Organization of American States

Engineering for the Americas

U.S. Trade and Development Agency

# Engineering for the Americas Symposium

Capacity Building for Job Creation and Hemispheric Competitiveness

Lima, Peru - November 29 - December 2, 2005

## Final Report

**Introduction**

The Engineering for the Americas Symposium, held in Lima, Peru from November 29th through December 2nd, 2005 paved the way for a multisectoral movement to enhance engineering education and technology in the Western Hemisphere, that have been deliberated over the past four years. This symposium took place as a follow-up to those efforts, and as a result of the Engineering for the Americas initiative, recognized as a priority for the hemisphere within the framework of the IV Summit of the Americas.

The symposium was coordinated by of the Organization of American States (OAS) in conjunction with the United States Trade Development Agency (USTDA), and the World Federation of Engineering Organizations (WFEO). Strategic partners such as the Hewlett-Packard Company, Microsoft Corp., National Instruments and three Mexican firms such as *Cementos Mexicanos* (CEMEX), *Normalización y Certificación Electrónica* (NYCE), and Neoris sponsored this event.

Approximately 213 participants from 24 member States of the OAS took part in the symposium, including distinguished professionals from diverse sectors linked to engineering capacity building in the Americas, such as: industry, academia, accreditation agencies, professional associations, and government agencies. The exchange of ideas and contacts made by the participants during the symposium was vital for its success.

The symposium's agenda was ambitious and it focused on three issues: the needs of the productive sector for engineering graduates and capacity building; quality assurance in engineering education; and country planning for financing of upgrades to engineering education. The Engineering for the Americas initiative intends to establish a mechanism that allows the creation of educational reforms at the regional level that include the needs of the productive sector and prepare new engineers with attributes certified by transparent accreditation systems, which will further professional mobility, investment levels, and therefore economic development. Thus, the symposium was made with the intention of making a step towards the achievement of this initiative, and ended with the proposal of creating regional working groups that might continue the actions already started in this event.

In a succinct manner, this document presents the main issues and recommendations discussed during the symposium. More information can be found at the symposium's webpage located at: http://www.oest.oas.org/engineering/. First, however, it is important to mention the ideas that achieved consensus during that event. They are the following:

The "knowledge-based economy" heralds an era in which the importance of innovation and engineering has surpassed that of capital. Participants saw knowledge as the principal source of wealth and progress and stressed that the quest for excellence in the training of engineers, the establishment of national accreditation systems, quality assurance, and mutual recognition were becoming key factors for competing in the "knowledge-based economy" or "flat world", as writer Thomas Friedman calls it.

They pointed to the importance of a regional approach to capacity building, which, inter alia, would enhance our countries' presence on the world stage and render them less dependent.

The notion of the Engineer of the 21st Century represents a change of paradigm, whereby an engineer today must help to create himself/herself, not look for work but create it. They must be a world class engineers, leaders, visionaries, and entrepreneurs, committed to the social environment and with a clear sense of the common good. Participants in the symposium emphasized the need to boost collaboration between industry and academia.

They underscored the importance of cooperation among countries and disciplines in efforts to improve engineering capabilities. There was talk, too, of the importance of improving the "ecosystem", and of the need to foster transparency, innovation, and opportunities.

Participants expressed concern at the low output of engineers and researchers in our region, compared to countries such as China and India, and at the low levels of investment in research and development (R&D) and the number of patents. Intellectual property was another topic addressed at the symposium. It was referred to as the "currency of the 21st century".

"I know my job, I do it well, and I can prove it". This is a phrase that summarizes the importance of accreditation and quality assurance on engineering education. Nevertheless, it was emphasized that in order to get the complete impact of accreditation, countries must also strive for mutual recognition to increase their presence in world agreements.

They pointed out that it is vital to seek solutions and financing with medium- and long-term policies and plans, developed with the active participation of the different sectors involved in these issues.

**The Symposium**

The symposium's inaugural session began with speeches from Dr. Alice Abreu, Director of the OAS Office of Education, Science and Technology, and Dr. Albert Angulo, Regional Director, Latin America and the Caribbean, USTDA, recalling the importance of science, technology, engineering, and innovation for the hemisphere's integral development, and the need to increase investment in these areas, as was stated in the IV Summit of the Americas. This session also emphasized the urgent need to start the process of establishing standards and accreditation procedures for engineering education throughout universities in Latin America and the Caribbean, with the objective of providing the regions with world class engineers; ready and qualified to participate and execute engineering megaprojects in the region or in today's globalized arena. Dr. Benjamín Marticorena, President of the National Council on Science and Technology of Peru (CONCYTEC), focused his presentation on the role of engineering and hemispheric cooperation. He highlighted that in most countries of the Americas science and technology are not competitive fields and, that being so, engineering can build bridges between the two. He said that, for that to come about, it was essential to have a supply of high-quality professionals, capable of providing innovative answers to meet the current needs of both local and global markets.

Dr. Ulises Pabón, Executive Vice-president of Quality for Business Success from Puerto Rico, as the speaker of the World Perspective Session, emphasized two key aspects: first, the concept of a globalized and interconnected planet, a "flat world" as this concept was dubbed by writer Thomas Friedman, in which knowledge is the main source for wealth and progress, that jointly with information and communication technologies, such as the Internet, provide everyone with similar competitive conditions; further he mentioned a set of "world flattening" drivers such as: outsourcing, offshoring, workflow, and others. The second concept is the Engineer of 2020, which gathers the necessary traits of the future engineer and determines what should be taught in engineering programs. As world progress evidences how Latin America and the Caribbean have fallen behind in science, technology, engineering, and innovation; it is also clear that nations like the United States and Canada cannot compete isolated in the world stage against ever increasing numbers of engineers from the Asian countries. The importance of political goodwill and budget assignments by local government officials and international multilateral organizations, and their roles in this process were also emphasized.

As part of the Keynote Session, Dr. Russel Jones, President of the WFEO Standing Committee on Capacity Building, as the moderator for the session, made a presentation on the objectives of the symposium, and opened the floor asking all participants to define what it is that industry requires from the engineering profession and its graduates. Dr. Wayne Johnson, Vice-president of University Relations at Hewlett-Packard Company, referred to the region's great potential and the need to capitalize on it. He also mentioned that the engineering ecosystem is affected and changed by globalization, interconectivity, entrepreneurship, knowledge society, and intellectual property. In this context of education and capacity building as development pillars, the importance of engineering for the knowledge society and for the development of human capacity was made very clear. He pointed to the challenges faced by different regions of the world due to the incorporation of China and India into the globalization process; as well as the number of engineers produced in Asian countries that increases annually and has reached 300 000 in China, 200 000 in India, 104 000 in Japan and 60 000 in South Korea. This last number is close to the annual production of engineers for the United States. He said that these countries have become development and academic poles and they will continue attracting capital and establishing multinational enterprises in the knowledge-based economy. He said that HP could not ignore this reality, and therefore last year opened a R&D center in China. Likewise he highlighted the importance of creating the conditions for labor force, and mechanisms that facilitate its full mobility.

Dr. Jorge Vélez-Arocho, Rector of the University of Puerto Rico at Mayagüez, stressed the importance of creating mechanisms and networks among universities as a hemispheric strategy, and the importance of preparing engineering students not only to be excellent professionals but also excellent human beings first. He referred to the difficulty of getting financial resources and how important regional integration can be to channel and share resources. Dr. Clement Sankat, Dean of the School of Engineering at the University of West Indies, Trinidad and Tobago, centered his intervention on the importance of developing a regional approach, especially for the Caribbean region; increasing the number of local patents as a way to strengthen national capacity; developing local content to reduce external dependency and to develop links between industry and academia. He also referred to what is needed in Trinidad and Tobago and the Caribbean in terms of technological and scientific infrastructure, national innovation systems, and the role of government as catalyzer and leader in this process. He emphasized the need for an engineering education that promotes economic growth and job creation. His comments were enhanced by the agreement of the audience.

Dr. William Wulf, President of the United States National Academy of Engineering, reached the symposium audience through a pre-taped video presentation. Dr. Wulf presented the Engineer of 2020 Project developed by the academy and mentioned the ever increasing technological penetration and the widening gap between what is needed for the future and what is taught in engineering. The symposium then continued with five plenary sessions to answer and develop the agenda.

**Needs of the Productive Sector**

This subject was developed during the first plenary session of the symposium and during the corresponding breakout sessions.

***First Plenary Session:*** **Needs of the Productive Sector for Engineering Graduates and Capacity Building**

Dr. Sailesh Chutani, Director, External Research and Programs at Microsoft Corp. in the United States, presented this session. One of the first topics addressed was the need for a strategic link between productive sector, academia, and government; and the need for a link between talent, education, intellectual property, and industry value. The importance of education and information technologies for the knowledge-based economy and for the diverse scientific disciplines was also mentioned, as well as the natural flow of resources to the centers of intellectual excellence around the world. He agreed with the definition of a "flat world" and exemplified this concept by signaling the cases of India and China, which

have achieved excellence in their education system based on academic and technological rigor coupled with state incentives for talent development. Long-term collaboration between industry, government and academia can be successful if they are based on a common vision, intellectual talent, and in a context of political and economical stability, according to Mr. Chutani.

Mr. Chutani's presentation was followed by a panel of people from the industrial sector, Dr. Marcos Formiga, Special Advisor to the President of the National Confederation of Industry of Brazil, Dr. Jorge Barata, Director of Odebrecht Peru, Dr. José Miguel Morales, President of the National Confederation of Private Entrepreneurial Institutions (CONFIEP) from Peru, and Oscar Arrieta Estrada, General Director of *Normalización y Certificación Electrónica* (NYCE) from Mexico, who made presentations on the strategic areas of their organizations. They all agreed on the importance of the development of small and medium-sized enterprises (SMEs) for the region, since they are job creators, and of the incorporation of technologies to be more competitive in international markets. Opportunities and abilities required for the engineering of the 21st century were also mentioned. The Director of NYCE Mexico shared its experience with the acquisition of a franchise of an education method from India, which later became a source of quality preparation for Mexican engineers. Concerns were also brought to the front, such as low hemispheric levels of investment in science and technology, low number of graduates, and a low number of patents compared to other regions, especially Southeast Asia and Europe. These low indicators are a reflection of the region's stagnation in science and technology.

**Breakout Sessions**

Among the most important issues addressed in the four breakout sessions that followed the first plenary are: According to the trade, economic and productive sector (group I), the need to discover a new innovation strategy; the capacity to "absorb" the necessary knowledge to create; and the creation of new knowledge rooted in the natural resources-based industries. Other ideas addressed were: lateral transference of technology; generic technology platforms; a global profile for professionals; the need to invest in accreditation; basic science as a priority in the formation of good engineers; and the need for scientific education from a very early age. The education, research development and innovation sector (group II), presented a model that integrates the business and technology fields; they referred to the importance of strategic partnerships among the different players, of student mobility, and the need for change in the knowledge and learning centers of universities; they also discussed issues of intellectual property, strengthening of the engineering ecosystem, and the need for a regional approach. They analyzed the importance of quality in education and the access to technologies as key factors to a greater investment, and the role of innovation on the preservation of engineering and for competitiveness. The development of a road map that involves all sectors for the process of Engineering for the Americas was suggested. They pointed-out the role of the university as a fundamental actor of change for the creation of enterprises and entrepreneurial capacity, and as a direct source of social development and economic process.

