

Problem Based Learning: Teaching engineers to tackle the SDGs





ROYAL
ACADEMY OF
ENGINEERING

16

**PEACE, JUSTICE
AND STRONG
INSTITUTIONS**



Wahidullah Azizi

The Royal Academy of Engineering

Nathalie Guillaume

The United Nations

Introduction:



- MBA from Cardiff Metropolitan University, UK, MSc. Chemical Engineering, Kabul Polytechnic University, and a One Year MIT Fulbright fellowship Scholarship in Urban and Regional Studies, also I achieved qualification in Coaching, Management and Leadership from UNITAR, Japan,
- As an advisor/manger managing humanitarian, rehabilitation, and development projects and in Asia mainly in Afghanistan and Pakistan.

‘The role of Engineers in promoting peace, justice, and strong institutions’



1. Humanitarian activities - Lifesaving operations in Afghan Refugee Camps in Pakistan 2000-2002:



Pakistan seeks world support to repatriate 3m Afghan refugees

- International Rescue Committee (**IRC**)
- Program for Afghan Refugees in Pakistan (**PARP**)
- Water Sanitation and Hygiene (**WASH**) projects in Refugee Camps
- Access to safe drinking water, sanitary latrines, and washrooms, and hygiene kits for nearly **35,000 refugees** (men women, and children)
- in the summer of **45 – 50 °C** applying Sphere Standards



2. Rehabilitation activities to support repatriation 2002 - 2004:



- United Nations Development Programme (**UNDP**) supporting Ministry of Rural Rehabilitation and Development (**MRRD**)
- National Area Based Development Programme (**UNDP/NABDP**)
- Reconstruction rural engineering infrastructures such as roads, schools, and health centres damaged during **Afghan – Russia War**
- Bottom up planning process where people made decisions on their priorities for the **new government**.



3. Development activities (2004 – 2007):



- United Nations Office for Project Services (**UNOPS**) supporting Ministry of Public Works (**MPW**) and Ministry of Rural Rehabilitation and Development (**MRRD**).
- National Rural Access Programme (**NRAP**)
- Managed the construction of **100kms of roads**, bridges, culverts, and other road infrastructures
- Bottom up planning process, developed the first **5 year Interim Rural Roads Master Plan and Investment Plan for Afghanistan**



