
35th WEDC International Conference, Loughborough, UK, 2011

THE FUTURE OF WATER, SANITATION AND HYGIENE:
INNOVATION, ADAPTATION AND ENGAGEMENT IN A CHANGING WORLD

Capacity building in the engineering environment: the WFEO guidebook

*D. Clinton, A. Cleland, D. Botha, K. Wall, M. Sanio,
D. Negussey & S. Lewis, USA*

BRIEFING PAPER 1097

The Standing Committee on Engineering Capacity Building of the World Federation of Engineering Organisations (WFEO) in October 2010 launched the first edition of a guidebook setting out its understanding of the challenges and complexities facing the engineering community regarding capacity and sustainability issues. The guidebook suggests approaches to the building of human resources and capability, and presents a collection of philosophies, programmes, initiatives and good practices collated from the experiences of a range of engineering organisations and engineering professionals.

Background

The World Federation of Engineering Organizations (WFEO) was founded in 1968 under the auspices of the UNESCO, the agency of the UN that is the generator of ideas and setter of standards in the fields of education, science, culture and communication. WFEO brings together national engineering organizations from over 90 nations, representing 8 million engineers from around the world. It co-operates with national and other international professional institutions in developing and applying engineering to the benefit of humanity. One means of accomplishing this goal is the formulating of advice and collation of experience, prepared independently of any commercial bias, which would be of assistance to others, such as governments and international agencies.

A case in point is the collaboration, with UNESCO, on capacity building in the engineering environment.

Both UNESCO and WFEO are of the view that given the strong relation between, on the one hand, creation of a critical mass of educated and skilled engineering and science graduates and, on the other, economic and social development, stronger efforts should be made to develop and build these capacities in developing countries. However they are also of the view that the decline in recognition of the role of engineering in many developed countries necessitates that a similar approach should be followed in all countries.

WFEO recognizes the need to identify, assemble, share and (if feasible) promote the production of material that could facilitate and assist with capacity building. It also recognizes the integration of effort that is required to undertake successful capacity building. It realised that the most suitable way to do this would be through the production of a guidebook for capacity building in the engineering environment and an associated compendium of programmes and initiatives.

Introduction

This guidebook was prepared by a multinational team from within WFEO membership which drew upon other colleagues and upon their networks of international contacts among professionals active in capacity building in the engineering environment.

The guidebook was launched at the WFEO World Engineers' Week in Buenos Aires in October 2010. It sets out suggested approaches to the building of human resources and capability. This capability would not only be in respect of engineering – although the guidebook's emphasis is on engineering.

The principles and ideas proposed in the guidebook are not position papers or policies of either UNESCO or WFEO, but represent a collection of philosophies, programmes, initiatives and good practices collated from the experiences of a number of engineering organizations and engineering professionals.

It is envisaged that the guidebook will be utilised as a source of reference to assist the creation of common understanding, the improvement of decision making, the promotion of integrated and multidisciplinary modes of development, and the improved planning and implementation of development programmes and initiatives.

The nature and role of capacity building

A generic definition of capacity building is:

“The building of human, institutional, and infrastructure capacity to help societies develop secure, stable, and sustainable economies, governments, and other institutions through mentoring, training, education, physical projects, the infusion of financial and other resources, and, most importantly, the motivation and inspiration of people to improve their lives.” (Hatch 2004)

Engineering professionals could confine their role to being only the planners, designers, constructors, operators and maintainers of infrastructure and services. Being professionally responsible demands however that engineers take a wider role upon themselves. This wider role includes a recognition that engineers need to facilitate and enhance not only their own knowledge, but also the knowledge of others, in order that decisions taken will ensure that engineering infrastructure is sustainable and that it is fit for its purpose -- which is to underpin quality of life and the economic well-being of communities and nations.

It is becoming increasingly evident that, in spite of well developed technical engineering expertise and solutions, the complexities to create and provide even basic infrastructure services are proving to be beyond the capacity of many governments, institutions and communities. There is ample evidence that in many countries – including developed nations – there is a steady loss of informed decision-making capacity where infrastructure and the built environment are concerned.

Across the world, there is insufficient understanding of the need for infrastructure and services, and of how to develop, deliver, operate and care for that infrastructure and services. This demands action from the engineering profession. However efforts to deliver what is right, feasible, appropriate and affordable are often not taken seriously enough, or even ignored. Capacity -- of a variety of institutions and individuals, and in respect of this understanding -- needs to be built.

The guidebook -- a compilation of advice

The guidebook presents a compilation of advice drawn from the experiences of the international engineering community, clustered under a set of headings which represent an idealised project:

- Researching needs: How to work with communities and institutions in order to establish their needs.
- Defining and influencing public policy: How to work with governments in participating nations to make the case for increasing resources for capacity building programmes, particularly emphasising the international evidence that building technical capacity has been vital to alleviating poverty, improving quality of life and building prosperity in nations.
- Educating, training and developing skills: How to develop and implement qualifications, ethics and competence standards in participating nations, including building of skills in the educators themselves, and providing suitable teaching resources.
- Participating: How to attract and retrain citizens towards education in engineering, in order to build a demographically representative and local or indigenous technical skills base.
- Building networks and support systems: How to build governance and representative structures and institutions to support all the above.
- Developing technical and business standards: How to develop a framework of standards, together with systems to improve adherence to these standards.
- Executing projects throughout their lifecycle: How to identify, and apply, factors key to taking projects from their initial conceptualisation right through to their successful completion, and subsequent successful operation.
- Obtaining and using external funding: How to apply for, and use, external funding.

