

CAST International Forum on Engineering Capacity

21-23 November 2018 Beijing

Theme: Capacity Building for a Shared and Better Future of Mankind

**“World Federation of Engineering Organisations (WFEO)
WFEO Engineering 2030 Agenda: Some Observations**

By Academician Dato Ir. (Dr) Lee Yee Cheong, Malaysia

Past President, World Federation of Engineering Organisations (WFEO) 2003-2005/ President, Academy of Engineering and Technology of the Developing World (AETDEW)/Honorary Chairman, UNESCO International Science, Technology & Innovation Centre for South-South Cooperation (ISTIC)/ Commissioner, UN Broadband Commission for Sustainable Development/Chairman, InterAcademy Partnership (IAP) Science Education Program (SEP) Global Council

1.0 WFEO Engineering 2030 Agenda

“A Plan to Advance the Achievement of the UN Sustainable Development Goals (SDGs) through Engineering” is WFEO Commitment to the UN Post 2015 Development Agenda through the 17 SDGs 2016-2030

It is an Agenda Worthy of Total Support by the Global Engineering Community.

As One who was Appointed by UN Secretary-General Kofi Annan to work for the UN Millennium Development Goals (MDGs) 2001-2015 through the UN Millennium Project, I offer myself unreservedly to WFEO President Marlene Kanga and WFEO President Elect Gong Ke to help achieve WFEO Engineering 2030.



World Federation of Engineering Organizations
Fédération Mondiale des Organisations d'Ingénieurs
50th anniversary

WFE Engineering 2030

A Plan to advance the achievement of the UN Sustainable Development Goals through engineering



Progress Report No. 1 - October 2018

A collaborative project with



United Nations
Educational, Scientific and
Cultural Organization

Division of Science Policy and Capacity Building
Natural Sciences Sector



Sustainable
Development
Goals

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1 NO
POVERTY



2 ZERO
HUNGER



3 GOOD HEALTH
AND WELL-BEING



4 QUALITY
EDUCATION



5 GENDER
EQUALITY



6 CLEAN WATER
AND SANITATION



7 AFFORDABLE AND
CLEAN ENERGY



8 DECENT WORK AND
ECONOMIC GROWTH



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



10 REDUCED
INEQUALITIES



11 SUSTAINABLE CITIES
AND COMMUNITIES



12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



13 CLIMATE
ACTION



14 LIFE
BELOW WATER



15 LIFE
ON LAND



16 PEACE, JUSTICE
AND STRONG
INSTITUTIONS



17 PARTNERSHIPS
FOR THE GOALS



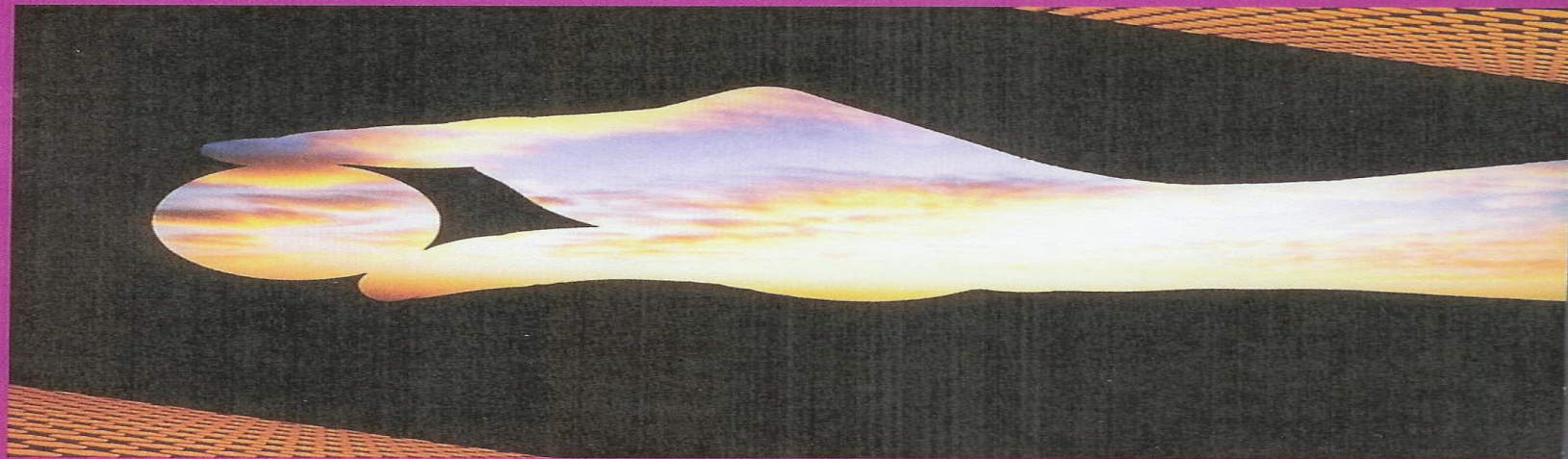
UN Millennium Project Team with UN Secretary-General Kofi Annan



task
force

Science, Technology, and Innovation

**Innovation:
applying knowledge
in development**



Achieving the Millennium Development Goals

 **MillenniumProject**

2.0 The World Federation of Engineering Organisations (WFEO)

Let us first take a look at WFEO through extracts from WFEO President Marlene Kanga's Keynote Address in Federation of African Engineering Organisations (FAEO) Annual General Assembly, Mombasa 18-21 September 2018

https://www.dropbox.com/s/wgkriwdcv6ov1hz/WFEO_Keynote_Address_at_2018_AEW_in_Mombasa.docx?dl=0

Quote

“WFEO is the peak engineering body, representing about 100 nations and 30 million engineers.

