the probability to have children"*. Individuals who previously could not have children, now have the hope to biological reproduce. Another noteworthy quote was *"the concept of making a family is borderless".* A number of individuals and couples have to travel cross-border to achieve their fertility goals due to restrictions (societal norms, regulations and laws) in their home country.

For Ms. Arlamovsky, the meaning of family is often divided between those who are bio-liberal and bio-conservative. The best definition of family she has heard while traveling the world is *"Family is the one who gets up at night and feeds the child."* She mentioned that the meaning of family is 'broad', and referred to the LGBTQ-A community – *"They are living family life too."* To end, Ms. Arlamovsky emphasized that we should not think about reproductive medicine as merely a means to produce a child. We must remember *"…these children will grow up and have opinions."*

Question. There have been conversations about "Rights to have (or not to have) a child" and "The best interest of the child" as the priority when discussing assisted reproduction. What is there is a need for a 'license to have a baby'? are we imposing an ideal family structure?

Professor Greely stated *"We all want the best interest for our child but there is no exact definition."* It is impossible to argue against "best interest of the child" but we must always be aware of exceptions as parents' judgments cannot be determinative. Also, assessment of best interest of the child may even be a decision between *"Being born vs. not being born."* Moreover, rights are complicated and are often confounded by status and wealth (affordability). Overall, rights and laws are context dependent as there is variability in legal systems. Countries have different opinions as we can see from differences in regulations related to assisted reproduction. For the conversation of 'license to have a baby', it exists in the 'adoption' system and one could also consider 'marriage' as a license. However, "*It has never been done for natural reproduction"* and would be possible to do so. Also, the agenda of licensing would also vary across countries as there are countries with 'too many children' (want to restrict) and countries with 'low fertility' (want to increase).

Professor Wiweko approached the question from a clinicians' perspective. He discussed the 'fit and proper' test for prospective parents before entering the assisted reproductive program. Generally, the process of assisted reproduction is regulation by cultural factors, ethics and laws. He used his home country, Indonesia, as an example. As there are concerns about overpopulation and 'too many children' being born, the government does not see the importance of public funding for infertility care. Individuals rights to access care are countered by a national-level concern. Furthermore, religion and culture play an importance role in societal preferences and acceptance of different

technological interventions. For example, Muslims are not allowed to adopt. From Professor Wiweko' s experience, Muslims (in Indonesia) need for genetic children often motivate them to seek medically assisted childbearing. With considerations to regulations that may be restrictive, couples may need to travel abroad.

Ms. Arlamovsky's experiences have led her to believe that physicians are often **"*expected to counsel their patients but they are not educated (or trained) to do so.*"** She also emphasizes the issue of 'social inequality' as in many circumstances **"you can only get a child** (by means of assisted childbearing) **if you have money."**

Question. What is the next big event for advances in reproductive technology? (3-5 years)
Professor Greely thinks that someone will make human eggs and human sperm from stem cells, and eventually, babies originated from artificial gametes. Additionally, there may also be the birth of a clone baby.

Professor Wiweko. There will be greater precision in medicine, particularly precision diagnosis. There may also be a possibility for 'designer babies' free from diseases and predictions.

Ms. Arlamovsky envisions a world in which grown-up children from third-party reproduction will meet their siblings by through platforms that release genetic information. Anonymity will become a grave issue and this will be a big problem for policy-makers.

3. **Feedback/opinion from participants**
   Question/comment 1. There are sometimes clauses in adoption laws that restrict women from raising a child as a single-parent. Women have to be married to a man and the couple must prove their financial capability. How should be reduce such restrictions?
   Professor Budi. In Indonesia, women must attain a letter confirming their 'infertile status' from their gynecologist in order to go through the adoption process. Many regulations in Indonesia are heavily influenced by the importance of genetics. Also, only biological children are entitled to family inheritance.

Professor Greely. Men's interests are often prioritized over women's interests. He strongly opposes laws that overlook women's interests and needs.

Ms. Arlamovsky stated that laws are often unfair and biased against women. Different countries have different laws on this issue.

Question/comment 2. What are the future prospects of imbalances in sex due to sex selection?

Professor Greely. Sex selection is a problem when preference for one sex is higher than the other. This preference, which is often 'preference for a son', also "***reinforces inferiority or sexual prejudice".*** If preferences in a particular culture or society is balanced, then there are lower social effects. Moreover, in some contexts, sex selection is a strategy for 'family balancing'. In conclusion, his response to whether sex selection would lead to gender imbalances or other societal implications was ***"It depends."***

Professor Wiweko shared that in Indonesia, there are over 600 ethnicities, which means there are differing preferences. He also stressed the importance of counselling and prioritizing the child's health. Furthermore, Professor Wiweko shared that technology allows for sex selection to occur *before* fertilization as the probability of gender depends on sperm. However, sex selection often occurs after fertilization. In such cases, there are remaining embryos. He wants individuals to think about the ethics of embryo disposal. Moreover, sex selection is allowed in many countries when medically necessary.