3. Development activities (2004 – 2007):



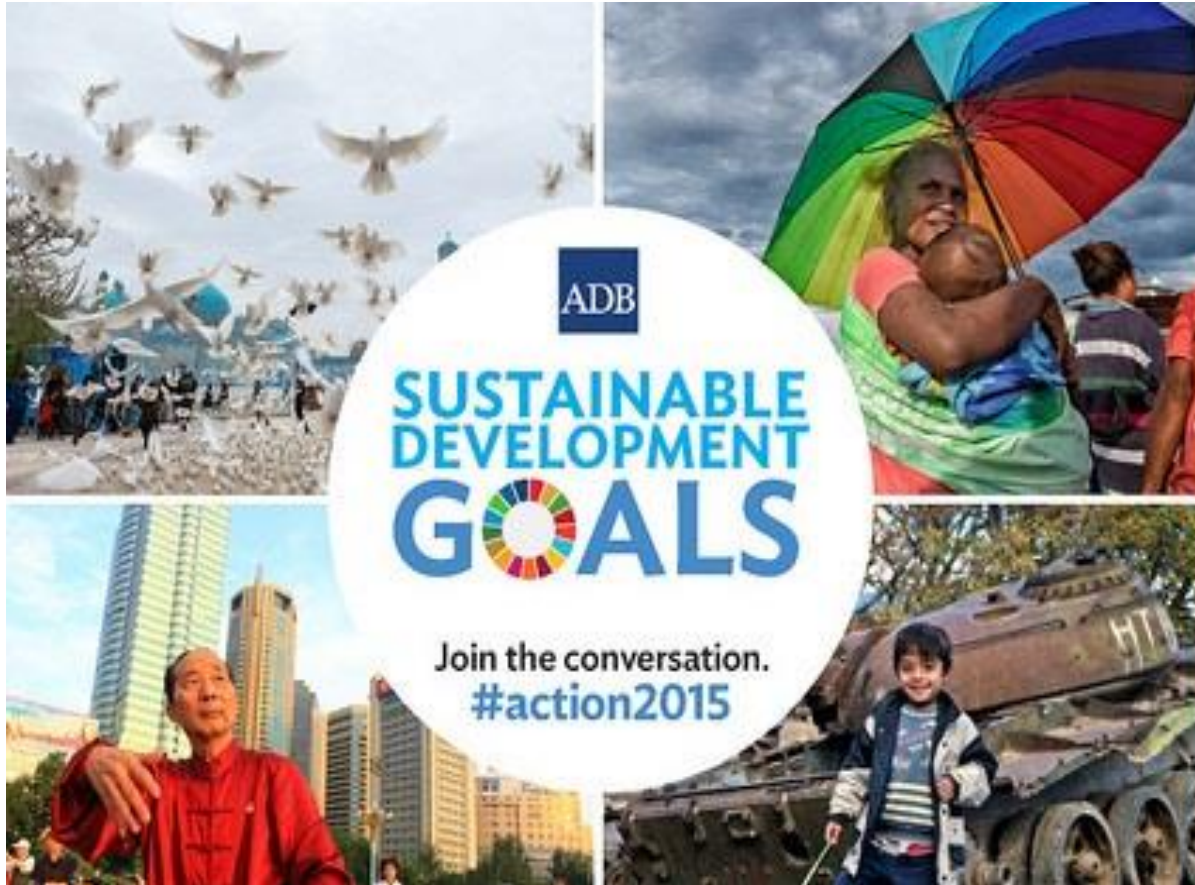
As a result of improving access; millions of rural communities have actively taken part in presidential and parliamentary elections since 2004.



What is the situation now?



Building peace engineering



16 PEACE, JUSTICE
AND STRONG
INSTITUTIONS



Provide peaceful and
inclusive societies
for sustainable
development, provide
access to justice for all

WHO DOES IT AFFECT?



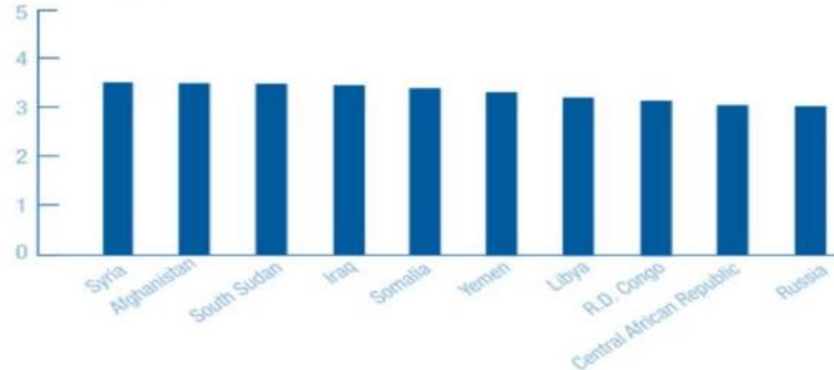
Corruption bribery, theft and tax fraud cost **\$1,260 million a year** in developing countries. Some **68.5 million people** displaced from their homes and **28.5 million children** do not go to school because of armed conflicts. **31 world's jail population** have been imprisoned without due process.



HOW IS THIS DISTRIBUTED AROUND THE WORLD?



The 10 least peaceful countries (with the lowest Global Peace Index) are in Asia (45%), Africa (50%) and Europe (5%):



MAIN CAUSES

Religious conflicts; the **political and economic interests** of countries, **social and economic inequalities**, which create a breeding ground for **political extremism, conflict and violence;** and the support of the **arms industry** by certain organisations and countries.



« Sustaining peace should be broadly understood as a goal and a process to build a common vision of a society, ensuring that the needs of all segments of the population are taken into account, (...) moving towards recovery, reconstruction and development (...) » [UN SC Res 2282 (2016) and UNGA Res 70/262]





Putting SDG16+ into practice

11 steps to promote peace, justice and inclusion



What is SDG16+?