It is the voice of engineering at the international level and promotes the important role of engineers in key issues facing the world like sustainable development, security, the growth of our cities, climate change and strategies for sustainable energy production to meet the needs to the growing population around the world.

WFEO is recognised by the United Nations, government, intergovernmental organisations, international NGOs and the public in general as a respected and reliable source of advice and guidance on strategies and policies. outcomes.

WFEO works through Standing Technical Committees, being hosted by National Members to address various sectors of our lives as follows:

- *Engineering and the Environment hosted by UK*
- *Energy hosted by USA • Engineering Education hosted by Lebanon*
- *Information and Communication hosted by India*
- *Engineering and Innovative Technologies hosted by China*
- *Engineering Capacity Building hosted by South Africa*
- *Disaster Risk Management hosted by Peru*
- *Anti-Corruption hosted by Zimbabwe*
- *Women in Engineering hosted by Nigeria*
- *Young Engineers/Future Leaders hosted by Kuwait*
- *UN Relations Committee hosted by USA*

WFEO has reached out to the following United Nations and International Organisations and is working closely with them:

- *UN Educational, Scientific and Cultural Organisation (UNESCO),*
- *UN Economic and Social Council, (ECOSOC),*
- *UN Department of Economic and Social Affairs (UNDESA),*
- *UN Development Program (UNDP),*
- *UN Industrial Development Organisation (UNIDO)*
- *UN Environmental Program (UNEP)*
- *UN Framework on Climate Change (UNFCCC)*
- *UN Office for Disaster Risk Reduction (UNISDR),*
- *The International Atomic Energy Agency (IAEA),*
- *The World Meteorological Organisation (WMO).*

WFEO have signed Partnership Agreements with the following:

- *International Engineering Alliance (IEA)*
- *International Science Council (ISC)*
- *International Federation of Engineering Education Societies (IFEES)*
- *Federation of International Consulting Engineers (FIDIC)*
- *International Network for Women Engineers and Scientists (INWES)*
- *International Centre for Engineering Education (ICEE, UNESCO Centre)*
- *International Science Technology and Innovation Centre for SouthSouth Cooperation (ISTIC, Malaysia, UNESCO Centre)”*

Unquote

3.0 WFEO Engineering 2030 Projects

- **Reviewing and Developing Standards for Engineering Education to meet current and future needs of industry and society,**
- **Capacity Building for Engineering Education Systems, accreditation and registration to meet the needs for engineers around the world,**
- **Capacity Building for Engineering Education,**
- **WomEng: 1 Million Girls in STEM,**
- **World Council of Civil Engineers: Water Monographies,**
- **Spain and Portugal: Partnerships for Water,**

3.0 WFEO Engineering 2030 Projects

- **The Global Cyber School,**
- **Innovative Technologies Assisting Disaster Risk Reduction - the International Meridian Circle Project,**
- **Sustainable Infrastructure and Resilience to Natural Disasters in Small Island Developing States,**
- **Piura River, Peru, Early Warning System –Resilience Against Natural Disasters,**
- **Partnerships for Governance, Anti-Corruption and Strong Institutions,**
- **World Engineering Day for Climate Change Action and Sustainability,**

4.0 Partnership Model to Achieve WFEO Engineering 2030 Agenda

WFEO President Marlene Kanga in Global Engineering Congress ICE London October 2018 emphasized SDG 17 “Partnership for the Goals” for achieving WFEO Engineering 2030.



Prospective Partners in WFEO Engineering 2030

- **International Engineering Alliance (IEA)**
- **International Science Council (ISC)**
- **International Federation of Engineering Education Societies (IFEES)**
- **Federation of International Consulting Engineers (FIDIC)**
- **International Network for Women Engineers and Scientists (INWES)**
- **International Centre for Engineering Education (ICEE, UNESCO Centre)**
- **International Science Technology and Innovation Centre for SouthSouth Cooperation (ISTIC, Malaysia, UNESCO Centre)”**

5.0 My Candid Observations

In my experience and opinion, WFEO ,as currently structured, does not have the capacity, capability and resources, especially financial, to make WFEO Engineering 2030 Agenda with any Global Impact.

