IFEES-AMERICAS STRATEGIC PLAN

"Supporting and Strengthening Innovation and Engineering Education in the Americas"

White Paper
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BACKGROUND

Led by the International Federation of Engineering Education Societies (IFEES), regional leaders from engineering education associations, academia, industry, and government agencies who have a long history of successfully developing and implementing engineering education, innovation/research and related projects in the Americas (from now on called IFEES-Americas)have agreed to join forces to prioritize four initiatives that have the potential to impact the region significantly. Associations supporting these Initiatives include:

- International Federation of Engineering Education Societies (IFEES) – www.ifees.net
- Ibero-American Science and Technology Education Consortium (ISTEC) – www.istec.org
- Engineering for the Americas – www.efta.oas.org
- Latin American and Caribbean Consortium of Engineering Institutions (LACCEI) – www.laccei.org
- Asociación Iberoamericana de Escuelas de Ingeniería (ASIBEI) – www.asibei.org
- Organization of American States, Office of Science and Technology and Innovation (OAS-OSTI) – www.redhucyt.oas.org/OCyT
- ABENGE - http://www.abenge.org.br and INNOVA, Brazil
- *Others to be added, see Appendix A. Please refer to IFEES-Americas Invitation below.*

INITIATIVES

1. **Developing Engineering Deans Councils across the Region**.
   a) Description.This initiative will establish Councils similar to efforts in the US, Europe, Chile and other parts of the world as well as the IFEES Global Engineering Deans Council (GEDC www.gedcouncil.org). There are nearly 266,000 engineers/technologists graduating from Latin America and Caribbean higher education institutions (according to the Network of S&T Indicators - www.ricyt.org) to meet the diverse engineering manpower and innovation needs of respective nations' economies. While these institutions are at different stages of development and achievement, all engineering educators recognize the need to better prepare engineers for the globalized economy. Engineering industry stakeholders are increasingly expecting engineering colleges to act as leaders in innovation, and to provide solutions to society's challenges with social responsibility and sustainability.

   The key challenges and responsibilities common to leaders of engineering institutions, hereafter referred to as 'engineering deans' (broader meaning of Dean is applicable), include

   - Delivering locally-pertinent and globally-relevant engineering education,
   - Influencing decision makers,
   - Making engineering more attractive to top students and increasing the number of graduates, who are being drawn away from science and technology disciplines,
   - Improving the quality of teaching and learning,
   - Improving retention rates,
   - Enhancing cultural and ethnic diversity,

- Fostering transnational mobility of students,
- Encouraging entrepreneurship;
- Recruiting and retaining quality faculty members,
- Building and maintaining the infrastructure in engineering schools for teaching and research,
- Improving the quality of governance practices in engineering schools,
- Developing adequate models for facilitating partnerships between engineering schools at the undergraduate and graduate levels,
- Fostering government and industry relations,
- Balancing education and research activities,
- Establishing accredited programs, and
- Developing adequate funding models for engineering schools.

Deans Councils provide an important forum for the exchange of information and discussion of experiences, challenges and best practices in leading an engineering school, provide a means for engineering deans to partner in innovation, and collaborate with industry and other stakeholders, and, build a network that would support engineering deans to play a leadership role in integrating and developing regional and national policies to advance the economies of the Americas.

b) Leaders – LACCEI, ASIBEI
c) Members of the Task Force – ISTEC, others TBD
d) Outcomes
    1. Create Deans Councils in each country in the Americas, and have each Council become a member of the GEDC. This subset will become the GEDC-AMERICAS Council.
    2. Identify thematic areas for integration (local, state, national, regional, international)
        i. EX: Energy and Environment - one planet, one environment, one chance
        ii. Others: nanotechnology, biotechnology, mining, oil and gas, agriculture, pedagogy, …
        iii. Culture of quality: accreditation and certification
        iv. Student recruitment and retention in Engineering
    3. Identify funding (cash, donations in-kind) opportunities (alumni, philanthropy, industry, etc)
        i. Local, State, National, Regional, International
    4. Create and enhance educational and R&D infrastructure (demands international collaboration) with social responsibility and sustainability
        i. Laboratories
        ii. Libraries
        iii. Double degree programs (undergraduate and graduate)
        iv. Facilitate mobility of students, staff, faculty (exchange programs)
        v. Accreditation
        vi. Innovate curricula

