Chapter 2

Cultivating, Nurturing and Sustaining International Cooperation in Engineering Education[1]

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After a cycle of upturn and downturn, the emphasis on international cooperation in engineering education and research appears to be on the rise again. While the previous cycle was underpinned by the Cold War and global competition in quality manufacturing, the current discussion is driven by new opportunities arising from information technology, and by nations' interest to improve the quality of their education programs. The new opportunities and concerns are global in scope, and call for a global partnership based on bold, new approaches in order to achieve meaningful progress. As an example of how the international community has responded, this paper describes the emergence, and mission, goals, structure and programs of the International Network for Engineering Education and Research, iNEER, a "virtual" global network formed to address the challenges.

INTERNATIONAL SCIENCE AND ENGINEERING

International cooperation in science and engineering has been of concern to policy makers and educators alike because many of society's problems are global in scope and impact. Thus, recent advances in many "big" science projects are direct results of international collaboration. Examples include plant and human genomics.

Even more indelibly etched into the annals of world events is the development of the atomic bomb and radar during World War II. Each of these successful scientific and

[1] Opinions expressed in this paper are the personal opinions of the author, and do not represent the position of any organization, public or private.

engineering endeavors helped change world history, and each came about through international cooperation.

Following the War, teams of German scientists and engineers came to the U.S.A., which benefited greatly from their presence. Their contributions in the aerospace programs of the U.S.A. have been well documented; other contributions are less well-publicized but no less impressive in their lasting impact on technological advancement and the cause of international cooperation.

HEAT AND MASS TRANSFER

An example is the field of heat and mass transfer, a field that straddles disciplines such as aerospace, nuclear, mechanical, and chemical engineering. Professor E.R.G. Eckert, Fig. 1, newly arrived from Germany, left an Air Force laboratory in Ohio, U.S.A. in the mid-1950s and started the Heat Transfer Laboratory (HTL) at the University of Minnesota. He and his associates and students, notably Professor R.J. Goldstein, Fig. 2, built HTL into the world's leading center for research and learning in heat and mass transfer. A veritable mini- United Nations, HTL had more than 60 graduates from more than 20 nations at any given time in the late 1950s to mid 1970s. International cooperation flourished between HTL and leading universities in United Kingdom, Germany, Japan, Brazil, Yugoslavia, Soviet Union, Canada and others. Students heard seminar speakers from around the world, as the likes of Hermann Schlichting (Germany), Ernst Schmidt (Germany), and Brian Spalding (UK) came calling.

FIG. 1
RECENT PHOTOGRAPH OF PROFESSOR E.R.G. ECKERT

Eckert and his international colleagues provided the leadership and impetus for a series of innovations for international cooperation in heat and mass transfer. These included starting up new international journals, and establishing international centers for heat and mass transfer in several countries. These innovations helped keep alive

international exchanges between the U.S.A. and the Soviet Union and the People's Republic of China as, remarkably, these exchanges continued even during the height of the Cold War, in the late 1970s and early 1980s.

The Cold War itself influenced international cooperation in engineering education in both positive and negative ways. On the one hand, it hampered free exchanges between the East and West; on the other, nations also paid special attention to international cooperation, treating it as a relatively harmless way to keep in contact.

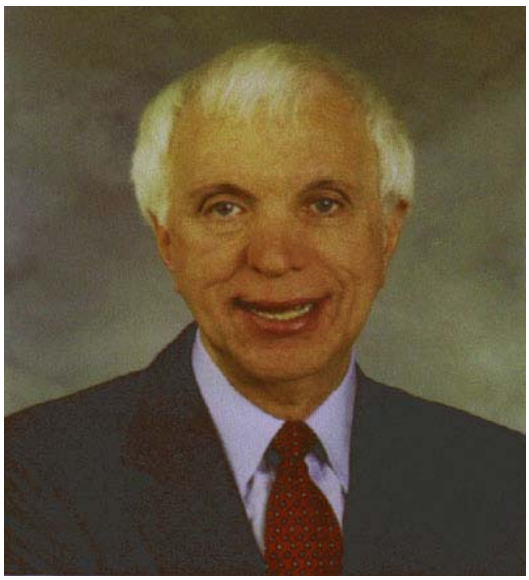

FIG. 2
RECENT PHOTOGRAPH OF RICHARD J. GOLDSTEIN, HEAD, MECHANICAL ENGINEERING DEPARTMENT, UNIVERSITY OF MINNESOTA, 1977-97

Indeed, the period from the mid- 1950s to early 1980s has been characterized by some as the Golden Age of international cooperation in engineering education and research.