Ms. Arlamovsky responded with examples of consequences that occur when individuals or couples do not get what they want – abortion or child killing. Sometimes giving parents a choice may be of the 'best interest of the child'.

Question/comment 3. In certain cultures, a woman's fertility needs to be proven before marriage or childbearing. Discussion about assisted reproduction and need/desire for children; and right not to have a child. Is there enough discussions on assisted reproduction and the responsibility of parenting.

Ms. Arlamovsky. Women are facing increasing pressure to take action or be proactive in terms of their fertility. There seems to be a pressure to study quickly, freeze their eggs when young, develop a career and then marry someone. It seems like ***"You** (the woman) **is the only one responsible."*** But for Ms. Arlamovsky, these are ***"rich people's problems".*** Most people do not have the means to rely on technology. And she stated that there is a lack of conversations around the parents' responsibility of parenting after assisted childbearing.

Professor Greely. ***"More choice isn't always good."*** More choices can cause harm or pain—It depends. Also, depending on one's perspective, choices may be wonderful *or* a form of oppression.

Professor Wiweko. Biologically, women are restricted by time. When they have access to assisted reproduction, many couples plead **"Dr. do anything for us".** Due to the high cost of treatment, many couples ask their physicians to transfer more than one embryo. Their desire for a child overpowers the potential risks of a twin pregnancy.

4. **Main conclusions from the presenters (Youth engagement project)**
Rationale:
- Family is a universal theme that is relevant and relatable to all individuals. There is no typical family, and this diversity is ever growing, thanks to the advancements in reproductive medicine.
- Youth today are the ones who will be experiencing the future consequences and outcomes of current technological advancements, reproductive technologies included. Therefore, the inclusion of youth in policy dialogues is responsible policy-making.

Lessons learnt:
1. The 3-step process (documentary screening, short debrief, facilitated scenario-based group discussions) can be an effective means of youth engagement in science, technology and innovation.
2. There is diversity in youths' opinions and attitudes.
3. Youth should be included in public dialogues on science, technology and innovation.

5. **Recommendations for action**
From the youth engagement project on the topic of 'modern parenthood', we can recommend the following:
1. Should involve and engage youth in dialogues on science, technology and innovation.
2. Should recognize the role of youth in national policy decision-making.
3. Should provide a platform for youth dialogue where youth have an opportunity to learn about existing and upcoming technologies, reflect and actively engage in conversations about them.
   3.1 The process of engaging youth should be creative and interactive.
   3.2 Youth engagement should be inclusive. Should engage youth from diverse backgrounds and contexts so that the engagement process reflects comprehensive needs.

6. Conclusion of the session

Reproductive technologies have the potential to allow everyone to have family, whether biological or not. It has given rise to new faces of the 'family' and has transformed our society and the way we think of families. Yet there are still disagreements in how these technologies should be managed and offered to the public. There is still no global consensus on how we should regulate and utilize these technologies, despite the fact that technological progresses are consistently underway. The implications of having new forms of families stretch far beyond a nation's borders and our own generation. It is not simply a scientific issue, but an issue for the human race. We must at least ponder what our responsibility as a society is. In particular, we must include the youth in public and policy dialogues. The technological advancements of today and tomorrow will impact the youths' futures and they should be involved in shaping their own futures.
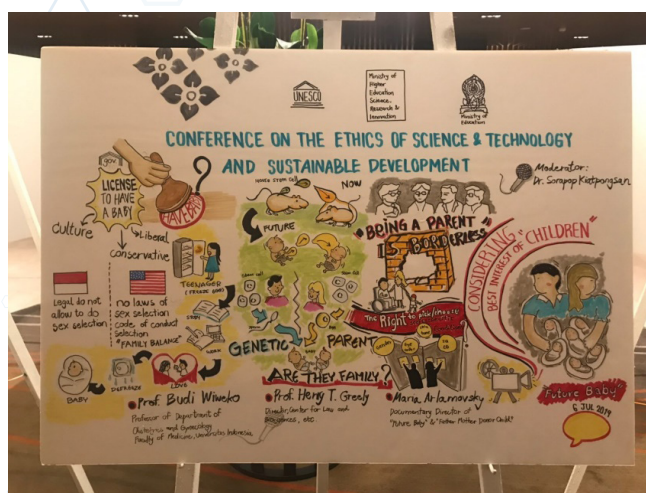
7. Acknowledgements

We would like to thank the Ministry of Higher Education, Science, Research and Innovation for funding this project and hosting the conference. We would also like to acknowledge members of the Thai Young Scientists Academy for their summary of the session.

8. Session rapporteur

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9. Sources to further study/references

Kamel, R. M. (2013). Assisted reproductive technology after the birth of Louise Brown. *Journal of reproduction & infertility, 14*(3), 96.

