

*Program Proposal to:
United Nations Education, Scientific and Cultural Organization (UNESCO)*

ENGINEERING FOR A BETTER WORLD:

Engineering and Technology for International Development

*To promote capacity building in engineering and technology
for poverty eradication, secure and sustainable social and economic development*

Proposal coordinated by the World Federation of Engineering Organizations and the American engineering community in conjunction and cooperation with the Basic and Engineering Sciences Division of UNESCO.

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, Secretary-General of the United Nations
World Economic Forum, Davos, 2002

It is important for us to remember the vital contribution of engineering and technology to development in general. We need to encourage international commitments to promote the kind of engineering and technology that contributes to lasting development around the world.

Koïchiro Matsuura, Director-General of UNESCO
Proceedings of the First World Engineer's Convention, 2000

Clearly, for the developing world, achieving sustainable development and participation in the global economy will depend on significant capacity building in science, technology and engineering.

Rosemary DiCarlo, Head of US Delegation
UNESCO Executive Board, 2003

Engineering is the bridge between Science and Society, turning scientific breakthroughs into practical tools for the welfare of mankind.

Jose Medem Sanjuan, President of WFEO
WFEO General Assembly, Moscow, September 2001

Executive Overview

This paper outlines a proposed program “**Engineering for a Better World - Engineering and Technology for International Development**” to promote capacity building in engineering and technology for poverty eradication, secure and sustainable social and economic development. The proposal presented by the World Federation of Engineering Organizations has been prepared in conjunction with the American Association of Engineering Societies and the National Academy of Engineering, in cooperation with the Basic and Engineering Sciences Division of UNESCO.

This proposal was developed following the announcement in September 2002 that the US will re-join UNESCO in October 2003. The commitment of the US engineering community, with the support of their government, offers the engineering community worldwide an opportunity to play a central role, with UNESCO, for capacity building in engineering, particularly in the developing countries. Engineering associations and member states are invited to support this proposal as an integral element of the program and budget of UNESCO.

The application of knowledge in engineering and technology underpins and drives sustainable social and economic development. Engineering and technology are vital in addressing basic human needs, poverty reduction and promotion of secure and sustainable development in developing countries, and to bridge the “knowledge divide” and promote intercultural dialogue and cooperation. At the same time, however, there is increasing international concern regarding the number of young people going into engineering, the consequences for future capacity in engineering, particularly in developing countries and effects on social and economic development.

The overall focus of this proposed UNESCO Program in “**Engineering for a Better World**” is to strengthen human and institutional capacity in engineering and technology in developed and developing countries through international cooperation. The Program aims at enhancing the capacity of developing member states to address poverty eradication and promote sustainable social and economic development, and the capacity of UNESCO to facilitate this process.

Program activities will include advocacy and advisory services, information gathering and publication, curricula development and delivery, continuing education, distance and virtual learning and associated expert meetings, workshops, conferences and institutional cooperation in partnership with the public and private sectors, professional bodies and NGOs.

The proposed Program is for a period of 6 years, from 2004, with possible extension. The program will require at least three core professional and support staff, complemented by seconded professional staff, consultants, fellows and interns. The Program budget is estimated at \$2.5million per year - \$15million over 6 years. The Program would be part of the Basic and Engineering Sciences Program of the Natural Sciences Sector of UNESCO, and would seek to develop active linkages across the other sectors of UNESCO in education, social sciences, culture and communications.

The program would be results-based, with an Advisory Board drawn from the international engineering and development communities. The Program could be based at UNESCO headquarters in Paris or, following UNESCO policy for decentralization, located elsewhere to take advantage of proximity to international organizations, potential donor agencies and foundations, universities, professional organizations and NGOs.

1 - Introduction

UNESCO is an intergovernmental organization with a mandate in education, the natural sciences, social and human sciences, culture, communication and information, and is a technical agency of the UN, serving 188 member states (189 with the return of the US). UNESCO cooperates with government, non-government and international organizations - in engineering this includes the World Federation of Engineering Organizations (WFEO) and Union of International Technical Associations (UATI), which are linked in the International Council for Engineering and Technology (ICET).