Sadik Kakac, Fig. 3, spearheaded another innovation. A leading heat transfer specialist from the Middle East Technical University in Turkey, he joined the faculty of the University of Miami in the late 1970s. He succeeded in convincing NATO to expand the coverage of its series of Advanced Study Institutes (ASI) to include engineering.

Starting in the late 1970s, Kakac directed ASIs on regular intervals to address the need by young educators and researchers to explore in-depth special topics in heat transfer. Convening in his native Turkey, Kakac helped advance international cooperation in engineering education and research through these ASIs, by carefully forming multi-national teams of heat transfer experts and young educators that he invited to the ASIs.

As depicted in Fig. 4, however, the Golden Age was followed by a downturn in international cooperation. The period from the early 1980s to the early 1990s saw many nations withdrawn unto themselves the better to focus on rebuilding their manufacturing programs. This was the time when loss of market shares in traditional manufacturing

sectors such as automobiles led many industrial nations to focus on national quality production issues. Cooperation gave way to competition.

FIG. 3
RECENT PHOTOGRAPH OF SADIK KAKAC, CHAIRMAN, MECHANICAL ENGINEERING DEPARTMENT
UNIVERSITY OF MIAMI, FLORIDA, U.S.A.

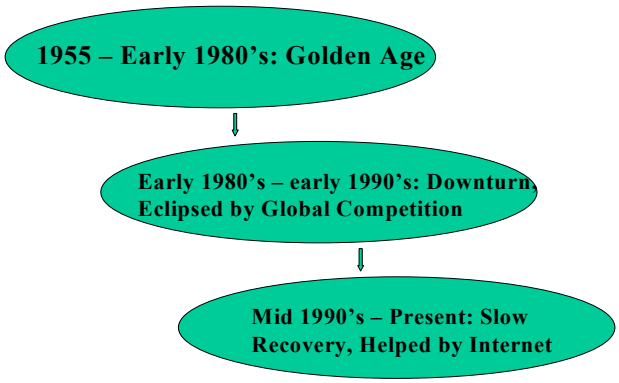

FIG. 4
RECENT CYCLE IN INTERNATIONAL COOPERATION IN ENGINEERING EDUCATION

Fortunately, this period was relatively short-lived. The collapse of the Soviet Union and widespread usage of the Internet gave rise to renewed interest and new opportunities for international cooperation. Beginning in the mid- 1990s, there has been a slow recovery of interest and activities in international cooperation in engineering education and research.

In addition, advances in communication and information technologies are also driving the recovery. These advances enable people to keep in touch like never before. They also make possible fast, real-time information and data transmission, linking all corners of the world. Equally important, the new technologies allow quick decision-making.

Many nations are also increasing their investments in science and engineering education and research. Furthermore, an increasing number of foreign graduates are returning to their homelands to help build the local economies, and are contributing to increasing the science and engineering capabilities of their countries.

These factors are creating parity for international cooperation.

Beyond that, as discussed below, many nations are beginning to focus on upgrading the quality of the engineering education programs.

The discussion to create iNEER, the International Network for Engineering Education and Research, roughly paralleled the recent developments described below.

RECENT DEVELOPMENTS

Since the early 1990s, an increasing number of engineering schools in industrialized and emerging economies around the world have begun a comprehensive examination of their undergraduate and post-graduate education systems. In order to meet new challenges in the 21st century, some of these institutions are seeking to broaden or restructure the systems. Issues of concern include a curriculum that is more connected with industrial practice, and incorporating information technology and distance learning, hands-on experience for undergraduates, global perspectives, and an emphasis on interpersonal and communications skills.

The need to open more opportunities to women and minorities is also driving the change in engineering and related disciplines such as computer science. Increasingly, new teaching tools and methods to enhance teaching and learning in these disciplines must be informed by advances in education research and technology-based education.

Pacing the changes are the Engineering Education Coalitions, Combined Research and Curriculum Development, Information Technology Research programs in the U.S. and similar programs in Brazil, Taiwan and elsewhere. In Europe, there is the Bologna Declaration [1] signed in 1999 by cabinet level officials from 29 nations, with more nations having joined since then.