Schwab, K. (2016). The Fourth Industrial Revolution: what it means, how to respond. Retrieved from https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

Panelists' works
Greely, H.T. (2016). *The End of Sex and the Future of Human Reproduction*. Harvard University Press

Arlamovsky, M. (2016). *Future Baby*. Austria: Nikolaus Geyrhalter Filmproduktion

Conference Summary

Name of Session/ Plenary
Plenary 8: "Building Collaborations for Ethics of S&T and Sustainable
Development"

Date and venue
6 July 2019, Centara Grand at Central Plaza Ladprao, Bangkok

Brief of session/plenary background
The plenary was a platform that welcomed a discussion on building
regional collaborations for ethics on science and technology (S&T) and
sustainable development. The panelists were invited from several ASEAN
state members and a representative from the UNESCO. They were
encouraged to share their national activities and experiences related to
the ethics of S&T. Success stories and challenges in each state members
were also discussed.

Main conclusions from each speaker/panelist
1. **Judge (ret.) Richard Magnus (Singapore), Chairman of Singapore's
   Bioethics Advisory Committee (BAC)**
   Mr. Magnus has suggested that it is crucial to promote the development
   in research that is based on "good" science. The BAC was established
   by the Singapore Cabinet with three main objectives: (1) to protect the
   rights and welfare of individuals; (2) to be a public education and a
   source of information on bioethical issues; and (3) to identify broad
   principles to govern the ethical, legal and social implications of human
   biology research.

   Acting as an individual body, BAC publishes several policy
   recommendations to the Singapore Cabinet and many consultation
   papers to general public. (Their publications can be found on the
   website.) In addition, the BAC has also participated in several

international platforms, e.g. the International Bioethics Committee, the Nuffield Council on Bioethics, and has recently became a member of the Steering Committee for 2018 Global Summit hosted by World Health Organization (WHO). The BAC has also contributed to the Agency for Science, Technology and Research's (A*STAR) Health and Biomedical Sciences International Advisory Council on issues related to the biomedical research. Mr. Magnus also revealed that the ASEAN collaborations for bioethics is important as there was a limited number of platforms on bioethics in Asia. He was hoping that the Bangkok Statement would initiate future collaborations between the ASEAN state members.

2. **Dr. Leonardo D. de Castro (Philippines), Chair of the Philippine Health Research Ethics Board (PHREB) and Eminent Bioethicist**
Dr. Castro shared that the PHREB is a national policy making body on health and health related research ethics with its missions on the issuance of national guidelines and accreditation of research ethics committees. He also suggested that collaborations could be built by a capacity building. There are several mechanisms to initiate national collaboration on research ethics, including data privacy workshops and ethics teacher training. At the international level, the Forum for Ethics Review Committees in Asia and the Pacific can also be a process of building the network in ASEAN.

Dr. Castro also emphasized on the lessons learned from the previous activities that the collaboration between researchers of interdisciplinary and inter-agency is an important in order to have at least one representative to represent each stakeholder. An involvement of youth was also recommended. Plays can be an effective tool to communicate with and engage students. In the end, the students should learn that ethics is closely relevant to them.

3. **Mr. Teav Rongsa (Cambodia), Deputy Secretary General, the National Science and Technology Council**
Mr. Rongsa revealed that, in Cambodia, the national policy on science, technology and innovation (STI) was still in its final steps of passing the policy. However, the process will be delayed because Cambodia does not have any ministries specifically appointed for the STI. In the meantime, he found that it was more practical to seek an international collaboration for funding. The National Science and Technology Council has initiated several capacity building workshops that was funded by the Republic of Korea. For example, a training program on

entrepreneurship was conducted to initiate the recognition of value creation to the local products. A training center on Technology Business Incubation (TBI) was also built with a support from the United Nations Office for South-South Cooperation in the Republic of Korea (RoK-UNOSSC) as a facility for startups by university graduates. The TBI program was partially supported by the government for a tenant selection process and the workshop and mentorship were managed by the Republic of Korea.

Mr. Rongsa pointed out that the challenges in Cambodia were the lack of experience and knowledge related to the STI. The process of passing law and regulations is still in its early stage. The limited source of funding is also a hurdle for Cambodia to initiate a collaboration.

4. **Mr. Souksavath Sihapanya (Lao PDR), Deputy Director-General, Department of Science**
   Mr. Sihapanya reported that Lao PDR had initiated an agenda for sustainable development goal 18 (Lives safe from UXO). The collaboration between stakeholders is encouraged and there has been an increase in the number of participating stakeholders, including private sectors, academic institutes, NGOs, etc. In addition, the government has also integrated the SDGs to the national planning framework and the Ministry of Science and Technology has been working closely with the UNESCO to address the SDGs using the STI in Lao PDR. However, the limited resources and facilities are still a challenge for sustainable development of S&T in Lao PDR.

5. **Dr. Le Thi Thu Hien (Vietnam), Vice Director, Institute of Genome Research, Vietnam Academy of Science and Technology**
   Dr. Hien reported that the Ministry of Health has established the National Bioethics Committee and was authorized for approval of the institutional bioethics committees. Fortunately, Vietnam is known for being one of the biodiversity hotspots. Studies on genome research is always supported by the government. However, there remains challenges, including the lack of funding and research expertise, the inefficient collaboration between institutes, etc.

