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World Federation of Engineering Organisations's compilation of capacity building good practice

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The Standing Committee on Engineering Capacity Building of the World Federation of Engineering Organisations 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.

1. Background

The World Federation of Engineering Organisations (WFEO) was founded in 1968 under the auspices of the United Nations Educational, Scientific and Cultural Organisation (Unesco), the agency of the United Nations Organisation that is the generator of ideas and setter of standards in the fields of education, science, culture and communication. WFEO, a non-governmental international organisation, brings together national engineering organisations from over 90 nations, representing eight-million engineers from around the world. WFEO cooperates with national and other international professional institutions in developing and applying engineering for 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.

At the World Summit for Sustainable Development in Johannesburg in 2002, WFEO hosted an event at which challenges around capacity building were discussed. At this event, the Africa Engineers Protocol concept of sustainable engineering as a prerequisite for sustainability, and the elements that are the foundation of sustainability, were introduced to WFEO. Subsequently, at the WFEO General Assembly in Tunis in 2003, and with the support of Unesco, WFEO created a Standing Committee on Engineering Capacity Building (CECB).

Since that time, the CECB's understanding of the challenges and complexities that face the engineering community regarding capacity and sustainability issues has grown immeasurably. CECB recognises the need to identify, assemble, share and (if feasible) promote the production of material that could facilitate and assist with capacity building. CECB also recognises

the integration of effort that is required to undertake successful capacity building. It has been decided 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.

2. Introduction

This guidebook was prepared, over a period of two years, by a multinational team drawn from the CECB membership. The chairman was American, and two other Americans were among the authors. All of these Americans have had (and in some cases are still having) extensive foreign experience of building capacity – including recent experience of building capacity in a war-torn nation. An American resident on the team is from Ethiopia, a country with which he still has close professional and academic ties. The New Zealand member of the team brings extensive experience of capacity building in the South Pacific. Finally, the two South African members of the team are also very experienced in capacity building through the Southern African region.

These authors drew upon other colleagues and upon their networks of international contacts among professionals active in capacity building in the engineering environment.

To further emphasise the international mix: the headquarters of WFEO is in Paris.

The guidebook was launched at the WFEO World Engineers' Week in Buenos Aires in October 2010.

The guidebook sets out suggested approaches to the building of human resources and capability within nations that will assist the sustainable achievement of national development objectives and the Millennium Development Goals. 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 organisations 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.

3. 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.

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 the 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.

Success in capacity building will only be achieved through a systematic approach, taking into account all six 'pillars' of capacity building that are listed here.

(*a*) Individual – to ensure that the needs of the individual are met.
(*b*) Institutional – to ensure that there are educational, professional, technical, governance and statutory institutions, systems and support structures in place. The institutions should be drawn from both public and private sectors, including stable, viable and responsible businesses, commercial enterprises and financial institutions that can support the provision, operation and maintenance of infrastructure and services.
(*c*) Technical – to ensure that there are technical standards, codes of practice, technical literature and guidance material and so on to underpin and support ethical and appropriate engineering, technological and procurement practices.

