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Años



COLEGIO DE INGENIEROS DEL PERÚ

Semana de la Ingeniería

"La Ingeniería en los tiempos de la COVID-19"

Del 8 al 12 junio 2020



WFEO / FMOI

Global Governance and Partnerships for engineering collaboration in the context of COVID-19 and beyond

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www.wfeo.org



The global impact of COVID-19

- The global economic impact of COVID-19 does not respect geographic boundaries.
- In just three months, the virus spread from Wuhan, China, to more than 140 other countries.
- In the fourteenth century, the bubonic plague spread the Black Death from China to Italy in the course of some sixteen years, 1331 to 1347.
- In our time, the pathogen arrived within days by nonstop flight from Wuhan to Rome.
- This is a consequence of the rapid pace of globalisation.



The need for collaboration and governance in science and engineering for COVID-19



- COVID-19 has had a global economic and social impact on millions
- Although there are differences in capacities to combat the virus, it's clear that the world must come together to develop responses and for a vaccine for mutual global benefit
- The UN Sustainable Development Goals have the objective of leaving no one behind. The world was moving slowly towards this goal. But progress in the last 6 months has never been more rapid as we collaborate against the threats of COVID-19. We cannot afford not to do so.



Global collaboration against pandemics



- Since the late 18th Century, the world has sought new ways to govern globalization in order to promote its benefits while controlling its many potential harms. The fight against pandemic disease has been prominent.
- The International Sanitary Conferences began in 1851 and continued until 1938, among the first modern efforts at global scientific and policy cooperation. These efforts gave rise to the World Health Organization in 1948, one of the first major agencies of the new United Nations, which was founded at the end of World War II.
- WHO, of course, is currently at the centre of the global fight against COVID-19.
- WHO has helped to coordinate scientific information about the pathogen and how to control it, and to coordinate and monitor the global push to contain and end the pandemic.



Global collaboration for global issues

- Disease control is not the only area where global cooperation is vital.
- The case for global cooperation and institutions extends to many urgent concerns:
- the control of human-induced **climate change**
- the conservation of **biodiversity**
- the control and reversal of the massive **pollution of the air, soils, and oceans**
- the proper uses and **governance of the internet**
- the need **for education for all** especially in science and engineering



Smoke Haze over the Sydney Opera House, during bushfires resulting from climate change, Dec 2019-Jan 2020 – showing that the impacts of climate change has no geographic boundaries



“Leaving no one behind”

- Francis Bacon once said “knowledge is power,” - scientific knowledge is indeed powerful and provides capacity to act.
- Modern scientific knowledge is not simply an understanding of the world, but an understanding that enables people to intervene in and alter that world – thus manifesting an orientation towards technology and innovation. **Engineers, of course do this better than anyone else.**
- But we need to use this knowledge, this capability to develop collaborative solutions, to share our knowledge and to build capacity and support countries to solve our global problems together.



Global collaboration needs good governance

- In order for the benefits of global collaboration to be realised, there is a need for good governance and agreement on the key principles that govern the collaboration.
- The key elements of good governance are described in the following slides as well as case studies from current ongoing work from Australia and internationally.
- Important engineering advances are highlighted in each case study.



Key elements of good governance for collaboration in science and engineering

Key elements of global governance for collaboration in Science and Engineering are for partners to:

- Set and agree **priorities**.
- Agree **funding** arrangements.
- Agree on the ownership of **intellectual property**.
- Put the science and technology research and innovation into **practice and products**.
- **Build capacity** for using the results of the research and innovation.