The need for international cooperation is also underscored by global expansion of marketing and R&D, starting in the early 1990s, by many industrial companies. International cooperation in R&D has provided companies with access to leading-edge fundamental developments, technologies, and fresh ideas.

Today, a high quality engineering education experience must be an open and inclusive one, in which the education process is integrated with research, and enabled by new technology-based teaching and learning techniques. Broad in preparation, graduates must be ready to work anywhere in our global village, or branch into new careers using the education in engineering as a springboard.

The costs of implementing these changes are high and no nation can succeed by doing it alone.

Stimulated by these developments, policy makers around the world have placed a high value on international cooperation in scientific and engineering research and education. For example, the National Science Board of the U.S. National Science Foundation has formed a special committee to recommend future directions for international science and engineering.

Up till now, however, budget realities have forced nations to focus spending on domestic programs, with international science and engineering relegated to a relatively small role.

Yet, educators and researchers around the world realize that the needs are urgent and time is of the essence. Since their domestic programs are still relatively well-funded, these educators and researchers ask: "To increase our productivity, why not link our programs with those elsewhere when such linkage makes sound technical sense? We can do so with existing funding or at most with a small add-on."

What these educators and researchers need are the opportunities to identify and meet their counterparts.

They seek a partnership that will provide mutual progress and benefits. They want a win-win arrangement. It is fair.

ADDRESSING THE CHALLENGES

Faced with these intersecting trends, iNEER has been formed by the international engineering education community with a mission to address the challenges in a radically new way. It aims to cultivate, nurture and sustain international cooperation where it makes sense, within the limit of its resources.

iNEER is a "virtual" global organization born in the information age, without constraints imposed by geography and culture.

iNEER's principal approach is to use recent advances in information and communications technologies to foster the creation of collaborative networks and partnerships in the engineering education and research communities worldwide. To achieve mutual progress, our primary objective is to increase personnel and information exchanges, and link ongoing, already funded domestic research and education programs, in order to work together without depending on new funds. We have the best chance to make progress if we work together as a coordinated network, united by a desire to share ideas and information, leverage our resources, and jointly formulate new solutions.

iNEER MISSION

Simply put, the mission of iNEER is: To elevate the quality of engineering education and research worldwide through international cooperation.

iNEER GOALS

The goals of iNEER are threefold:

1. To develop a global network of educators and researchers to help advance the education and research enterprise worldwide.

2. To achieve mutual progress through international exchanges, linkages, assessment and accreditation, formation of cooperative partnerships, and information sharing and leveraging in enhancing the education experience for students.
3. To facilitate the development of ways to enhance the undergraduate and post-graduate experiences of students by nourishing human as well as institutional connections among educators, students and industrial organizations around the world.

CULTIVATING, NURTURING AND SUSTAINING INTERNATIONAL COOPERATION

It bears repeating that iNEER is an independent, non-profit, networking "virtual" professional organization aimed at accomplishing the Goals stated above. It cultivates, nurtures and sustains international partnerships, linkages and interconnections, both institutional and personal.

iNEER has been formed with the belief that nations' economies are increasingly interconnected. Engineering education, which must produce the human resources that drive the global economy, is now an international enterprise. Future progress will depend on international cooperation. Institutions wishing to succeed in producing graduates for the global marketplace must find new ways to work together. And, international cooperation does not happen through benign neglect; it must be cultivated, nurtured and sustained over time.

iNEER's approaches are to (a) sponsor and facilitate the organization of high quality engineering education partnership conferences; (b) initiate other international forums, specialist workshops and conferences at selected sites as needed; (c) develop new mechanisms and programs that promote international cooperation; (d) develop and maintain a directory and repository of information for international cooperation in research and education; and (e) assemble and disseminate updated information related to international cooperation in engineering education and research.

Every year, the iNEER Secretariat sponsors a number of activities and sends out about a dozen e-mail announcements, all relating to international engineering and science. It also develops and maintains a website for information dissemination and exchange.

Through its well-recognized logo, goodwill, and help with program development and monitoring, iNEER is the principal sponsor of the International Conference on Engineering Education (ICEE), and seeks to provide quality control and continuity, and inter-ICEE follow-up.

iNEER promotes fresh ideas and new models for international cooperation. From time to time, it issues calls for new proposals to host the ICEE or other conferences, workshops, and retreats. The Network also helps develop collaborative initiatives emanating from these meetings.

