

THE IMPACT OF NATIONAL DISASTERS IN AFRICA AND AN ANALYSIS OF THE ROLE OF BELT AND ROAD INITIATIVES AND CAPACITY-BUILDING PRACTICES.

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**Conference on Integration of Science, Technology & Industrial
Innovation & Inauguration of the ANSO Africa Hub**

27 September 2025 | Addis Ababa, Ethiopia

PRESENTATION OUTLINE

- **About the World Federation of Engineering Organisations (WFEO)**
- **Introduction**
- **Impact of Chinese Cooperation with Africa**
- **Context: Disasters in Africa**
- **Challenges in Disaster Response**
- **The Belt and Road Initiative (BRI) in Africa**
- **Case Studies: BRI & Disaster Resilience**
- **Capacity Building in Africa**
- **WFEO's Engineering Capacity Building for Africa Programme (ECPAB)**
- **Opportunities for Integration**
- **Strategic Recommendations**
- **Conclusion**



ABOUT THE WORLD FEDERATION OF ENGINEERING ORGANISATIONS (WFEO)



- **The global organisation for the engineering profession, representing the interests of more than 30 million engineers**
- **Founded in 1968 under the auspices of UNESCO**
- **100+ national engineering institutions**
- **10+ international engineering institutions representing the interests of engineers along continental lines or specific fields of engineering globally**
- **11 Standing Technical Committees and 3 Working Groups**
- **Supported by a Secretariat based in Paris with the Executive Director as Head and other Secretariat staff.**
- **Executive Board**
- **Executive Council**
- **General Assembly**
- **Established relationship with many UN Agencies/Bodies**
- **Established relationship with other international Non-governmental organisations**



RELATIONSHIP WITH THE UN AND SOME OF ITS AGENCIES.

Through its Professional Societies and Members worldwide, WFEO assists UN bodies with analysing the technical, economic, and environmental feasibility of sustainable development proposals and implementing Best Practices to achieve the Sustainable Development Goals (SDGs).



Member/Co-Leader of UN Scientific and Technological Community Major Group



Associate status with UNESCO



ECOSOC Accredited Body



Consultative status with UNIDO and UNISDR



Member of ITU



Partner status with UN water



United Nations

Department of Economic and Social Affairs



Observer status with IAEA and UNEP





World Federation of Engineering Organizations
Fédération Mondiale des Organisations d'ingénieurs
Official partner of UNESCO (associate status)



PARTNERING ORGANIZATIONS.