The guidebook presents a number of case studies in order to illustrate how capacity can be built in widely varying circumstances -- such as South Pacific island nations with small populations, war-torn nations which have rebuilding needs, or nations rich in natural resources but poor in infrastructure development.

Examples are presented in the guidebook of the capacity that may be needed by communities and institutions, particularly in respect of:

- Skills: Including skills that are technical, financial, and people-oriented.
- Resources: Including finance, training programmes and mentoring processes, and policies (particularly public policies).
- Decision-making mechanisms: Including policies, prioritisation rules and mechanisms, risk analysis and policies, incentives, ethics, standards, and trade-off mechanisms -- but more than these. And recognizing:
 - that choices are never absolute, but are invariably between alternatives;
 - the importance of understanding that results depend on a chain of factors, and of identifying (and addressing) the weakest links; and
 - the importance of the "80/20 rule" and of getting the basics right.
- Administration and systems: Including governance, laws and regulations, procurement, monitoring and evaluation, and feedback loops.

The institutions referred to could include:

- Indigenous institutions (i.e. from the nation where the capacity building is taking place), as opposed to foreign; or
- Informal institutions (such as unorganised communities), as opposed to formal; or
- Public sector institutions, including government itself, parastatals, and semi-government agencies and utilities, as opposed to community-based organisations and non-governmental organisations, as, in turn, opposed to the private sector.

Not only would each developmental situation require capacity building specific to that situation, but each institution significant to that situation would require capacity building appropriate to its own needs.

Finally: It is important that the parties involved in capacity building are not referred to as "contributing" or "receiving". For a number of reasons, not least that, in the authors' experience, all parties receive during a capacity building process, and all contribute. The increase in capacity is not a uni-directional phenomenon -- rather, all should be referred to as "participants".

The compendium

A resource additional to the guidebook, and complementing it, will be a compendium of programmes, projects, and initiatives. The compendium is however intended to be more than just a resource to be consulted. The intention also is that it will stimulate exchange of ideas, and that the best of these will be captured and added to the compendium. This exchange of ideas will also no doubt identify aspects that need to be covered -- hopefully that will, in turn, stimulate the development of programmes and initiatives that could fill the gaps.

The compendium cannot therefore be a static document, but will need to be updated from time to time. Contributions will be promoted and encouraged. For this purpose, the compendium will have to be in the form of an electronic database, hosted on the WFEO website.

Population of the compendium is, at the time of writing, in its early stages.

Usage of the guidebook and compendium

Who will use the guidebook and compendium, and how would they be used?

The guidebook could inter alia, and depending on the situation needs, assist with:

- identification of capacity building needs;
- designing of capacity building programmes -- for specific circumstances, or in response to, say, a region-wide need (for example, to serve as a generic template for a country, that it can adapt for its specific needs from time to time);
- resourcing, and then carrying out, capacity building programmes;

- enhancing trust and credibility with stakeholders, including funding and resource institutions.

The guidebook is in the first instance written for a professional readership of built environment planners and implementers who have the broader understanding of the role that infrastructure and services issues play, and who have the passion, the empathy and compassion to contribute to a better life for all. These readers will most probably be in senior management positions, and include those with strategic responsibilities. They will be people who have the ability, and the authority, to influence others.

However the material in the guidebook is also selected for its value to a range of possible participants in capacity building. That is, the guidebook addresses capacity building at many levels, also taking account of the broad pipeline of issues and items in infrastructure service delivery.

The compendium will attempt to address an even wider audience than that for which the guidebook is intended. For example, some of the compendium material is suitable for school learners, rural communities, and/or officials with little if any strategic influence in infrastructure-related institutions.

In conclusion

It is trusted that this practice-based guidebook, and the compendium to come, will be much used, and will prove a valuable contribution to achieving national development objectives and the millennium development goals.

References

- Committee on Engineering Capacity Building of the World Federation of Engineering Organisations (2010) *Guidebook for capacity building in the engineering environment*. (Members of the committee: Daniel Clinton (WFEO: chairperson of CECB), Andrew Cleland (Institute of Professional Engineers of New Zealand), Kevin Wall (Council for Scientific and Industrial Research, South Africa), Michael Sanio (American Society of Civil Engineers (ASCE)), Dawie Botha (South African Institution of Civil Engineering), Dawit Negussey (Syracuse University/ASCE), Sheryl Lewis (United States Army Corps of Engineers/ASCE) and Paul Day (Patriot Technical Consultants).) First edition -- 2010. WFEO, Paris, France. 110 pages. <http://www.civils.org.za/Publications/tabid/81/Default.aspx>
- Hatch, Henry (2004). *Presentation at a workshop sponsored by the Office of the Science and Technology Advisor to the U.S. Secretary of State, March 2004.*

Keywords

Infrastructure, capacity building, engineering, guidebook, sustainability.

Contact details

Name of Principal Author:
Dr Kevin Wall,
CSIR Built Environment,
P.O. Box 395,
Pretoria 0001,
SOUTH AFRICA.
mobile +27-82-459-3618
office +27-11-841-2040
kwall@csir.co
www.csir.co.za

Name of Second Author:
Daniel D. Clinton, Jr.,
Vice President WFEO, Chair CECB,
12410 Boheme St,
Houston TX 77024-4930,
UNITED STATES.
Office +1-713-464-3244
Mobile +1-713-203-5409
pecanvalley@juno.com
www.wfeo.org