The professional associations (group III) highlighted the role of this sector in the promotion of hemispheric competitiveness and job creation, the government's role and state enterprises participation in decision making, the link between this sector and academia, and the opportunities for enhancing competitiveness. The benefits of accreditation were mentioned as a control mechanism for quality in engineering education. This group also addressed the creation of exchange mechanisms within the context of free trade agreements. All the speakers in this group emphasized the importance of associations in the regulation of engineering practice. The government and financial sectors (group IV) referred to the diversity of policies and the need that these policies respond to country and regional needs. They also mentioned stagnation in patent creation and engineering in countries like Brazil, in spite of investment and efforts made by governments. It was mentioned that Brazil, in its efforts towards an accreditation system, assesses students and their performance until the year 2010. A new science and technology law in Venezuela was also presented; and criticism on the negative impact of not counting on political support to increase investment in these areas arose.

A call to provide opportunities for entrepreneurs and to keep engineering students aware and ready to solve market demands and society needs was made. A revision of engineering policy was called for, with the idea of doing a qualitative analysis of the information needed to select some successful experiences from other countries and the need to develop local capacity, so that development projects and foreign aid can be assigned to local engineers. The need for strong self-esteem and competitive desire in the professional culture was also mentioned. Another topic that was undertaken was the importance of the OAS' role to achieve consensus within this continental initiative.

At this point, the engineer of the 21st century can be defined as one that has an integral formation, world-class, with a broad perspective and vision of the national and international realities, leader, entrepreneurial, team-work oriented, multilingual, but above all, socially committed, with ethical principles, and clear notions of common good. It was stated that this search continues on the path of excellence in the formation of engineers, with particular attention to the quality of the education itself. This education must be supported by national accreditation systems, quality assurance and mutual recognition, as requirements to compete in the knowledge-based economy, taking advantage of its fruits and favoring the flow and mobility of professionals and investment.

The topics of the plenary session and the four groups previously summarized where presented by their *rapporteurs* during the consolidation and conclusion session, for which Dr. Lueny Morell, Director, and Dr. Dan Marcek, Deputy Director, of University Relations for Latin America at Hewlett-Packard Company in the United States, where responsible and channeled the debate. During the closing session of that day, Dr. Abreu emphasized the complexity of the topic, on the heterogeneous reality of the Americas, and the need for creativity to face the issues. She mentioned that even the countries with the smallest economies recognize the importance of science and technology for development, and that there is no single solution to the problems addressed in the symposium. Adequate collaboration channels must be developed and the OAS can have a key role innovating, creating real mechanisms for collaboration.

**Capacity Building and the Role of Quality Assurance in Engineering Education**

These subjects were developed during the second and third plenary sessions of the symposium, as well as during the corresponding breakout sessions.

***Second Plenary Session:*** **Building Quality into Engineering Education to Compete in a Flat World**

This plenary was dedicated to the improvement of quality in engineering education to compete in a flat world and the speaker was Dr. Tim Anderson, Associate Dean for Research, College of Engineering, University of Florida. Dr. Anderson indicated that it was necessary not just to discover how to improve, but also how to institutionalize quickly and continuously the innovations achieved. He explained the SUCCEED model created by the US National Science Foundation (NSF) to improve education in engineering, as well as the lessons that this project left, such as: investment in teamwork; differences in innovation systems among different universities; associating with industry instead of competing with it; skills development; and the importance of evaluation for the improvement of innovation. He recommended the strengthening of the transition period from high school to university in the engineering programs due to the fact that drop out levels were strongly correlated to adaptation difficulties during the transition period. The need for laboratories to make engineering studying more attractive, practical, challenging, and entertaining was also mentioned, and he stressed that industry could collaborate with academia in setting up, financing, and tooling these labs by executing projects with university labs and faculties. This will produce a virtuous circle of better prepared engineers who produce better results for industry and employers, and then these returns go back to academia for more capacity building. As future goals and challenges, Anderson mentioned the use of technology in education, the transition from knowledge-acquiring to knowledge-use, the increasing role of universities in lifelong learning, educating to interface with other disciplines, improvement in the infrastructure of diffusion, and the internationalization of engineering education.

Dr. Luiz Scavarda, Administrative Vice-president of the *Pontificia Universidad Católica de Río de Janeiro*, Brazil, presented the REENGE program, developed in the mid-90's in Brazil among several engineering schools and three federal agencies. The results of this program allowed the participant institutions to develop a good relationship with secondary schools to assure the flow of quality human resources; facilitated the development of double diploma programs with European institutions, to generate mutual reliance on students' quality; and financed the formation of enterprise incubators at the university level. He mentioned that among the negative aspects of this program are that a close relationship with the productive sector was not established, and that it was not possible to apply this program to schools that did not participate of the program.

Dr. Róger Díaz de Cossío, Coordinator for Systems Engineering of the Sub-direction of Electronics of the Engineering Institute at the *Universidad Nacional Autónoma de México* (UNAM), critiqued the factors that hamper the quality of engineering. He referred specifically to the fact that engineering programs in Latin America are too long, rigid, complicated, and lack mobility. He compared engineering programs with a rigid and inflexible pipeline. He emphasized that this contributes to students leaving engineering. He requested a redefinition of the concept of engineering and an effective link between academia systems of engineering and the industrial private sector, as well as the importance of a necessary reform, like the European Bologna Declaration, to converge engineering programs and proposals around the hemisphere. Other panelists reinforced the issues by presenting diverse indicators, like Dr. Alain Gauthier, Dean of Engineering at the Universidad de los Andes, Colombia, who also called to attention the low number of technicians coming out of the education system in Latin America. The subject of continued education and the recertification of practicing engineers were analyzed by Dr. Jorge Alva, President of the Civil Engineers Chapter, Departmental Council of Lima, *Colegio de Ingenieros del Peru*. As a cornerstone of these ideas, the need to develop local capacity building and networking was emphasized, without these capacities and networks it is difficult to attract strategic partners.

***Third Plenary Session***

**Session I: Quality Assurance in Engineering Education around the World and Implications for the Western Hemisphere**

This plenary session had two sessions. S*ession I* of the plenary was dedicated to quality assurance in engineering education worldwide and its impact on the Western Hemisphere. Dr. Eric Norris, Member of the International Committee, Canadian Council of Professional Engineers (CCPE), stated that today's economic interdependence makes it even more necessary to have qualified human capital. This is why it's so important to start accreditation systems that can provide engineers with the required credentials to support their professional practice. Dr. Norris listed the basic elements for capacity building: an educated population, engineering capacity, professional mobility, and credibility of the educating standards, and accreditation. He also referred to the accreditation criteria, the systems, the variations of these systems, and the evolution of the systems using benchmarks such as verification and monitoring. The challenges posed by globalization were also mentioned, as well as the traits and limitations of the Washington Accord. The importance of international recognition achieved by an accreditation process and its costs were also stated.

Dr. Jerry Yeargan, Distinguished Professor and Head of Computer Science and Computer Engineering of the University of Arkansas and former President of ABET, referenced the importance of quality assurance systems in the education process as fundamental in all efforts to create capacity building. He also stated that accreditation improves quality in education, and this leads to economic growth. The principal trends of quality assurance were listed, such as: global interest in accreditation; results based on accreditation criteria; and the creation of new accreditation systems. He stated that an accreditation system must assure the formation of engineers needed by the productive sector; further, it must require the following of rules that drive to this objective. He mentioned the importance of self-assessment for each program, the identification of strengths and weaknesses, and an analysis at the light of the institutional mission. He

emphasized that beyond the participation of evaluation, collaboration is required with academia, the productive sector, professional associations and the government, to establish correctly the standards for a successful accreditation process. Likewise, he reviewed what is going on in Europe, and the impact of the Bologna Declaration on engineering education.

**Session II: Engineering Education Quality Assurance Experiences of the Western Hemisphere. Best Practices and Lessons Learned**

In *session II* of this plenary, Kathryn Aberle, Associate Executive Director of ABET, summarized her presentation with a resounding phrase regarding accreditation systems in engineering: "I know my job, I do it well, and I can prove it!" – this is knowledge, execution, quality, and measurement; all within the context of accreditation. She also referred to the Western Hemisphere Initiative where Canada, Mexico, and the United States are participating and promoting the establishment of national quality assurance systems, mutual recognition agreements among countries, assistance in the development of national capacity to sustain quality assurance systems, and the facilitation of international dialogue and professional mobility among qualified professionals in Latin America.

The panelists in this session saw accreditation as a process of continuous improvement and as part of a value chain. Different accreditation models with similar objectives were analyzed, including experiences in the United States, Peru, Costa Rica, and Mexico. Panelists also agreed on the need to prepare local evaluators. Dr. Dick Seagrave, President of ABET, presented a model on the evaluation of the EC2000 accreditation process (based on outcomes assessment), that is been made in collaboration with the Pennsylvania State University. Among the attained results on the impact assessment of this accreditation system, made for the first time in the United States, can be observed changes on interpersonal communication, design on engineering and the use of modern engineering tools among the new graduates. He emphasized the importance of accountability as an essential element that involves all the stakeholders in the development, evaluation, and improvement process of the curriculum, and in the establishment and publication of goals, measurement of achievements, among others. Dr. Enrique Alvarez, Executive Committee Vice-president of the Quality and Accreditation Institute for Engineering and Technology Careers (ICACIT), Peru, shared the Peruvian experience on the development of a local accreditation system with the support of ABET. He focused on the creation of a quality culture. He highlighted that Latin American education lacks a culture of quality evaluation. He mentioned that engineering faculties show fear of evaluations that may force them into profound structural changes and modifications in their work models; changes that lack political will and economic resources. He stressed the importance of developing a culture of quality.

Dr. Teófilo Ramos, Vice-president for Institutional Research at the *Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM)*, Mexico, referred to the history of the Mexican accreditation system that began in 1991 with the support of ABET and ASEE in Mexico City and Monterrey, which started a pilot program for the accreditation process in the ITESM, where members of Mexican engineering schools were invited, and founded the *Consejo de Acreditación de la Enseñanza en Ingeniería* (CACEI) that since then had accredited more than 336 programs in Mexico. Afterwards, he focused his intervention in talking about sustainability in growing accreditation systems; the importance of implementing workshops to prepare evaluators; and of the need that accreditation institutions be independent of government. He emphasized the benefits that accreditation brings to society, such as: safety, standards, optimization, and professionalism. He highlighted the important step forward given by the Mexican government when incorporating the evaluation and accreditation of educational quality as a central point of the development national plan. Dr. Ross Peters, Vice-chair of the Canadian Engineering Accreditation Board (CEAB) emphasized the importance of knowledge and know-how transfer in the success of the Costa Rican development of their process of accreditation. He also mentioned that these examples of strategic partnerships with accreditation associations could serve as catalysts for other countries, so that they too could achieve mutual recognition systems of the capacities of their professionals.

**Breakout Sessions**

Among the main topics addressed by the Southern Cone countries session (group I) were the developing accreditation systems in that region, which are still evolving. In the Argentinean case, this process was initiated and promoted by the *Consejo Federal de Decanos de Ingeniería*, supported by the government, and put forward by the *Oficina Nacional de Acreditación* (CONEAU). Today, almost 90% of engineering programs offered in Argentina are accredited or in the process, based on similar standards to the ones of ABET or CACEI. Perhaps its major difference with respect to others is that it is mandatory for most engineering programs, and without accreditation the diplomas of those programs do not receive national validation. The government also resolves the shortcomings identified in the accreditation process. Uruguay showed mechanisms for quality assurance that are currently executed at the University of the Republic, and includes institutional evaluation, MERCOSUR engineering programs accreditation, and other mechanisms not yet systematized. This subregion is currently trying to achieve mutual university degree recognition among its members. This mechanism is still in its experimental phase but is already applied to six programs in each country participating in this regional accreditation pilot test. The countries participating were Brazil, Uruguay, Argentina, Paraguay, Bolivia and Chile. The accreditation system, named MEXA, has proven successful as the first accreditation system to be developed at the regional level (with the support of several countries) and to have manuals, norms, training courses for peer reviewers, etc. Brazil offers a different perspective: quality assurance in engineering graduate programs which are recommended and periodically evaluated by the Coordination for the Enhancement of Higher Education of Brazil (CAPES). The objectives of these programs are evaluated as well as faculty, students, programs, research, curriculum, and results. The CAPES recommendation is essential to obtaining funds, scholarships, and public sector financing, and the recognition of the degree throughout the country, among other things. Also, the Iberoamerican Association of Engineering Education Institutions, formed by 12 countries in the Americas, Spain, and Portugal defined the Iberoamerican engineer concept and produced the Declaration of Santa Fe and including recommendations regarding the admission of students to universities, academic credits, duration of the engineering programs, and other concepts.