Global governance in science and engineering - Priorities

- Driven by demand from users
- Institutional priorities as they collaborate together
- Thematic priorities



Tracking COVID-19 in raw sewage

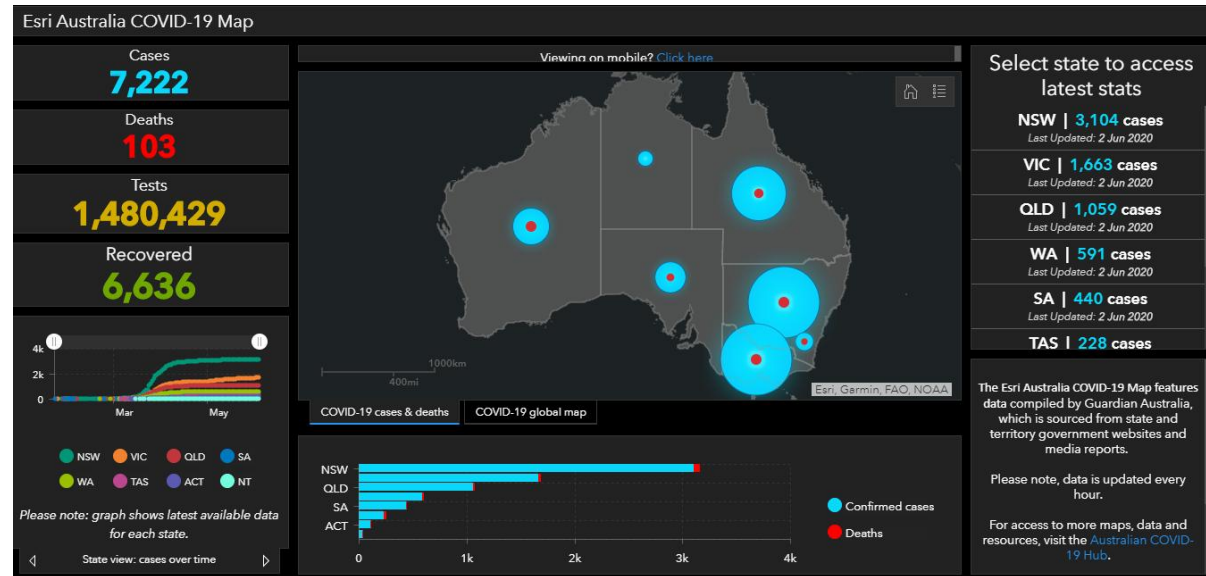
**Geospatial
mapping**

Government priority on public health to track spread of COVID-19 has resulted in collaboration between University of Queensland and the CSIRO (Federal Government) and international researchers to track the virus in raw sewage in waste water treatment plants. This will enable **geospatial mapping** and tracking of the virus in highly populated areas.



Global governance in science and engineering - Priorities

- Real time mapping of COVID-19 cases assist government with testing and tracking.



Tracking COVID-19 in Australia

Geospatial mapping

ESRI is using real-time **geospatial mapping** to assist the government in Australia to track and map COVID-19 cases to assist in policy making about travel and lock downs.



Global governance in science and engineering - Priorities

- Collaboration between universities, hospitals and engineers resulted in rapid development of 3D printed face shields in Australia. The design was made public.



3D Printed Components of Face Shield developed in Australia

3D printing

3D printing for personal protective equipment for COVID-19
Royal Melbourne Hospital, Melbourne School of Design and the Melbourne School of Engineering 3D Innovation Centre collaborated to produce a **3D printed** face shield. International collaboration has been established by Austin Hospital USA 3DMedLab which produced a PAPR (Positive Air Pressure Respirator).



Global governance in science and engineering - Funding

- Government funded
- In kind contributions
- Major world bodies, e.g. World Bank



Funding for Collaboration to develop a vaccine for COVID-19

The Coalition for Epidemic Preparedness Innovations (CEPI), a global group that aims to speed up the development of vaccines and cut short the COVID-19 pandemic is funding research around the world. **Artificial Intelligence** is used for rapid identification of suitable vaccines.

**Artificial
Intelligence**

Governments around the world are funding research into COVID-19 vaccine development in their national institutions. 100 vaccines are being researched.



Engineering for Sustainable Development

Global governance in science and engineering - Funding

- University funding for specialized and targeted research

Nano Sensors



University of New South Wales Sydney - Funding for Rapid Response Research for COVID-19

A point of care, rapid testing for COVID-19 at the New South Wales Smart Sensor Network and the Australian Centre for NanoMedicine has received funding under the **UNSW COVID-19 Rapid Response Research Fund**. The technology uses **nano-sensors** to detect viral RNA without requiring amplification - it detects the virus rapidly like a lateral flow device whilst giving direct evidence of it.