- WFEO Standing Technical Committees are Think Tanks, not supported by WFEO to make their concepts into practicable engineering reports with global impact for the benefits of humankind .**
- The WFEO Engineering 2030 Projects are essentially projects of WFEO International Members or National Members unlikely to have national impact, let alone Global Impact.**
- All WFEO Prospective Partners are really and rightly focused on long-established and successful agenda for their own members and constituencies. UN SDGs are not really their core priority.**

5.1 WFEO Relations with UNESCO, the Collaborative Partner in WFEO Engineering 2030

WFEO has yet to establish any close relationship with top leadership nor working relationship at managerial levels in UNESCO in whose building in Paris WFEO has its Head Office. WFEO has not leveraged on UNESCO's tremendous knowledge networks.

There are several water related projects in WFEO Engineering 2030, I am not sure WFEO international and national members concerned have consulted UNESCO, the acknowledged “water resources” agency in the UN system with deep and widespread experience and network in water resources engineering and sciences throughout the world since the UN World Summit on Sustainable Development WSSD Johannesburg 2002. Are we reinventing the wheel in WFEO Engineering 2030 water projects?

Similarly UNESCO is the UN Lead Agency for Education

In WFEO Engineering 2030 Projects on Engineering Education and STEM, have the relevant project managers consulted with UNESCO?

I had personally arranged last March for Raida Al-Alawi from Bahrain in charge of the Global Cyber School Project to meet UNESCO Executives from UNESCO “ICT and Education 2030” with its extensive and truly global network as I do not think Global Cyber School can be realized from Bahrain and WFEO alone.

6.0 My Experience in Global Science and Engineering Advocacy

Before I put forward my constructive recommendations, I would like to share with you my experience in global science and engineering advocacy through the UN Millennium Project and the global umbrella body of the academies of sciences and the academies of medicine, the InterAcademy Partnership (IAP) and the International Science, Technology and Innovation Centre for South-South Cooperation under the Auspices of UNESCO (ISTIC).

I have been associated with the InterAcademy Council (IAC) since 2001-2006 . I was IAC founding board director representing the Academy of Sciences Malaysia (ASM). I am IAP Science Education Program (SEP) Global Council Chairman again representing ASM. I have been Chairman and now Honorary Chairman of ISTIC Governing Board since ISTIC's establishment in 2008, representing the Government of Malaysia.

6.1 The International Science, Technology and Innovation Centre for South-South Cooperation under the Auspices of UNESCO (ISTIC)

ISTIC www.istic-unesco.org is a UNESCO Category 2 Centre. ISTIC is an successful outcome of the 2nd Summit of the Group of G77 and China in Doha in 2005. The Summit Meeting urged UNESCO to balance the supply side of STI in high end R&D with the demand side of STI on the ground for the benefit of the peoples of the developing world. UNESCO requested Malaysia to host ISTIC. ISTIC is completely funded by Malaysia to assist sister developing countries in STI through South-South cooperation.

ISTIC's priority agenda has been as follows:

- **Maintenance of Infrastructure;**
- **Accreditation and Mobility of Engineers and Technicians;**
- **Technopreneurship Development;**
- **STEM and Inquiry Based Science Education (IBSE);**
- **STI Policy Development;**
- **Women in STI.**

ISTIC has anchored its programs on STI institutional and human capital capacity building based on the UN MDGs, the WEHAB (Water, Energy, Health, Agriculture and Biodiversity) of the UN Summit on Sustainable Development Johannesburg 2002 and the UN SDGs.

