

## Engineering for a Better World

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### Abstract

In 2003, the United States of America rejoined UNESCO after an absence of 18 years. The US government indicated to UNESCO that it wanted a significant portion of the increased funds that it would provide to its budget to be allocated to enhancing its programs in engineering and engineering education – in order to promote technical capacity building for economic development in developing countries. A major proposal on how to mount an enhanced engineering program, entitled “Engineering for a Better World”, has been developed by the US engineering community and UNESCO’s engineering staff and submitted to UNESCO for consideration.

The overall objectives of the “Engineering for a Better World” proposal are to strengthen human and institutional technical capacity in developing countries, to promote engineering to young people, and to provide an interactive and catalytic role for the application of engineering and technological resources to sustainable economic and social development and poverty eradication. There is specific reference to the Millennium Development Goals of eradicating extreme poverty and hunger, ensuring environmental sustainability, promoting gender equity and empowering women, and developing global partnerships for development.

### Mandates for capacity building

*“Let me challenge all of you to help mobilize global science and technology to tackle the interlocking crises of hunger, disease, environmental degradation and conflict that are holding back the developing world.”*  
*Kofi Annan, 2002”*

Several of the development goals outlined in the Millennium Declaration amplify this call to action:

Eradicate extreme poverty -- reduce by half the number of people living on less than a dollar a day

Ensure environmental sustainability -- reduce by half the proportion of people without sustainable access to safe drinking water

Develop a global partnership for development -- in cooperation with the private sector, make available the benefits of new technologies—especially information and communications technologies.

The Monterrey Consensus of the International Conference on Financing for Development states: “It is critical to reinforce national efforts in capacity building in developing countries and countries with economies in transition in such areas as institutional infrastructure, human resource development, ... basic education ...”. The Consensus goes on to cite international trade as an engine for development.

The United Nations Decade of Education for Sustainable Development (2005-2014) cites capacity building and training as one of its seven strategies. UNESCO is the lead agency for this DESD effort.

An effort in capacity building at UNESCO can address these goals directly.

*“We need to encourage international commitments to promote the kind of engineering and technology that contributes to lasting development around the world.”*

*–Koichiro Matsuura, 2000*

The Medium-Term Strategy of UNESCO for 2002-2007 (31C/4) includes a strategic objective on "Enhancing scientific, technical, and human capabilities to participate in the emerging knowledge societies". It states that UNESCO will focus on human and institutional capacity building and networking in the basic sciences and engineering.

The approved Programme and Budget for 2004-2005 (32C/5) includes regular budget and extrabudgetary funds for capacity building in science and technology for development. A background statement notes: "Engineering and technology are a vital but often overlooked part of our knowledge, infrastructure, culture and heritage, and are vital assets that require development, management, and maintenance. The development and application of knowledge in engineering and technology is a driving force of sustainable social and economic development and an important factor for poverty eradication." A strategy statement says: "The overall strategy of UNESCO in the engineering sciences and technology is to promote human and institutional capacity building, particularly in the developing countries."

At a recent meeting of the UNESCO Executive Board (170), it was recommended that overall priorities for the natural sciences sector be:

- the principal priority shall be water and associated eco-systems
- the other priorities shall be:
  - oceans
  - capacity building in the basic and engineering sciences, the formulation of science policies, and the promotion of a culture of maintenance
  - promoting the application of science, engineering and appropriate technologies for sustainable development, natural resource use and management, disaster preparedness and alleviation, and renewable sources of energy.

### **Mechanisms for capacity building**

Following are primary mechanisms that would be most effective in technical capacity building:

- Development and promulgation of educational materials at all levels: primary and secondary, tertiary, and continuing education
- Training materials, and programs to train trainers for developing countries
- Workshops for educators (e.g., on curriculum development, best practices, quality assurance, etc.)
- Conferences for decision makers from developing countries (e.g., on resources and methods for capacity building)
- Collaborations with industry (e.g., pursuit of the agreements recently signed with Microsoft and Intel)

As an example, mechanisms to promote human and institutional capacity building in engineering might include:

- Strengthen engineering education, training and continued professional development
- Standards, quality assurance and accreditation
- Development of curricula, learning and teaching materials and methods
- Distance and interactive learning (including virtual universities and libraries)
- Development of engineering codes of practice for the international community
- Promotion and public understanding of engineering and technology
- Development of indicators, information and communication systems for engineering
- Addressing gender issues in engineering, science and technology
- Inter-university and institutional cooperation
- Development of policy and planning to support the above

The above items comprise the primary elements of the “Engineering for a Better World” proposal.