The iNEER website is freely accessible to everyone. An archive for proceedings of past workshops, conferences and other business transactions, the website contains a wide array of information items of a networking nature related to international cooperation.

MEMBERSHIP

The iNEER community, at over 6,000 strong currently (January, 2002) is comprised of educators and researchers from academe, industry and government bonded by a desire to work collaboratively to elevate the quality of engineering education in institutions around the world.

Exploiting the capabilities for communication afforded by the Internet, every member in the iNEER community has access and input directly to programs. Absent a hierarchical structure, the operation of iNEER is characterized by adaptability, flexibility, and prompt decision-making and feedback.

An organization without walls, iNEER invites and welcomes to its community membership educators who support the iNEER goals, and are interested in working collaboratively with other members. Open to individuals from government, industry or academic institutions of all regions of the world, inclusive of industrialized and developing nations, iNEER membership may be obtained by self-nomination or second-party nomination by sending an e-mail to the Secretary-General at **waung@ineer.org**. Nominations by existing members are especially welcome.

Membership in iNEER is obtained free of charge from the Secretariat, available without regard to national origin or creed; the business of iNEER, however, is limited to accomplishing the iNEER Goals, as described above.

Members may terminate membership upon request. Membership may also be terminated by the Secretariat due to lack of participation by members.

ICEE CONFERENCES

With the conclusion of ICEE-2001 in Oslo and Bergen, Norway, seven ICEEs are now behind us. These are listed in the following, with the numbers of participants, as reported by organizers, given in parentheses:

ICEE-1994: Taipei (120 attendees; 6 countries)
1995: Taipei (120)
1997: Chicago/Carbondale (250):
http://www.siu.edu/~coalctr/icee2.htm
1998: Rio de Janeiro (550):
http://www.ctc.puc-rio.br/icee98
1999: Ostrava/Prague (400):
http://www.fs.vsb.cz/akce/1999/icee99/welcome.htm
2000: Taipei/Taiwan (350):
http://www.icee2000.nctu.edu.tw
2001: Oslo/Bergen (420 attendees; 48 countries)
http://www-pors.hit.no/tf/icee01/

Proceedings for ICEE-1997 and later conferences have been archived on the iNEER website at: http://www.ineer.org.

Future conferences have been scheduled as follows:

ICEE-2002: Manchester:
http://www.meeting.co.uk/icee
2003: Valencia:
http://www.upv.es/icee2003/
2004: Gainesville, FL, U.S.A.

PROPOSALS FOR NEW ICEES

In June 2001, the iNEER/ICEE-ISC Secretariat announced a solicitation for new ICEE proposals for conferences in year 2005. Six proposals were received and are currently under review by the iNEER Board and ICEE-ISC. The proposals are from universities in USA, Portugal, Poland, South Korea, Puerto Rico, and Singapore.

ICEE-2001

The iNEER Secretariat helped with both program development and information dissemination to members of the iNEER community, then at 3,750+ strong. This led to 455 abstracts being received, with 155 from the U.S.A. alone.

Owing to limitations imposed by conference facilities, 380 abstracts were accepted. The final counts for papers submitted were about 320 from 47 countries.

The statistics cited above on abstracts and papers submitted are all record highs for ICEE and, indeed for an international engineering education conference.

ICEE-2002

The 9/11 attacks did not seem to have a significant negative impact on abstract submission to ICEE-2002. Per agreement with UMIST, the host for ICEE-2002, iNEER again helped with program development and abstract generation, leading to 15 technical sessions being proposed and accepted by UMIST. These 15 sessions targeted specific emerging areas in engineering education. Volunteers from 10 nations stepped forward to organize these sessions.

The Calls for Papers were forwarded to the iNEER community in December 2001. By the closing date in February, 2002 a record total of 482 abstracts were received from 48 countries. The 15 targeted Calls received over 200 of the abstracts. Over 90% of the abstracts came from the iNEER community.

PARTNERSHIP WORKSHOPS

Education workshops are an important component of an ICEE, and it was no exception for ICEE-2001. Starting in the fall of 2000, the Secretariat worked with the international community to launch several multi-national education partnership workshops. The US-Czech Republic-Poland Workshop and the US-Scandinavia Workshop coalesced into an umbrella workshop, the "ICEE International Partnership Workshop." This took place on August 4, 2001 just before the start of ICEE-2001. Six leading members of the iNEER community jointly organized this workshop.