Since the United States withdrew from UNESCO in 1984, US engineers have worked with UNESCO through partnerships with engineering NGOs, particularly WFEO and UATI in such areas as the 1996 World Congress of Engineering Education and Business Leaders, World Conference on Science in 1999 and the first World Engineers' Convention in 2000.

With the return of the US to UNESCO in October 2003, this proposal aims at facilitating the participation of the US engineering community in cooperation for international development, building upon the existing partnerships. This proposal is a response to the opportunity offered by the commitment of the US and international engineering community, and support of the US government, for an expansion of core UNESCO program activity in capacity building in engineering, and the application of engineering and technology for poverty eradication, secure and sustainable social and economic development, particularly in the developing countries.

2 – UNESCO and the international challenge for engineering

The importance of the engineering sciences and technology in driving sustainable economic and social development and addressing basic needs and the reduction of poverty was emphasised at the World Conference on Science in 1999, the World Engineers' Convention in 2000 (and will be on the agenda at the WEC 2004 meeting in Shanghai), the Johannesburg World Summit on Sustainable Development in 2002 and relate particularly to the UN Millennium Development Goals. There is increasing concern, however, regarding the capacity of countries around the world to apply engineering and technology for development and poverty reduction, and a consequent need for capacity building in the engineering sciences and technology. At the same time, there is also increasing awareness regarding the need to strengthen the capacity of UNESCO in the engineering sciences and technology to assist member states in this process.

The overall vision and mission of UNESCO in the engineering sciences and technology is to promote human and institutional capacity building for poverty reduction and sustainable economic and social development. In order to promote engineering there is a need to enhance the public understanding of engineering and for systemic reform in engineering education to encompass wider social and ethical concerns in such areas as gender sensitivity, sustainable design, problem- and project-based learning in an inter-sectoral approach.

The overall strategy of UNESCO and the **“Engineering For a Better World”** proposal is to promote human and institutional capacity building, particularly in the developing countries, through the transfer and exchange of knowledge and innovation in international networking, cooperation, intercultural dialogue and partnership. The program will reflect UN Millennium Development Goals and UNESCO priorities and Medium Term Strategy including sustainable development and poverty eradication, the New Partnership for Africa's Development (NEPAD)

priorities, Least Developed Countries (LDCs), small island states, young people, women and gender issues in engineering. Key strategic challenges the Program will face are why young people around the world are turning away from engineering and how this may be understood and addressed, how best to promote the public understanding of engineering and how engineering may most effectively be applied to poverty eradication and sustainable development.

The overall objectives of the proposal are to strengthen human and institutional capacity in developing and developed 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 will be 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 partnership for development.

The Program “**Engineering for a Better World**” will facilitate the commitment of the international engineering community to work with and strengthen the capacity of UNESCO to assist member states in applying engineering and technology to sustainable development and poverty eradication. The program will strengthen regular program activities as an integral program of UNESCO, using Regular Program funds and also seek extra-budgetary financial support.

3 - Capacity Building in Engineering and Technology

We live in globalizing knowledge societies, where the application of science, engineering and technology are of increasing importance for economic and social development. As knowledge-based development is emphasized, science and engineering are faced with the prospect of shortages of qualified engineers and supporting technologists primarily in developing nations.

The program strategy to promote human and institutional capacity building in engineering will focus on the need for:

- ?? strengthening 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 ethics and codes of practice;
- ?? promotion and public understanding of engineering and technology;
- ?? development of indicators, information and communication systems for engineering;
- ?? addressing women and gender issues in engineering and technology;
- ?? inter-university and institutional cooperation, including fellowships;
- ?? development of engineering and technology policy and planning to promote the above.

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 2004.

4 - Engineering and Technology for Poverty Eradication

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" is scheduled for later 2003.

5 - Engineering and Technology for Sustainable Development

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.

6 – Public/private Partnerships

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.

7 - Budget

The “Engineering for a Better World” Program will require an estimated budget of \$2.5million per year - \$15million over 6 years. The budget will be allocated approximately as follows:

- Human and institutional capacity building - 40%
- Engineering, technology and poverty eradication - 20%
- Engineering, technology and sustainable development - 20%
- Inter-university and institutional cooperation program – 10%
- Administrative Support and Budget – 10%