



**WORLD FEDERATION OF ENGINEERING ORGANIZATIONS
FÉDÉRATION MONDIALE DES ORGANISATIONS D'INGÉNIEURS**

**Concept Note
WFEO 50th Anniversary Symposium,
UNESCO Paris, 7th March 2018
for**

WFEO Engineering 2030

A Plan for engineers to progress the achievement of the UN SDGs

A collaborative project with



Division of Science Policy and Capacity Building
Natural Sciences Sector

Preliminary for Discussion, November 2017

Background

In September 2015, the world came together to declare the new UN Sustainable Development Goals. These goals take an integrated approach for future development, combining progress in economic prosperity, social inclusion and environmental sustainability. The implementation of these goals is a key objective of the World Federation of Engineering Organisations.

The World Federation of Engineering Organisations is the peak body for engineering, representing nearly 100 nations and 20 million engineers. It is the voice of engineering at an international level and promotes the important role of engineers in key issues that the world is now facing: sustainable development, the growth of our cities, climate change and strategies for energy production to meet the needs to the growing population around the world.

In this work, the World Federation of Engineering Organisations is recognised by government, intergovernmental organisations, international NGOs and the public in general as a respected and reliable source of advice and guidance on strategies and policies that use engineering and technology for the benefit of human development and wellbeing and sustainable outcomes.

The Mission of WFEO includes:

- To represent the engineering profession internationally, providing the collective wisdom and leadership of the profession to assist national agencies choose appropriate policy options that address the most critical issues affecting countries of the world.
- To enhance the practice of engineering.
- To foster socio-economic security and sustainable development and poverty alleviation among all countries of the world, through the proper application of technology.

WFEO therefore has a key role in leading and co-ordinating the various projects for developing engineering capacity for maximum long term impact to achieve the UN Sustainable Development Goals. WFEO is able to bring together educational institutions, government and industry to facilitate projects that address the need for engineering capacity in various regions of the world. The national and international members of WFEO, that are leading professional engineering institutions, will play a key role in this endeavour and in developing country and region specific responses.

The celebration of WFEO 50th anniversary in 2018 is a catalyst to develop a framework for an action plan for the engineering capacity that is required to achieve the UN Sustainable Development Goals (SDGs). A Symposium on 7th March 2018 will be the first formal event

where WFEO will bring together its members and partners to develop the *WFEO Engineering 2030 Plan*.

This concept note is divided into 3 sections:

- Section I reviews the need for engineers in the context of sustainable development and achieving the UN SDGs
- Section II addresses the leadership role of WFEO in developing the *WFEO Engineering 2030 Plan*.
- Section III outlines expected outcomes from the Symposium in March 2018
- Section IV provide an action plan for 2018 and 2019.

Section 1: The Need for Engineers in the Context of Sustainable Development and Achieving the UN Sustainable Development Goals

Engineers and engineering is critical for achieving the UN Sustainable Development Goals. Engineers have a key role in supporting the growth and development of essential infrastructure such as roads, railways bridges, dams, communication, waste management, water supply and sanitation, energy and digital infrastructure which facilitate communications. They enable a country's economy to grow and develop and this in turn can lead to better economic and social outcomes including improved life expectancy, higher literacy rates and better quality of life.

There is an important link between a country's engineering capacity and its economic development. Engineers are responsible for the modern world – from the houses we live in, the food we eat, the transport we use and all the comforts derived from electricity and clean water supplies. However, with half the world living in poverty and millions of people without sufficient food or sanitation, engineering is needed to support the progress of sustainable development across the world.

The World Bank reports¹ the significant positive effect of infrastructure on output, productivity and growth and the ability of economies to be innovative. Other research shows that there is a significant positive impact on the GDP of countries that have a sufficient number of engineers.² However, it is not just about the quantity but also the quality of engineers which

¹ Engineering Growth: Innovative Capacity and Development in the Americas* William F. Maloney, Felipe Valencia Caicedo, March 9, 2016, World Bank Research publication, <http://pubdocs.worldbank.org/en/422491458852358129/Engineers-County7A.pdf>, accessed May 2017.