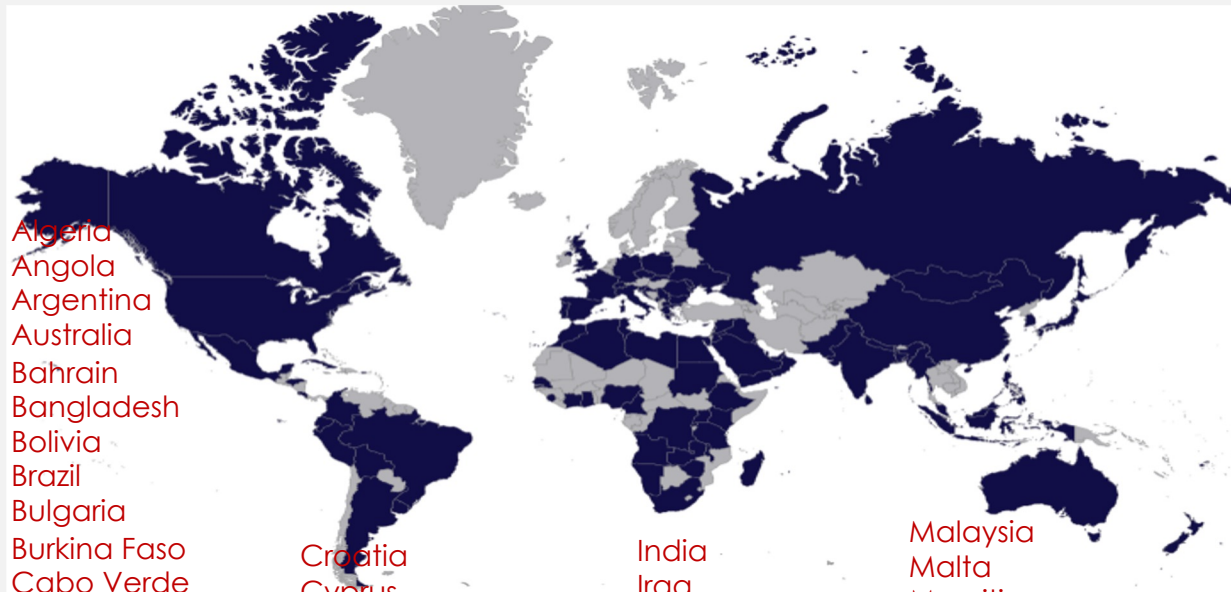


ENGINEERS
WITHOUT
BORDERS
INTERNATIONAL





NATIONAL MEMBERS



Algeria
Angola
Argentina
Australia
Bahrain
Bangladesh
Bolivia
Brazil
Bulgaria
Burkina Faso
Cabo Verde
Cameroon
Canada
China
Chinese Taipei
Colombia
Costa Rica
Côte d'Ivoire

Croatia
Cyprus
Czech Republic
DR Congo
Ecuador
Egypt
Fiji
France
Germany
Ghana
Greece
Honduras
Hong Kong

India
Iraq
Italy
Japan
Jordan
Kenya
Korea
Kuwait
Lebanon
Liberia
Libya
Madagascar
Malawi

Malaysia
Malta
Mauritius
Mexico
Montenegro
Morocco
Mozambique
Myanmar
Nepal
New Zealand
Namibia
Nigeria
Oman
Pakistan

Palestine
Peru
Poland
Portugal
Puerto Rico
Romania
Russia
Rwanda
Saudi Arabia
Senegal
Serbia
Sierra Leone

Singapore
Slovakia
Slovenia
South Africa
Spain
Sri Lanka
Sudan
Switzerland
Syria
Tanzania
Tunisia
Uganda
United Arab Emirates
United Kingdom
United States of America
Ukraine
Uruguay
Yemen
Zambia
Zimbabwe



INTERNATIONAL MEMBERS

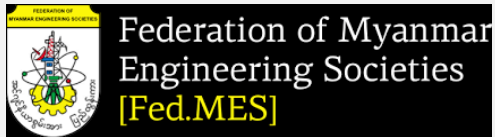




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AFFILIATE MEMBERS





STANDARD TECHNICAL COMMITTEES, POLICY IMPLEMENTATION COMMITTEES AND WORKING GROUPS






- **Engineering and the Environment (Hosted by China)**
- **Energy (Hosted by France)**
- **Engineering Education (Hosted by Myanmar)**
- **Information and Communication (Hosted by Iraq)**
- **Engineering and Innovative Technologies (Hosted by Malaysia)**
- **Engineering Capacity Building (Hosted by Zimbabwe)**
- **Disaster Risk Management (Hosted by Peru)**
- **Anti-Corruption (Hosted by Tunisia)**
- **Women in Engineering (Hosted by Ghana)**
- **Young Engineers/Future Leaders (Hosted by Lebanon)**
- **Water (Hosted by Spain and Portugal)**
- **UN Relations Committee (Hosted by the USA)**
- **Working Group on Climate Change (Hosted by the United Kingdom)**

INTRODUCTION: WHY PARTNER WITH AFRICA – IT IS THE CONTINENT OF THE FUTURE!

That's 1.5 billion people in Africa with:

- Rising middle class
- Growing digital adoption
- Increasing consumer spending
- Massive infrastructure needs

The Numbers Everyone Ignores:

-  Africa's GDP: \$3.4 trillion and growing at 3.8% annually
-  Mobile penetration: 80%+ in major markets
-  Urbanisation: 40% and rising rapidly
-  Demographics the population dividend: 60% under age 25
-  Consumer spending: \$2.1 trillion by 2030