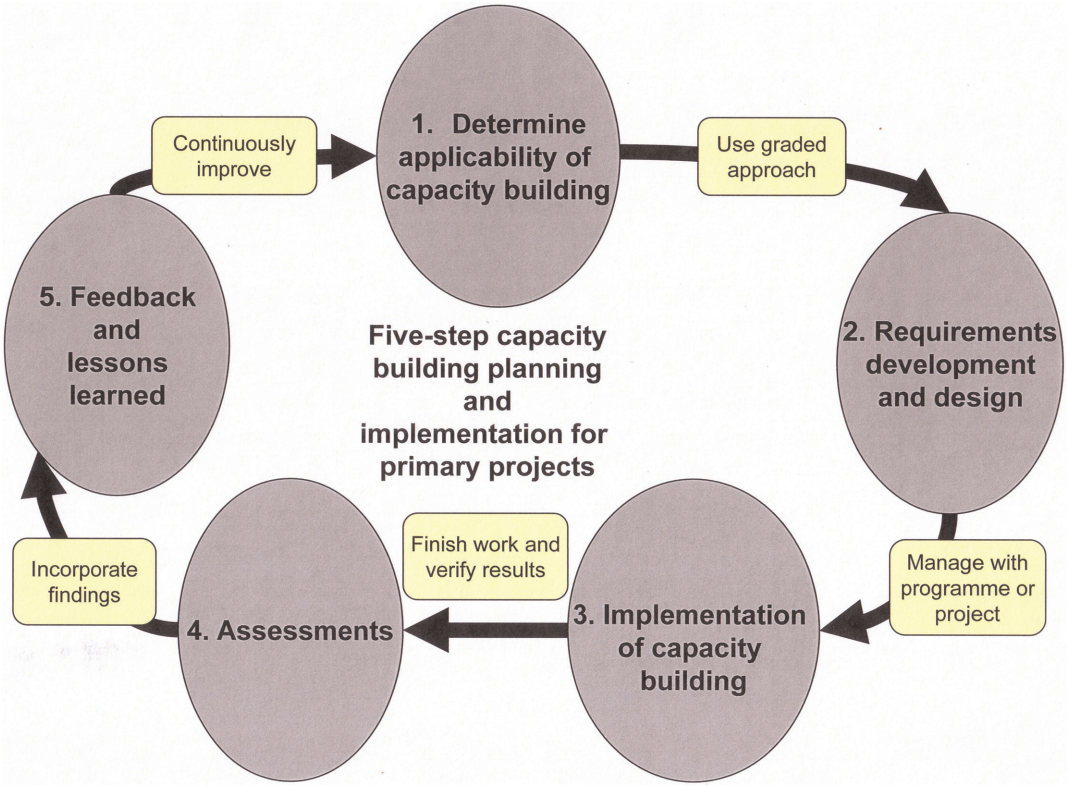

Figure 1. WFEO five-step planning and implementation process. This figure illustrates a recommended five-step – and iterative – planning and implementation process, including periodic assessments, and feedback, learning lessons in order to continuously improve the process

(*d*) Decision-making – to ensure that decision-makers have sufficient information and understanding as well as access to knowledge and skills to enable them to make logical and rational decisions.
(*e*) Finance – to ensure that adequate and affordable finance is available to enable sustainable solutions (including adequate revenue streams after external donors have moved on) and that financial practice is at all times responsible.
(*f*) Resources, tools and supplies – to ensure that there is access to appropriate, affordable and suitable materials, tools and supplies for the building, operating and maintaining of infrastructure.

One size certainly does not fit all. A flexible approach, tailored to the circumstances, is necessary (Figure 1 (WFEO, 2010, p. 63)). In each instance where the building of capacity is deemed to be advisable, the systematic approach introduced in the paragraph above needs also to ascertain to what extent, and in what manner, it is necessary to address all three levels, namely

(*a*) the level of the enabling environment
(*b*) the organisational level
(*c*) the individual level.

Each capacity-building programme or initiative must include the following steps.

(*a*) Be preceded by
  (*i*) identification of stakeholders
  (*ii*) assessment of requirements and identification of priorities for capacity building (i.e., priorities in terms of both what capacity to be built, and whose capacity to be built)
  (*iii*) identification and mobilisation of agencies that will build the capacity, and mentor and sustain this in the longer term.
(*b*) Be followed by assessment of the results of capacity building (results not just in terms of capacity built, but to what extent that capacity is leading to the required improvements in terms of outcomes – for example, not just that people who, through the capacity-building