   Dr. Hien also suggested that an online platform for knowledge sharing would benefits the committee, especially when the new technology and information can be shared by the neighboring countries that are more developed.

6. **Dr. Agus Purwadianto (Indonesia), Vice Chairman, National Bioethics Committee**

    Dr. Purwadianto reported that bioethics has become the fourth pillar of the medical science education in Indonesia. The UNESCO also plays an important role in developing a PhD program for bioethics in medical science. The Indonesian Hospital Association contributed in establishing the Hospital Ethics and Legal Committee, Clinical Advisory Board, and the National Research Committee. Dr. Purwadianto also revealed that the term of bioethics is still challenging to be fully adopted in Indonesia due to inefficient research funding.

7. **Dr. Dafna Feinholz, Chief of Bioethics and Ethics of Science, UNESCO**

    Dr. Feinholz suggested that the definition of the bioethics is now extending not only to medical science and life science, but also to public policy, protection of environment, etc. The Bioethics and Ethics of Science Section implements its capacity building programs that are consisted of two pillars: (1) a program to develop bioethics institutes at the national level. The state members are encouraged to establish a practical impact of ethics in STI. A local platform for discussion can initiate an implementable model that is relevant to the national contexts. (2) a program to promote education on bioethics. Courses on bioethics are one of the fundamental requirements in the curriculum. Dr. Feinholz pointed out that these courses require both well-planned contents and skilled instructors/teachers to deliver the contents.

Panel discussions with participants/stakeholders

Dr. Kanchana Wanichkorn (Thailand), Vice-President, Office of National Higher Education Science Research and Innovation Policy Council, as a moderator, concluded that there were two levels of collaboration: (1) capacity building for practitioners and (2) mechanisms to support the capacity building and funding by policy makers. Within the ASEAN Member States (AMS), Thailand and Singapore can initiate a regional network. Dr. Wanichkorn also emphasized that the main interests fall into five areas: genome technology, AI, robotics and big data, climate change, research integrity, and modern parenthood.

Feedback/opinions from participants

A representative from the UNESCO Office in Jakarta has supported the statement shared by Dr. Feinholz. Because of the increase in world diversity, bioethics will bring consensus. Singapore is an excellent example of the implementation at the national level which can be extended to other

state members with a support from the UNESCO. The discussion on bioethics should be based on existing problems and challenges at the national level to demonstrate the practical application.

Overall considerations
ASEAN collaborations for bioethics is important as there is a limited number of platforms on bioethics in the region.
The national collaborations could be built by capacity building, including workshops and training.
Many countries are experiencing similar problem on the limited source of funding and inefficient collaboration between institutes. In many cases, it can be practical to seek an international collaboration.

Recommendations for action
Bangkok Statement is encouraged to establish to initiate future collaborations between ASEAN Member States (AMS).
An online platform is an effective way to share knowledge on new technologies among countries.

Conclusion of session/plenary
Interdisciplinary and inter-agency collaborations are crucial to provide an inclusive platform for stakeholders. Regional collaboration can be efficiently promoted through international and national capacity building programs. Local challenges were shared by the panelists based on their national contexts. In summary, similar challenges repeatedly occur in the state members are the lack of resources and inefficient collaborations. In order to address those challenges and achieve the collaboration, several suggestions were made by the panelists which can be categorized into two levels: (1) the contribution from the practitioners; and (2) the implementation by the policy makers.

In the future, Thailand and Singapore will take a spearhead to initiate ASEAN collaboration and Bangkok Statement can be one of the reference documents that initiates the collaborations for ethics of S&T and sustainable development in the regional level.

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Sources to further study/references
www.snt.gov.kh
www.ethics.healthresearch.ph/index.php
www.bioethics-singapore.org/
www.stethicsconference2019.net

We, the participants of the Conference on the Ethics of Science and Technology and Sustainable Development,

Having gathered in Bangkok (Kingdom of Thailand) on 5 and 6 July 2019 to reflect and debate on the relationship between ethical approaches and principles in science and technology and the sustainable development of society, would like to:

- express our profound gratitude to the Government of the Kingdom of Thailand for having convened this Conference in conjunction with the 26th Session of the UNESCO International Bioethics Committee (IBC) and the 11th Session of the UNESCO World Commission on the Ethics of Scientific Knowledge and Technology (COMEST);
- extend our sincere thanks to both the Government and peoples of the Kingdom of Thailand for their generous hospitality extended to all participants and excellent organizational arrangements of the Conference, including its facilities, staff and services.