² See Engineering UK, The Contribution of Engineering to the UK Economy – the multiplier impacts, January 2015, <https://www.engineeringuk.com/media/1323/jan-2015-cebr-the-contribution-of-engineering-to-the-uk-economy-the-multiplier-impacts.pdf>, accessed May 2017.

affects the outcomes of engineering projects and their contribution to the economy. This makes it essential for a country to have its own human capital resource of engineers who can design build and maintain vital infrastructure to international standards to deliver maximum benefit to the economy.

As the pace of technological innovation and development accelerates, there is an increasing need for engineers. Some of the factors are discussed below.

Engineers and the 4th Industrial Revolution

From the time of the first Industrial Revolution, engineering has underpinned the growth of the industrial economy. The invention of steam and electricity led to a transformation of economies, from agriculture to manufacturing, resulting in increased incomes and prosperity for developed countries especially in Europe and North America.

We are now at the start of the 4th industrial Revolution where data and the interconnectedness of machinery and the Internet of Things is driving new efficiencies and innovation. Engineering continues to be at the heart of the latest revolution. Engineers have an important role in these innovations, developing new ideas and scientific breakthroughs into new inventions and products that can help many countries accelerate their economic development.

Green Infrastructure and Smart Cities with increasing Urbanisation

With increasing urbanisation and growing cities, engineers are expected to develop new innovations for green infrastructure for smart cities and develop renewable energy sources. Engineers are also vital to solving the problems of climate change and to implement sustainable solutions for the use of depleting resources especially the use of water.

The Demand for Engineering in the South-South regions

There is expanding demand for engineers and engineering services in Asia-Africa and South America – along the alignment of “South-South” countries. As the world’s fastest-growing economies urbanise and grow large cities, infrastructure growth, and consequently the need for engineering is increasing.

The One Belt and One Road Initiative

The One Belt and One Road Initiative is expected to extend from China through Asia and Africa to Europe and is expected to have a crucial role in infrastructure development – including roads, railways and ports. It is anticipated that the One Belt One Road Initiative, with large investments flowing to countries in Africa, Central and South East Asia, will increase the demand for engineers.

Section II: -WFEO Engineering 2030 – A Plan to develop engineering capacity to achieve the UN SDGs

As the peak body for professional engineering institutions, the World Federation of Engineering Organisations has a key role to lead the development of engineering capacity of appropriate recognised standards for sustainable development. This will be formulated through the *WFEO Engineering 2030 Plan*.

WFEO will work with UNESCO, its national and international members and its international partners to establish the Plan.

Key participants in the Plan will include:

UNESCO

- WFEO is a recognised a member of the UN major science and technology group;
- WFEO is a recognised NGO of UNESCO and other UN organisations and is committed to working towards achieving the UN Sustainable Development Goals (SDGs);
- WFEO has regular dialogue with UN bodies including UNEP, UNFCCC and UNISDR and others.

WFEO will liaise with the UNESCO Natural Sciences Division in developing an action plan to address the engineering capacity required to achieve the UN SDGs.

WFEO NATIONAL AND INTERNATIONAL MEMBERS – THE PROFESSIONAL ENGINEERING INSTITUTIONS

WFEO already has long standing established relationships with professional engineering institutions around the world as the peak international body for these institutions, with 90 national and 10 international members. WFEO will work with its members, through specific projects, to achieve the goals of the *WFEO Engineering 2030 Plan*.

WFEO STANDING TECHNICAL COMMITTEES

The WFEO Standing Technical Committees have access to specialised expertise through their members and will support the Plan through specific activities, for example, but not limited to:

- Standing Technical Committee on Capacity Building - identify capacity building projects in engineering especially in Africa and Asia;

- Standing Technical Committee on Anti-Corruption - develop training programs for ethical engineering practice and to implement the ISO 37000 Standard for Anti Bribery systems;
- Standing Technical Committee on Women in Engineering - develop programs to increase diversity in engineering;
- Standing Technical Committee on Young Engineers - develop professional training and development programs.