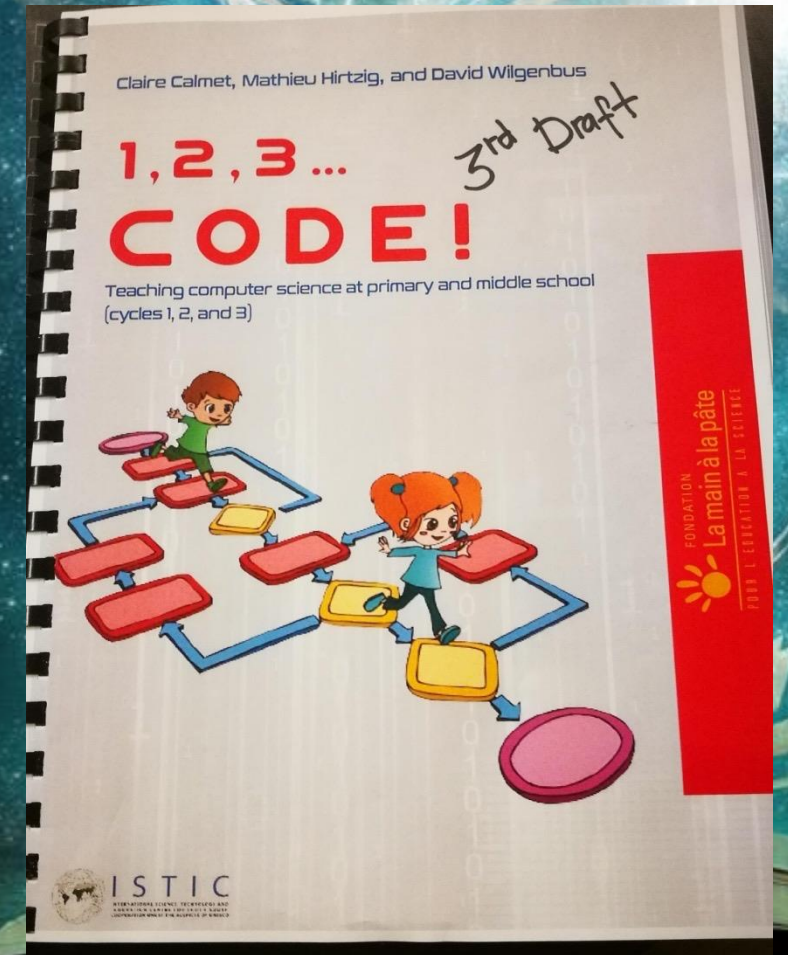
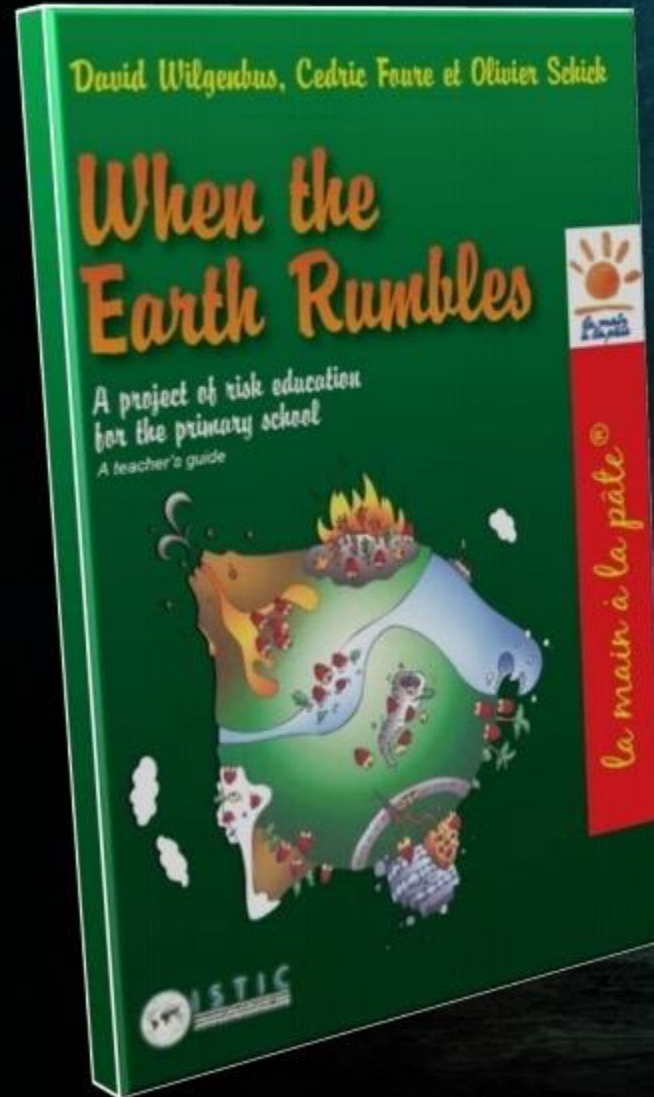
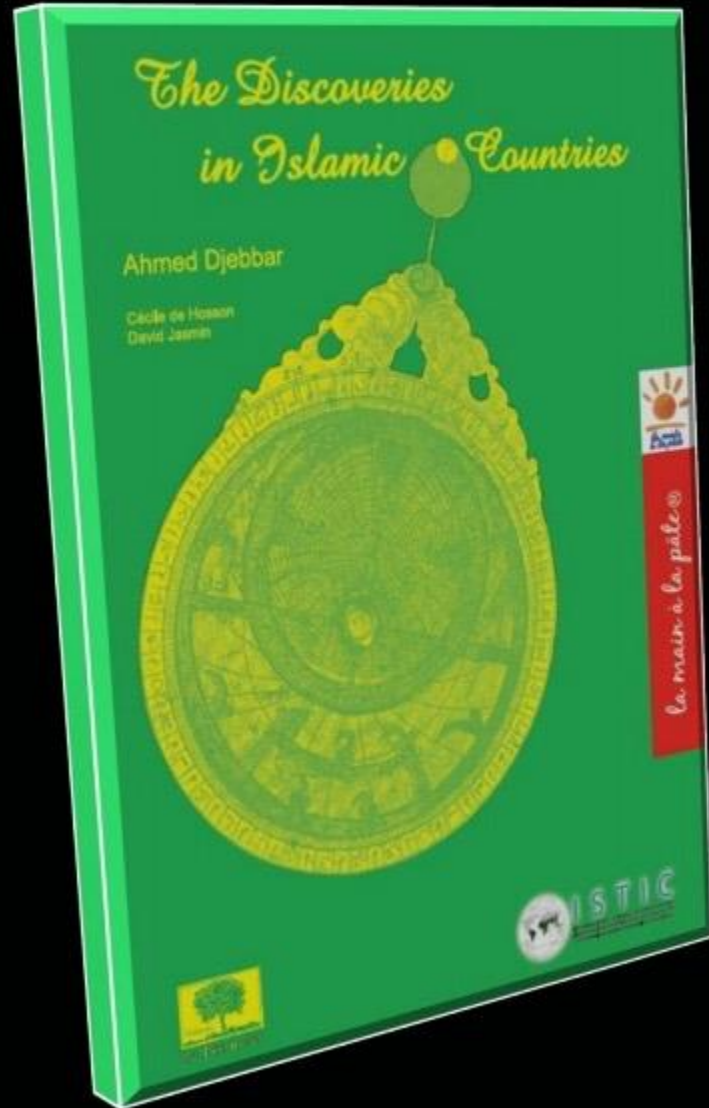
Though ISTIC has been managed by a core staff of less than 10 persons, ISTIC has done extremely well