The program will also recognise the increasing need to develop capacity and apply engineering in emergency and disaster response, relief, prevention and management. Engineering plays a crucial but often under-recognised role in dealing with emergencies, disasters and post-conflict situations. In the short term, engineering-related needs include the immediate provision of food and water, sanitation, shelter, security and emergency health services. These needs are followed in the medium term by reconstruction, broad public health management and putting people back to work. Longer-term needs include broader social and economic development issues and poverty reduction. To facilitate activity in this area the Program will develop linkages with international agencies active in these fields and form partnerships with NGOs such as Engineers Without Borders/Ingénieurs Sans Frontières (EWB/ISF), Registered Engineers for Disaster Relief (REDR) and the World Economic Forums' – Disaster Relief Network. In this context, an "International Forum on Engineering in Emergencies and Disasters", is proposed for 2005.

Poverty is often considered economically, but relates primarily to the limited access of poor people to the knowledge and resources with which to address their basic human needs: water supply and sanitation, food production and processing, housing, energy, transportation, communication, income generation and employment creation.

Engineering and technology -appropriate to the context of poor people in terms of the social, economic, educational and knowledge situations- can then enable them to alleviate their own poverty and promote sustainable livelihood development. Poor people are often more exposed to emergencies, natural and man-made disasters, and there is an important role for engineering and technology in emergency and disaster preparedness, mitigation and response.

Program activities will include promoting technology for poverty eradication, improving innovation systems through applied research, development of information and information-sharing and pilot project activity. To assist in the process of initiating interest and activity in this area, an "International Focus on Engineering, Technology and Poverty Eradication" was held in Washington in April 2004. The Focus identified the particular need to support the networking of universities and related institutions in engineering and technology to promote the sharing of information, experience and applied research and related activities promoting the application of engineering and technology to poverty eradication. The Focus also called for a larger international forum to promote this, and an "International Forum on Engineering and Technology for Poverty Eradication" is being organized in late 2005 to promote and support this initiative.

The engineering knowledge and technology currently exists to make significant progress towards meeting basic human needs and advancing more quickly towards sustainable development as outlined in the WSSD and the UN Millennium Development Goals. It is imperative to apply it now where it is needed the most and can make the most difference.

Accordingly, the proposed program would address the need for (in addition to the strategy elements mentioned under capacity building in engineering and technology) direct support for the United Nations WEHAB (Water, Energy, Health, Agriculture and Biodiversity) objectives articulated at WSSD including:

water supply and sanitation;  
cleaner production and recycling;  
energy efficiency and conservation, renewable energy and clean coal technology;  
emergencies and disaster preparedness and response, including urban security;  
post shock and conflict restoration, rehabilitation and reconstruction;  
engaging engineers in decision making, policy making and planning.

Program partnerships will strengthen the capacity of developing countries to address poverty eradication and promote sustainable development, as well as the capacity of UNESCO to assist in this process, through support in such areas as secondment and consultancy services. Program partnerships will be sought with governmental agencies, universities and education institutions, international organizations (UN organizations and international financial institutions), and non-government organizations around the world. Partnerships with engineering educational institutions will include a focus on fellowships for applied research and training. Fellowship visits would take place both in developing and developed country partners – to facilitate understanding of the local situation and needs in both partner contexts.

## **Conclusion**

Program implementation will include various types of delivery mechanism or “modalities” of activity. These include conferences, symposia, workshops, expert meetings, seminars, training activities, publications, toolkits, curricula development and delivery, continuing education, videos and CD-ROMs, indicators, statistics, surveys, studies and research, advocacy, advisory services, monitoring and evaluation, institutional cooperation and partnership with professional bodies, NGOs, the public and private sectors. The use of ICTs will also facilitate and enhance activities in such areas as: distance and open learning, virtual meetings and conferences, multi-media information and training materials and electronic networking.

The UNESCO “Engineering for a Better World” Program is proposed to be established with a commitment of financial resources for a period of six years, with the possibility of extension. The program will require the development of human and financial resources in the engineering sciences and technology for development within UNESCO, and strong partnership with national and international organizations in the engineering community. The Program would be part of the Basic and Engineering Sciences program of the Natural Sciences Sector of UNESCO. The Program will have an Advisory Board consisting of members of the international engineering technology and development communities. As regards resources - the Program will require at least three core professional and support staff, decentralized professional and support staff located at UNESCO field offices, complemented by seconded professional staff, consultants, fellows and interns.

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