IMPACT OF CHINESE PARTNERSHIP WITH AFRICA

- Chinese megaprojects transforming the Continent of Africa.
 - Lagos-Calabar coastal railway
 - Mombasa-Nairobi railway
 - Addis Ababa-Djibouti railway
 - The Shenzhen of East Africa,
 - Bagamoyo Tanzania
 - Autoroute A1 Algeria (Algeria East–West Highway)
 - New Cairo
 - Congo-Brazzaville Special Economic Zone
 - Lobito-Luau railway, Angola
 - Abuja-Kaduna railway
 - Modderfontein New City, South Africa
 - Kariba South Power Station Expansion Project (300MW peaking plant)
 - Hwange Power Station Extension Project (600MW Coal fired)

IMPACT OF CHINESE PARTNERSHIPS ON AFRICA

- In my opinion, China's engagement has been predominant in the massive investment in inclusive infrastructure throughout Africa. .
- There has been some concern in Africa and Asia that in managing infrastructure projects, China imports most products from China, not only construction materials but even basic foodstuff. This needs a win-win redress to ensure that the massive investments also impact the recipients in terms of capacity building, economic activities and growth for both parties.
- It is therefore most important that African countries take urgent steps to assure that their engineering capacity and education qualifications are substantially equivalent to international standards leading to an adequate pool of indigenous engineering expertise to regulate and uplift their engineering industry for quotas of local content.

IMPACT OF CHINESE COOPERATION WITH AFRICA

- I would like to refer to the book “China Safari: On the Trail of Beijing’s Expansion in Africa” by Serge Michel and Michel Beuret published in French in 2008. Its narrative is by no means sympathetic to China.
- The authors were so assertive in the concluding paragraphs, I quote: **“In the end China has met Africa’s needs head-on and at least established a sound basis for development. If China hadn’t built the infrastructure, especially the communications and electricity networks, no one would have.”**
- The book posits that China’s involvement in Africa has awoken it to the fact that it is not condemned to everlasting stagnation. China is obviously there at the pursuit of its interests but in the process it has offered Africa a future or at least a vision of the future that would have been inconceivable a decade ago.
- **“In the end, China’s arrival has been a boon for a continent adrift, a continent forgotten for too long by the rest of the world. So China has achieved something very important. It has given Africa a real sense of worth, as much in the eyes of Africans themselves as in the eyes of foreigners.”**
- The West has never been more interested in Africa than it is now that China has embarked on an unprecedented cooperation framework. Americans, Europeans, Japanese, and Australians are just some of those who have gotten the message loud and clear.

THE BELT AND ROAD INITIATIVE (BRI) IN AFRICA

- Over 50 African nations are engaged with BRI one way or the other
- Investment in transport, energy, ICT & industrial hubs
- Potential to integrate disaster resilience into infrastructure
- Opportunities: knowledge transfer, tech adoption, financing

ONE BELT ONE ROAD

- The B&R routes run through the continents of **Asia, Europe and Africa**, connecting the **vibrant East Asia economies at one end and developed European economies** at the other.
- The **Silk Road Economic Belt** focuses on bringing together **China, Central Asia, Russia and Europe**, linking **China with the Persian Gulf and the Mediterranean Sea through Central Asia and the Indian Ocean**. The Maritime Silk Road is designed to go from China's coast to Europe through the South China Sea and the Indian Ocean in one route, and from China's coast through the South China Sea to the South Pacific in the other.
- Due to the sheer magnitude and spread of B&R Initiative, there have been doubts raised in the North whether China can fulfil her B&R Commitments.
- I am very optimistic for the following reasons:
 - China graduates more than **one million engineers a year** to supply needed skilled human capital for her infrastructure construction and related industries.
 - China has her financial wherewithal with China's foreign exchange **reserves crossing the US\$3.32 Trillion** mark by early 2025.
 - China's **tremendous infrastructure development at home and her cutting edge engineering, manufacturing and project management capabilities and capacities**.
 - China has taken over **800 Million people out of poverty** since the start of its reforms in 1980. Remarkable achievement indeed.