Furthermore, we, the participants of the Conference,

Bearing in mind the Universal Declaration of Human Rights (1948) and the ASEAN Declaration on Environmental Sustainability (2012),

Recalling the Declaration on the Responsibilities of the Present Generation towards Future Generations (1997), the Universal Declaration on the Human Genome and Human Rights (1997), which was endorsed by the United Nations General Assembly on 9 December 1998, the International Declaration on Human Genetic Data (2003), the Universal Declaration on Bioethics and Human Rights (2005), the Declaration of Ethical Principles in relation to Climate Change (2017), and the Recommendation on Science and Scientific Researchers (2017),

Having regard to the Doha Declaration on the TRIPS Agreement and Public Health (2001), the policy report on "Responsible Conduct in the Global Research Enterprise", produced by the InterAcademy Council and IAP in 2012, the International Ethical Guidelines for Health-related Research Involving Humans, prepared by the Council for International Organizations of Medical Sciences (CIOMS), as revised in 2016 in collaboration with the World Health Organization (WHO), the Singapore Statement on Research Integrity, which was drafted at the Second World Conference on Research Integrity in 2010, the European Code of Conduct for Research Integrity, prepared by the European Federation of National Academies of Sciences and Humanities (ALLEA) in 2011 and revised in 2017, the Declaration on Scientific Integrity in Responsible Research and Innovation (Latin Countries), prepared by the UNESCO Iberian Chairs in Bioethics and presented at the University of Barcelona in 2016, and the outcomes of the Second International Summit on Human Genome Editing: Continuing the Global Discussion in 2018,

Taking into account the findings and recommendations contained in the recent Reports of COMEST on "The Ethical Implications of Global Climate Change" (2010), on "Ethical Perspective on Science, Technology and Society: A Contribution to the Post-2015 Agenda" (2015), on "Ethical Principles for Climate Change: Adaptation and Mitigation" (2015), on Robotics Ethics (2017), on "Water Ethics: Ocean, Freshwater, Coastal Areas" (2017), as well as in the recent Reports of the IBC on Social Responsibility and Health (2010), on the Principle of Non-Discrimination and Non-Stigmatization (2014), on Updating Its Reflection on the Human Genome and Human Rights (2015), on the Principle of the Sharing of Benefits (2015), and on Big Data and Health (2017),

Noting the findings of the Preliminary Study on the Ethics of Artificial Intelligence, prepared by the COMEST Extended Working Group on Ethics of Artificial Intelligence, which includes a recommendation to UNESCO to examine the possibility of a standard-setting instrument in this area,

Intending to contribute to the advancement of ethical science and technology for the implementation of the 17 Sustainable Development Goals (SDGs) and their 169 targets, as contained in the *2030 Agenda for Sustainable Development*, adopted by the United Nations General Assembly on 25 September 2015, in order to "free the human race from the tyranny of poverty" and to "ensure that all human beings can fulfill their potential in dignity and equality and in a healthy environment", while "protect[ing] the

planet from degradation, including through sustainable consumption and production, sustainably managing its natural resources and taking urgent action on climate change, so that it can support the needs of the present and future generations",

Reaffirming the need to ensure a balance between economic development, social development and environmental protection as interdependent and mutually reinforcing pillars of sustainable development,

Acknowledging the ethical, legal and social aspects of science, technology and innovation (STI) and their implications for sustainable development,

Recognizing the importance of ethics in reducing detrimental social impacts that may result from STI developments needed to achieve the sustainable development goals,

Emphasizing that ethics should lay at the foundation of how STI is to be applied for the implementation of the SDGs, and that STI should not only be treated as the means of implementation of the 2030 Agenda, but as drivers of inclusive and people-centered sustainable development,

Underlining the importance of science and technology ethics in the development of the bioeconomy, circular economy and green economy,

Further emphasizing the importance of ethics in addressing potential challenges raised by STI developments in the era of converging technologies, including in the following areas: genome and other new life sciences technologies; robotics, big data, Internet of Things, and artificial intelligence technologies; and geoengineering and other climate change technologies,

Also emphasizing the importance of reinforcing scientific integrity,

Further recognizing the importance of science as a common good of humanity and the human right to share in scientific advancement and its benefits, *underlining* the need to ensure open and equal access to scientific data and knowledge, in particular in the rapidly developing areas of disruptive technologies, which may lead to the increase of the digital and developmental gap between and within peoples and countries,

Also recognizing the importance of involving young people in general, and young scientists and researchers in particular, especially girls and

young women, in the reflection on ethics of science and technology, in order to nurture new generations of citizens and scientists that are fully aware of these issues,

Further underlining the importance of reinforcing science, technology, engineering and mathematics (STEM) education for young people in general, and especially for girls and young women, to encourage them to consider careers in these fields,

Referring to the basic principles and values of autonomy, human dignity, equity and justice, solidarity, integrity, freedom of thought and expression, privacy and personal security, empowerment, transparency and accountability, as well as to the concepts of prevention of harm and the precautionary approach,

Confident that scientific and technological integrity will help maintain public trust in scientific and technological progress,

