Ibero-American Science and Education Consortium (ISTEC): New Challenges in a Global Collaborative Environment

Dulce García
ISTEC President, dgarcia@istec.org

Marisa De Giusti
Comisión de Investigaciones Científicas de la Provincia de Buenos Aires,
PrEBi, Universidad Nacional de La Plata, Director Liblink Initiative,
mdegiusti@gmail.com

Ramiro Jordan
ISTEC EVP, Universidad de Nuevo México, Albuquerque, New Mexico,
rjordan@istec.org

Wilfrido Moreno
University of South Florida, Tampa, Florida, wmoreno@istec.org

Carlos Nusch
PrEBi, Universidad Nacional de La Plata, carlosnusch@gmail.com

Abstract — *The Ibero-American Science and Technology Education Consortium (ISTEC) is a non-profit organization comprised of educational, research, industrial, and multilateral organizations throughout the Americas and the Iberian Peninsula. The Consortium was established in 1990 to foster scientific, engineering, and technology education, joint international research and development efforts among its members, and to provide a cost-effective vehicle for the application and transfer of technology. After twenty years, ISTEC has established a presence in the region, but it also has experienced problems to interact with different cultures and interests. During 2010 it suffered important changes in its organization and big efforts were realized to accomplish new goals and to share worldwide expertise, to facilitate distributed problem solving, creating the local critical mass needed for the development of regional projects in areas such as: continuing education, libraries and repositories, globalization of the culture of quality and accreditation standards, R&D, intellectual property development, capital acquisition, and social responsibility, among others. ISTEC continues to be dedicated to the improvement of Science, Engineering, Technology, Math education, R&D, and Entrepreneurship. The Consortium will foster technology transfer and the development of social and business entrepreneurs through the implementation of a global network that pretends to reach other countries in the world creating clusters of businesses and institutions that share common interest, assisting in the establishment of strategic alliances/joint ventures, and the promotion of collaborative partnerships in general.*

Index terms — *Challenges, Collaborative Work, Education, Culture of Quality, Entrepreneurship, Funding.*

1. History

In an effort to analyze the needs, strengths and expectations of governments, academia, the private sector, multilateral organizations, and to define an agenda in Science and Technology (S&T) as a catalyst for social, cultural, and economic development, starting in June 1990 personnel from the University of New Mexico (UNM) visited countries in Ibero-America to identify and evaluate opportunities for successful collaboration in science, innovation, technology, education and entrepreneurship. Meetings were held with officials from various governments, educational institutions, research facilities, and industrial firms to gauge interest in establishing efforts to improve international collaborations in S&T. The visits resulted in the identification of areas of common interest for employing state-of-the-art technology in hands-on education, research, technology transfer and entrepreneurship. An organizational meeting was then held in December of 1990 at UNM involving participants from universities, industries, governments, and foundations throughout Ibero-America. In the meeting a series of obstacles were identified that had to be addressed immediately:

- Lack of current information for planning and developing technology
- Lack of expertise in the use of information
- Lack of international cooperation in developing the critical mass needed for projects and joint efforts
- Lack of interaction and confidence among universities, industries, governments, and multilateral agencies
- Lack of availability of technology
- Lack of entrepreneurship to bring technology and intellectual property to the marketplace

The above difficulties are aggravated by another problem, which is the lack of awareness of the simultaneous existence and interaction of the above obstacles. It is imperative that efforts be made to address these issues concurrently in order to further the scientific and technological development of Ibero-America. It was a consensus among the participants in the meeting that traditional mechanisms for cooperation are not sufficient, and new, more effective mechanisms are needed. As a result of the meeting, ISTEC was created and universities, industries, and other organizations became members by signing a Memorandum of Understanding (MOU).

In 1999, ISTEC officially became a U.S. 501 (c) (3) non-profit organization, comprised of a General Assembly, a Board of Directors, and an Executive Office that handles the day-to-day operations. After 20 years of implementing successful projects, ISTEC has broadened its spectrum and is developing programs intended to promote socio-economic efforts focused in Ibero-America but in a global context..

2. Objectives and Mode of Operation

The objectives of the Consortium are to conceive, plan, and carry out activities of higher education, R&D, and technology transfer for the purpose of facilitating scientific and technical development of the Ibero-American countries.

ISTEC participants encourage the free flow of and access to information in the pursuit of technical excellence. By coordinating eminent personnel and resources from diverse geographical locations, ISTEC has developed a mechanism called the Initiative, which is an organized effort to create activities to address a specific area of concern. The Initiatives are member-driven, flexible, and run concurrently. Within Initiatives, projects are identified, planned, and implemented. The distributed structure from which the projects stem avoids duplication of efforts and inherently responds to the needs of the ISTEC membership. Projects are designed with both short- and long-term goals, and with consideration of social impact. They are dynamic and expandable, and coordination is encouraged in order to maximize the utilization of available resources.