The 17 Sustainable Development Goals (SDGs) include SDG16, as well as a number of targets under other goals that are also critical for building peaceful, just and inclusive societies – particularly SDG5 on promoting gender equality and SDG10 on reducing

inequalities. The term 'SDG16+' is used to describe these commitments across the 2030 Agenda, and it provides a framework for comprehensive action on a range of peace-related issues.

For more see: https://cic.nyu.edu/sites/default/files/peaceful_just_inclusive_targets_analysis_aug2016.pdf

Why this approach?

To achieve the 2030 Agenda commitments to peace, justice and inclusion depends on engagement, ownership and action on SDG16+ by a range of people and institutions at national and sub-national levels. There is no blueprint for this process, but – based on

Saferworld's experience of testing approaches with partners over several years – we have identified lessons on how to catalyse and support a locally-led process. These lessons are illustrated above.

For more see: <https://www.saferworld.org.uk/global-action-against-conflict/2030-agenda>

Challenges

Illegal logging, waste trafficking, corruption and bribery, plundering, exploitation of natural resources and poaching are examples of **GOVERNANCE AND ENFORCEMENT FAILURES**



ILLEGAL TRADE IN ANIMALS AND PLANTS - including **TIMBER AND CHARCOAL** - is a large source of **CRIMINAL EARNINGS** in the world, estimated to be worth \$50 to \$150 billion per year



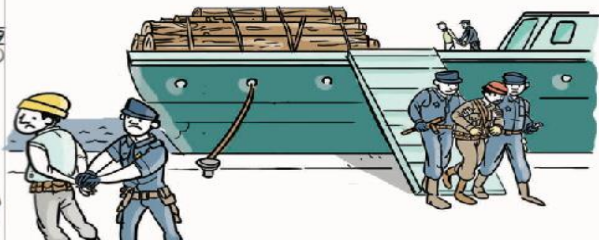
Revenues generated by **ENVIRONMENTAL CRIMES** enrich international criminal cartels and **FUEL CONFLICTS** across the world