In the last 10 Years, ISTIC has organised over 75 events in G77 countries with 3500 participants from some 70 countries. Many of the ISTIC “Alumni” have been at top STI policy making levels in their own countries.

ISTIC is the most Eminent Category 2 Centre in UNESCO and an outstanding South-South Cooperation Centre in the UN System.

IBSE-STEM 教育

IBSE资源翻译
法语翻成英语



ISTIC's Global Reach



ISTIC's Solid Relationship with UNESCO Paris has been based on Its "Return Home to UNESCO"

ISTIC First Briefing of G77 Permanent Delegations to UNESCO Nov. 2009 UNESCO Paris



Briefing Meeting Hosted by Malaysian Permanent Delegation to UNESCO 9 November 2009



Delegates at Briefing



ISTIC Second Briefing of G77 Permanent Delegations to UNESCO January 2012

www.istic-istic-unesco-unesco.org



Briefing Meeting Hosted by Malaysian Permanent Delegation to UNESCO 18 January 2012, UNESCO Paris

Dato' (Dr) Ir. Lee Yee Cheong conducting briefing



Group photo with the G77 Permanent Delegations to UNESCO

ISTIC 3RD BRIEFING OF G77 PERMANENT DELEGATIONS TO UNESCO 27 SEPTEMBER 2013



Briefing Meeting Hosted by Malaysian Permanent
Delegation to UNESCO 27 September 2013, UNESCO Paris

G77 Countries Permanent Delegations
and UNESCO Executives.

Group photo: Speakers and Panellists with
H.E. Irina Bokova, Director-General of UNESCO

Return Home to UNESCO 2015



45 delegates of the G77 Countries Permanent Delegations and UNESCO Officers participated in the programme

ISTIC with the support from the Permanent Delegation of Malaysia Office to UNESCO organized the programme to brief G77 Countries Permanent Delegations and UNESCO Officers on ISTIC's programmes



From left to right: ISTIC Chair Dr Lee Yee Cheong; Minister of Education of Malaysia Mr Seri Mahdzir Khalid; UNESCO Director-General Irina Bokova; Dr Noorul Ainur, Secretary General of the STI Ministry; Prof Daniel Rouan, La main à la pâte

ISTIC 5th Anniversary Conference 22 May 2013 Kuala Lumpur

www.istic.istic-unesco.unesco.org



HE UNESCO D.G. Irina Bokova Delivering Keynote Address at Opening





INTERNATIONAL SCIENCE, TECHNOLOGY AND INNOVATION CENTRE FOR SOUTH-SOUTH COOPERATION UNDER THE AUSPICES OF UNESCO (ISTIC) 4

WHO WE ARE

ISTIC is the successful outcome of the 2nd Summit of G77+China in Doha 2005. The Summit agreed UNESCO to balance initiatives on the Supply Side of S&T with more initiatives on the Demand Side for the benefit of people in South countries. UNESCO approached Malaysia to host the IISTIC as a Category II Centre in 2006. IISTIC was formally launched in Kuala Lumpur in 2007. IISTIC acts as an international platform for South-South Cooperation in Science, Technology and Innovation and has made use of the STI networks of G77, UNESCO and other international organizations. IISTIC contributes to the implementation of the Millennium Development Goals (MDGs) and social uplift. IISTIC also promotes Malaysia's agenda for science, technology and innovation in the developing world.

OBJECTIVES OF IISTIC

- To provide scientists, technologists, innovators, short and long-term STI policy makers from south countries with the opportunity to exchange ideas and experiences in specified areas with the aim of developing STI systems.
- To address both common and specialized and project-oriented needs of developing countries by developing countries to set up knowledge based enterprises and technology transfer programmes at regional and inter-regional levels.

HARI UNESCO

MALAYSIA 2015
TOGETHERNES



RECOGNITION

Excerpts from DG Speeches



“I am so pleased to be here today, to congratulate the International Science, Technology and Innovation Centre for South-South Cooperation for its outstanding work and to thank the Government of Malaysia for its leadership.”

