

## Technology and Development Program

The Technology and Development Program's (TDP) primary mission is to provide a focus at MIT for research and education related to the role of technology in the socioeconomic development of newly industrialized nations. TDP works with other academic departments and research centers throughout MIT to:

- Promote awareness of the relationship between science, technology, and development among faculty and students at MIT
- Provide a focal point for the technology and development activities of faculty, students, and visiting scholars interested in the field of technology and development
- Assist the faculty, students, and staff of collaborating institutions in other countries to develop research and academic interests consistent with their national needs
- Serve as a contact for interested organizations outside MIT (government, academic, private sector) to access the Institute's resources and its knowledge of developing countries, particularly of their socioeconomic and technological problems

TDP carries out these objectives through research, academic programs, and contacts with international and national organizations that have an interest in broad areas of technology and development. In order to fully utilize available resources, TDP is structured to interact with other academic departments and research centers throughout MIT.

### Current Research Programs

The two major ongoing programs are in Thailand and Malaysia.

#### Thailand

In Thailand, TDP collaborates in research and education with two major Thai institutions: the Collaborative Program of Science and Technology with the National Science Technology and Development Agency of Thailand, and the Collaborative Program of Science and Technology with the King Mongkut University of Technology at Thonburi. These two programs are funded under an agreement with Suskapatana Foundation, and both started in 1996.

#### Malaysia

TDP continued to assist the [Malaysia University of Science and Technology](#) (MUST) in establishing itself as a leading graduate university in Malaysia. TDP's efforts in capacity building are focused on four broad areas: (1) MUST's development of graduate degree programs in selected areas, (2) MUST's establishment of a research agenda, (3) MUST's formation of partnerships with the private sector, and (4) MUST's development of an appropriate institutional organization, including but not limited to administration and finance.

To date, MIT's activities in this collaboration with MUST have been supported by Motorola, Inc., acting through its Global Telecom Solutions Sector and its Global Software Group. A temporary campus has been established at GL33, Ground Floor, Block C, Dataran Usahawan Kelana, 17 Jalan 7/26, Kelana Jaya, 47301 Petaling Jaya, Selangor, Malaysia.

### **Academic**

During the period July 1, 2004 to June 30, 2005, MIT helped MUST augment its seven master of science programs. Thus, MUST now offers master of science degrees in transportation and logistics; information technology; biotechnology; construction engineering and management; materials science and engineering; energy and environment; and systems engineering and management. MUST faculty have been hired in each of these academic program areas and have been assisted by MIT faculty in course development and mentoring. The first MUST graduates—from the biotechnology, information technology, and transportation and logistics programs—will receive their MSc degrees on December 14, 2005.

### **Research**

In addition to its educational component, this collaboration involved research that was focused initially on scientific and technological areas in which expertise already resides both at MIT and MUST, and/or in collaboration with qualified faculty members of other universities or research staff of research and development institutions. MIT and MUST continued their joint research projects: Web Services for New Business Applications in Telecommunications; Regional Strategies/Intelligent Transportation Systems; Intelligent Information Integration; Support of MITSIMLab in Application in Malaysia; Application of Modern Biotechnology for Aquaculture Feed Production; Carrier Networks: Integrated Service Planning; Developing a Transportation Telematics and Telemedicine Architecture to Reduce Highway Deaths in Malaysia; Increased Therapeutic Protein Production in Mammalian Cell Culture; Assessing Project Evaluation Techniques Used for Major Transportation Projects in Asia; and Bioprocess Improvement Through Transcriptional Analysis of Cellular Response. Additional projects include: Wavelets and Neural Computing—Complementary Tools for the Interpretation of Sensor Data; and Global Accords, Best Practices, & IT for Sustainability.

Planned research activities are planned in the following areas: precision agriculture, with emphasis on oil palm; post-harvest strategies for tropical fruit export market; regional transportation policy strategy; and a common ticketing system for Klang Valley. New joint cooperative research between MUST and MIT will be initiated in the areas of transportation and logistics; information technology; biotechnology; construction engineering and management; materials science and engineering; energy and environment; and systems engineering management.