INTERNATIONAL PARTNERS IN ENGINEERING

WFEO has partnerships with other international organisations in engineering and will establish joint projects, as well as facilitate projects currently in progress, to meet the objectives of the **WFEO Engineering 2030 Plan** in building engineering capacity to achieve the UN SDGs. Examples include:

- Development of policy frameworks and metrics in science and engineering with the International Science Union (ICSU) (and the future merged body with the International Social Science Council, the International Science Council) to meet the UN SDGs;
- Support and facilitate the work of the WFEO national and international members in assisting education institutions achieving the required standards in engineering education and professional development, to develop the capacity for engineers;
- Mentoring and support initiatives for engineering educational institutions, e.g. FEIAP – Federation of Engineering Institutions in Asia and the Pacific, an international member of WFEO;
- Extend the reach of multilateral recognition of engineering education and professional development of engineers through partnership with the International Engineering Alliance;
- Support and facilitate professional training to support engineers throughout their careers, e.g. FIDIC – Federation of International Consulting Organisations;
- Develop international frameworks and strategies to address diversity in engineering through joint projects with WFEO Standing Technical Committee on women in engineering, national members and international partners;
- Facilitate the capacity building and improvements in standards in engineering education e.g. International Federation of Engineering Education Societies (IFEES);
- Capacity Building projects in professional engineering institutions in Sub-Saharan Africa by WFEO members and international partners, e.g. SAICE, ECZ, FAEO, RAEng etc.;
- Encouragement of girls into STEM and other projects, e.g. WomEng, South Africa;
- Address anti-corruption in engineering, e.g. WFEO Standing Technical Committee on Anti-Corruption. GIACC, World Justice Project;

- Capacity development activities by the Category II UNESCO body – ISTIC, based in Malaysia and by other bodies in Africa and the Americas;
- Engineering education programs development by ICEE-UNESCO based in Tsinghua University, Beijing, including the use of technology to support engineering education.

ENGINEERING EDUCATORS – UNIVERSITIES, TECHNICAL INSTITUTIONS AND ASSOCIATIONS

WFEO will work with universities and other educational institutions, accreditation bodies and international organisations involved in engineering education to bring together the relevant parties with the expertise and experience in engineering education from around the world to support the *WFEO Engineering 2030 Plan*.

INDUSTRY: ASSOCIATIONS AND LARGE COMPANIES

WFEO will work with industry and industry associations in the engineering sector to mobilise the resources with the expertise and experience to engage with industry and employers to:

- inform desired graduate outcomes from engineering education, especially with rapidly changing needs as a result of technological advancements;
- determine desired professional development requirements so that engineers are competent in their disciplines throughout their careers.

Section III Outcomes of WFEO 50th Anniversary Symposium, March 2018

In March 2018, WFEO will be celebrating its 50th anniversary. This event presents the opportunity to bring together the national and international members of WFEO and its international partners to discuss the leadership role of WFEO in providing the framework for supporting the engineering capacity that is required to meet the challenges of achieving the Sustainable Development Goals (SDGs).

Format of the Event

A symposium is to be held on 7th March 2018 in two sessions, from 1.00 pm to 3.00pm and 3.30pm to 5.30pm to discuss how the Plan may be developed and implemented.

The Symposium will be structured as follows:

- Session 1- 1.00 pm -3.00 pm: capacity building for engineers and engineering – and analysis of needs and capacity and demand for quality education and professional development
- Session 2 – 3.30 pm – 5.30 pm: Special issues relating to engineering including ethics, sustainable engineering practices, diversity and innovation

Speakers are to include:

- The UNESCO Director General as the opening speaker
- Representatives of various UN organisations that are involved in science and engineering, education, diversity and sustainable engineering, depending on availability including UNESCO, UNISDR, UNEP
- Leaders of various projects that are relevant to the topic of the Symposium including:
 - Some of the chairs of the WFEO Standing Technical Committees that have initiated relevant projects;
 - National and international members of WFEO that are involved in specific relevant projects;
 - The leaders of the international partners of WFEO in science and engineering that are working on specific projects;

The speakers will showcase activities and achievements to date and present options for future work.