- Irina Bokova, DG UNESCO at 5th Anniversary, 22 May 2013

“It is a special pleasure for me, because I visited ISTIC earlier this year, on 22 May, and I saw for myself its strengths in action. ISTIC is a small organization, with a very big footprint.”

- Irina Bokova, DG UNESCO at ISTIC Return Home, 27 September 2013

“The world needs science, science needs new talents and, together with ISTIC, with the astounding work done by the teams of the Fondation La main à la pâte in more than fifty countries, UNESCO will continue to work in order to attract more young people towards science throughout the world. For talent can be met everywhere, in developing countries, in the developed world, in the world ready to develop, ready to cooperate.”

- Irina Bokova, DG UNESCO at ISTIC One-Day Event, 5 April 2016

“Grateful for the extraordinary work led by ISTIC to advance science, technology, innovation & South-South cooperation.”

- Irina Bokova, DG UNESCO at ISTIC One-Day Event, 5 April 2016

RECOGNITION

Dato' Ir. (Dr.) Lee Yee Cheong Received Award from UNOSSC

Dato' Lee Yee Cheong, ISTIC Governing Board Chairman, was honoured with the **Triangular Visionary Leadership Award 2014** by the United Nations Office for South-South Cooperation (UNOSSC) at the UN Global South-South Development Expo 2014 on 17 November 2014 in Washington DC. The award was a recognition of his leadership in promoting South-South Cooperation and Triangular Cooperation through ISTIC.



6.2 InterAcademy Partnership (IAP)

IAP is the umbrella body of national academies of sciences and national academies of medicine with aspiration of getting national academies of engineering on board.

IAP is strongly supported by the vast resources of the US National Academies of Sciences, Engineering and Medicine.

The US National Academies are served by the US National Research Council funded by the US Congress with a permanent staff of several hundred to enable the US National Academies to publish more than two hundred scientific, engineering and medical policy reports per year and make the US dominant in IAP. <http://www.nasonline.org/about-nas/history/archives/milestones-in-NAS-history/organization-of-the-nrc.html>