For ICEE-2002 a similar, major partnership workshop is being organized by Lueny Morell and Vittal Rao.

FEEDBACK ON ICEE

For each ICEE, the Secretariat receives feedback on various aspects of the conference. These are reviewed by iNEER and are used to provide guidance for future conferences. Feedback from past conferences is posted on the iNEER website. To access the feedback, click on "Feedback Forum" on the navigation menu from the front page of the website http://www.ineer.org.

OUTREACH TO EXPAND THE GLOBAL PARTNERSHIP

To reach out to new potential networking partners, the Secretariat regularly corresponds with heads of various institutions. Contacts made recently include the following institutions: Texas A&M University, Houston, TX, USA; National U. of Singapore; Singapore Technological University; CLUSTER; U. of Puerto Rico, Mayaguez, Puerto Rico; Anna University, India; Donetsk State Technical U. , Donetsk, Ukraine; and National Technical U. of Ukraine – "KPI," Kiev, Ukraine

Several of these institutions have responded by becoming active in iNEER activities.

NETWORKING VISITS AND DISTRIBUTION OF "LETTERS"

In May, 2001 the iNEER Chair and Secretary-General attended an international education workshop at Donetsk State Technical U. marking the 80th anniversary of its founding. Following that the Secretary-General attended the Scientific Board meeting of VSB – Technical U. of Ostrava in Ostrava, CZ, and visited the National Technical U. of Ukraine – NTUU "KPI" -- and signed a Protocol of Cooperation with that institution. A copy of the Protocol is posted on the iNEER website.

In an effort to promote international understanding and cooperation, the Secretariat disseminated to the iNEER community and posted on the website "Letters" written following each of these visits, as well as visits to Manchester, UK in conjunction with the ICEE-ISC.

Specifically, the following "Letters" were disseminated as described above:

1. "Letter from Ostrava," May 29, 2001; http://www.ineer.org via "ICEE-ISC Communications" link.
2. "DonSTU Celebrates 80th with Conference and Concerts," June 3, 2001; http://www.ineer.org via "ICEE-ISC Communications" link.
3. "Letter from NTUU 'KPI'," June 4, 2001; http://www.ineer.org via "ICEE-ISC Communications" link.
4. "Letter from Manchester, Part I: On the Venue for ICEE-2002," October 11, 2001; http://www.ineer.org via "ICEE-ISC Communications" link.
5. "Letter from Manchester, Part II: On the Planning for ICEE-2002," October 11, 2001; http://www.ineer.org via "ICEE-ISC Communications" link.

To see these "Letters," visit the iNEER website and from the navigation menu on the front page, click on "ICEE-ISC Communications."

FACILITATING PARTNERSHIP MOUS

Upon request, the Secretariat helps facilitate and coordinate the development and signing of new cooperative agreements by heads of academic institutions. As a direct

result of these MOUs, coupled with past ICEE workshops, numerous international exchanges have started, involving both senior administrators and young researchers. For example, in April 2000, three high level administrators from the Silesian University of Technology in Gliwice, Poland visited their partners at the University of Florida, University of Missouri – Rolla and Southern Illinois University at Carbondale, Illinois. Three students from the Czech Republic are currently studying at the University of Missouri – Rolla, having started in January 2001. Two researchers from VSB-Technical University have carried out extended research studies at NJIT.

The signing ceremony for international cooperative agreements usually takes place at the conference banquet. This was carried out in front of about 400 attendees during ICEE-2000 in Taiwan.

To see photographs of the signing event conducted in Taiwan, visit the www.ineer.org website and click on "Photo Albums."

Four agreements were signed at the ICEE-2000 conference banquet in front of approximately 400 attendees, in the Hall of Golden Dragon on the top floor of the Grand Hotel in Taipei, promulgating the following new partnerships:

- National Chiao Tung University – New Jersey Institute of Technology. President Y.C. Chang and President Saul Fenster signed on behalf of NCTU and NJIT, respectively.
- VSB Technical University of Ostrava – National Chiao Tung University. Rector Vaclav Roubicek and President Y.C. Chang inked the agreement.
- New Jersey Institute of Technology – VSB Technical University of Ostrava. President Saul Fenster and Rector Vaclav Roubicek were the signatories.
- University of Missouri (Rolla) – VSB Technical University of Ostrava. Vice Chancellor Wendell Ogrosky and Rector Vaclav Roubicek were signers.