Solutions



STOP all forms of **ENVIRONMENTAL CRIMES**



DEVELOP EFFECTIVE, ACCOUNTABLE AND TRANSPARENT INSTITUTIONS at all levels



PROVIDE ALTERNATIVE LIVELIHOODS to those at the bottom of the criminal chain

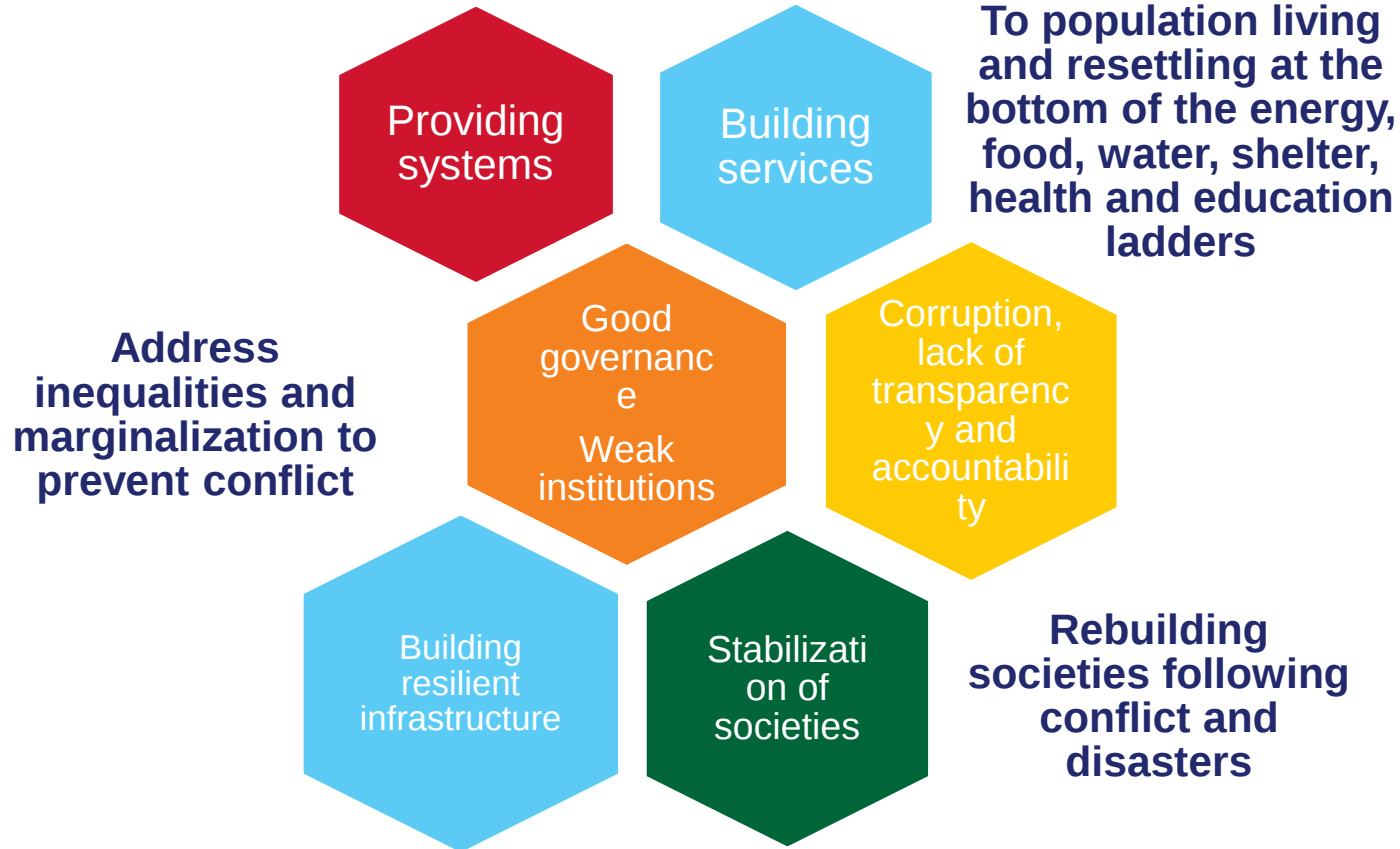


Peace Engineer is an expert in the field of peacemaking who can:

- facilitate a dialogue for renewal of social relations after destructive conflicts
- act as a mediator during destructive conflicts in order to stop or prevent escalation of tensions and violence
- carry on negotiations in order to initiate or restore peaceful processes in the communities
- develop projects for strengthening peaceful cooperation in the communities of different regions of the country
- run workshops, consultations and supervision in this field of activities



Engineers' contribution to peace



Social responsibility of engineers



The Data Society

Gathering big data is often a misunderstood concept. What does it really mean, and how can it be beneficial to society? Data is a valuable resource for companies, but it can also be used to empower citizens. At Intel Labs, data comes alive to make life better for people.

The Big Picture

Here are some of the many areas that benefit from collecting and sharing data.

DAY TO DAY PLANNING

Apps like Saga integrate all applicable social networks to give an idea of how the user spends his/her day, and how to make life more efficient.



Engineers are creating solutions to protect user privacy while transferring data.

85% of mobile and computer users say that they have taken steps to protect their privacy.

TRAFFIC PATTERNS

Sites use data to show available spots in private driveways or in parking lots whose owners subscribe to the service.

THOUGHTFUL GIFT-GIVING

Intel Labs is working on data in the form of shopping histories and digital wish lists that can help you give personalized presents.

HEALTH AND FITNESS MANAGEMENT

The Intel Science and Technology Center for Big Data is working to advance genomics analysis, which allows patients to assess their chances of contracting an inherited disease by looking at DNA patterns.

TRAVEL BOOKING

Some apps can make personalized itinerary suggestions to users based on collected data from sites like Facebook and Expedia.

2.5 quintillion
Bytes of data created every day.

Did you know?
90% of the data in the world was created just in the past two years.

500,000
The number of jobs expected in five years just to be able to process data.