The Central American countries session (group II) emphasized the initiative of the university community on the subject of accreditation and the lack of government involvement in this process. This region is in the process of integrating its education system and the need to create more opportunity for dialogue, trust building, collaboration, and financing with the purpose of promoting accreditation was mentioned. The symposium is seen as an opportunity to initiate contacts for this goal. Costa Rica presented a very clear exposition of the steps to follow during an accreditation process, their success was based on the efforts of their professionals and the excellent consulting received from their Canadian accreditation agency counterparts. The importance of a consulting partner was emphasized especially when the accreditation process is done for the first time and there is no prior experience. The Costa Rican experience can serve as a recommended model.

The Caribbean Countries Community session (group III) analyzed the state of the development of their engineering capacity, and the problems and challenges associated. They emphasized the small size of their economies, budget restrictions, and as a result, the insufficient number of highly qualified professionals, essential elements for capacity building. There was a discussion on developing a harmonized accreditation system for the whole Caribbean region and the role that some institutions can play in this effort, such as the Caribbean Development and Cooperation Committee (CDCC), their secretariat is located at the NIHERST, and the Council of Caribbean Engineering Organizations (CCEO). An agreement to work on the initial road map of a regional accreditation system was reached. It is expected that this process to regional accreditation will be led by the deans of the engineering faculties, professional associations, the CARICOM, the OAS, and other pertinent institutions. Professional support is to be provided by CEAB, ABET, CACEI, among others.

The Andean countries session (group IV) showed from different perspectives the efforts and challenges that a region faces on the path to accreditation. The importance of accreditation as a mechanism of continued improvement for the engineering career was highlighted, as well as the importance of selfstudy. The Peruvian institution ICACIT presented their accreditation experience which is being developed with the support of ABET. The experiences of Bolivia and Ecuador were also presented. LACCEI, the Latin American and Caribbean Consortium of Engineering Institutions stated that there is a lack of participation of the Caribbean and Latin America in international agreements. This issue generated a rich discussion. There was agreement on the need for the region to form part of international mutual recognition agreements; to implement accreditation processes and continue working for their recognition.

***Young scientists award ceremony.*** **-** Following the consolidation and conclusion session on the second working day, there was a ceremony in which prizes were awarded to young people from Peruvian secondary public schools who had excelled in science and technology-related areas with numerous youths in the country. This ceremony formed part of a program run by CONCYTEC of Peru, which chaired the session accompanied by other Peruvian Government representatives, and representatives of the OAS and of Hewlett-Packard, who distributed diplomas and a small computer donated by Hewlett-Packard to each of the award-winners. During the ceremony, a video illustrated the work being done by CONCYTEC in this area.

**Country Planning for Financing Upgrades to Engineering Education**

These subjects were developed during the fourth and the fifth plenary sessions of the symposium, as well as during the corresponding breakout sessions.

**Fourth Plenary Session**

This session focused on the capacity building presentation offered by Dr. Russel Jones of WFEO. He started his presentation reviewing recent mandates related to engineering building capacity issued by the ministers of science and technology, and the heads of state and government of the Americas. He referred to the book "The Elusive Quest for Growth", which states that the use of advanced technologies and education that drives to the improvement of technological abilities facilitate economic growth of developing countries. Next, he mentioned clear examples with countries like India, China, and Korea that have been able to position themselves thanks to the development of their technical capacities, as indicated by their amount of engineering graduates and their science and technology performance, during the last decades. He stated that what Latin America and the Caribbean need to develop their capacities is to enhance engineering education (interactions with the productive sector, quality assurance through accreditation systems, increase in the number of engineers, investment in infrastructure and upgrading of faculties), to innovate in products and services, and to provide opportunities to stem brain drain. He suggested some options to achieve these objectives including the need to develop self-assessments at the country level, to develop financing options, and to make policy changes to promote engineering mobility and entrepreneurship. He said that these efforts would impact foreign direct investment, SMEs, trade expansion, sustainable development, job creation, and poverty reduction. He distributed among participants a suggested form for country planning (Annex).

**Fifth Plenary Session**

This plenary was developed through two sessions. *Session I* was focused on financing the country plans, while *session II* was focused on country planning. Four breakout sessions organized by sectors also took place.

**Session I: Financing the Country Plans**

During this session, each panelist referred to the possibilities of obtaining financing through regional multilateral organizations. The main message was centered on the basic steps to obtain financing.

Several important issues were discussed by the panelists, among others the following: Dr. Christof Kuechermann, Director of the Inter-American Development Bank (IDB) National Office in Peru, mentioned that competitiveness is highly dependent on science, technology, and innovation levels, which is why the IDB has dedicated important resources to strengthening these areas in the region. He recognized the potential of engineering in the development of our economies and the importance of working with universities that can produce innovative engineers. He also supported the development of accreditation systems in the universities and the support of the mathematical sciences. A recent loan in the amount of US $25 million to the Peruvian government for the development of science and technology capacity was also mentioned, with a counterpart contribution of US $11 million, to support technologic innovation to be managed by a council formed by academia, government and industry. He also mentioned the new IDB paradigm, which is to be a receptor of country proposals forwarded by the ministries of economy and finance, for the development and improvement of infrastructure through joint public/private projects. He also mentioned that the Republic of Korea had entered the IDB as the 47th member with a US$ 50 million non-refundable fund destined for countries with low growth and development.

The second panelist, Dr. Wayne Johnson, Vice-president, University Relations Worldwide, Hewlett-Packard Company, United States, stated that the financing issue should be approached from a wide perspective. He mentioned that there are three multilateral financing institutions that provide loans and donations for efforts conducive to science, technology, engineering, and innovation; they are the World Bank, the IDB, and the *Banco de Fomento Andino.* He suggested identifying common needs, compatibility with the policies of the financing institutions, and a joint effort in goals and plans between academia, government, and industry. As an example, he mentioned the existence of a tax that goes to universities in Brazil, as well as a special fund provided by HP and the Puerto Rican government.

The third panelist, Dr. Rafael Pérez-Colón, Director of Multilateral Institutions Relations for Latin America and the Caribbean, Microsoft, United States, agreed with the prior panelists on this issue. In addition, he suggested other important approaches in the search for economic resources, such as: networking, planning, and execution. He suggested that the sectors involved with this initiative arrive at clear strategies that reflect country plans, and regional implementation. The importance of reaching long-term consensus and decisions is also a key because resources are usually tied to structured programs. He suggested looking at the available resources that the financing institutions have for the region, and he commented that Microsoft has similar funds earmarked for future events or initiatives within the Engineering for the Americas framework. He committed to prepare a report for the OAS and the symposium participants on how to obtain access to these funds and the necessary framework for continued support of the engineering initiative. This report was promised for the end of January 2006.

The fourth panelist, Dr. Odilón Marcuzzo Do Canto, President of the Studies and Projects Financing Institution (FINEP) of Brazil, referred to financing policies in this country, in which all financing is done by firms, government, and multilateral organizations. Science and Technology policy in Brazil is no longer government-focused but rather nation-focused, he said. This had achieved the creation of an innovation law that allows for the financing of projects between universities and industry. Funds provided in the period from the 1970's up to 2004 enabled Brazil to develop research on petroleum exploration and other fields, as a result today there is oil exploration done by Brazilians at more than 2,000 meters below sea level. This innovation law allows for incentives, assistance, and funds to small, medium-sized and individual firms or professionals. Assistance is provided directly by FINEP. A US$ 500 million dollar fund pool is expected for next year and concentration on products and services for exporting and industry problem-solving initiatives will be favored.

**Session II: Country Planning**

Dr. Alice Abreu described the role of the OAS as a mechanism fostering dialogue and hemispheric cooperation; the work of the OAS Office of Education, Science and Technology, that she leads, in a

number of areas; and the mandates of the IV Summit of the Americas in science and technology. Among other issues, she underscored recognition of the importance of this area for development, economic growth and a higher standard of living. She mentioned that although global trends point to a significant increase in experimental R&D, above all in industry, in Latin America investment in R&D remains very low, averaging 0.5 percent, or less than GDP, compared with 2 percent or more in industrialized countries, and 3 percent of Korea. She highlighted the urgent need to develop national innovation systems in an environment of national consensus transcending party-political vested interests and those of the government of the day and providing continuity through specific policies and funding; the need to implement strategies for integrating technological innovation with national economic objectives and binding the different components of the system together; and the need to increase funding for R&D and develop a skilled labor force. Dr. Abreu said that all that presupposed maintaining public opinion well informed about the potential impacts of scientific and technological knowledge; promoting a scientific culture to bring about democratic participation in decision-making processes related to science policy; generating local opportunities; and promoting ties with researchers from other countries, and so on.

For his part, Dr. Benjamín Marticorena, President of CONCYTEC, Peru, presented a report on the state of science and technology in Peru. He mentioned that in terms of financial resources and research, the science and technology program in Peru was not particularly promising and way behind levels achieved 25 years ago. He stressed that many of the problems stemmed from a lack of incentives and opportunities for anyone wishing to pursue scientific research in Peru, as a result of which there was a massive brain drain to the developed countries. He recommended a greater investment in the development of science and technology as fundamental tools for combating poverty and forging sustainable development.

**Breakout Sessions**

The trade, economic and productive sector (group I) session, demonstrated the importance of accreditation for free trade; of metrology as a discipline that should be incorporated into the engineering curriculum; of the "hands on" approach to teaching; and of the need for new curricula and interaction among players, reflecting the new careers and new skills of today's engineers. Particular emphasis was placed on the role of the USTDA, its work in over 100 countries, and its efforts to advance science, technology and engineering and on the importance of free trade for job creation for engineers. Participants emphasized the importance of metrological systems in coping with the challenges of globalization and free trade; and the part they play in domestic trade, comparability, and global credibility. Hewlett-Packard's and Pennsylvania State University's "Learning Factory Project" was also presented, along with its underlying principles such as "hands on" curriculum, problem-solving industry, the team work approach, project management and multidisciplinarity. The session also addressed academic models for the digital era and the Sapiens Model, a technical platform for constructing new curricula that facilitates a revamping of learning processes.

After reviewing the status of engineering, science, and technology in Latin America and the Caribbean, the education, research development and innovation sectors (group II) presented a plan based on practical suggestions and actions to be taken into account for the development of engineering in the Americas. It contains nine concrete proposals, including promotion of a system similar to that of the Declaration of Bologna, a re-examination of existing curricula, the creation of evaluation tools, the establishment of fiscal incentives, and so on. The importance of creating intellectual property in the region was also emphasized, along with the importance of respecting that one already existing in the region. Engineering education and evaluation methods used in Mexico were explained and it was pointed out that long-term planning, based above all on the participation of governments, universities, and industry may generate further investment. Participants again underscored the part played by the OAS as the coordinator of the hemispheric efforts to make headway in this field.