A similar signing ceremony was held during the banquet at ICEE-2001 in the presence of about 400 attendees. In this, Wendell Ogrosky, Vice Chancellor for Research, University of Missouri – Rolla, USA and Vice Rectors J. Chojan and W. Zielinski of the Silesian University of Technology, Poland signed a cooperative agreement in Oslo, Norway on August 8, 2001. Fig. 5 shows a photograph of the scene at signing.

2001 iNEER RECOGNITION AWARDS

By the deadline of July 12, 2001 the Secretariat received 18 nominations. A panel of three judges (one university president, one past president of an education organization and a past-dean of a major university) from two countries selected three award winners. They are, in alphabetical order:

Prof. William Van Buskirk, Provost and Senior V.P. for Academic Affairs, New Jersey Institute of Technology, Newark, NJ, USA:

"For Sustained Contributions in Establishing Research and Education Linkages between USA and India, France, Thailand, Ghana, Kenya, and United Arab Emirates"

FIG. 5
DR. WENDELL OGROSKY, VICE CHANCELLOR FOR RESEARCH, UNIVERSITY OF MISSOURI – ROLLA, USA AND VICE RECTORS J. CHOJAN AND W. ZIELINSKI OF THE SILESIAN UNIVERSITY OF TECHNOLOGY, POLAND SIGNING COOPERATIVE AGREEMENT AT ICEE-2001 IN OSLO, NORWAY ON AUGUST 8, 2001

Prof. Radim Farana, VSB - Technical U. of Ostrava, Ostrava, Czech Republic:

"For Innovations and Accomplishments in Creating and Maintaining the iNEER Web-Based Information System"

Prof. Denis Gillet, Institut d'Automatique, Swiss Federal Institute of Technology, Lausanne, Switzerland:

"For Innovations and Accomplishments in Distance and Flexible Learning Methodologies for Engineering Education"

The awards were made during the ICEE-2001 conference banquet on August 8, 2001.

Images of all iNEER Awards are posted on http://www.ineer.org via the "iNEER Awards" link.

THE iNEER WEBSITE

The fully functional site started operation in late summer of 2000 with a server space donated by NJIT. The webmaster is Prof. Radim Farana of VSB – Technical U. of Ostrava; the associate webmaster is Ray Hayling of NJIT. The iNEER/ICEE-ISC Secretary-General is the Editor.

This website contains selected information on engineering research and education relevant to international partnerships. Some of this is described individually in this paper.

In addition, proceedings and abstracts for ICEE-1997 through ICEE-2001 are archived.

The website has a directory and repository for information on international engineering education and research. To promote information exchange, reports and important correspondences related to iNEER/ICEE-ISC are archived on the website. Photographic records of typical scenes of business activities, as well as of an informal networking nature, from past ICEE and ISC meetings are presented.

The overall system includes static HTML pages and database connection based on the Active Server Pages (ASP) technology. The webmaster and administrator of the iNEER information system may be contacted by e-mail at: waung@ineer.org or radim.farana@ineer.org

A new web-counter has been set up and shows that this website receives up to 1100 visits per month since we started keeping track in April 2001.

PHOTO ALBUM

The following photo groups have been added to "Photo Album" on the iNEER website:

1. "ICEE-ISC Meeting 2001, Manchester"
2. "ISC Meeting 2000, Porsgrunn"
3. "Scenes from Kiev, June 2001"
4. "DonSTU Celebrates 80th, May 29-June 3, 2001"
5. "Scientific Board Meeting, VSB Technical University of Ostrava, May 25 2001"

iNEER TALKS/PAPERS

During the past year, the iNEER website published several articles and papers relevant to international science and engineering [1-10].

CONCLUSIONS

As nations' economies become increasingly inter-dependent, engineering education, which must supply a mobile, globally informed workforce needed for the global economy, must respond with an increased emphasis on international cooperation. With its focus on partnership and networking, free membership, information sharing, and resource leveraging, iNEER represents a new mechanism for international cooperation.

The strong participation by the international community in its conferences and workshops indicates that iNEER is indeed filling a need. Its increasing acceptance and support by the international engineering education community has been aided by the recent upturn in the cycle of emphasis on international cooperation; it is also a result of the openness, inclusiveness, responsiveness and flexibility adopted by iNEER.