6.2 InterAcademy Council (IAC) for Policy Studies for the UN

InterAcademy Council

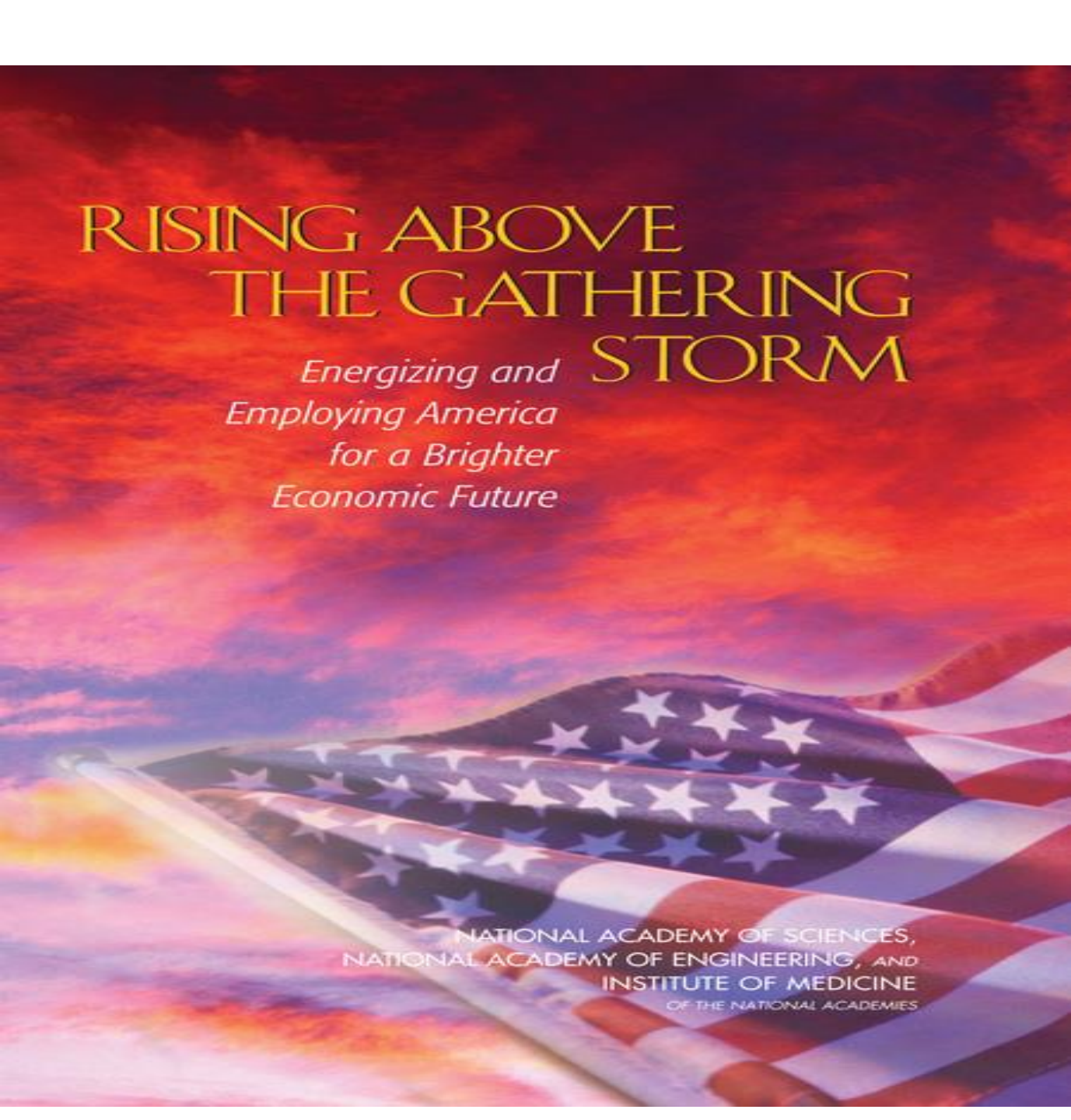
About the IAC



“Lighting the Way: Toward a Sustainable Energy Future”

Public release: October 12, 2007

Co-chairs: Jose Goldemberg, Brazil
Steven Chu, USA

The book cover features a dramatic, fiery sky in shades of red, orange, and yellow. In the foreground, an American flag is shown waving, with its stars and stripes clearly visible. The title 'RISING ABOVE THE GATHERING STORM' is written in a large, bold, yellow serif font. Below the title, the subtitle 'Energizing and Employing America for a Brighter Economic Future' is written in a smaller, italicized, white serif font. At the bottom of the cover, the names of the organizations are listed in a small, white, sans-serif font.

RISING ABOVE THE GATHERING STORM

*Energizing and
Employing America
for a Brighter
Economic Future*

NATIONAL ACADEMY OF SCIENCES,
NATIONAL ACADEMY OF ENGINEERING, AND
INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES

In a world where advanced knowledge is widespread and low-cost labor is readily available, U.S. advantages in the marketplace and in science and technology have begun to erode. A comprehensive and coordinated federal effort is urgently needed to bolster U.S. competitiveness and pre-eminence in these areas. This congressionally requested report by a pre-eminent committee makes four recommendations along with 20 implementation actions that federal policy-makers should take to create high-quality jobs and focus new science and technology efforts on meeting the nation's needs.



NAE GRAND CHALLENGES FOR ENGINEERING

MAKE SOLAR ENERGY ECONOMICAL
DEVELOP CARBON SEQUESTRATION METHODS
CYCLE
MANAGE THE NITROGEN CYCLE
PROVIDE ACCESS TO CLEAN WATER
RESTORE AND IMPROVE URBAN INFRASTRUCTURE
ADVANCE HEALTH INFORMATICS
ENGINEER BETTER MEDICINES
REVERSE-ENGINEER THE BRAIN
PREVENT NUCLEAR TERROR
SECURE CYBERSPACE
ENHANCE VIRTUAL REALITY
ADVANCE PERSONALIZED LEARNING
ENGINEER THE TOOLS OF SCIENTIFIC DISCOVERY

- MAKE SOLAR ENERGY ECONOMICAL**
- PROVIDE ENERGY FROM FUSION**
- DEVELOP CARBON SEQUESTRATION METHODS**
- MANAGE THE NITROGEN CYCLE**
- PROVIDE ACCESS TO CLEAN WATER**
- RESTORE AND IMPROVE URBAN INFRASTRUCTURE**
- ADVANCE HEALTH INFORMATICS**
- ENGINEER BETTER MEDICINES**
- REVERSE-ENGINEER THE BRAIN**
- PREVENT NUCLEAR TERROR**
- SECURE CYBERSPACE**
- ENHANCE VIRTUAL REALITY**
- ADVANCE PERSONALIZED LEARNING**
- ENGINEER THE TOOLS OF SCIENTIFIC DISCOVERY**



NATIONAL ACADEMY OF ENGINEERING



Chinese Academy of Sciences

Hongxiang Lu
Editor-in-Chief

Science & Technology in China: A Roadmap to 2050

Strategic General Report
of the Chinese Academy of Sciences

Science Press
Beijing

Springer

China's modernization is viewed as a transformative revolution in the human history of modernization.