It is expected that outcomes of the symposium will include a framework of projects that will progress the role of engineering in achieving the UN SDGs including:

1. Strategies to maximize the impact of cooperation and coordination of the various initiatives involved in engineering education and professional development at the national, regional and global level to achieve the UN SDGs and other internationally agreed goals;
2. The data required to assess the need for engineers and existing capacity for education and training to support evidence based policy making to support the attainment of internationally agreed goals;
3. The best means for sharing of sources of good practices in collaboration for developing capacity in engineering;

4. Revitalising and mobilising global partnerships between engineering organisations in various parts of the engineering development cycle in order to develop innovative solutions to achieve the UN SDGs and other internationally agreed goals;
5. Strategies to address potential sources of funding from a wide range of institutions that can support the objectives of the proposed agreed actions;
6. Collaborative processes to develop advocacy initiatives to promote the actions by the engineering sector in developing frameworks for achieving the UN SDGs;
7. Collaborative mechanisms to support the work being done by the various international engineering organisations;
8. Initiatives to share best practices between the various stakeholders of WFEO.

The overall outcome is a plan of action that will be developed and implemented by the national and international members of WFEO and its international partners to progress the UN SDGs through capacity building in engineering. A report will be prepared after the Symposium on the outcomes discussion and the proposed action plan. This will be shared with all participants and WFEO partners.

Section IV Action Plan for 2018-2019

The WFEO Symposium in March 2018 will be the commencement of a schedule of activities during 2018 and 2019 and beyond. The current plan of work will consist of:

1. International Day of the Engineer

Application for declaration of 4th March as the International Day of the Engineer by the United Nations

- The International Day of the Engineer will be an important recognition of the importance of engineering to modern life and the significant impact of engineering on the well-being, social and economic development of the people of the world;
- The importance of engineering in achieving the UN Sustainable Development Goals;
- WFEO will seek formal support from its national and international members for the declaration of the day;
- The application process will commence in 2018 and it is hoped that an announcement can be made at the World Engineers Convention in Melbourne in November 2019.

2. WFEO World Engineering Index

- WFEO will work to develop a *WFEO World Engineering Index* to provide a relative indicator of Engineering Activity, Needs, Capacity and Quality. It will facilitate a

comparison of engineering capacity between countries and regions and the prioritisation of actions required to address the gaps that exist as well as progress that is being made.

- The index will be based on data sets obtained from the United Nations and other international sources. It is anticipated that the Index will also provide a measure of progress being made in engineering, which is essential to achieving the UN Sustainable Development Goals
- It is anticipated that the *World Engineering Index* will be published annually.

3. WFEO meetings and events

The WFEO Engineering 2030 plan will be a focus of WFEO meetings held between 2018-2019. Key events that are currently being planned include:

- **WFEO Global Engineering Convention, London, 20-26 October 2018**
 - This meeting will include an international convention and WFEO Executive Council meetings and will be an opportunity for roundtable discussion on specific priorities identified in the *WFEO Engineering 2030 Plan*;
 - 3-4 sessions to be held during the week to cover topics which will include capacity building in engineering, the work of WFEO international partners and facilitation and support, integrity and ethics, young engineers, diversity, etc.
- **Additional events during 2018-19 hosted by WFEO national and international members**
 - These meetings will include African Engineering Week, the meetings of the regional engineering institutions and meetings organised by the national members of WFEO which will address specific projects of the *WFEO Engineering 2030 Plan*.

4. Reporting on progress with the WFEO Engineering 2030 Plan

- A report on progress with the *WFEO Engineering 2030 Plan* will be prepared for the WFEO General Assembly in Melbourne Australia in November 2019. This will provide an update on the status of projects in progress and will include contributions from national and international members of WFEO and international partners of WFEO.
- It is anticipated that this report will be produced every two years.

Dr. Marlene Kanga
WFEO President Elect,
1 December 2017.