vii. Cultural awareness, diversity (ethnic, gender), communication skills

5. Create/enhance national forums and strategic alliances among government-industry-academia-multilateral organizations-NGOs-civil society
    i. Influence decision makers
        1. EX: Influence in S&T policies (local, state, national, regional, international)
        2. Strategic areas of investment and development within each country and Region
            a. Align resources of local organizations similar to the NSF in the USA; industry and multilateral organizations
        3. Infrastructure development
            a. EX: Internet connectivity and access; content; services; applications (social networking)
            b. Integration/Interconnection with other regional and international infrastructures
    ii. Create environment for entrepreneurship (social, business); creation of ecosystems; leadership
    iii. Dissemination of content
    iv. Organize periodic events to influence society

2. **Engineering Faculty Capacity Building**.

a) Description. The world needs good quality engineering talent in order to find solutions to the global challenges facing humanity such as energy, environment, health and communications. The Indo-US Collaboration for Engineering Education (IUCEE) program was motivated by the global vision of American Society for Engineering Education (ASEE) and International Federation for Engineering Education Societies (IFEES), and anchored at University of Massachusetts Lowell. It was conceptualized by over 150 leaders of engineering education and businesses, including many IITans from the US and India in 2007, keeping in mind creation of a sustainable model with the involvement of all the stake holders. The vision was and is to improve the quality and global relevance of engineering research and education in India by the imbibing of global best practices from the US and other countries with help of best faculty members. US and other countries benefit from access to high quality engineering talent resulting from improved capacity of Indian engineering research and education. The goal is to build a solid base by strengthening the four pillars of education: 1) learner-centric teaching; 2) research excellence; 3) outcomes based quality supported by accreditation and 4) innovation and entrepreneurship. In 2009, two regions (Latin America and Africa) have showed interest in adapting/adopting the IUCEE model as a unified effort to establish a strong engineering faculty capacity building program. In the Americas, Brazil has initiated formal steps to start the process of implementing a similar program in the country. Several of the associations supporting this Initiative have a history of on-site and on-line training to enhance undergraduate programs, improve/create graduate programs for R&D and potential entrepreneurial activities. Double Degree Graduate Programs are also part of this effort to build, enhance, and maintain the

faculty capacity needed in the Americas. To accompany these efforts the development of IT infrastructure is essential for improving education and R&D.

b) Leaders – IUCEE, ABENGE/INNOVA

c) Members of the Task Force – LACCEI, ISTEC, others TBD

d) Outcomes

Create/enhance programs for the enhancement and life-long learning of human resources in Engineering (train the trainer)

1. The goal is to build a solid base by strengthening the four pillars of education:
    a. Learner-centric teaching;
    b. Research excellence;
    c. Outcomes based quality supported by accreditation and
    d. Innovation and entrepreneurship.
2. On-site and on-line training
3. Innovate and develop new curricula
4. Involve professional societies, industry, academia, government agencies, multilateral organizations, civil society, NGOs
    a. Lear from successful working models
5. Facilitate exchange programs
6. Identify funding (cash, donations in-kind) opportunities (alumni, philanthropy, industry, etc)
    a. Local, State, National, Regional, International
7. Dissemination of content
8. Organize periodic events to influence society

3. Awareness of the Role of Engineering for Economic Development.

a) Description The basic strategy for economic and social development is based on three pillars: new technology, leadership, and entrepreneurship. But it is the human capital the driving force for economic changes. Therefore, engineers as enablers of new technology and effective leaders play a fundamental role in the sustainable growth of not only developed but also emergent economies. It is evident that there is a necessity in the region to recognize the importance of engineering and engineering education in the rapidly changing world and their impact in the society. Previous discussions have been centered on political and economic development of Latin American societies, and have distracted from the necessity for capacity building in the area of Engineering. It is critical for the region not only to recruit and retain more engineering students but also to diversify the engineering population and to prepare the future engineers with the leadership skills to carry out the necessary transformations for economic growth and global competitiveness.