The original Initiatives of ISTEC in its inception in 1990 were four. Below is a brief summary of ISTEC's Initiatives.

A) Digital Libraries Linkages Initiative: One of the basic tenets of knowledge creation is access to up-to-date information in real time. This Initiative aims to modernize document delivery to complement education, research, manufacturing and policy design. Additionally, the initiative proposes to broaden electronic availability of research materials, to upgrade the information skills of library staff and to sharpen the skill and independence of the electronic user.

In order to manage all bibliographic resources required by users (journal articles, book chapters, congress proceedings, theses and patents) the Celsius Software environment was developed at the Universidad Nacional de La Plata, Argentina. The second generation of that environment, Celsius Network, permits interconnection among all instances of Celsius, installed in servers of each of more than 62 Institutions that participate in the project distributed in 12 countries of America. This platform is offered free of charge to all ISTEC institutions. For more information see: http://celsius.prebi.unlp.edu.ar/

This Initiative is in compliance with the Open Access Movement and the Open Software Development community. This Initiative encourages the creation of networks (local, national, regional, global) of institutional open access repositories of knowledge and data. Through this effort we intend the members to generate new knowledge using all existing resources in a collaborative framework.

The availability of having this network facilitiates innovative negotiations with the Commercial Publishing companies which translates to broader access of their collection and reduction in prices.

B) Advanced Continuing Education Initiative: The key to the development of any nation is the availability of highly qualified human resources. This initiative seeks to upgrade the available skills and increase the number of qualified individuals in applicable areas. Projects conducted within this initiative involve the adaptation, design and enhancement of curricula, professional development, accreditation, on-site training and web-based distance learning.

As a result of this initiative the development of new materials that incorporate the latest technology in state-of–the-art textbooks, online resources, distance learning programs, and laboratory materials. This initiative employs the most current technology to develop superior systems for the educational process. In addition, the initiative utilizes non-traditional faculty, staff, and student exchanges, including graduate interuniversity degrees (Double Graduate Degrees; MS and PhD). The interuniversity degree program allows students to receive graduate credit from accredited programs at other institutions, and upon completion of the degree, receive diplomas from each university. The primary purposes of the interuniversity degree program are to promote the creation and improve the quality of graduate programs in Ibero-America, as well as to offer students access to education and credentials otherwise not available in their area.

C) Research and Development Laboratories: The costs of introducing state-of-the-art infrastructure in education are difficult to accomplish for most developing countries. The introduction of state-of-the-art infrastructure in educational institutions is pivotal for the social, cultural and economic development of nations. This initiative has been created to provide a vehicle for performing research and development in a variety of disciplines. The laboratory facilities are utilized in teaching situations and to enhance interaction between industries and universities in order to foster innovation, creativity and collaboration. Therefore, this initiative improves the ability for the latest technology to be applied to the resolution of problems in a variety of areas and encourages the development of solutions that have regional and local social and economic impact.

D) Los Libertadores: This initiative is a "common thread" effort that links all of the goals and objectives of ISTEC. Los Libertadores seeks to create a flexible network of electronic services (e-services) for education, information exchange, R&D, as well as to provide ICTs for social, cultural, political and economic development. These services are connected through a

hemispheric web-based backbone. The initiative proposes to share worldwide expertise, facilitate distributed problem solving and create the critical mass needed for the improvement of regional projects. It will foster technology transfer and the encouragement of social and business entrepreneurs through the implementation of "Centers of Excellence" – unique clusters of businesses and institutions (technology parks) that share common interests such as in health care complexes, micro and nanotechnology, biotechnology, energy and other multidisciplinary areas.

3. ISTEC: New Concerns and Challenges

We have a well-established network in the region and our next step is to work with its members to guarantee sustainable socio-economic development in Ibero-America in a global context. Our goal is to spur an international strategy for generating and supporting collaborative activities among academia, industry, government, which are aligned with local, national, regional and global challenges. For instance, challenges such as the OECD effort on "Transforming Innovation to Address Social Challenges", and the Engineering Grand Challenges identified by the US National Academy of Engineering.

Additionally, we seek to challenge communities to develop proactive and action-oriented approaches aimed at creating the synergy needed to empower communities to develop innovate ways to use technology applications that improve economic development and the quality of life within their communities.

ISTEC wants to align itself with international efforts being carried out by and with other organizations that are concerned with STEM education, R&D and entrepreneurship. We want to identify identify stakeholders visionaries in advancing education in STEM and other areas.