The professional associations (group III) emphasized, among other things, that solutions sought for the region had to be tailored to its particular circumstances, and that it was up to the inhabitants of each

country to define their needs. Hotly debated topics included: ways to achieve effective cooperation among the different actors, a more active role for the associations, and greater participation by young engineers. The group discussed continuing education, university accreditation and professional re-certification, as one of the functions of the associations. Participants suggested incorporating social sciences and humanities in the curricula for engineers in order to contribute to their multidisciplinary education and to prepare them for addressing development issues. Mention was made of a possible reciprocal license in engineering for Latin America and the Caribbean and of the role the OAS can play in these endeavors.

The government and financial sector group (group IV) centered its presentation on the boosting of the capacity to generate employment and competitiveness in the Hemisphere. Among the issues addressed were the effect on education of the new environment triggered by globalization, the knowledge-based economy, and market forces. The role of the State is key inasmuch as it identifies the interests of society and the productive sectors. Mention was made of critical facets of education that the State must guarantee, such as financing for it and the quality of the education imparted. The group proposed a new system for financing higher education based on the quality of teaching and return on investment. As for quality, it was emphasized that the State must provide sufficient resources to guarantee the competence of the institutions responsible for educational accreditation and it must see to it that suitable quality standards are set. Attention was also drawn to the change in the way teaching is delivered, from the traditional classroom method to semi- and virtual attendance, and to the critical thinking needed for studying via electronic networks.

The consolidation and conclusion session was chaired by Dr. Saúl Hahn, Chief of the Division of Science and Technology of the OAS Office of Education Science and Technology, and one of the main coordinators of the symposium. It consisted of presentations by the *rapporteurs* of the various sessions held on the last day of the symposium, highlighting the items referred to above.

**Closing Session / Next steps**

Dr. Russel Jones mentioned the conferences to be held in 2006, during which the Engineering for the Americas concept can be promoted, including that being organized by the American Society for Engineering Education (ASEE) for June, in Chicago; the International Conference on Engineering Education, Puerto Rico, July; the Convention of the Pan American Federation of Engineering Societies (UPADI) in Atlanta in September; and the LACCEI and ASSEE/International Brazilian Colloquium in October. He also referred to the OAS Office of Education, Science and Technology as the Secretariat for the Engineering for the Americas movement, and to possible activities to be carried out under that framework, such as: studies, accreditation workshops (with countries grouped together according to level of development or region), and country planning and financing workshops (including governments, industries and development banks).

Dr. Jorge Vélez-Arocho referred to the importance of the ministers and heads of State addressing the areas of science, technology, engineering, and innovation, to the challenges involves and widespread pressure to improve training in engineering and technology in the Hemisphere. He focused on the key topics discussed at the symposium and its outcomes. In his view, the symposium managed to convey a sense of the needs and opportunities associated with improvement and quality assurance of engineering education. He suggested that further studies be conducted in the region to define the needs of the productive sector; to plan appropriate ways to finance the required improvements in each country; and to draw up a plan for sustaining this initiative. He mentioned the importance of identifying enterprises in each country that were prepared to take part in this initiative, as well as ways of incorporating other engineering-related fields in order to achieve the initiative's goals. He touched on few other issues, too, that were then left pending and will surely prompt comments at future meetings.

Dr. Abreu reaffirmed the OAS' commitment to continue supporting this movement, Engineering for the Americas, and gladly expressed the acceptance of the offer to the Office of Education, Science and

Technology of the OAS to be its Technical Secretariat. She added that there would indeed be a number of activities in connection with this effort, including, in the near future, subregional workshops aimed at transferring knowledge for accreditation and at looking into the possibility of adapting already existing procedures. Before declaring the symposium closed, she thanked the cosponsors of the meeting and all those who had taken part in it.

To close the event, Dr. Saúl Hahn thanked the audience for their participation in the diverse sessions and debates, and he made an invitation to continue the challenge of developing the peoples of Latin America and the Caribbean.

*For further information on the Engineering for the Americas Symposium, please visit http://oest.oas.org/engineering/*

Report prepared by the Office of Education, Science and Technology of the Organization of American States.

Alice Abreu
Director
Office of Education, Science and Technology

Saúl Hahn
Chief, Division of Science and Technology
Office of Education, Science and Technology

María Celina Conte
Specialist, Division of Science and Technology
Office of Education, Science and Technology

Washington, D.C.
January 14, 2006

## Annex

**Symposium's Work Schedule**
**List of Participants**
**Suggested Template for Country Planning**

Organization of American States

Engineering for the Americas

U.S. Trade and Development Agency

# Engineering for the Americas Symposium

Capacity Building for Job Creation and Hemispheric Competitiveness

Lima, Peru - November 29 - December 2, 2005

## Work Schedule

### TUESDAY, NOVEMBER 29, 2005

12:00 p.m. – 6:00 p.m. — Registration of participants
*Opian Room*

7:00 p.m. – 9:00 p.m. — **INAUGURAL RECEPTION**
*Palacio de Torre Tagle*

### WEDNESDAY, NOVEMBER 30, 2005

8:00 a.m. – 9:00 a.m. — Registration of participants
*Foyer Room*

9:00 a.m. – 9:45 a.m. — **INAUGURAL SESSION**
*Mediterraneo C Room*

Welcoming Remarks:

**Alice Abreu,** Director, Office of Education, Science and Technology, Organization of American States (OAS)

**Ronalth Iván Ochaeta Argueta,** Director, National Office, Organization of American States (OAS), Peru

**Albert Angulo,** Regional Director, Latin America and the Caribbean, U.S. Trade and Development Agency (USTDA), United States

**Benjamín Marticorena,** President, National Council of Science and Technology (CONCYTEC), Peru

9:45 a.m. – 10:45 a.m. — **WORLD PERSPECTIVE**
*Mediterraneo C Room*

*Speaker:*

**Ulises Pabón,** Executive Vice President, Quality for Business Success Inc.

10:45 a. m. - 11:15 a.m. — Coffee Break

11:15 a.m. – 12:30 p.m. — **KEY NOTE SESSION**
*Mediterraneo C Room*

*Chair:*

**Russel Jones,** President, WFEO Standing Committee on Capacity Building

*Speaker:*

**Wayne Johnson,** Vice President, University Relations Worldwide, Hewlett-Packard Company, United States

*Respondents:*

1. **Jorge Vélez-Arocho,** Chancellor, University of Puerto Rico at Mayagüez (UPRM),
2. **Clement Sankat,** Dean of Faculty of Engineering, University of West Indies (UWI), Trinidad & Tobago

12:30 p.m. – 12:45 p.m. — **Video Projection**
*Mediterraneo C Room*

*Speaker:*

**William Wulf,** President, National Academy of Engineering, United States

12:45 p.m. – 2:15 p.m. — Lunch (provided)
*Terrace*

**Development of an appreciation that targeted engineering capacity is an essential element for economic development**

**Desired Outcomes for the day:**

- An understanding of the elements and key development factors of knowledge- based economies
- Understanding that technical capacity building is necessary for economic development in the current global economy
- An understanding of the general thrust of the "Engineering for the Americas" effort
- Development of an understanding of the needs of the productive sector re engineering graduates and capacity building
- Open discussion of the needs of the productive sector from a variety of perspectives
- Development of a consensus on the needs of the productive sector for high quality engineering graduates, in appropriate quantity

**Plenary Sessions:**

- Inaugural session
- Keynote session – putting Engineering for the Americas in context -case studies
- Plenary session I – Needs of the productive sector
- Consolidation and conclusion session

**Breakout Sessions:**

- Trade and economic development perspectives
- Education and innovation perspectives
- Professional association views
- Government and finance sectors ideas

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2:15 p.m. – 3:30 p.m.
*Mediterraneo C Room*

**FIRST PLENARY SESSION**

Needs of the Productive Sector in Regards to Engineering Graduates and Capacity Building

*Speaker:*

**Sailesh Chutani,** Director, External Research and Programs, Microsoft, USA

*Rapporteur:*

**Marcos Formiga,** Special Adviser to the President, National Confederation of Industry, Brazil

*Panelists:*

1. **Jorge Barata**, Director, Odebrecht Peru, Peru
2. **José Miguel Morales,** President, National Confederation of Private Entrepreneurial Institutions (CONFIEP), Peru
3. **Oscar Arrieta Estrada**, General Director, Normalización y Certificación Electrónica (NYCE), Mexico

Open Floor for Dialogue

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3:30 p.m. – 5:00 p.m.
*Opian Room*

**BREAK OUT SESSIONS** (Coffee Available)

**Group I: Trade, Economic and Productive Sector:**

*Speaker:*

**Jorge Yutronic,** Director of the FONDEF Program, National Commission of Scientific and Technologic Research (CONICYT), Chile

*Rapporteur:*

**Keith Eischeid,** Country Manager for Andean and Caribbean Regions, U.S. Trade and Development Agency (USTDA), United States

*Panelists:*

1. **Alberto Pfeifer,** General Executive Coordinator, Consejo Empresario de America Latina (CEAL), Brazil
2. **Juana Kuramoto**, Associate Researcher, Analysis Group for Development (GRADE), Peru
3. **Antonio Villalobos**, Information Technology Director, CEMEX, Mexico
4. **Igor Alvarado**, District Sales Manager, National Instruments Andean & Caribbean, National Instruments

Open Floor for Dialogue

*Mediterraneo C Room*

**Group II: Education, Research Development and Innovation Sector**

*Speaker:*

**K.D. Sirvastava,** Provost, University of Trinidad & Tobago, Trinidad & Tobago

*Rapporteur:*

**Mario R. Nieto Lovo,** Dean of School of Engineering and Architecture, University of El Salvador, El Salvador

*Panelists:*

1. **Rafael Perez Colón,** Multilateral Institutions Relations for Latin America & Caribbean, Microsoft, United States
2. **Rodrigo Varela Villegas,** General Director, Centro de Desarrollo del Espíritu Empresarial, Colombia
3. **Armando Valim,** Group Manager, Academic Marketing, National Instruments

Open Floor for Dialogue

*Poseidon Room*

**Group III: Professional Associations:**

*Speaker:*

**Geoffrey Abdullah,** President, Association of Professional Engineers of Trinidad & Tobago (APETT), Trinidad & Tobago

*Rapporteur:*

**Enrique Alvarez,** Executive Committee Vice-President, Quality and Accreditation Institute for Engineering and Technology Careers (ICACIT), Peru

*Panelists:*

1. **Colin Smith,** President, Canadian Council of Professional Engineers (CCPE), Canada
2. **Freddy Bolaños,** Accreditation Commission, Escuela Federal de Ingenieros y Arquitectos, Costa Rica
3. **Claudio Dall'Acqua,** President, Pan American Federation of Engineering Societies (UPADI), Brazil

Open Floor for Dialogue

*Oceanus Room*

**Group IV: Government and Finance Sectors:**

*Speaker:*

**Sandoval Carneiro**, Former President, Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Brazil

*Rapporteur:*

**Eduardo Ismodes**, Dean of Faculty of Science and Engineering, Pontifical Catholic University, Peru

*Panelists:*

1. **María Elena Fernández,** President, Fundación Instituto de Ingeniería (FII), Venezuela
2. **Javier Piqué**, Dean, Consejo Departamental de Lima, Colegio de Ingenieros, Peru

Open Floor for Dialogue

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5:00 p.m. – 6:30 p.m.