CONTEXT: DISASTERS IN AFRICA

- Africa disproportionately affected by cyclones, floods, droughts, epidemics
- Annual economic losses: > USD 12.7 billion (Coalition for Disaster Resilient Infrastructure –CDRI 2024) due to damaged infrastructure and buildings from natural disasters.
- Many African countries report losses of 2-5% of GDP annually on average due to climate extremes and related disasters.
- Considering broader economic, social and indirect impacts the loss could reach 30-50 Billion USD p.a.
- Human toll: loss of lives and millions displaced, food insecurity, public health crises
- Climate change intensifying frequency & impact

CHALLENGES IN DISASTER RESPONSE

- Weak early warning systems
- Inadequate infrastructure resilience
- Limited funding & fragmented policies
- Skills gap in science, engineering & disaster risk reduction

CASE STUDIES: BRI & DISASTER RESILIENCE

- Mozambique cyclones: Cyclone Idai was a wake up call for resilient bridges/roads
- Ethiopia & Kenya: rail/energy systems with resilience frameworks
- Public Health: China-Africa CDC & AI-driven epidemic surveillance

WFEO CECB ROLE IN DRR

Through the **WFEO Capacity Building Committee**, we have actively promoted:

- **Knowledge transfer and skills development** in disaster prevention engineering;
- **Regional collaboration frameworks** that support engineering capacity for early warning systems and emergency response;
- **Inclusive training programs** targeting engineers and stakeholders in under-resourced regions;
- Contributions to global dialogues on integrating sustainable engineering into disaster resilience planning.

CAPACITY BUILDING IN AFRICA

- Importance of STEM skills & engineering institutions
- Agenda 2063 & SDG 13: Climate Action
- WFEO, FAEO, ANSO Hub roles:
 - Training programs
 - Open science collaboration
 - Regional knowledge-sharing



THE IMPORTANCE OF ENGINEERING CAPACITY BUILDING FOR SDGS

Global Sustainable Development Report (GSDR) 2023

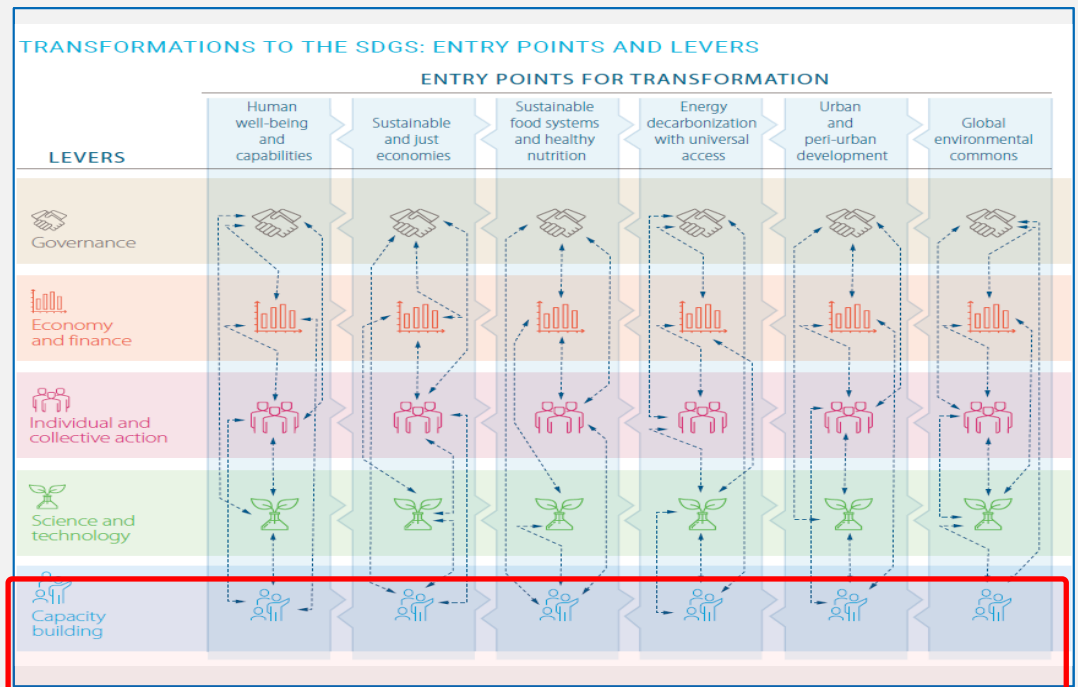


Capacity building in all countries is needed to support decisive and transformative action through any entry point.