(I am a board member of the NSW Smart Sensor Network)
Engineering for Sustainable Development



Global governance in science and engineering – Intellectual Property

- Strategies for sharing new knowledge includes:
- Licensing
- Collaborative patent pools
- Open access to some information as a “public good”



Medicine Patent Pool for HIV medicines

In 2010, UNITAID funded a patent pool for patent holders and manufacturers of generic drugs. This fostered availability of HIV drugs at affordable prices and the development of new drugs.

A similar patent pool may be established for affordable vaccines and treatment of COVID-19.



Global governance in science and engineering – from research to product/practice

- **Delivering results is important**
- **Communication between researchers and users**
- **Developing production mechanisms**
- **Knowledge and training**



Accelerating production of vaccine for COVID-19

Global collaboration are in progress to test a number of vaccines and therapeutic approaches across the world. In Australia, CSIRO has commenced testing candidate vaccines from the University of Oxford (UK) and Inovio Pharmaceuticals Inc (US) at the Australian Centre for Disease Preparedness in Geelong, Victoria.



Global governance in science and engineering – from research to product/practice

- Collaboration to bring products to market is important



Emergency Invasive Ventilator
www.Greyinnovation.com

Accelerating production of ventilators for COVID-19

3D printing

The NSW Smart Sensing Network (NSSN) has joined NSW-based electrical manufacturer **Circuitwise** with a consortium of companies led by **Grey Innovation** that aim to produce 2,000 invasive ventilators in Australia. Australian companies are collaborating within a short timeframe using **3D printing and advanced manufacturing** to produce lifesaving medical equipment for Australia and internationally.



Global governance in science and engineering – capacity building

- Sharing of knowledge between developed and developing countries
- Training of users
- Develop Institutional capacity



<http://www.wfeo.org/covid-19-knowledge-hub/>

World Federation of Engineering Organisations (WFEO) - Capacity Building through Knowledge hub for COVID-19

WFEO has developed a knowledge hub to disseminate **knowledge on engineering responses** to COVID-19 to its members in 100 nations representing 30 million+ engineers.



Global governance in science and engineering – capacity building

- Training and on line learning

Information & Communication technologies



<https://en.unesco.org/covid19/educationresponse/globalcoalition>

UNESCO Global Education Coalition for COVID-19

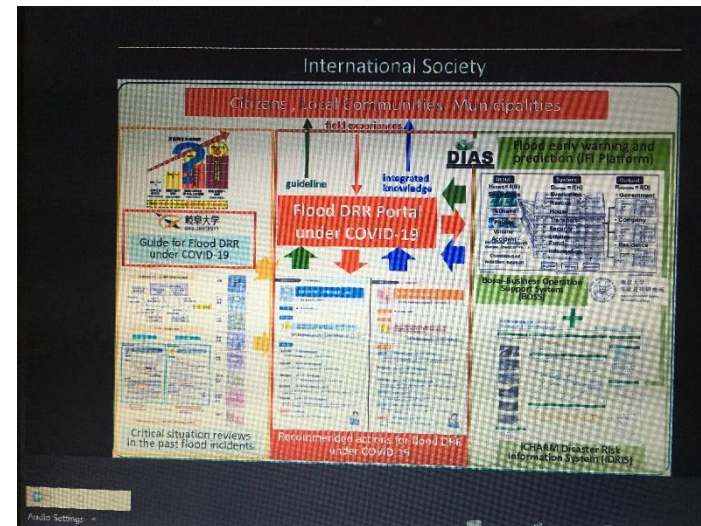
UNESCO has brought together educators, international organisations, companies and civil societies in a coalition to address the need for on-line resources as 90% of education has been affected by the COVID-19 shutdown. **Information and communication technologies** have made this possible. Investment in remote learning should both mitigate the immediate disruption caused by COVID-19 and establish approaches to develop more open and flexible education systems for the future.