*Mediterraneo C Room*

**CONSOLIDATION AND CONCLUSION SESSION**

*Chair:*

1. **Lueny Morell**, Director, University Relations for Latin America, Hewlett-Packard Company, United States
2. **Dan Marcek**, Deputy Director, University Relations, Hewlett-Packard Company, United States

*Rapporteurs:*

1. **Marcos Formiga**
2. **Keith Eischeid**
3. **Mario R. Nieto Lovo**
4. **Enrique Alvarez**
5. **Eduardo Ismodes**

Open Floor for Dialogue

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**EVENING OPEN (dinner on your own)**

## THURSDAY, DECEMBER 1, 2005

Capacity Building & the Role of Quality Assurance in Engineering Education

*Fostering economic development through the establishment of a robust mechanism of quality assurance in engineering education that stimulates innovation and creativity, and that maintains competence in the fundamental engineering skills.*

**Overarching: Buy-in to the necessity of a meaningful quality assurance program and confidence that it can be accomplished**

**Desired Outcomes for the day:**

- Understanding of global trends in the advancement of engineering education
- An understanding of the generally accepted principles of accreditation
- An understanding that quality assurance of engineering education may be accomplished through a variety of mechanisms and methodologies and an understanding of other kinds of QA processes (e.g. Ministry of Education, institutional)
- A knowledge of current global initiatives and pressures impacting engineering education and practice
- A knowledge of quality assurance systems in different parts of the world along with mutual recognition agreements and the potential implications for the Americas
- Identify the next steps to outline a plan for a Quality Assurance system for engineering education within each country and identify the resources required to implement the plans including financial, expertise, etc.

**Plenary Sessions II and III:**

- The Why - Generally accepted principles of Quality Assurance and Accreditation
- The How - Quality Assurance around the world and global initiatives

**Breakout Sessions:**

- Sharing best practices
- Determining next steps

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8:30 a.m. – 10:15 a.m.
*Mediterraneo C Room*

**SECOND PLENARY SESSION**

Building Quality into Engineering Education to Compete in a Flat World

*Speaker:*

**Tim Anderson,** Associate Dean for Research, College of Engineering, University of Florida (UFL), United States

*Rapporteur:*

**Robert Kersten,** Pan American Academy of Engineering, United States

*Panelists:*

1. **Luiz Scavarda,** Administrative Vice President, Pontificial Catholic University (PUC-RIO), Brazil
2. **Roger Díaz de Cossío,** Coordinator for the Systems of the Subdirector of Electromechanics of the Engineering Institute, Universidad Nacional Autónoma de México (UNAM), Mexico
3. **Alain Gauthier,** Dean of Engineering, Universidad de los Andes, Colombia
4. **Jorge Alva**, President of the Civil Engineers Chapter, Departmental Council of Lima, Colegio de Ingenieros del Peru, Peru

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10:15 - 10:30 a.m. Coffee Break

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10:30 a.m. – 1:00 p.m. **THIRD PLENARY SESSION**

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10:30 a.m. – 11:00 a.m.
*Mediterraneo C Room*

**Session I:** Quality Assurance in Engineering Education around the World and Implications for the Western Hemisphere

*Speaker:*

**Eric Norris,** Member of the International Committee, Canadian Council of Professional Engineers (CCPE), Canada

*Panelist:*

**Jerry R. Yeargan,** Distinguished Professor and Head of Computer Science and Computer Engineering, University of Arkansas and 2001-2002 President of ABET, United States

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11:00 a.m. – 1:00 p.m.
*Mediterraneo C Room*

**Session II:** Engineering Education Quality Assurance Experiences of the Western Hemisphere: Best Practices and Lessons Learned

*Speaker:*

**Kathryn Aberle,** Associate Executive Director, Accreditation Board for Engineering and Technology (ABET), United States

*Panelists:*

1. The Costa Rican/Canadian Model for Development of an Accreditation System
   **Ross Peters,** Vice Chair, Canadian Engineering Accreditation Board (CEAB)

2. Bringing Outcomes Assessment into an Engineering Quality Assurance System
   **Dick Seagrave,** President, Accreditation Board for Engineering and Technology (ABET), United States
3. Challenges in Starting a Quality Assurance System for Engineering Education
   **Enrique Alvarez,** Executive Committee Vice President, Quality and Accreditation Institute for Engineering and Technology Careers (ICACIT), Peru
4. Sustaining a Growing Accreditation System
   **Teófilo Ramos,** Vice President for Institutional Research, Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM), Mexico

Instructions to working groups – Kathryn Aberle

1:00 p.m. - 2:00 p.m. Lunch (provided)
*Terrace*

2:00 p.m. – 5:00 p.m. **BREAK OUT SESSIONS** (Coffee available)

Each working group will be asked to choose from these suggested topics:

(1) Challenges in Starting an Accreditation System:
(2) Sustaining and Growing an Accreditation System
(3) Other?

Questions to be considered in each group

- How can what we have learned be used in our own country?
- Who needs to be brought into this discussion?
- How do we develop a plan to move this forward?
- What assistance is desired or needed?
- How can we optimize resources?

*Mediterraneo C Room* **Group I: Southern Cone Countries**

*Speaker:*
**Osvaldo Micheloud,** President, Engineering Education Committee, Argentinean Deans Association, Argentina

*Rapporteur:*
**Nabil Esmail,** Dean of Faculty of Engineering & Computer Science, Concordia University, Canada

*Panelists:*
1. **Ismael Piedra Cueva,** Dean of Faculty of Engineering, Universidad de la República, Uruguay
2. **Antonio MacDowell Figueiredo,** Coordination of Post Graduate Programs in Engineering (COPPE/UFRJ), Brazil
3. **Mario Gómez Mejía**, Executive Director, National Association of Faculties and Schools of Engineering (ASIBEI), Mexico

Open Floor for Dialogue

*Opian Room* **Group II: Central American Countries**

*Speaker:*
**Knut Walter Franklin,** President, Accreditation Commission for Higher Education Quality, El Salvador

*Rapporteur:*
**Aldo José Urbina Villalta,** Rector, Universidad Nacional de Ingeniería (UNI), Nicaragua

*Panelists:*
1. **Daniel Hernández,** Coordinator for Capacity Building Department, Colegio Federado de Ingenieros y Arquitectos, Costa Rica
2. **Juan Manuel Muñoz,** Coordinator of the Institutional Program of University Autoevaluation and Accreditation, Universidad Nacional de Ingeniería (UNI), Nicaragua
3. **Francisco Estuardo Ruiz Cruz**, President, Colegio de Ingenieros, Guatemala

Open Floor for Dialogue

*Triton Room*

**Group III: Caribbean Countries**

*Speaker:*

**Gosett Oliver,** Dean of Faculty of Engineering, University of Technology, Jamaica

*Rapporteur:*

**Ramón Vásquez,** Dean of Engineering, University of Puerto Rico at Mayaguez (UPRM), Puerto Rico

*Panelists:*

1. **Hollis Charles,** Representative, Caribbean Council of Science and Technology, Trinidad & Tobago
2. **Aaron Lewis**, Dean, Faculty of Science and Technology, University of Belize, Belize
3. **Indhira de Jesus,** Dean of Engineering, Instituto Tecnológico de Santo Domingo (INTEC), Dominican Republic

Open Floor for Dialogue

*Poseidon Room*

**Group IV: Andean Countries**

*Speaker:*

**José Valdez Calle,** President, Instituto para la Calidad de la Acreditación de las Carreras de Ingeniería y Tecnología (ICACIT), Perú

*Rapporteur:*

**Deborah Wolfe,** Director, Education, Outreach and Research, Canadian Council of Professional Engineers (CCPE), Canada

*Panelists:*

1. **Vladimir Mendizábal,** Pan American Academy of Engineering, Bolivia
2. **Moisés Tacle,** Rector, Escuela Superior Politécnica del Litoral (ESPOL), Ecuador
3. **Maria M. Larrondo-Petrie,** Latin American and Caribbean Consortium of Engineering Institutions (LACCEI)

Open Floor for Dialogue

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5:00 p.m. – 6:00 p.m.

*Mediterraneo C Room*

**CONSOLIDATION AND CONCLUSION SESSION**

*Chair:*

**Jerry Yeargan**

Distinguished Professor and Head of Computer Science and Computer Engineering, University of Arkansas and 2001-2002 President of ABET, United States

*Rapporteurs:*

1. **Robert Kersten**
2. **Nabil Esmail**
3. **Aldo José Urbina Villalta**
4. **Ramón Vásquez**
5. **Deborah Wolfe**

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6:00 p.m. – 7:00 p.m.

*Mediterraneo C Room*

**AWARD CEREMONY FOR YOUNG SCIENTISTS**

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**EVENING OPEN (dinner on your own)**

## FRIDAY, DECEMBER 2, 2005

**Overarching: Instill confidence that a realistic plan for the engineering for the Americas, specific to each country, can be implemented in the future**

**Desired Outcomes for the day:**

- Clear understanding of the role of engineering education and capacity building in developing countries, the need for innovation and quality assurance and development of a country roadmap
- Guidance on needed country planning to effect enhancement of technical personnel base
- Information on potential funding sources for implementation of country plans
- Development of a consensus on the need for and approach to country planning
- Development of a path forward for the Engineering for the Americas program

**Plenary sessions IV and V:**

- Capacity Building
- Country planning- building the roadmap

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8:30 a.m. – 9:00 a.m.
*Mediterraneo C Room*

**FOURTH PLENARY SESSION**
Capacity Building

*Speaker:*
**Russel Jones,** President, WFEO Standing Committee on Capacity Building

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9:00 a.m. – 11:45 a.m.

**FIFTH PLENARY SESSION**
Country Planning, Financing of Upgrades to Engineering Education, Partnerships

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9:00 a.m. – 10:15 a.m.
*Mediterraneo C Room*

**Session I: Financing the Country Plans**

*Speaker:*
**Christof Kuechemann**, Director, IDB Country Office, Inter-American Development Bank (IDB)

*Rapporteur:*
**Nicolas Osorno,** Director of Entrepreneurial Innovation, Nicaraguan Council of Science and Technology (CONACYT), Nicaragua

*Panelists:*
1. **Wayne Johnson,** Vice President, University Relations Worldwide, Hewlett-Packard Company, United States
2. **Rafael Perez Colón,** Multilateral Institutions Relations for Latin America & Caribbean, Microsoft, United States
3. **Odilon Antonio Marcuzzo do Canto,** President, Financiadora de Estudos e Projetos (FINEP), Brazil

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10:15 a.m. – 11:45 a.m.
*Mediterraneo C Room*

**Session II: Country Planning**

*Speaker:*
**Alice Abreu,** Director, Office of Education, Science and Technology, Organization of American States (OAS)

*Rapporteur:*
**Vladimir Yackovlev,** Vice President, National Academy of Engineering, Venezuela

*Panelist:*
**Benjamín Marticorena,** President, National Council of Science and Technology (CONCYTEC), Peru

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11:45 a.m. – 1:30 p.m.
*Mediterraneo B Room*

**BREAK OUT SESSIONS**

**Group I: Trade, Economic and Productive Sector**

*Speaker:*
**Keith Eischeid,** Country Manager for Andean and Caribbean Regions, U.S. Trade and Development Agency (USTDA), United States

*Rapporteur:*
**Angela Uller,** Director, Coordination of Post Graduate Programs in Engineering (COPPE/UFRJ), Brazil

*Panelists:*
1. **Héctor Nava Jaimes,** General Director, National Center of Metrology (CENAM), Mexico
2. **Lueny Morell & John Lamancusa,** Director of University Relations for Latin America, Hewlett-Packard Company, United States / Professor of Mechanical Engineering, Pennsylvania State University, United States
3. **Fernando Jaimes,** Director for Science and Technology, Tecnológico de Monterrey, Mexico

Open Floor for Dialogue

*Mediterraneo C Room*

**Group II: Education, Research Development and Innovation Sector**

*Speaker:*

**Edgar Sánchez Sinencio,** TI/J. Kilby Chair Professor, Texas A&M University (TAMU), United States

*Rapporteur:*

**Luiz Paulo Brandão,** Ex Dean of Engineering, Military Institute of Engineering, Brazil

*Panelists:*

1. **Edwin Durán Zurita,** Principal Adviser for University Development, Universidad Privada Boliviana, Bolivia
2. **Jaime Puente,** Manager, External Research and Programs for Latin America, Microsoft, United States
3. **José Antonio Chang,** Rector, Universidad San Martín de Porres, Peru
4. **Carlos Galdeano,** Coordinator for the Engineering and Technologies Areas of CENEVAL, CENEVAL, México.