As is evident from this paper, iNEER has grown and has taken on several new initiatives during the past two years. It is necessary for it to guard against temptations to over-extend and over-commit. Its primary role should be to create interconnections between and among institutions and individuals in engineering education and research. iNEER should not be a professional society with membership dues and a paid

headquarters staff. As a networking organization, iNEER must not and need not act like a well-funded professional society.

iNEER must, on the other hand, work closely with the professional societies in mutually reinforcing ways. Most of all, it must continue to expand the global reach of the iNEER community.

iNEER needs to be more engaged in countries such as Russia, China, India, Argentina, Japan, South Korea, Germany, France, United Kingdom, Mexico, Canada, Argentina and others.

To accomplish this, it is necessary for it to develop a cadre of active members in each of these countries. For this, it needs the help and support of all members of the iNEER community.

ACKNOWLEDGMENTS

The contributions of the global community members, either through active programming involvement or attendance at conferences and workshops, are what make iNEER work. These contributions are greatly appreciated by the iNEER Board and Secretariat.

Another important ingredient in this global partnership is the collective contribution of the sponsors, both donors and in-kind; their support is gratefully acknowledged. In addition, the donation of time, ideas and energy by several key individuals must be mentioned here for the record. These include, in no particular order: Radim Farana, S.T. Mau, Angela Vega, Raymond Hayling, Saul Fenster, John Mead, Vic Ilic, Randy Hinrichs, Robert Aung, Maybelle Jordan, Juh-Wah Chen, Max Yen, Edward Parrish, Victor Schutz, Vittal Rao, Luiz Scavarda, Annie Aung, Che-Ho Wei, Wayne Johnson, Vaclav Roubicek, Andrea Samolejova.

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5. Win Aung, "iNEER Presentation," Scientific Board Meeting, VSB Technical University of Ostrava, May 25, 2001; http://www.ineer.org via "iNEER Talks/Papers" link.

6. A.A. Minayev, "The Triune Way – The Main Trends of the Development of Engineering Education at Donetsk State Technical University at the Edge of Centuries," presentation at Donetsk State Technical University, Donetsk, Ukraine, June 1, 2001; http://www.ineer.org via "Reports/Talks" link.

7. D. Obracaj, "Report from 56th Inauguration of Academic Year at Silesian University of Technology (2000/2001)," private correspondence from International Relations Office, Silesian University of Technology, Gliwice, Poland, October, 2000; http://www.ineer.org via "Reports/Talks" link.

8. Saul Fenster, "Reflection on the Need to Rethink the Education of the Engineer," Keynote Address delivered at ICEE-2000, August 14, 2000; http://www.ineer.org via "Reports/Talks" link.

9. John S. Jackson, "Trends in Higher Education Today Which Impact Engineering Education," Keynote Address delivered at ICEE-2000, August 14, 2000; http://www.ineer.org via "Reports/Talks" link.

10. R. Farana, T. Clausen, P. Hicks, J. Mead, V. Roubicek, L. Sanchez Ruiz, L. Scavarda, V. Schutz, C.H. Wei, M. Yen, W. Aung, "Implementation of Web-Based Information Exchange with a Directory and Data Repository for International Education and Research Cooperation," Invited Paper, presented at ICEE-2000, Taipei, Taiwan, August 13-18, 2000; http://www.ineer.org via "iNEER Talks/Papers" link.

Win Aung received his Ph.D. in Mechanical Engineering from the University of Minnesota in 1969 and joined Bell Laboratories the same year. He has been affiliated with NSF since 1974. Elected to the U.S. Senior Executive Service in 1985, he received the NSF Federal Engineer of the Year award in the same year. He is a Fellow of American Society of Mechanical Engineers (ASME) and a registered Professional Engineer of the District of Columbia. He has published over 120 technical publications, and edited or co-edited 7 books. An expert in thermal science and heat transfer, he received the ASME Classic Paper Award in 1999. In the same year, he received the *Doctorem Honoris Causa* (honorary doctorate degree) from VSB – Technical University of Ostrava, Ostrava, Czech Republic. He was appointed Secretary-General of the International Steering Committee of the International Conference on Engineering Education (ICEE), a conference series that he founded in 1994. In 2000, he co-founded the International Network for Engineering Education and Research (iNEER) and serves as its Secretary-General. He has served as an adjunct or visiting professor at several universities, where he has had an active role in teaching and research since 1976.