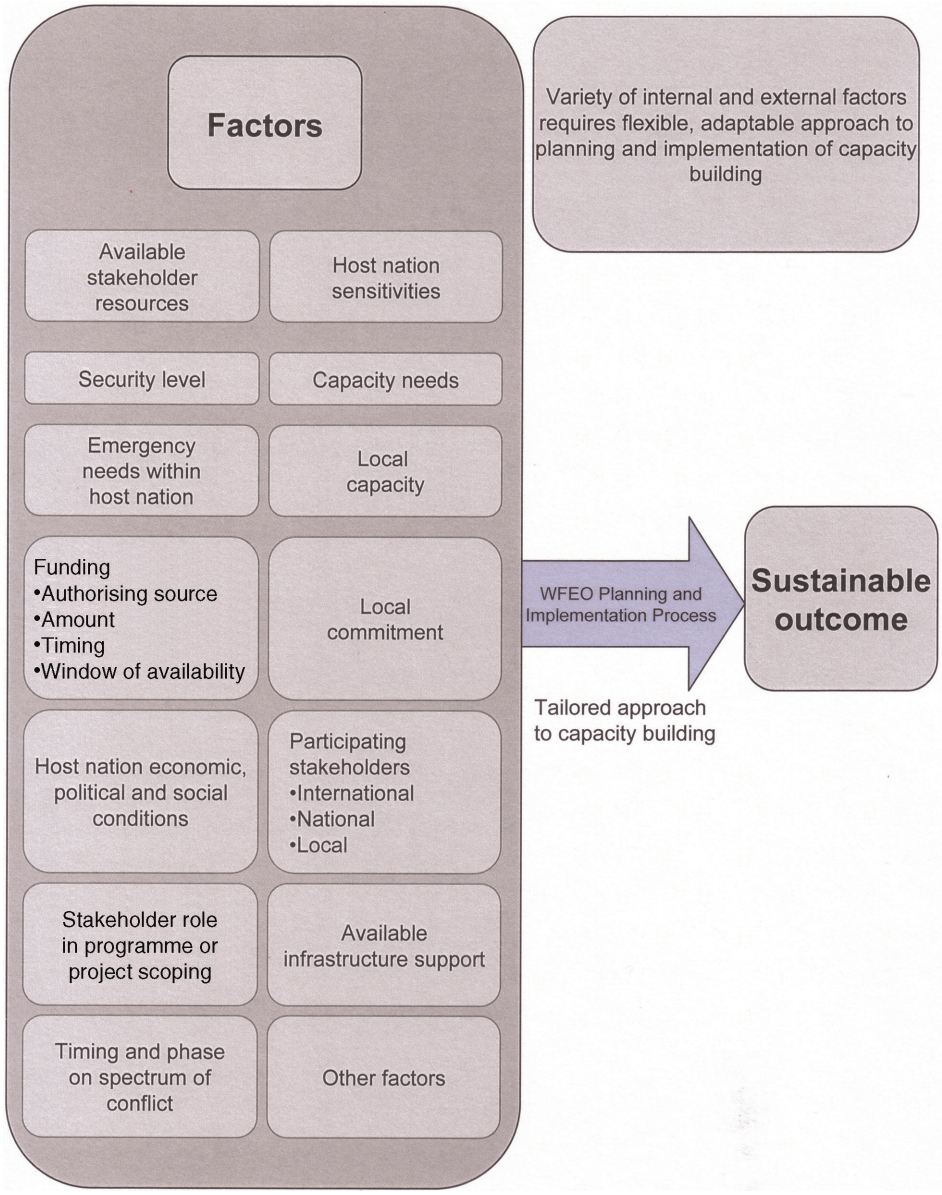

Figure 2. Flexible, adaptable approach to capacity building. One size certainly does not fit all. A flexible approach, tailored to the circumstances, is necessary. The figure illustrates this flexible 'tailored approach', leading (if all goes well) to a sustainable outcome

programme, have become more skilled, but also that they apply those skills and, furthermore, that this brings about better results in terms of achieving whatever it is they have been capacitated to do); and feedback, leading to continuous improvement in capacity.

(*c*) Be iterative (i.e., a first round of capacity building might be of a basic nature only, with each round successively raising the bar). Figure 2 illustrates a recommended five-step – and iterative – implementation process (WFEO, 2010, p. 63).

To reiterate: capacity building

(*a*) must be focused on the purpose of improving capacity – for example, by improving service delivery by those in whom capacity is being built – and not be about building

capacity for its own sake, as it is all too often the case that the need to apply the capacity is lost sight of
(*b*) must address needs according to priority.

The efficacy of capacity building must be evaluated. Part of the evaluation must be an assessment of cost-effectiveness – namely, was the effort and cost of capacity building justified by the improvement in areas such as service delivery? If it was not, then maybe lack of capacity was not the bottleneck, and some other way to improve service delivery should rather have been undertaken. Alternatively, the capacity-building needs might have been misunderstood, or the effort might have failed because of its content or inappropriateness, or even because of the way in which it was conducted and by whom.

Identification of the weak links in the service-value chain must be part of that assessment prior to deciding where and what capacity must be built. If the objective is to improve service delivery, say, should priority attention go to some other link or links that is or are weaker, rather than to capacity building?

If capacity building is for the purpose of supporting a project or programme of some sort, such as an infrastructure-delivery programme, then it goes without saying that the capacity building must be integrated with the programme life cycle.

4. The guidebook – a compilation of advice

The guidebook presents a compilation of advice drawn from the experiences of the international engineering community. This advice represents what the authors of the guidebook regard as 'good practice', rather than 'best practice'. If a current situation is much below good practice, the goal should be to raise it to good-practice levels – and not to strive for best practice, which would invariably require unwarranted effort and resources. Many nations, institutions and communities are too often so enthralled by the thought of achieving best practice that they devote disproportionate resources to a minority of projects and programmes, leaving inadequate resources for projects which might be more mundane, but which are likely to be important to more citizens. Voltaire put it so well when he wrote that 'the best is the enemy of the good'. This compilation of advice is clustered under a set of headings, listed here, which represent an idealised capacity-building project.