Open Floor for Dialogue

*Oceanus Room*

**Group III: Professional Associations**

*Speaker:*

**Julio Rivera Feijóo,** Dean, Colegio de Ingenieros, Peru

*Rapporteur:*

**Catherine Didion,** Former AWIS Executive Director, Vice President of the Didion Group, United States

*Panelists:*

1. **Cyro Laurenza**, Chairman of the Technical Committee, Pan American Federation of Engineering Societies (UPADI), Brazil
2. **Hollis Charles,** Former President, Board of Engineers of Trinidad & Tobago, Trinidad & Tobago

Open Floor for Dialogue

*Opian Room*

**Group IV: Government and Finance Sectors**

*Speaker:*

**Luis Alberto Lima Morra,** President, National Council for Science and Technology (CONACYT), Paraguay

*Rapporteur:*

**Susana Vegas Chiyón**, Dean of Engineering, Universidad de Piura, Peru

*Panelist:*

**Oscar Gambetta**, Adviser to the Secretary of Science, Technology and Productive Innovation, SECYT, Argentina

Open Floor for Dialogue

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1:30 p.m. - 3:00 p.m. Lunch (provided) - **NATIONAL LEVEL PLANNING**

*Mediterraneo A Room* *(Suggested that participants gather by country or region to foster dialogue)*

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3:00 p.m. – 3:45 p.m. **CONSOLIDATION AND CONCLUSION SESSION**

*Mediterraneo C Room*

*Chair:*

**Saúl Hahn,** Chief of Division of Science and Technology, Office of Education, Science and Technology, Organization of American States (OAS)

*Rapporteurs:*

1. **Nicolás Osorno**
2. **Vladimir Yackovlev**
3. **Angela Uller**
4. **Luiz Paulo Brandão**
5. **Catherine Didion**
6. **Susana Vegas Chiyón**

3:45 p.m. – 4:45 p.m. **CLOSING SESSION / NEXT STEPS**

*Mediterraneo C Room*

*Chair:*

1. **Saúl Hahn,** Chief of Division of Science and Technology, Office of Education, Science and Technology, Organization of American States (OAS)
2. **Russel Jones,** President, WFEO Standing Committee on Capacity Building

*Speakers:*

1. **Alice Abreu,** Director, Office of Education, Science and Technology, OAS – "Programs Needed"
2. **Jorge Velez-Arocho,** Chancellor, University of Puerto Rico at Mayagüez (UPRM) – "Studies Needed"

4:45 p.m. **END OF SYMPOSIUM**









Organization of American States (OAS) * Office of Education, Science and Technology (OEST)
U.S. Trade and Development Agency * World Federation of Engineering Organizations (WFEO)
Hewlett-Packard Company (HP) * National Instruments * Microsoft Corp.
NEORIS * Normalización y Certificación Electrónica (NYCE) * Cementos Mexicanos (CEMEX)

# List of Participants

**Argentina**

Oscar Enrique Gambetta
Asesor
Secretaría de Ciencia, Tecnología e Innovación Productiva
Ministerio de Educación, Ciencia y Tecnología
ogambetta@agencia.secyt.gov.ar

Cristobal Lozeco
Dean
Facultad de Ingenieria y Ciencias Hidricas (UNL)
plozeco@fich.unl.edu.ar

Osvaldo Micheloud
Immediate Past President
Education Committee
Angentinean Deans Association
omiche@fibertel.com.ar

Miguel Yadarola
President
Pan American Academy of Engineering
mayadarola@arnet.com.ar

**Belize**

Aaron Lewis
Dean Faculty Science and Technology
University of Belize
alewis@ub.edu.bz

**Bolivia**

Edwin Durán-Zurita
Senior Advisor for University Advancement
Universidad Privada Boliviana (UPB)
eduran@epb.edu

Edgar Heredia
Director
Universidad Privada Boliviana (UPB)
edgar@entelnet.bo;
edgarh@grupoforte.net

Jose Mendez
President
Sociedad de Ingenieros de Bolivia (SIB)
jose-mendez@urscorp.com

Vladimir Mendizabal Aguayo
Pan American Academy of Engineering
mendicon@supernet.com.bo

Emilio Rivera Chávez
Ingenierio Mecánico
Facultad Nacional de Ingeniería
Universidad Técnica de Oruro
satii@entelnet.bo;
satii@nogal.oru.entelnet.bo

Roberto Valera Camacho
Secretario de Vinculación Nacional e Internacional
Sociedad de Ingenieros de Bolivia (SIB)
robertovalera@mail.com

**Brazil**

Benedito Aguiar Neto
Professor
Universidad Federal de Campina Grande/ABENGE
bganeto@cct.ufcg.edu.br

José Luiz Albertin
Financial Director
SAE Brasil
directoria-Albertin@ryuma.com.br;
jlalb@uol.com.br

Luiz Paulo Brandão
Ex Dean of Engineering
Instituto Militar Engenharia (IME)
brandao@ime.eb.br

Sandoval Carneiro Jr.
Ex Dean, Professor
Department of Electric Engineering
Federal University of Rio de Janeiro (UFRJ)
sandoval@coep.ufrj.br

Claudio Amaury Dall' Acqua
Presidente
Unión Panamericana de Asociaciones de Ingenieros (UPADI)
claudio@dallacqua.com.br;
presidente@upadi.org.br

Silvia Costa Dutra
Diretora de Comunicação e Propaganda
Associação Brasileira de Ensino de Engenharia (ABENGE)
silviad@unisinos.br; abenge@iba.com.br

Marcos Formiga
Asesor Especial da Presidência
Confederação Nacional da Industria (CNI)
mmformiga@cni.org.br

Joaci Franklin de Medeiros
Manager
Strategic Planning, Basic Industrial Technology (TIB), Biodiesel
Associação Brasileira das Instituições de Pesquisa Tecnológica (ABIPTI)
jfmedeiros@abipti.org.br

Luiz Antonio Gargione
Dean of Planning
Universidade do Vale do Paraiba (UNIVAP)
gargione@univap.br

Cyro Laurenza
Presidente - Comite Técnico
Unión Panamericana de Asociaciones de Ingenieros (UPADI)
cyro.laurenza@terra.com.br

Antonio MacDowell de Figueiredo
Instituto Alberto Luiz Coimbra de Pós-Graduação e Pesquisa de Engenharia (COPPE/UFRJ)
Universidade Federal de Rio de Janeiro (UFRJ)
amdf@scire.coppe.ufrj.br

Odilon Antonio Marcuzzo do Canto
Presidente
Financiadora de Estudos e Projetos (FINEP)
Ministério da Ciência e Tecnologia (MCT)
presidencia@finep.gov.br;
odilon@finep.gov.br

Mario Neto Borges
Scientific Director
Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG)
marioneto@fapemig.br

Alberto Pfeifer
Executive Director
Conselho de Empresarios da America Latina (CEAL)
pfeifer@ceal-int.org

Luiz Carlos Scavarda do Carmo
Administrative Vice- President
Pontifical Catholic University of Rio de Janeiro (PUC-RIO)
scavarda@puc-rio.br

Angela Uller
Directora
Instituto Alberto Luiz Coimbra de Pós-Graduação e Pesquisa de Engenharia (COPPE/UFRJ)
angela@adc.coppe.ufrj.br

**Canada**

Nabil Esmail
Dean and Professor
Faculty of Engineering and Computer Science
Concordia University
esmail@encs.concordia.ca

Dick Fletcher
Memberof CCPE
Canadian Council of Professional Engineers (CCPE)
dfletcher@urban-systems.com

Michael David Miller
Dean
Faculty of Engineering
University of Victoria
mmiller@cs.uvic.ca

Eric Norris
Associate Professor (former)
McGill University
eric.norrix@mcgill.ca

Ross Peters
Member
Canadian Engineering Accreditation Board (CEAB)
gpeters@engr.mun.ca

Colin Smith
President
Canadian Council of Professional Engineers (CCPE)
csmith@vccep.bc.ca

Deborah Wolfe
Director; Education, Outreach & Research
Canadian Council of Professional Engineers (CCPE)
deborah. wolfe@ccpe.ca

**Chile**

Paulino Alonso
Decano
Council of Deans of Engineering Schools Chile
palonso@ucv.cl

Luis Ayala Riquelme
Vice Dean (Acting Dean)
Faculty of Physical and Mathematical Sc
University of Chile
layala@ing.uchile.cl

Cesare Celle
Managing Director Latin America Operations
Hatch Ingenieros y Consultores Ltda.
ccelle@hatch.cl

Mario Marchese Mecklenburg
Director
Hatch Consulting Group, Latin America
HATCH
mmarchese@hatch.cl

Christian Vial
Pontificia Universidad Católica de Chile (PUCP)
cvial@ing.puc.cl

Jorge Yutronic
Executive Director
National Commission for Scientific and Technological Research (CONICYT)
jyutronic@conicyt.cl

Joel Zambrano Valencia
Decano Facultad de Ingeniería
Universidad de Concepción
jzambran@udec.cl

**Colombia**

Mauricio Duque
Associate Professor
Universidad de los Andes
maduque@uniandes.edu.co

Alain Gauthier
Dean of School of Engineering
Universidad de los Andes
agauthie@uniandes.edu.co

Carlos Munoz
Associate Professor of School of Engineering
Pontificia Universidad Javeriana
cemunoz@javeriana.edu.co

Javier Paez Saavedra
Decano de Ingenierías
Universidad del Norte
jpaez@uninorte.edu.co

Rodrigo Varela Villegas
Director General
Centro de Desarrollo del Espiritu Empresarial
Universidad Icesi
rvarela@icesi.edu.co

**Costa Rica**

Mayra Urtecho Alvarado
Directora
Sistema Nacional de Acreditación de la Educación Superior (SINAES)
sinaes@conare.ac.cr

Freddy Cespedes
Executive Director Assistant
Colegio Federado de Ingenieros y de Arquitectos Costa Rica
fbolanos@cfia.or.cr

Daniel Hernández Jiménez
Jefe
Departamento de Formación Profesional
Colegio Federado de Ingenieros y de Arquitectos de Costa Rica
danielhernandez@cfia.or.cr

Fernando Silesky Guevara
Ingeniero Quimico
Universidad de Costa Rica
fersilesky@costarricense.cr

**Dominican Republic**

Indhira De Jesús
Decana Área Ingeniería
Instituto Tecnologico de Santo Domingo (INTEC)
idejesus@intec.edu.do

Domingo Jimenez Ramirez
Decano
Facultad de Ingenieria y Arquitectura
Universidad Autónoma de Santo Domingo
postmaster@fiauasd.net

**Ecuador**

Kleber Barcia Villacreses
Asesor
Centro de Investigación Científica y
Escuela Superior Politecnica de
Litoral (ESPOL)
kbarcia@espol.edu.ec

Vincente Gallardo Posligua
Director de la Carrera de Ing. en
Sistemas Computacionales
Facultad de Ingeniería
Universidad Católica de Santiago de
Guayaquil
Gallardo@ucsg.edu.ec