1. **_Encourage_** regional economic communities, governments, academic institutions and professional associations, the private sector, civil society and international organizations, especially UNESCO, to:
   a. Promote inclusive public debate on the ethics of science and technology;
   b. Promote development of inclusive policies and programmes to reduce and mitigate the risks of harm which may arise from new technologies;
   c. Create and strengthen networks of stakeholders in ethics of science and technology, including the public sector, consumers and educational institutions;
2. **_Urge_** all stakeholders to facilitate, in a spirit of community service, the effective assumption of responsibilities by scientific researchers and research institutions as laid out by various aforementioned instruments;
3. **_Urge_** all stakeholders to facilitate programmes of studies of ethics in science and technology and **_encourage_** that all scientifically- and medically-trained students learn about ethics of science and technology;
4. **_Urge_** governments, policy makers, academics and their learned societies, as well as the private sector, to provide mechanisms to promote scientific culture among the general public and public awareness of,, and dialogue about, the ethical issues in science and technology, as well as to integrate ethical dimension into science and technology courses and to disseminate best practices in ethics of science and technology;

5. ***Encourage*** governments, universities, and the private sector to establish mechanisms which can result in best-practice guidelines for genomic technology that are appropriate for each country;
6. ***Urge*** governments to promote beneficial and constructive use of artificial intelligence, robotics and big data in society for enhancement of living quality, education and common infrastructure, and pay special attention to remote areas to reduce inequality and level up access opportunities;
7. ***Urge*** governments to promote the principles of climate change ethics in all climate-related actions (mitigation and adaptation) to be utilized for all sectors and stakeholders at implementation levels;
8. ***Urge*** governments, the private sector, universities and research institutions to provide institutional frameworks that foster research integrity, ethical practices, and the free and open exchange of opinions by all concerned on the ethical, human, scientific, social or ecological value of developments in science and technology;
9. ***Encourage*** governments and universities to enable members of the younger generation to become involved in ethics of science and technology, with special emphasis on issues concerning sustainable development.
10. ***Call for*** ambitious action at all levels to implement the Recommendation on Science and Scientific Researchers (2017), which offers a policy framework for all the action points in the present statement.

CONFERENCE ON THE ETHICS OF SCIENCE & TECHNOLOGY AND SUSTAINABLE DEVELOPMENT

Centara Grand at Central Plaza Ladprao, Bangkok, Thailand

PROGRAMME: FRIDAY 5th JULY 2019

07.30 – 08.30 **Registration of Participants**
Venue: Vibhavadee Ballroom

09.00 – 09.30 **Opening Ceremony:**
Presenting Programme Booklet to HRH Princess Maha Chakri Sirindhorn;
Permanent Secretary of Ministry of Higher Education, Science, Research and Innovation (Thailand)

Briefing of the meetings;
Minister of Higher Education, Science, Research and Innovation (Thailand)

Opening Remarks; HRH Princess Maha Chakri Sirindhorn

09.30 – 10.10 **Keynote Addresses:**
Dr. Xing Qu, Deputy Director-General of UNESCO

Prof. Yongyuth Yuthavong, Member of the UNESCO International Bioethics Committee (IBC) and Former Chairperson of UNESCO Intergovernmental Bioethics Committee (IGBC)

10.10 – 10.30 **Coffee Break**

Plenary 1

10.30 – 11.40 **Ethics of S&T and Sustainable Development – From Policy to Practice**
Dr. Dafna Feinholz, Chief of Bioethics and Ethics of Science, UNESCO

Prof. Johannes van Delden, Chairperson, UNESCO International Bioethics Committee (IBC)

Prof. Marie-Hélène Parizeau, Chairperson, UNESCO World Commission on the Ethics of Scientific Knowledge and Technology (COMEST)

Dr. Kitipong Promwong, President of Office of the National Higher Education, Science, Research and Innovation Policy Council (ONES)

Dr. Somsak Chunharas, Chairperson of Thai National Committee on Ethics of Science and Technology; Former Deputy Minister of Public Health (Thailand); and Former Member of the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST)

Plenary 2

11.40 – 12.50 **Principle of Individual Responsibility as related to Health**
Chair: Prof. Johannes van Delden, Chairperson of the IBC

Speaker: Prof. Delia Sanchez Varela, Rapporteur of the IBC; Co-Coordinator of the IBC Working Group; Associate Professor of Bioethics, School of Medicine, University of the Republic

12.50 – 14.30 **Lunch Break**

14.30 – 18.20 **Parallel Sessions:**
1. **Ethical and Societal Challenges toward Genome Technology**
2. **AI, Robotics and Big Data: Giving Legitimacy to Homo Digitus**
3. **Towards Climate Change Ethics Implementation**
4. **Building up the Culture of Research Integrity in the Developing World**

Ethical and Societal Challenges Toward Genome Technology

5 July 2019
Venue : Vibhavadee Ballroom A

Session 1

Ethical and Regulatory Aspects of Genome Technology: The Challenge to Establish Norm in Developing Countries

By Dr. Prasit Phowthongkum,
Chulalongkorn University, Thailand.

14.30 - 14.50

Gene Editing in Early Human Development: Towards a Global Debate and Governance for Responsible Conduct

By Prof. Carlos Maria Romeo Casabona,
University of the Basque Country, Spain.