Capacity building needs to be applied cohesively with and in support of other levers including governance, business and finance, individual and collective action, and **science and technology**.



Source: p2, GSDR 2023 Key Message



Entry Points and Levers for Transformations to the SDGs | Photo: 2023 GSDR



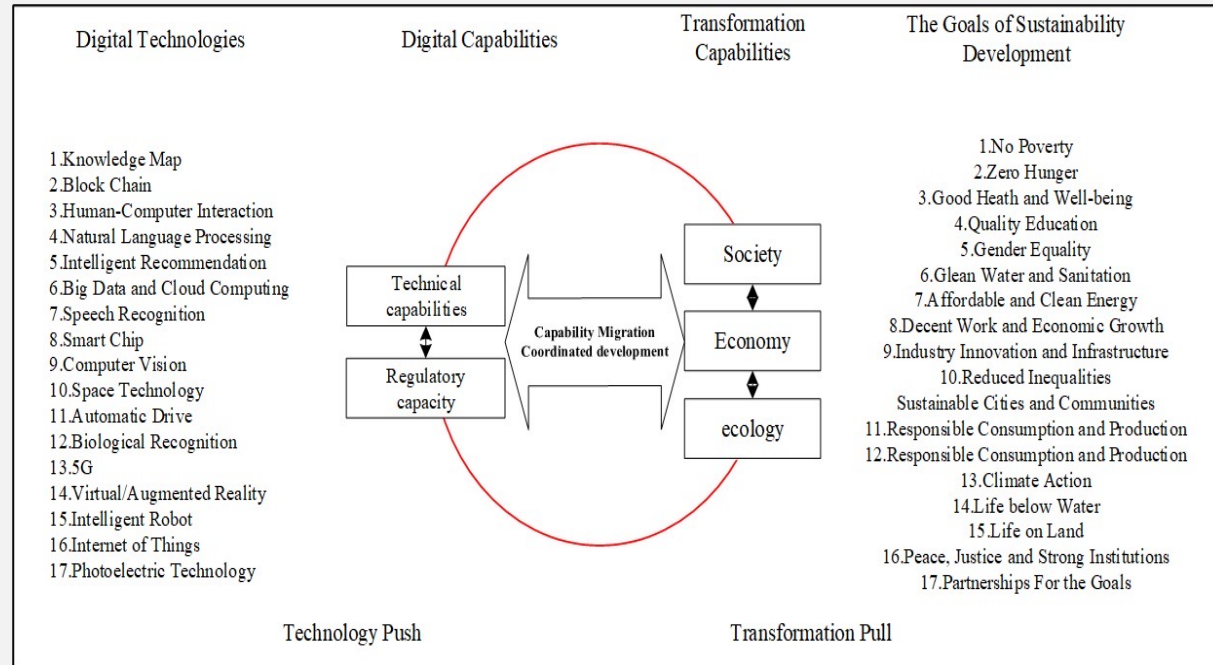
CAPABILITY FOR DIGITAL AND SUSTAINABLE DUAL TRANSFORMATION

Resolution adopted by the General Assembly
 on 21 March 2024

[without reference to a Main Committee (A/78/L.49)]

78/265. Seizing the opportunities of safe, secure and trustworthy artificial intelligence systems for sustainable development

Expanding participation of all countries, in particular developing countries, in digital transformation to harness the benefits and effectively participate in the development, deployment, and use of safe, secure, and trustworthy artificial intelligence systems, including **by capacity building relating to artificial intelligence.**





CHALLENGES

The multiple dimensional contents of “Capacity” : Technical, Economical, Environmental, Social and Organizational Dimensions

- *to make innovative curriculum design by embedding the considerations of environmental impacts, social inclusion, etc. into technical upskilling contents*

The diversity of engineering profession in technology

- *to find a handle (emerging digital technology, especially big data and AI, which is relevant to and could empower all engineering profession*

The lack of infrastructure and financial funds

- *to work with partners together to combine and leverage in given resources*
- *to engage governmental, nongovernmental organization and cooperate in to the program*

OPPORTUNITIES FOR INTEGRATION

- Start Partnerships in DRR
- Embed DRR into BRI projects
- Harness AI & digital tech for early warning & response
- Strengthen regional centers of excellence (AAHSI)
- Mobilize financing for resilient infrastructure