### **Industry Outreach**

A major objective of MIT participation in MUST is to promote cooperation among industry, academia, and government; to inform industry of technological development; and to transfer technology whenever possible. A number of short courses relating to

MIT/MUST's proposed academic program and research activities have been initiated by MIT and offered at MUST.

### ***Institutional Building***

MIT is providing assistance to MUST with regard to organization, management, and administration of the university infrastructure, including all aspects of university administration (i.e., financial, human resources, physical resources, and academic program development).

### **Future Research Initiatives**

TDP will continue to work cooperatively with MUST in Malaysia and will continue to foster its relationships and discussions with appropriate institutions in Colombia and Egypt. In Colombia, TDP and the Mariano Ospina Foundation have jointly prepared a proposal to establish an institute for research and education on large-scale infrastructure systems in Bogota. In addition, TDP continues its dialogue on initiating research activities in both Colombia and Egypt.

### **Current Education Initiatives**

The TDP-sponsored Middle East Program at MIT has completed its 16th year. The program (under the direction of Professor Nazli Choucri, TDP associate director) involves faculty from the Department of Political Science; the Department of Economics; the History Faculty; the Department of Urban Studies and Planning; the Sloan School of Management; the Department of Civil and Environmental Engineering; the Science, Technology, and Society Program; and the Aga Khan Program for Islamic Architecture. The program enables students with an interest in the Middle East to develop expertise in the area in addition to their own academic fields of specialization; and it examines the processes of socioeconomic change, technological development, political change, institutional development, capital flows, and business and investment patterns in the region.

TDP's primary educational activities outside MIT are currently focused on its collaboration with MUST. Beginning in September 2005, the following graduate courses will be offered at MUST:

- Foundations of Software Engineering
- Foundations of Information Technology
- Computer Systems Engineering
- Information Processing for Engineering Systems
- Database, Internet, and Systems Integration Technologies
- Distributed Development of Engineering Information Systems
- Global Information Systems: Communications and Connectivity Among Information Systems
- Animal Cell Biotechnology
- The Basic Biology of Biotechnology
- Topics in Molecular Biology
- Kinetics of Biological Systems
- Downstream Processing

- Foundations of Computational Systems Biology
- Introduction to Transportation Systems and Logistics
- Carrier Systems
- Introduction to Intelligent Transportation Systems
- Transportation Demand and Economics
- Transportation Flow Systems
- Transportation Policy, Strategy, and Management
- Advanced Intelligent Transportation Systems
- Logistics Systems
- Air Transportation
- Construction Finance
- Strategic Management in the Design and Construction Value Chain
- Sensor Technologies for the Monitoring and Characterization of Network Infrastructure
- Project Control
- Project Technology
- Project Evaluation
- Thermodynamics and Kinetics of Materials
- Mechanical Properties of Materials
- Magnetic Materials: Principles and Applications
- Electronic Materials Design
- Materials Selection, Design, and Economics
- Fabrication Technology
- Mechanical Behavior of Polymers
- Sustainable Energy
- Environmental Policy and Economics
- Electricity and Natural Gas: Issues in Regulation and Economics
- Biomass Processing for Energy Conversion
- Chemicals in the Environment: Fate and Transport
- Fundamentals of Energy Conversion
- Operations Research and Planning
- Engineering Risk-Benefit Analysis
- Introduction to Technology and Policy
- System and Project Management
- Operations Management
- System Dynamics for Business Policy
- Systems Analysis and Design
- Research Methods

At MIT, the TDP program in Malaysia has supported over 60 faculty members from throughout the Institute and over 50 graduate students at MIT.

## **Organization**

The director of TDP is Professor Fred Moavenzadeh of the Department of Civil and Environmental Engineering. Professor Nazli Choucri of the Department of Political Science is the program's associate director; Patricia Vargas is the assistant director.

**Fred Moavenzadeh**

**Director**

**James Mason Crafts Professor of Systems Engineering and Civil and Environmental Engineering**

*More information about the Technology and Development Program can be found online at <http://web.mit.edu/mit-tdp/www/>.*