(*a*) Researching needs. How to work with communities and institutions in order to establish their needs.
(*b*) 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.
(*c*) 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.
(*d*) 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.
(*e*) Building networks and support systems. How to build governance and representative structures and institutions to support all the above.
(*f*) Developing technical and business standards. How to develop a framework of standards, together with systems to improve adherence to these standards.
(*g*) Executing projects throughout their life cycle. How to identify, and apply, factors key to taking projects from their initial conceptualisation right through to their successful completion and subsequent successful operation.
(*h*) 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. As an example, in 2008 the Institution of Professional Engineers New Zealand (IPENZ) perceived a general need for capacity building of the engineering communities in the South Pacific region. Following extensive consultations with representatives of the engineering communities in six nations (Papua New Guinea, Samoa, Tonga, Cook Islands, Fiji and Vanuatu), it was agreed that a capacity-building programme would be initiated with the objective of setting up a South Pacific Engineers Association and drawing up competence registers. The desired outcome would be a significant improvement of engineering standards in the region. The structure recognises the particular nature of nations with populations that are insufficiently large for national systems to be viable. Further South Pacific nations will be added as the Association builds up strength. The Association will be largely self-governing, but underpinned from New Zealand (WFEO, 2010, Appendix A5.1).

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

(*a*) Skills: including skills that are technical, financial and people-oriented.
(*b*) Resources: including finance, training programmes and mentoring processes, and policies (particularly public policies).

(*c*) Decision-making mechanisms: including policies, prioritisation rules and mechanisms, risk analysis and policies, incentives, ethics, standards, and trade-off mechanisms – but more than these, also recognising
  (i) that choices are never absolute, but are invariably between alternatives
  (ii) the importance of appreciating that results depend on a chain of factors, and not on one factor – and realising the importance of identifying weak links, and in particular identifying the weakest link and that, once it is addressed, the next weakest link becomes the new priority
  (iii) the importance of the '80/20 rule' and of first getting the basics right, with the 'nice-to-haves' to follow only if resources remain.
(*d*) Administration and systems: including governance, laws and regulations, procurement, monitoring and evaluation, and feedback loops.

The institutions referred to could include the following types.

(*a*) Indigenous institutions (i.e., from the nation where the capacity building is taking place), as opposed to foreign.
(*b*) Informal institutions (such as unorganised communities), as opposed to formal.
(*c*) 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 that is 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'. This is 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 unidirectional phenomenon – rather, all should be referred to as 'participants'.

5. 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.

6. Usage of the guidebook and compendium

Who will use the guidebook and compendium, and how will they use it?

To reiterate: the purpose of the guidebook and compendium is to provide a source of reference to institutions and communities and to those involved at any level in working to build

(*a*) engineering capacity
(*b*) sustainability of nations at large where this concerns infrastructure, services and basic needs.

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

(*a*) identification of capacity-building needs
(*b*) designing of capacity-building programmes – for specific circumstances, or in response to, say, a region-wide need (e.g., to serve as a generic template that a country can adapt for its specific needs from time to time)
(*c*) resourcing, and then carrying out, capacity-building programmes
(*d*) reducing the risks of and 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 to do what is right.

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. By way of example, using the following means, capacity building was integrated with the construction programme of two major capital projects (a dam and a road, both in rural areas) in South Africa.

(*a*) Adult education in basic numeracy, literacy and elementary life skills, including training on how to handle personal finances and banking.
(*b*) Providing on-the-job skills training for individuals.
(*c*) Specifying that a portion of the work be labour-intensive.
(*d*) Micro-, small- and medium-contractor development and predetermining those portions of the project to be allocated to the small enterprises.
(*e*) Providing child care facilities for females with young children, so that they can be free to accept employment on the project (WFEO, 2010, p. 72).

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 will be suitable for school learners, rural communities, and/or officials with little, if any, strategic influence in infrastructure-related institutions.

In conclusion, the guidebook is entirely based on practice. 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 range of engineering organisations and engineering professionals.

It is trusted that the guidebook, and the compendium to come, will prove a much-used resource, and a valuable contribution to achieving national development objectives and the Millennium Development Goals.

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REFERENCE

WFEO (Committee on Engineering Capacity Building of the World Federation of Engineering Organisations) (2010) *Guidebook for Capacity Building in the Engineering Environment*, 1st edn. WFEO, Paris, France. See http://www.civils.org.za/Publications/tabid/81/Default.aspx (accessed 15/12/2011). Also at http://www.wfeo.net.