14.50 - 15.10

Biotechnology Norms and the Liberal International Order

By Prof. Jonathan D. Moreno,
University of Pennsylvania, United States of America.

15.10 - 15.30

Report: Policy Research and Guideline Development for Genetic Testing in Thailand

By Dr. Surakameth Mahasirimongkol,
Ministry of Public Health, Thailand.

15.30 - 15.50

Discussion / Q & A — **15.50 - 16.10**

Coffee Break — **16.10 - 16.30**

Session 2 Ethical and Legal Management of Genome Technology in the Global Context — **16.30 - 17.40**

Discussion / Q & A — **17.40 - 18.00**

Dr. Somsak Chunharas, **Moderator**
Chairperson of Thai National Committee on Ethics of S&T, Thailand.

AI, Robotics and Big Data : Giving Legitimacy to Homo Digitus

5 July 2019

Venue : Vibhavadee Ballroom B

Session 1:

Ethical and Responsible AI: What Do We Need to Think About?

Mr. Michael Araneta,
Associate Vice President IDC Financial Insights Asia/Pacific

14.30 - 15.00

Philosophical Reflection on AI, Robotics and Big Data

Prof. Peter-Paul Verbeek,
Member of the UNESCO COMEST Professor of Philosophy of Twente University, Netherlands

15.00 - 15.30

OECD's Policy and Role in Facilitating Ethical Development and Use of Big Data and AI

Ms. Anne Carblanc,
Head of our Digital Economy Policy division, Committee on Digital Economy Policy, France

15.30 - 16.00

Coffee Break

16.00 - 16.30

Session 2: AI, Robot and Big Data: Threat or Cure for the Public and What Can We do?

Prof. Sang Wook Yi,
Professor of philosophy at Hanyang University, Republic of Korea, and a member of the COMEST

Mr. Richard David Hames,
Strategic Foresight Practitioner, Mentor, Philosopher

Dr. Nova Ahmed,
Representative from Global Young Academy

Dr. Nares Damrongchai, Moderator
Member of Thai National Committee on Ethics of S&T, CEO of TCELS

16.30 - 17.40

Discussion / Q & A

17.40 - 18.00

Towards Climate Change Ethics Implementation

5 July 2019
Venue : Vibhavadee
Ballroom C

Session 1: Understanding Ethical Implication and its Implementation on Climate Change

Why Ethics Can Help Climate Change Abatement?

Prof. Donald A. Brown
Widener University School of Law, Harrisburg, Pennsylvania, United States of America

14.30 - 14.50

The Application of the Principles of Climate Change Ethics in the ASEAN Region: The Case of Haze Pollution

Prof. Rainier Ibana
Former Member of COMEST; Former Chair, Philosophy Department, Ateneo de Manila University, Philippines

14.50 - 15.10

Implementing Climate Change Ethics as a Global Ethic: Prospects and Constraints

Prof. Johan Hattingh
Former Member of COMEST, Professor of Philosophy, Department of Philosophy, University of Stellenbosch South Africa

15.10 - 15.30

Discussion / Q & A

15.50 - 16.10

Coffee Break

16.10 - 16.30

Session 2: Bringing Science to Public – The Ethical Aspect

Prof. Donald A. Brown
Widener University School of Law, Harrisburg, Pennsylvania, United States of America

Prof. Rainier Ibana
Former Member of COMEST; Former Chair, Philosophy Department, Ateneo de Manila University, Philippines

Prof. Johan Hattingh
Former Member of COMEST, Professor of Philosophy, Department of Philosophy, University of Stellenbosch South Africa

Dr. Suntriya Muanpawong
Research Judge, The Supreme Court, Thailand

Dr. Sirintornthep Towprayoon, Moderator
Member of Thai National Committee on Ethics of S&T

16.30 - 17.40

Discussion / Q & A

17.40 - 18.00

Building Up the Culture of Research Integrity in the Developing World

5 July 2019

Venue : Ladprao Suite

American Experiences of Research Misconduct and Attempts to Solve the Problem

Dr. Lida Anestidou,
Senior Program Officer, Institute for Laboratory Animal Research, Division on Earth and Life Studies, US National Research Council, United States of America

15.00 - 15.30

Korean Experiences of Research Misconduct and Attempts to Solve the Problem

Prof. Kim Ock-Joo,
Member of the IBC; Professor and Chair, Department of the History of Medicine and Medical Humanities, Seoul National University, Republic of Korea

15.30 - 16.00

Role of Public Research Institutes in Supporting the Industry in Advanced Countries: The Cases of Fraunhofer, NIST, CSIRO, AIST, and ITRI

Prof. Patarapong Intarakumnerd,
Deputy Program Director Science, Technology and Innovation Policy Program, National Graduate Institute for Policy Studies (GRIPS)

16.00 - 16.30

A New Kind of Plagiarism

Prof. Anoja Fernando,
Member of the IBC; Professor Emeritus of Pharmacology, Faculty of Medicine, University of Ruhuna, Sri Lanka