How Data Can Change the World

How can people access it to make their lives better? Intel Labs put a premium on research that can benefit billions of people around the world.



Prediction

Use of sensors to monitor extreme weather conditions to be able to distribute real-time information.



Prevention

The United Nations' Global Pulse Initiative maps data to point out vulnerable areas.



Protection

Data collected by satellites allows scientists to map trends and detect changes brought by deforestation and climate change.



Source: Urban population growth (World Health Observatory); Cisco Visual Networking Index; Global Mobile Data Traffic Forecast Update 2012-2017; Intel Data

☺ Schoolchildren celebrate
a new bridge in Soweto East,
Kenya, avoiding the open
sewer below.



Peace Engineering in post-conflict

New mission: better design things for communities in or just out of conflict to further social cohesion and foster a lasting peace.

- The key is to start thinking about this **from the beginning of the design process.**



- How to **apply engineering practice to peacebuilding efforts**: *mapping and design of roads* can illustrate the virtues of peace engineering:



- In a dictatorship, for example, the government would usually like big sweeping roads designed for a quick exit and minimize smaller roads, sidewalk space and squares where people can meet and exchange ideas.





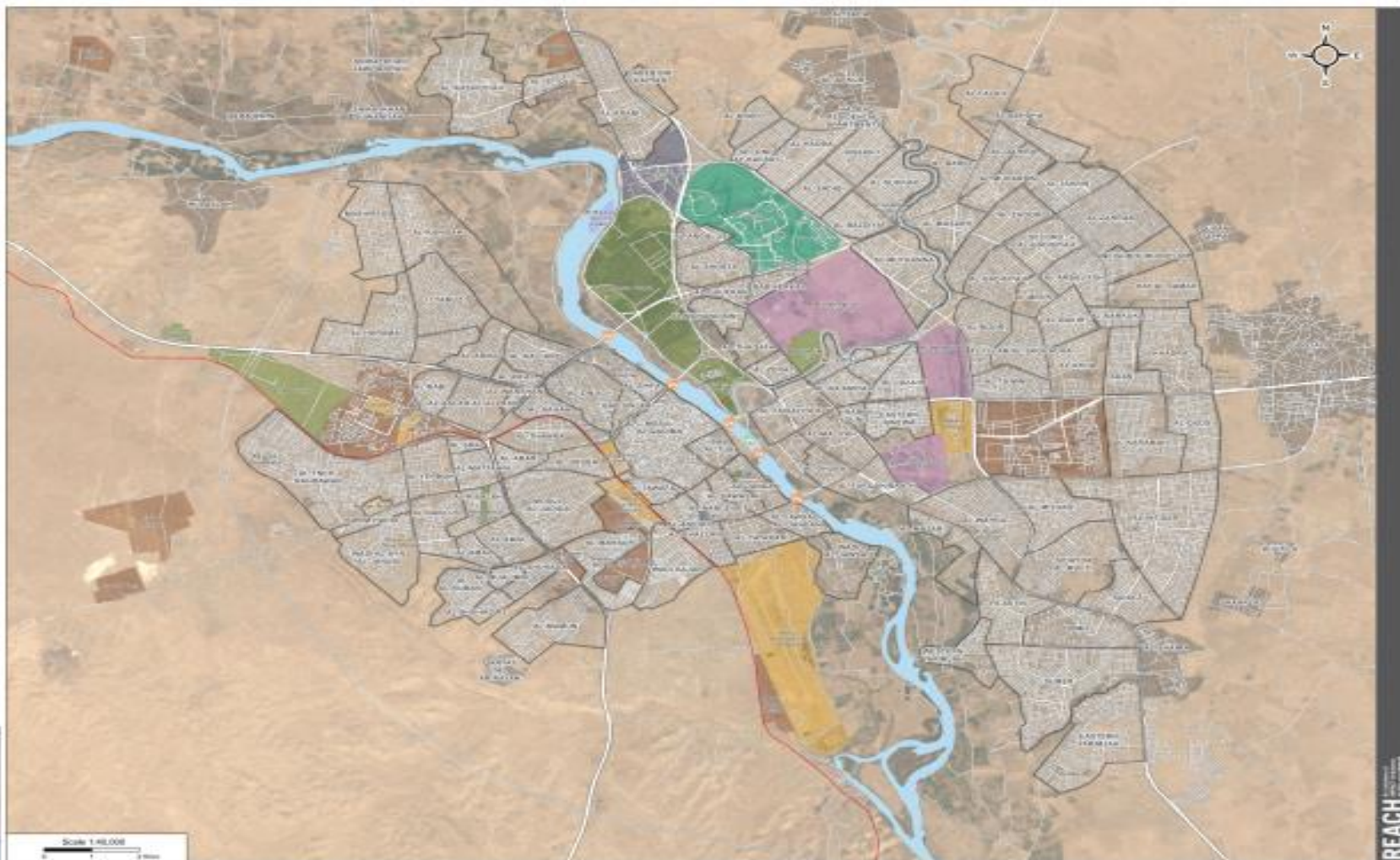
- Neighbourhood
- Village
- Education
- Government
- Industrial
- Park/Forest
- Services
- Tourism