An important activity within is the ISTEC Leadership Council Meeting. The ISTEC Leadership Council is an Advisory Group that ISTEC created to develop recommendations in STEM and other areas in education, R&D and entrepreneurship for socio-economic development with social responsibility in a global context. This Advisory Group is composed of university Presidents, Deans, Chairs, leaders from industry, and representatives from government agencies and multilateral organizations, and it provides guidance and support to ISTEC and other interested organizations. Recommendations made by the ISTEC Leadership Council will be subsequently submitted to all Heads of State of the Americas through the Engineering for the Americas (EftA) Initiative, hosted by the Organization of American States, and to our partners organizations so solutions can be created to our present challenges.

Presently, ISTEC is working in the following new programs that address some of the Challenges.

Science and Technology Entrepreneurships for Economic Development, (STEED): The objective of this Program is to combine the science and technology potential of the membership with the technology commercialization expertise found in the US, Europe, Asia in order to create partnerships with universities, governmental organizations, research parks, and companies. These partnerships are designed to create new organizations that combine business experience and technical knowledge to foster the development of economic activities. These activities will require participation by engineering departments, schools of management, medicine and biology, as well as governmental organizations, research laboratories, and financial entities. The collaboration of these entities will enhance the ability of the partnerships to flourish.

ISTEC-SALUD: A group of medical and engineering professionals from the ISTEC membership conceived the ISTEC/SALUD Program as a cooperative effort to share experiences in medicine, biology, engineering and other areas. In addition to facilitating traditional areas of biomedical research, this initiative facilitates a new, interdisciplinary study called Neuro-systems Engineering which integrates medicine, engineering and computational sciences. This initiative also serves as an avenue for identifying and implementing self-supporting methods of providing medical services to underserved communities. Another effort is the integration of non-traditional and traditional medicine.

This is a new interdisciplinary program that incorporates Information and Communication Technologies (ICTs) through different ISTEC Initiatives and Programs. The objective of ISTEC SALUD is to create, by means of multidisciplinary cooperative projects, a "Network of networks" in research, technology development, training and social action and assistance, with the final goal of improving health and environment. This approach promote the well-being and raise the quality of life in the Ibero-American region, respecting the ethical, historical and cultural values of individuals and their respective communities.

GRANA-ISTEC: is a system that measures the quality of educational programs under academic models (in situ, distance learning or mixed), according to international quality standards and social relevance, with a clear vision of the present necessities to encounter the complexity of globalization.

The GRANA-ISTEC program is a real-time, online self-evaluation tool for educational programs, using international standards and leading to a Certificate of Quality. The objective of the GRANA-ISTEC program is to aid academic institutions in their process of accreditation/certification of undergraduate, graduate, and e-learning educational programs that have as a goal meeting the challenges of developing Global Engineers, and in particular the Engineer for the Americas. In addition, GRANA-ISTEC helps organizations in the establishment and dynamic development of a culture of Quality and Continuous Improvement, finding a balance between globalization trends and local contexts. It is one of the objectives of GRANA to prepare the critical mass that will enable recognized program evaluators to follow their own self-evaluation process.

To address these challenges ISTEC has updated its Vision and Mission.

VISION: ISTEC will be a leading force in fostering socio-economic and educational change in Ibero-America, by creating prosperity and improving the quality of life in the region.

MISSION: ISTEC's mission is to foster sustainable socio-economic development in Ibero-America by carrying out programs focused on:

- Advancing the state of higher education in Science, Technology, Engineering and Math (STEM)
- Generating and disseminating knowledge and information,
- Establishing cost-effective vehicles for technology transfer,
- Encouraging joint international research and development,
- Fostering an environment for entrepreneurship and collaboration,
- Promoting leadership models that adhere to the principles of responsibility and accountability.

The mission will be achieved by nurturing a network that promotes trust and integration between academia, government, industry and society. ISTEC also strives to strengthen social responsibility as a common shared value in the region.

4. Conclusion

During the last twenty years ISTEC has been growing more and more, as well as dealing with a number of challenges that implies a collaborative work. Over 28 countries ISTEC has got strategic alliance among academia, industry, government agencies, and multilateral organizations. To foster sustainable socio-economic development in Ibero-America by carrying out programs focused on: advancing the quality of education, and promote the culture of quality, generating and disseminating knowledge and information, establishing cost-effective vehicles for technology transfer, encouraging joint international research and development, and creating an environment for entrepreneurship. While nurturing a network that promotes trust and integration ISTEC also strive to strengthen social responsibility as a common shared value in the region.

The ISTEC Model will help in bridging the Digital Divide that afflicts all nations. This Digital Divide can be transformed into Digital Opportunities with Information Technology (DD … to … DO IT!).

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