Engineering for Sustainable Development



Global governance in science and engineering – capacity building

- Sharing knowledge on emergency response to natural disasters during COVID-19



Guidance on social distancing in emergency shelters after a major flood event

Sharing knowledge and resources in areas of common interest

Organisations are sharing resources on guidance for managing **emergency response following natural disasters** in a COVID-19 environment. The above example is from Japan on managing social distancing in emergency shelters after a flood event, shared with South East Asia and Asia Pacific leaders at UNESCO SEEAP Meeting 19 May 2020.

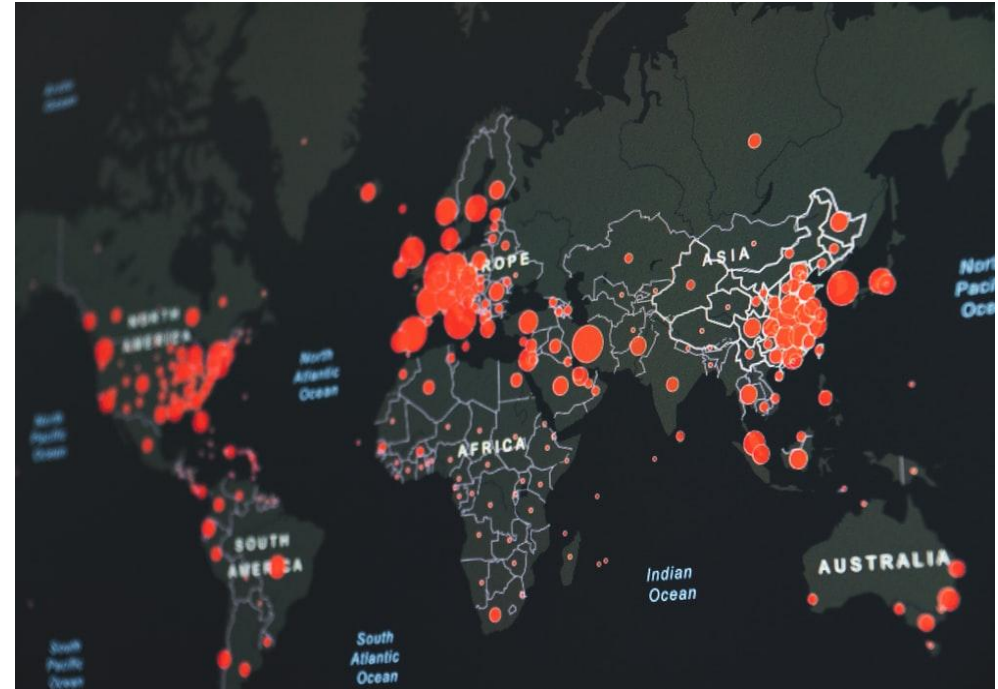
There is a role here for **CIP** that hosts the **WFEO Committee for Disaster Risk Management**

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Will the world come together to collaborate in science and engineering for COVID-19?

- COVID-19 is an unprecedented global pandemic which has resulted in infections in most countries in the world.
- There is an imperative for all nations to work together collaboratively on the detection, response and prevention of this disease.
- Global institutions including the UN, World Bank, governments, NGOs and civil society are working together to solve this problem.
- WFE0 has a role for knowledge transfer and capacity building among its 100 national and regional members.



Implications for the Future

- COVID-19 has accelerated collaboration between governments, universities, research institutions and companies at an unprecedented pace.
- Seemingly insurmountable barriers have fallen away in a few weeks.
- We have invented new technologies in many fields of engineering.
- The good will of engineers around the world, working together in partnership will help to solve not only the problems of COVID-19 but many other global problems.
- This is essential for engineers to facilitate the advancement of the **UN Sustainable Development Goals leaving no one behind.**



Engineering for Sustainable Development



Lessons from COVID-19



- The lessons learned for global collaboration and governance will be important for advancing the UN Sustainable Goals, especially in engineering and advanced technologies.
- **LETS WORK TOGETHER TO LEAVE NO ONE BEHIND!**





Engineering for Sustainable Development

- **Participation**
- **Influence**
- **Representation**



The world's engineers
united in rising to
the world's challenges.
For a better,
sustainable world.



**The World Federation of Engineering
Organizations**

Fédération Mondiale des Organisations d'Ingénieurs