b) Leaders – OAS-OSTI, LACCEI, ISTEC, ASIBEI, ABENGE/INNOVA

c) Members of Task Force- LACCEI (emphasis in student Leadership), ISTEC (academia, industry, government agencies, multilateral organizations, students)

d) Outcomes

Create/enhance programs for the dissemination of information on the importance of S&T, Math and Engineering education, R&D, and entrepreneurship for the social, economic, cultural and political development

1. Involve professional societies, press, industry, academia, government agencies, multilateral organizations, civil society, NGOs
2. Identify funding (cash, donations in-kind) opportunities (alumni, philanthropy, industry, etc)
    a. Local, State, National, Regional, International
3. Dissemination of content
4. Organize periodic events to influence society

4. **Innovation, Entrepreneurship and New Business Creation**.

a) Description: Moving technology from the scientific discovery stage to a commercially successful product is one of the major drivers of economic development in today's economic order. The other driver that is not as apparent and that many economic developers forget about is the issue of global markets. These are the markets that not only buy these commercial products but markets that can be developed so that they produce, generate income and use the income to buy more innovative products produced by technology commercialization processes. In this loop lies the economic miracle of the 21st century. New dynamic global models need to be created that blends business expertise and technical knowledge to benefit the economic, social and cultural development activities in the different parts of the world. The model can be expanded and adapted to different regions of the globe, it will self-align to support international research and education across science and engineering. Stakeholders, industry-academia-government-multilateral organizations and civil society, can build a better trade, education, research, and technology transfer climate based on technology commercialization. An entrepreneurial team in Latin America faces many challenges to the advancement of their businesses. Some of the known challenges are:

- Lack of a technological entrepreneurial culture
- Weak IP protection system
- Limited or no regional venture capital and credit systems
- Limited or no entrepreneurial education
- Limited seasoned entrepreneur and risk capital networking opportunities
- Lack of awareness to specificities imposed by the environment in the innovation process

Any venture fund must mitigate these and other concerns. Several of the partnering associations are working to foster the dormant entrepreneurial skills in the Latin American Region. Some issues being addressed are:

1. Develop research programs investigating technology forecasting and assessment processes across international markets by developing new and novel market research procedures and tools for technology-based products across international markets

2. Identify and examine research technology entrepreneurship issues in the Americas across all scientific disciplines with emphasis on information technology, energy, health, nanotechnology, wireless communications and biotechnology.
3. Support technological entrepreneurs in the Americas to meet international market needs and support product development for international markets.
4. Support the establishment of Management of Technology (MOT) programs that can work with the engineering, science and technology organizations to increase technological entrepreneurship activities for socio-economic development with social responsibility in a global context
5. Identify and examine the intellectual property issues in the Americas
6. Create a collaborative effort among industry-academia-government-multilateral organizations and civil society to effect necessary changes

b) Leaders – ISTEC

c) Members of Task Force – LACCEI, ASIBEI, others TBD

d) Outcomes

Create an environment for entrepreneurship (social and business)

1. Creation of a Venture Fund
    a. Partner with existing venture funds
    b. Seek matching with multilateral organizations and private equity firms
2. Creation of ecosystems
    a. Multicultural, multilingual, multidisciplinary,….
    b. Work with existing technology parks
    c. Help create technology parks
    d. Network technology parks
    e. Thematic ecosystems
3. Entrepreneurship/leadership; innovation, job creation
    a. Social
    b. Business
    c. Incubation, spin-offs
    d. Long-term leadership
    e. Role models
    f. Diversity
    g. Tax benefits, incentives
    h. Equity: haves vs. have-nots
    i. Intellectual property and publications
    j. Development: economic, political, cultural, social
4. S&T policies: local, national, regional, international
    a. Investment Incentives
    b. Politics and policy
    c. Awareness
    d. Civil Society
    e. Professional societies