THE WFEO IS IMPLEMENTING THE UNGA RESOLUTIONS OF AI IN ENGINEERING CAPACITY BUILDING

Resolution adopted by the General Assembly
on 21 March 2024

[without reference to **Seizing the opportunities of safe, secure and trustworthy AI systems for sustainable development**

78/265. Seizing the opportunities of safe, secure and trustworthy artificial intelligence systems for sustainable development

“**Expanding participation of all countries**, in particular developing countries, in digital transformation to harness the benefits and effectively participate in the development, deployment, and use of safe, secure, and trustworthy artificial intelligence systems, including by **capacity building relating to artificial intelligence**.”

United Nations

A/78/L.86



General Assembly

Distr.: Limited
25 June 2024

Original: English

Seventy-eighth session

Agenda item 13

Integrated and coordinated implementation of and follow-up

to the

summary

Enhancing international cooperation on capacity building of AI

Algeria, Burundi, Cambodia, China, Congo, Cuba, Dominica, Egypt, Equatorial Guinea, Eritrea, Gabon, Indonesia, Iran (Islamic Republic of), Iraq, Kazakhstan, Lao People's Democratic Republic, Liberia, Nicaragua, Nigeria, Pakistan, Qatar, Sierra Leone, Syrian Arab Republic, Uganda, United Republic of Tanzania, Venezuela (Bolivarian Republic of), Zambia and Zimbabwe:
draft resolution

Enhancing international cooperation on capacity-building of artificial intelligence

BACKGROUND: SDGS PROGRESS IN AFRICA AND CAPACITY BUILDING

For Africa, **less than 17 percent** of the 17 measurable SDGs are on track to be achieved by 2030. Progress on the SDG agendas varies across subregions, but **none of the subregions is on track to achieving the SDGs.**



On 25 August 2023, the 78th United Nations General Assembly adopted a resolution proclaiming 2024-2033 the International Decade of Sciences for Sustainable Development (IDSSD). The General Assembly recognised that developing countries face specific challenges in accessing new sciences and technologies, stressing the need to bridge the divides within and between nations and highlighting the importance of financing and **capacity-building**.

SOLUTIONS

The Concept

WFEO's new Africa Program

WFEO recognises the importance of **capacity building** for Africa to achieve the goals outlined in the Africa Agenda 2063 and to accelerate the implementation of the SDGs of the UN's 2030 Sustainable Development Agenda.

To address this need, WFEO proposed a 10-year Engineering Capacity Building for Africa Programme initially funded by the China Association of Science and Technology (CAST).



The Objectives



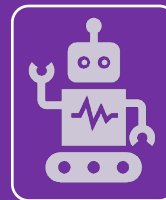
Enhance Capacity in Engineering Education

- to improve the quality and relevance of engineering education across the continent



Enhance Capacity in Continuous Professional Development

- To enhance technical and soft skills required for Africa's digitalization and green transition