16.30 - 17.00

Coffee Break

17.00 - 17.30

General Discussion

17.30 - 18.00

CONFERENCE ON THE ETHICS OF SCIENCE & TECHNOLOGY AND SUSTAINABLE DEVELOPMENT

Centara Grand at Central Plaza Ladprao, Bangkok, Thailand

08.00 – 08.30   **Registration of Participants**
Venue: Ladprao Suite

Plenary 3

08.30 – 09.25   **Ethical Implications of the Internet of Things (IoT)**
Chair: Prof. Marie-Hélène Parizeau, Chairperson of COMEST
Speaker: Prof. Peter-Paul Verbeek (Netherlands),
Coordinator of the COMEST Working Group;
Professor of Philosophy of Technology, University of Twente

Plenary 4

09.25 – 10.20   **Ethics of Artificial Intelligence: Preliminary Study of the COMEST Extended Working Group**
Chair: Prof. Marie-Hélène Parizeau, Chairperson of COMEST
Speaker: Prof. Sang Wook Yi (Republic of Korea),
Member of the COMEST Extended Working Group; Professor of Philosophy, Hanyang University

Plenary 5

10.20 – 11.10   **Assisted Reproductive Technologies (ART) and Parenthood**
Chair: Prof. Johannes van Delden, Chairperson of the IBC
Speaker: Prof. Signe Mezinska (Latvia),
Vice-Chairperson of the IBC; Co-Coordinator of the IBC Working Group; Associate Professor,
Faculty of Medicine, University of Latvia

11.10 – 11.30   Coffee Break

Bridging Science and Society: Consequences of Scientific Developments in Reproduction

6 July 2019
Venue :
Ladprao Suite

Plenary 6

Assisted Reproductive Technologies and Parenthood in the 21st Century

Prof. Henry T. Greely
Director, Center for Law and the Biosciences; Professor
(by courtesy) of Genetics, Stanford School of Medicine; Chair of
Steering Committee of the Center for Biomedical Ethics; and Director,
Stanford Program in Neuroscience and Society

Maria Arlamovsky
Documentary Director of "Future Baby" and "Father Mother Donor Child"

Prof. Budi Wiweko
Professor of Department of Obstetrics and Gynecology Faculty of
Medicine Universitas Indonesia

Dr. Sorapop Kiatpongsan, Moderator
Managing Director of the Institute of Public Policy and Development,
Member of Thai National Committee on Ethics of S&T

Lessons Learned from the Public Communication, Consultation and Participation through Art and Media: Youth Engagement in Science, Technology and Innovation Project

- *Raweena Pawa*
- *Parima Suwannakarn*
- *Lucksika Udomsrisumran*

11.30 - 13.00

Lunch Break | **13.00 - 14.00**

Water Ethics: Ocean, Freshwater, Coastal Areas" & "Land Use Ethics

Plenary 7

Water Ethics: Ocean, Freshwater, Coastal Areas

Prof. Deborah Oughton (Norway)
Coordinator of the COMEST Working Group;
Professor and Research Director, Centre for Environmental Radioactivity,
Norwegian University of Life Sciences

Land Use Ethics

Prof. Grace Sirju-Charran (Trinidad and Tobago)
Vice-Chairperson of COMEST; Member of the COMEST Working Group;
Vice-President, Bioethics Society of the English-speaking Caribbean
(BSEC)

Prof. Marie-Hélène Parizeau, **Chair**
Chairperson of COMEST

14.00 - 15.10

Building Collaborations for Ethics of S&T and Sustainable Development

Plenary 8

6 July 2019
Venue : Ladprao Suite

Dr. Dafna Feinholz,
Chief of Bioethics and Ethics of Science, UNESCO

Mr. Teav Rongsa (Cambodia)
Deputy Secretary General, National Science and Technology Council

Dr. Agus Purwadianto (Indonesia)
Vice Chairman, National Bioethics Committee

Mr. Souksavath Sihapanya (Lao PDR)
Deputy Director-General, Department of Science

Prof. Leonardo D. de Castro (Philippines)
Chair of the Philippine Health Research Ethics Board (PHREB) and Eminent Bioethicist

Judge (ret.) Richard Magnus (Singapore)
Chairman of Singapore's Bioethics Advisory Committee

Dr. Le Thi Thu Hien (Vietnam)
Vice Director, Institute of Genome Research, Vietnam Academy of Science and Technology

Dr. Kanchana Wanichkorn (Thailand), Moderator
Vice-President, Office of the National Higher Education, Science, Research and Innovation Policy Council

15.10 - 16.40

Coffee Break   **16.40 - 17.00**

Presentation of the Bangkok Statement
Prof. Yongyuth Yuthavong, Moderator

17.00 - 17.20

Closing Remarks
Assoc. Prof. Soranit Siltharm
Permanent Secretary of Ministry of Higher Education, Science, Research and Innovation (Thailand)

17.20 - 17.40

ACKNOWLEDGEMENTS

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