f. Other businesses, interest groups

5. Accountability: Know-how Vs. know-who
6. Dissemination of content
7. Organize periodic events to influence society

IFEES-AMERICAS INVITATION

In order to carry out activities for the benefit of the Americas Region, IFEES-Americas invites other engineering education associations and stakeholders to the table to jointly develop strategic and implementation plans by May 2010. We would like to identify organizations and champions who are committed to spending time and resources to carry out activities which accomplish the proposed Four Initiatives. The invitation is to identify "champions" willing to take the responsibility and leadership of efforts under each Initiative. This entails identify opportunities, fund raising, define strategies and milestones, perform project management; go from an idea to the execution of projects with measurable outcomes.

IFEES-AMERICAS "ENCUENTROS"

We are seeking feedback from different organizations operating in the Americas on the possibility of organizing **IFEES-Americas "Encuentros"** during their planed 2010 activities before the World Engineering Education Forum (WEEF) to be held in Singapore in October 17-22, 2010. http://weef2010.wordpress.com In addition, if there is an interest in organizing the event, we are requesting proposals for the location, dates and tentative agenda that can further the goal, objectives and outcomes identified.

IFEES-AMERICAS "ENCUENTROS" GOAL and OBJECTIVES

The main goal of these **"Encuentros"** is to bring together engineering education stakeholders to share ideas and unify efforts in shaping an action plan for the next lustrum to promote and fund initiatives to foster social, economic, and cultural growth with social responsibility in a global context through innovation and engineering education in the Americas as key elements for competitiveness and success in a knowledge-based economy.

The main goal will be achieved by fulfilling the following objectives:

1. Align and strengthen collaboration among engineering stakeholders in the Western Hemisphere
2. Encourage financial support for innovation and engineering initiatives in the Americas
3. Envision challenges and opportunities in innovation and engineering for a sustainable growth of the region
4. Develop specific plans for each of the four Initiatives, including implementation steps, increase participants, and identify funding resources and metrics for assessing outcomes.

The **"Encuentros"** objectives will be accomplished by using a dynamic format where the participants are engaged in active and interactive discussions and activities and will consist of plenary presentations

followed by working sessions where participants discuss and strategize an action plan for the themes under consideration.

a. Leaders – IFEES, IFEES-AMERICAS, LACCEI, ASIBEI, EftA, ISTEC
b. Members of Task Force- *Please refer to IFEES-Americas Invitation.*
c. Outcomes
    1) Create Deans Councils in each country in the Americas, and have each Council become a member of the GEDC. This subset will become the GEDC-AMERICAS Council
    2) Identify "champion" organizations and individuals to further each of the Four Initiatives
        1. Commitment implies: leadership, funding, administrative support, IT infrastructure, press releases, donations, organizing events, contacting individuals/organizations, writing articles, etc, etc
    3) Identify and secure funding to carry out projects/programs under each of the Four Initiatives
        1. Proposal writing and submission to foundations, industry, multilateral organizations, government agencies, donors, others
        2. Coordinate efforts with organizations already actively involved in the Region; avoid duplication of efforts and maximize resources
    4) Raise Regional awareness within academia, industry, multilateral organizations, foundations, NGOs, social networks, government agencies, donors
    5) Present an IFEES-Americas action plan in the upcoming World Engineering Education Forum to be held in Singapore in October 17-22, 2010 and other pertinent organizations (website to be opened January 2010; http://weef2010.wordpress.com/about/).

NEXT STEPS

The organizations agree to disseminate this white paper describing the Four Initiatives; an invitation to organizations to actively participate; feedback on the possibility of organizing IFEES-Americas **"Encuentros"** during their 2010 planed activities and proposals for its organization; and request assistance in raising the awareness level of S&T, Math, Engineering Education, R&D and Entrepreneurship with social responsibility and in a sustainable fashion in a global context. Lastly, help us identify the "champions" that want to make a difference.