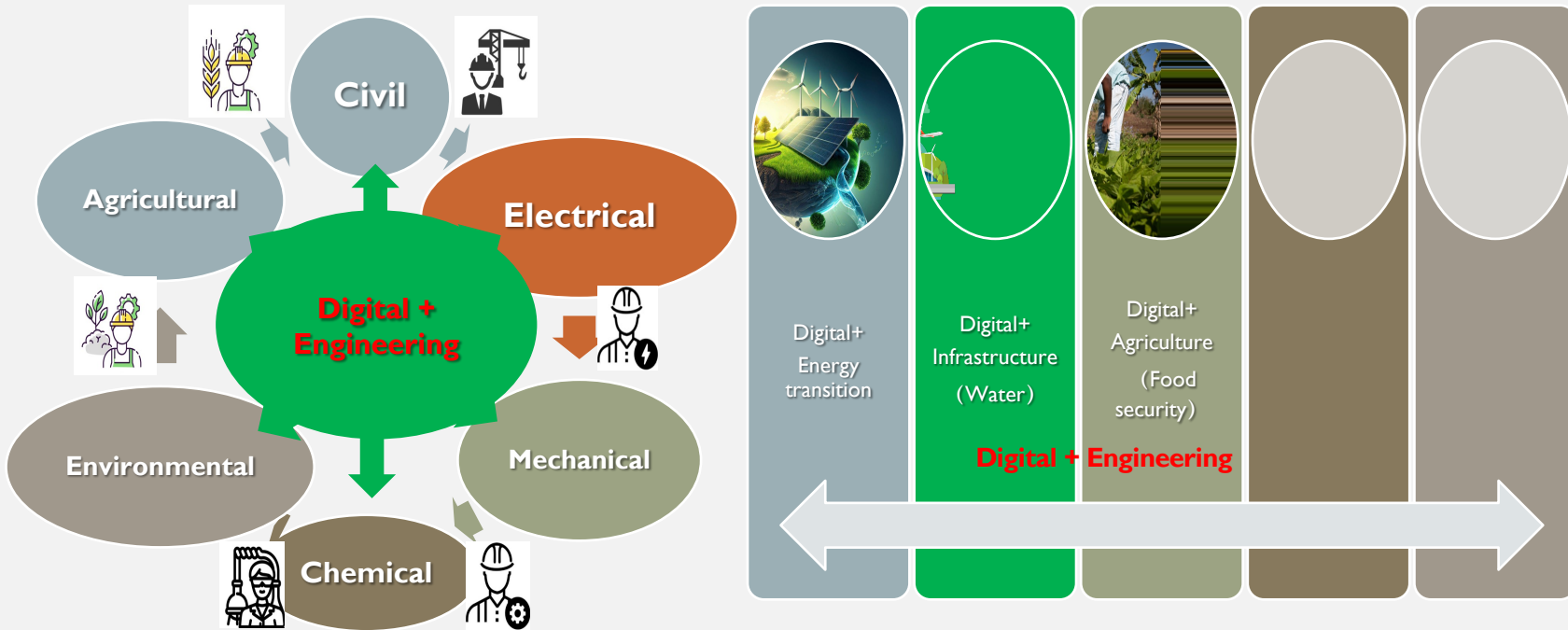
Enhance Capacity in Technology Transfer

- to harness advanced technologies to address Africa's developmental challenges and promote innovation

WFEO ECBAP

The WFEO ECBAP Uniqueness is its Emphasis on Leveraging Digital + Engineering Capability to implement SDGs

Digital + Engineering



STRATEGIC RECOMMENDATIONS

- 1) Africa-China Disaster Resilience Knowledge Exchange Program
- 2) Prioritize climate-smart infrastructure in BRI
- 3) Foster trilateral cooperation (Africa–China–Global)
- 4) Expand WFEO/FAEO leadership in capacity building
- 5) Leverage AAHSI as platform for AI-driven DRR innovation

CAPACITY BUILDING FOR CREATING RESILIENT COMMUNITIES THROUGH INNOVATION, COLLABORATION,

Take aways:

- **Share best practices** from WFEO initiatives across Africa, Asia and other regions; these include use of technology especially Big Data Analytics, AI, and various remote sensing technologies for early warning systems, detection, mitigation and other interventions.
- **Highlight the role of engineering in climate adaptation and infrastructure** resilience;
- **Advocate for stronger integration between international cooperation and local capacity building in the Belt and Road region;**
- Foster new partnerships for collaborative training and research in disaster mitigation.

Our shared goal is to develop **resilient communities** through innovation, collaboration, and engineering leadership—ensuring no region is left behind in disaster preparedness and sustainable development.

The world engineering community is united in rising to **the global challenges which are more dire in Africa, through collaboration with stakeholders, for** a better and more sustainable world.

CONCLUSION

- Disasters threaten Africa's sustainable development
- BRI offers Win-win pathways for resilient growth
- Capacity building is a key enabler in the BRI and **the ANSO Africa Hub of Science and Innovation** is a practical way to improve the Africa China Partnerships.
- **Collective action** ensures **science-driven resilience**

THANK YOU

- Contact: Dr. Eng. Martin Manuhwa
- Vice President, WFEO | Chair, WFEO CECB

“Resilience is not built in the absence of challenges, but through collective innovation and cooperation.”



**It always seems
impossible until it's done.**

Nelson Mandela