Cecilia Paredes
Decano Facultad de Ingeniería y Ciencias de
la Producción
Escuela Superior Politecnica de Litoral
(ESPOL)
cparedes@espl.edu.ec

Victor Paredes
Ingeniero en Petroleos
Universidad Central del Ecuador
figempa@andinanet.net

Fernando Romo
Dean
School of Sciences and Engineering
Universidad San Francisco de Quito
(USFQ)
fromo@mail.usfq.edu.ec

Moises Tacle Galárraga
Rector
Escuela Superior Politécnica de Litoral
(ESPOL)
mtacle@espol.edu.ec

**El Salvador**

Francisco Antonio Alarcón Sandoval
Vice Decano
Facultad de Ingeniería y Arquitectura
Universidad de El Salvador
falarcon@telesal.net;
falarcon@ing.ues.edu.sv

Willian Ernesto Marroquin
Vice Rector Académico Adjunto
Universidad Centroamericana "José
Simeón Cañas" (UCA)
emarroquin@ing.uca.ed.sv;
wmarroqu@ing.uca.edu.sv

Mario Nieto Lovo
Decano
Facultad de Ingeniería y Arquitectura
Universidad de El Salvador
mariornieto@navegante.com.sv;
marionieto55@hotmail.com;
mnieto@ing.ues.edu.sv

José Mario Sorto
Presidente de Junta Directiva
Asociacion Salvadorena de Ingenieros
y Arquitectos (ASIA)
asiajunta@integra.com.sv

Knut Walter Franklin
Vocal
Comisión de Acreditación de de la
Calidad de la Educación Superior
knut.walter@mined.gob.sv;
kwalter@itelgua.com

**Guatemala**

Maria Eugenia Alvarez Gomez
Directora de Proyectos
Colegio de Ingenieros de Guatemala
eugenia_ag@yahoo.com

Francisco Ruiz Cruz
Civil Engineer
Colegio de Ingenieros de Guatemala
r.ruiz@cig.org.gt

**Guyana**

William Wilson
Dean
Faculty of Technology
University of Guyana
wawilson@uog.edu.gy

**Honduras**

Saúl Jimenez Mencias
Dean of Engineering
Universidad Nacional Autónoma de
Honduras
jpipom@yahoo.com;
sajime@terra.com

Joselino Rivera Briceno
Secretary of Engineering
Tegucigalpa Nacional Autonoma de
Honduras
jrivera@cybertelb.hn

**Jamaica**

Howard Chin
President
Jamaica Institution of Engineers
hmc14@cwjamaica.com

Audley Darmand
Lecturer
School of Engineering, Electrical Engineering Programme
University of Technology, Jamaica
adarmand@utech.edu.jm

Gossett Oliver
Dean
Faculty of Engineering & Computing
University of Technology of Jamaica
goliver@utech.edu.jm

**Mexico**

Oscar Arrieta Estrada
Director General Tecnológico NYCE
Normalización y Certificación Electrónica (NYSE)
oscar.arrieta@tecnyce.com.mx

Roger Diaz de Cossio
Director
Instituto de Ingenieria, UNAM, Mexico
rdic@pumas.iingen.unam.mx

Carlos Galdeano Bienzobas
Coordinador del Área de las Ingenierías y de las Tecnologías
Centro Nacional de Evaluacion para La Educacion Superior (CENEVAL)
carlos.galdeano@ceneval.edu.mx

Mario Gómez Mejía
Secretario Ejecutivo
Asociación Nacional de Falutades y Escuelas de Ingeniería (ANFEI)
sec-ejec@anfei.org.mx

Fernando Jaimes
Director
División de Tecnologías de Información y Electrónica
Tecnológico de Monterrey
fijaimes@itesm.mx

Gloria Susana Lazo Quintanilla
Director
Industrial & Systems Engineering Program
Instituto Tecnológico de Monterrey
susana.lazo@itesm.mx

Hector Nava-Jaimes
Director
Centro Nacional de Metrologia (CENAM)
hnava@cenam.mx

Fernando Ocampo Canabal
Presidente del Consejo Directivo
Consejo de Acreditación de la Enseñanza de la Ingeniería (CACEI)
fdocampo@cacei.org

Teofilo Ramos
Director of Institutional Effectiveness
Instituto Tecnológico de Monterrey
tramos@itesm.mx

Antonio Villalobos
Director
Informática en Soluciones de Negocio
CEMEX
antonio.villalobos@cemex.com

**Nicaragua**

Juan Muñoz Muñiz
Civil Engineer
Universidad Nacional de Ingeniera
juanmonozmuniz@yahoo.com

Nicolas Osorno
Vice Presidencia de la República y Presidente de CONICYT
Consejo Nicaraguense de Ciencia y Tecnología (CONICYT)
Nicolas.Osorno@conicyt.gob.ni

Rosa Maria Rodriguez
President
Colegio de Ingenieros de Nicaragua
rmr12rmr@yahoo.com.mx

Aldo Urbina Villalata
Rector
Universidad Nacional de Ingenieria (UNI)
rectoria@uni.edu.ni

Silvia Villagra Gutierrez
Asesora de Dirección Académica
Universidad Nacional Autónoma de Nicaragua
silviavillagra@latinmail.com

**Panama**

Martin Candanedo
Decano
Universidad de Panama
martin.candanedo@utp.ac.pa

Delva Batista de Chambers
Vice-President
Research, Graduate Studies and Continuing Education
Universidad Tecnológica de Panamá
delva.chambers@utp.ac.pa

**Paraguay**

Luis Alberto Lima Morra
Ministro, Presidente del Consejo
Consejo Nacional de Ciencia y Tecnologia (CONACYT)
Presidencia de la República
lalima@conacyt.org.py

**Peru**

Leonardo Alcayhuamán Accostupa
Decano
Facultad de Ingeniería
Universidad Ricardo Palma (URP)
lalcayhuaman@urp.edu.pe

Jorge Alva
Presidente del Capitulo de Ingenieros Civiles del Consejo
Colegio de Ingenieros del Perú
alvalupe@infonegocio.net.pe; jpique@ciplima.org.pe

Enrique Alvarez
Vice Presidente - Gerente General
Serlipsa Corporation
e.e.alvarez@ieee.org

Brun Narciso Armestar
Director de Carrera de Ingemiería Industrial
Universidad Peruana de Ciencias Aplicadas
narmesta@upc.edu.pe

Marco Baca
Director de la Carrera de Ingeniería Industrial
Universidad Privada del Norte
mbl@upmorte.edu.pe

Maria Isabel Barrios
General Manager
Enginzone S.A.C.
mibarrios@enginzone.com.pe

Alberto Bejarano
Director Académico
Instituto Técnico Superior del Perú (TECSUP)
abejarano@tecsup.edu.pe

Jose Beteta
Director de la Escuela Profesional de Ingenieria Sanitaria y Ambiental
Facultad de Ingeniería Ambiental
Universidad Nacional de Ingeniera
rrpp@uni.edu.pe; eingsa@uni.edu.pe; jobelo@uni.edu.pe

Manuel Cáceres Lampen
Jefe del Departamento Académico
Facultad de Ingeniería y Arquitectura
Universidad de San Martín de Porres (USMP)
mcaceres@usmp.edu.pe

Mercedez Ines Carazo
Coordinadora Nacional
Red de CITEs
PRODUCE
mcarazo@produce.gob.pe

Luis Cárdenas Lucero
Director de la Escuela Profesional de Ingenieria Industrial
Facultad de Ingeniería y Arquitectura
Universidad de San Martín de Porres (USMP)
lcardenas@usmp.edu.pe

Eliodoro Carrera Chinga
Director del Programa Académico
Ingeniería Industrial y de Sistemas
Universidad de Piura - Campus Lima
ecarrera@ads-udp.edu.pe; ecarrera@udep.edu.pe

Willy Eduardo Carrera Soria
Quality Assurance Manager
Certification Laboratory
Pontificia Universidad Católica del Perú
wcarrer@pucp.edu.pe

Victor Cerna Huarachi
Secretario Técnico de la Comisón Reglamentos Técnicos y Come
Instituto Nacional de Defensa de la Competencia y de la Protección Intelectual (INDECOPI)
vcerna@indecopi.gob.pe

Mario Chipoco Quevedo
Decano
Facultad de Ciencias e Ingenieria
Universidad Católica de San Pablo
mchipoco@ucsp.edu.pe

Jorge Cuadros Blas
Jefe de La Oficina De Calidad Universitaria
Oficina de Acreditación y Calidad Universitaria (OFAC)
Universidad Nacional de Ingeniera
ofac@uni.edu.pe

Ricardo Cuya Vera
Coordinador ISO 9000
Departamento de Calidad Educativa e ISO 9000
Universidad Tecnológica del Perú (UTP)
calidad@utp.edu.pe; rcuya@yahoo.es

José Dajes Castro
Jefe
Servicio Nacional de Metrología
Instituto Nacional de Defensa de la Competencia y de la Protección Intelectual (INDECOPI)
jdajes@indecopi.gob.pe

Danila Alexix Dueñas
Profesor Principal
Universidad Nacional Federico Villarreal
alexis_duenas@yahoo.com

Néstor Escobedo Ferradas
Jefe de la Oficina de Invenciones y Nuevas Tecnologías
Instituto Nacional de Defensa de la Competencia y de la Protección Intelectual (INDECOPI)
nescobedo@indecopi.gob.pe

Mery Fanola
Periódico Parlamentario Ultima Noticia
ultimanoticia@terra.com

Elizabeth Gonzales Tapia
Prensa
eliza18_3@yahoo.com

Carlos Herrera Descalzi
Presidente del Directorio
Alfa Plus S.A.
cherrerad@terra.com.pe

Eduardo Ismodes Cascón
Decano
Facultad de Ciencias e Ingeniería
Pontificia Universidad Católica del Perú (PUCP)
eismode@pucp.deu.pe

Juana Kuramoto
Associate Researcher
Grupo de Analisis Para el Desarrollo (GRADE)
kuramoto@grade.org.pe

Lorena Landeo
Coordinadora, Curso de Autoevaluación de Carreras en Educación Superior
Dirección Académica de Planeamiento y Evaluación
Pontificia Universidad Católica del Perú (PUCP)

Carlos Alfredo Larraviere Vera
Assistant Analyst
Instituto Nacional de Defensa de la Competencia y de la Protección Intelectual (INDECOPI)
clarriviere@indecopi.gob.pe

Rolando Liendo Chicata
Gerente General, CEO
LOLIMSA
rliendo@lolimsa.com.pe

Gustavo Luyo Velit
Secretario General
Colegio de Ingenieros del Perú
gustavoluyo@logistica.com.pe

Marcelo Santiago Marin
Ecuadorian Embassy
mar1sev@hotmail.com

Benjamín Marticorena Castillo
Presidente
Consejo Nacional de Ciencia y Tecnologia (CONCYTEC)
bmarticorena@concytec.gov.pe

Ludvik Medic
Director de Carreras de Ingeniería de Software e Ingeniería de Sistemas de Información
Facultad de Ingeniería
Universidad Peruana de Ciencias Aplicadas (UPC)
Imedic@upc.edu.pe

Augusto Mellado Méndez
Vice Rector
Universidad de San Martín de Porres (USMP)
amellado@usmp.edu.pe

Linderbergh Meza Cardenas
Vicedecano
Consejo Departamental de Lima
Colegios de Ingenieros del Perú
vicedecano@ciplima.org.pe

Roberto Molina
Director
Academia Peruana de Ingenieria (API)
mmomtoya@ipen.gob.pe