- Destroyed
- Damaged Bridge
- Temporary Bridge

- Railway
- Road
- River

Data source:
Neighbourhood: OSM, GNHinter
Road and railway: OSM
City infrastructure: OSM, GNHinter, MC
Lake (river): OSM
Satellite imagery: Sentinel-2 from 2016/2017
Copyright: ESA
Source: Copernicus Open Access Hub
Population: WGS 1984 UTM Zone 38E
Contact: map@reach-iraq.org
File: 9102_Map_Mosul_L00_06Nov2017

Note: Data, integrations and boundaries contained on this map are not warranted to be accurate and do not imply acceptance by the UN/ACH partners - information is shown as-is on this map.



The need for peace engineering in Sudan

- Signing of the Comprehensive Peace Agreement, only a few Sudanese refugees have returned home.
- **Lack of infrastructures** such as schools, hospitals and houses.
- Unemployment or lack of economic activities to support normal livelihood.
- **Lack of traditional building materials in Sudan** largely made of a clay/silt soil, known as 'Black Cotton Soil', which requires special, and expensive, construction designs and techniques.
- **Deforestation** caused by excessive use of trees used to produce burnt bricks.
- **Lack of road infrastructure** makes transport very expensive and limits it to the dry seasons





© Typical African hut with its mud and pole construction.

Engineers must embrace a *new mission statement* : *promoting a culture of peace and building a more sustainable, stable, equitable, resilient and peaceful world.*

Engineers Without Borders, the EWB-International network, and the Mortenson Center in Engineering for Developing Communities developed programs that are designed to make student engineers and professionals *think globally and act locally*, become more *global thinkers and doers* aware of the **consequences of their decisions** on the design, planning, management, and operation of projects in different socioeconomic, cultural, and political situations.



Building a new engineering practice



How can engineers best be equipped with the **attitudes, skills, and knowledge** necessary to work at the intersection between what is expected of them by society in their professional careers and the peace-related activities mentioned above?



Peace engineering programs are crucial to educate global engineers with the attitudes, hard and soft skills, and knowledge necessary to work in the complex and challenging context of human development in their lifetime.

As part of creating the global engineering education of the future, there is an urgent need to develop a **comprehensive body of knowledge on peace engineering and engineering diplomacy** that emphasizes the professional and ethical obligation of engineers to be able to address complex issues.



Building a new practice for global citizens

Only two educational programs in the USA have started to examine the body of knowledge of peace engineering:

- the University of St. Thomas in Minneapolis;
- the Drexel University in Philadelphia.