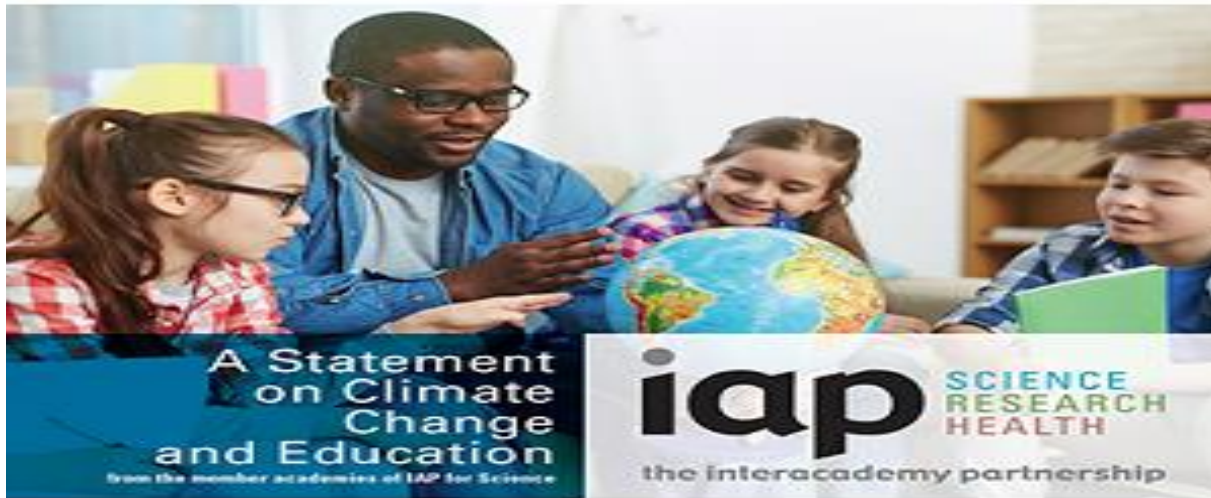
As such, the Chinese Academy of Sciences (CAS) decided to give higher priority to the research on the science and technology (S&T) roadmap for priority areas in China's modernization process.

6.3 InterAcademy Panel (IAP) Science Education Program (SEP)

For the remainder of the 21st century and beyond, climate change poses an existential threat to humanity.

Decisions on how to tackle the effects of climate change, however, need to be based on sound science and rational judgement. They will also need to be made through the coming years – so it is the younger generation, currently in schools and learning about science, who will need to make those decisions.

The Paris Climate Agreement (UN, 2015) recognizes this by stating that “Parties should take measures ... to enhance climate change education” (Paris Agreement, Art.12).



ONE BELT ONE ROAD FUSION OF CIVILISATION CURRICULUM



**IAP SEP has written to
the Director General of
World Health
Organisation WHO to
support Curriculum
Design on Healthy
Lifestyle for Mind and
Body for School Children**



SCIENCE
for Global Goals

M O S Q U I T O !

COMMUNITY RESEARCH GUIDE



**HOW CAN WE
ENSURE HEALTH FOR ALL
FROM MOSQUITO-BORNE DISEASES?**



developed by
Smithsonian
Science Education Center

in collaboration with
iap SCIENCE
RESEARCH
HEALTH
the interacademy partnership

7.0 WFEO Institute for WFEO Engineering 2030

All the above successful science and engineering advocacies have been anchored by a core group of expert study managers augmented by a global network of scientific and engineering experts. The core group can be as big as the few hundreds of the US National Research Council or as small as less than 10 of ISTIC.

On any global study, adequate funding must be available to develop the concept by the core group and hold periodic meetings of study group preferably in various regions of the world, arrange publication and dissemination and monitor and review outcomes,

I strongly recommend that WFEO considers urgently to discuss with CAST to establish and fund the WFEO Institute to be housed in CAST Beijing with a core group of managers.

The WFEO Institute would have a global fellowship with Fellows drawn from WFEO standing technical committees, working groups and interested partners actively engaged in WFEO Engineering 2030.

The WFEO Institute has to be adequately funded by CAST.

The great pool of committed expertise that WFEO has failed to tap is the 30 million engineers worldwide that WFEO Marlene Kanga states that WFEO represents.

However very few even know of the existence of WFEO as WFEO is an umbrella organisation very remote from the individual engineers on the ground.

Many of them have of their own established international professional engineering organisations in the spirit of volunteerism that have been working independently of WFEO in initiatives in developing countries for the UN SDGs

These international recognised engineering organisations mostly managed by young professional engineers include:

- **Engineers Without Borders**
https://en.m.wikipedia.org/wiki/Engineers_Without_Borders
- **Registered Engineers for Disaster Relief (RedR)**
<https://en.m.wikipedia.org/wiki/RedR>
- **Engineers Against Poverty**
https://en.wikipedia.org/wiki/Engineers_Against_Poverty

There are also many SDG related initiatives by transnational institutions/societies of engineers like ICE, IET, IMechE, IChemE of UK and IEEE, ASCE, ASME, of USA. In GEC London, I was very impressed by the Village Electrification Project of IEEE that is spreading throughout the developing world.



YOUTH and the **MILLENNIUM DEVELOPMENT GOALS**

Challenges and Opportunities for Implementation

by: The Ad hoc working group for youth and the MDGs



WFEO Institute should reach out to all of them to nominate their most active and committed as Fellows of WFEO Institute.

WFEO National Members have published many national policy papers and reports on engineering and technology impacts on their nations. Such reports should be catalogued in an electronic archive managed by WFEO Institute.

WFEO Institute must actively propagate all study reports of WFEO, WFEO International Members, National Members and Partners in UN SDGs

THANK YOU