Carmen Montenegro
Gerente de Producto Andesk
Nexsos del Perú
carmen.montenegro@nexsysla.com

Modesto Montoya
Presidente
Instituto Peruano de Energía Nuclear (IPEN)
modesto_montoya@yahoo.com; mmontoya@ipen.gob.pe

José Miguel Morales
Presidente
Confederación Nacional de Instituciones Empresariales Privadas (CONFIEP)
jmmorales@garciasayan.com;postmaster@confiep.org.pe

Juan Fernán Muñoz Rodríguez
Presidente
Capítulo de Ingeniería Industrial y de Sistemas
Colegio de Ingenieros del Perú
industriales@ciplima.org.pe

Flora Muroi
Commercial Specialist
U.S. Commercial Service
United States Embassy
flora.muroi@mail.doc.gov

Julio P. Orihuela
Consultor Minero
Capitulos de Minas
Colegio de Ingenieros del Perú
jporihuela@usa.net

Aurelio Padilla
Primer Vice-Rector
Universidad Nacional de Ingenieria
pvicerrector@uni.edu.pe

Julio Padilla Solis
Decano de la Facultad de Ingeniería de Sistemas
Escuela de Ingeniería
Universidad de Lima
jpadilla@correo.ulima.edu.pe

Kurt Paulsen
Jefe
Departamento de Ingeniería
Pontificia Universidad Católica del Perú (PUCP)
kpaulse@pucp.edu.pe

Frans Peralta Alférez
Jefe
Oficina Central de Logistica
Universidad Nacional de Ingeniera
fperalta@uni.edu.pe

Luis Peschiera
Gerente Apoderado
Hatch Asociados S.A
lpeschiera@hatch.com.pe

Javier Pique del Pozo
Decano
Consejo Departamental de Lima
Colegio de Ingenieros del Perú
jpique@ciplima.org.pe; decano@ciplima.org.pe

Isaac Rios Quinteros
Coordinador
Patronato de la Universidad Nacional de Ingenieria (PUNI)
irios@cetemin.peru

Julio Rivera
Decano
Colegios de Ingenieros del Perú
DECANO@CIP.ORG.PE

Mario Rivera Orams
Director General
Instituto Técnico Superior del Perú (TECSUP)
mrivera@tecsup.edu.pe

Juan Rodriguez Guerra
Jefe del Area de Fomento de la competencia e Innovación
Instituto Nacional de Defensa de la Competencia y de la Protección Intelectual (INDECOPI)
jarodriguez.indecopi.gob.pe

Teresa Salinas Gamero
Consejo Nacional de Ciencia y Tecnologia (CONCYTEC)
tsalinas@yahoo.com

Guillermo Sánchez Hernández
Decano de la Facultad de Ingeniería
Universidad Privada del Norte
mbl@upmorte.edu.pe

Lieneke Schol Calle
Gerente General
Microsoft Perú S.A.
lienekes@microsoft.com

Hugo Silva
Country Manager
Autodesk
hugo.silva@autodesk.com

Jorge Tejada Polo
Director
Escuela Profesional de Ingeniería Electrónica
Universidad de San Martín de Porres (USMP)
jtejada@usmp.edu.pe

Juan Francisco Tisza
Decano
Facultad de Ingeniería Electrónica y Mecatrónica
Universidad Tecnológica del Perú
tisza@utp.edu.pe

Jose Luis Torres Herrera
Sociedad Minera Cerro Verre S.A.A.
jtorres@phelpsp.com.pe

José F. Valdez
Presidente
Instituto para la Calidad en la Acreditación de las Carreras de Ingeniería y Tecnología (ICACIT)
valdezj@cosapidata.com.pe

Nelson Vallejo Gómez
Agregado de Cooperación Universitaria
Embajada de Francia
nelson.vallejo-gomez@diplomatic.gouv.fr

Oswaldo Hernán Vargas Cuellas
Director Ejecutivo del Proyecto Huascarán
Ministerio de Educación
ivexler@minedu.gob.pe; ovargas@minedu.gob.pe

Guillermo Vega Alvear
Presidente
Academia Peruana de Ingenieria (API)
vegaalv@terra.com.pe

Susana Vegas Chiyón
Decana
Facultad de Ingeniería
Universidad de Piura
svegas@udep.edu.pe

Jesús Villanueva Napurí
Director de la Escuela Académica
Facultad de Ingeniería Electrónica y Eléctrica
Universidad Nacional Mayor de San Marcos
jvillanuevan@unmsm.edu.pe

Robert Walcutt
Vice President
Engineering
Air-Transport IT Services, Inc.
rwalcutt@softout.net

**Puerto Rico**

Lueny Morell
Director
University Relations Latin America
Hewlett-Packard Company
lueny.morell@hp.com

Ulises Pabon
Executive Vice President
Quality for Business Success, Inc.
upabon@qbsteam.com

Pierre E. Schmidt
Dean
School of Engineering
Universidad del Turabo
pschmidt@suagm.edu

Edgardo Torres-Caballero
Government Affairs Manager
Latin America, Caribbean and Puerto Rico
Hewlett-Packard Company
edgardo.torres-caballero@hp.com

Ramón Vásquez Espinosa
Dean
College of Engineering
University of Puerto Rico (UPR)
nuega@uprm.edu; rece@ece.uprm.edu

Jorge Velez-Arocho
Rector
University of Puerto Rico
rector@rectoria.uprm.edu

**Trinidad & Tobago**

Geoffrey Abdulah
President
Association of Professional Engineers of Trinidad and Tobago
gma@wow.net

Hollis Charles
President
Board of Engineers of Trinidad & Tobago
wfield@tstt.net.tt; wfield@trinidad.net

Clement Sankat
Dean
Faculty of Engineering
The University of the West Indies
clem@uwi.tt

Krishan Srivastava
Provost
University of Trinidad and Tobago (UTT)
kds@utt.edu.tt

**United States**

Kathryn Aberle
Associate Executive Director
Accreditation Board for Engineering and Technology (ABET)
kaberle@abet.org

Igor Alvarado
District Sales Manager
National Instruments Andean & Caribbean
National Instruments Corp
igor.alvarado@ni.com

Timothy Anderson
Associate Dean for Research and Graduate Programs
College of Engineering
University of Florida
tim@ufl.edu

Albert Angulo
Regional Director
Latin America and the Caribbean
U.S. Trade and Development Agency (USTDA)
aangulo@ustda.gov

Paulina Bendaña
Director of Strategy & Programs
International Relations
The Boeing Company
paulina.bendana@boeing.com

Sailesh Chutani
Director; External Research & Programs
Microsoft Research
sailesh@microsoft.com

Chuck Concannon
Manager
University R&D Collaboration, Global R&D Strategy, Phantom Works
The Boeing Company
charles.c.concannon@boeing.com

Catherine Didion
Vice President
The Didion Group
cdidion@didiongroup.com

Keith Eischeid
Country Manager
U.S. Trade and Development Agency (USTDA)
keischeid@ustda.gov

Margaret Hanson-Muse
Commercial Counselor
U.S. Commercial Service
rj.donovan@mail.doc.gov

Marc Hoit
Interim Associate Provost for IT
Office of the Provost
University of Florida
mhoit@ufl.edu

Howell Howard
Consejero Económico Adjunto
Embajada de los Estados Unidos de América
howardhh@state.gov

Frank Huband
Executive Director
American Society for Engineering Education (ASEE)
f.huband@asee.org

Wayne Johnson
Vice President
University Relations Worldwide
Hewlett-Packard Company
wayne.johnson@hp.com

Russel Jones
President
Standing Committee on Capacity Building
World Federation of Engineering Organizations (WFEO)
rcjonespe@aol.com

Robert Kersten
Dean & Professor Emeritus
University of Central Florida
rdk99@earthlink.net

John Lamancusa
Professor of Mechanical Engineering
Director - Learning Factory
The Pennsylvania State University
jsl3@psu.edu

Maria Larrondo Petrie
Executive Vice President
Latin American and Caribbean Consortium of Engineering Institutions (LACCEI)
petrie@fau.edu

Dan Marcek
Deputy Director
University Relations
Hewlett-Packard Company
daniel.marcek@hp.com

Daniel Martinez
Economic Advisor, Alternate Representative
United States Department of State
martinezdl@state.gov

Patricia McCarthy
University Relations Program Manager
Hewlett-Packard Company
pat.mccarthy@hp.com

Mary Jane Parmentier
Lecturer, Global Technology and Development
College of Technology and Applied Sciences, Department of Information and Management Technology
Arizona State University (ASU)
mj.parmentier@asu.edu

Rafael Pérez Colón
Multillateral Institution Relations
Microsoft
rafaelpe@microsoft.com

Jaime E. Puente
Program Manager, External Research and Programs
Microsoft Research
japuente@microsoft.com

Gustavo Roig
Associate Dean College of Engineering
Florida International University (FIU)
Gustavo.roig@fiu.edu

Sinencio Sanchez
JI Jack Kilby Chair Professor &
Director of the Analog Mixed-Signal Center
Texas A&M University (TAMU)
sanchez@ee.tamu.edu

Richard Seagrave
President
Accreditation Board for Engineering and Technology (ABET)
seagrave@iastate.edu

Armando Valim
Group Manager
Academic Marketing
National Instruments Corp
armando.valim@ni.com

Jerry Yeargan
Distinguished Professor and Head
Computer Engineering
University of Arkansas
jry@uark.edu

**Uruguay**

Ismael Piedra-Cueva
Dean
Facultad de Ingenieria
Universidad de la República
ismaelp@fing.edu.uy;
decanato@fing.edu.uy

**Venezuela**

Maria Elena Fernandez
Presidenta Ejecutiva
Fundación Instituto de Ingeniería para la Investigación
mariafe@fii.org

José Ochoa Iturbe
Director
Escuela de Ingeniería Civil
Universidad Católica Andrés Bello
jochoa@ucab.edu.ve

Vladimir Yackovlev
Vice Presidente
Academia Nacional de la Ingeniería y el Habitat
vyackovlev@unimet.edu.ve

**International Organizations**

Alice Abreu
Director, Office of Education, Science and Technology
Organization of American States (OAS)
aabreu@oas.org

Saúl Hahn
Chief of the Division of Science and Technology
Office of Education, Science and Technology (OEST)
Organization of American States (OAS)
shahn@oas.org

Maria Celina Conte
Specialist
Office of Education, Science and Technology (OEST)
Organization of American States (OAS)
mconte@oas.org

Erika Gabriela Lopez
Consultant
Office of Education, Science and Technology (OEST)
Organization of American States (OAS)
oestint4@oas.org

Ronalth Iván Ochaeta Argueta
Director
Office of the General Secretariat
Organization of American States (OAS)

Gala Redington
Principal Specialist
Office of Education, Science and Technology (OEST)
Organization of American States (OAS)
gredington@oas.org

Omar Serrano
Consultant
Office of Education, Science and Technology (OEST)
Organization of American States (OAS)
oestint9@oas.org

André Vieira de Carvalho
Consultant
Office of Education, Science and Technology (OEST)
Organization of American States (OAS)
acarvalho@oas.org

Christof Kuechemann
Director
Country Office
Inter-American Development Bank (IDB)
ChristofK@iadb.org

**Logistics Support**

Frank Ferrer
President
MFM Group Inc.

Jason Dellaire
Marketing Analyst
MFM Group Inc.

Arturo Garrido
Presentation Manager
MFM Group Inc.

Jacqueline Leal
Marketing Manager
MFM Group Inc.

Marty Ponce-Urizar
Account Executive
MFM Group Inc.

Chris Schaffer
Marketing Analyst
MFM Group Inc.