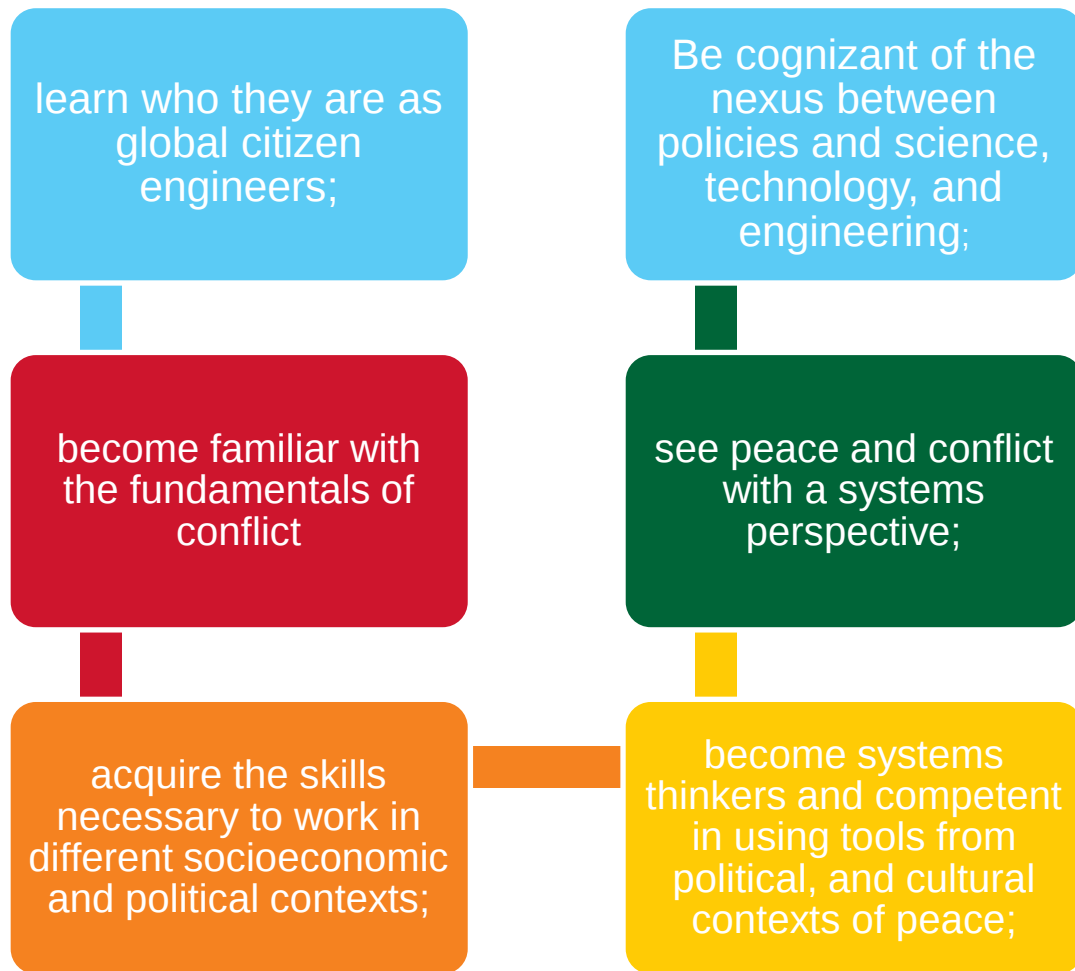
These two peace engineering programs represent a first step **towards educating global engineers to be more than just providers of technical solutions.**



A second step in scaling up peace engineering at the international level is to **establish a multi-disciplinary and international community of practice** to help shape the education, research and development, outreach, and practical components of this newly emerging field of engineering.

Another step is to recognize that, at a minimum, any peace engineering program should give engineers the tools and mobility to :





The need for a community of practice in peace engineering



Scientists and engineers need to become aware that they are more than providers of scientific and technical knowledge and solutions. They can also be **entrepreneurs, peacemakers, and facilitators of sustainable human development.**

Engineers need to actively **take the lead in developing a peace-industrial complex.** It is therefore essential to scale up and advertise engineering diplomacy initiatives so that they become standard practice.

That community of practice is necessary to develop a body of knowledge to train STE people in the fundamentals of diplomacy and diplomats in integrating science, technology, and engineering in their day-to-day decision making.

This would represent a springboard for **innovation, business development, and job creation,** and provide a **powerful platform for recruiting more young people to various fields of engineering.**