Ibero-American Engineer Profile

“You see, for engineers to be an engineer is not enough to be an engineer. While they are dealing with their particular task, the history takes away the ground from under the feet. They must be alert and leave their tasks: Take a look at the landscape of life that is always complete.”

José Ortega y Gasset

The newly emerging circumstances of the relationship between higher education, knowledge and society, require us as Ibero-American citizens to build on the common ground of our history and respectful treatment of each country’s own setting, as well as pursue a renewed and sustainable engineers education project.

One of the central purposes of the Ibero-American Engineer Project is to create a common area of engineering education that allows shaping of engineering curricula that is substantially equivalent in Ibero-America, sensitive to differences and addresses each country’s own characteristics, conceived as mechanisms for the recognition and equivalence of qualifications. The necessary strategy to fulfill that commitment includes the establishment of agreements that promote academic mobility, finding integration lines to address mutual problems of the Ibero-american reality, and the adoption of core curriculum structures with common elements that support the assessment of attributes comparable professionals.

Training of engineers in Ibero-America will seek to ensure that alumni can practice their profession with competence, ethics and competition anywhere in the world and, of course, a priority in any of the countries of the region thanks to its understanding of the historical, cultural and social that identify us. To the Academic rigor in their education, must be added the effort of institutions and engineering education programs to strengthen knowledge of resources, expectations and needs of the Ibero-American region. The ability of self-training, lifelong learning support, and the flexibility to accept the permanent nature of changes are part of the training requirements of new generations of engineers, necessary to address the impact on the region's dynamic changes of knowledge, obsolescence of professional tasks, shifts in the geo-economic orientation, the agreements on environmental protection and increased demands for democratic participation and sustainable development.

Definition and strategic components of the Ibero-American engineer

The Ibero-American engineer must be a global engineer with commitment and locally relevant, equipped with solid scientific, technical, technological, cultural bases, and established values and principles, aware of the importance and significance of its links.
with history and regional development, faithful to their social and environmental commitments, attentive to the identification of problems and opportunities in the environment to act responsibly and competently in any national and international stage.

The identification and characterization of the desirable attributes in Ibero-American engineers, should be part of a commitment to transforming education in engineering to develop a strategy that addresses the different future scenarios and social needs in the XXI century in each country of the region, and to influence its preparation to improve the negotiating capacity of society in pursuit of their economic and technological development, and the strengthening of their material and moral infrastructure. These attributes should be considered fully articulated with technological, attitudinal, social and political competencies, which have previously been defined by the Association².

Among the features that should be pursued in the Ibero-American engineer stands:

- The self-learning ability and commitment to continuing education, especially with the application and implementation of technological advances.
- The ability to analyze, model, experiment and solve design problems, open solutions and multidisciplinary approach.
- Leadership and competence of oral and written communication, even in a second language, and integration in interdisciplinary working groups.
- Understanding the interaction between engineering, development and society, considering cross-cutting areas, such as management, finance and economics.
- The ethical foundation and appreciation for the values, culture and art.
- The ability to efficiently use the growing development of telecommunications and computer tools.

Considering these characteristics should promote agreements on changes in the design and development of curricula, in teaching strategies and, in general, academic culture necessary to strengthen these qualities in the next generation of engineers.

² In November 2013 ASIBEI published the Valparaiso’s Statement, about generic skills of the Iberoamerican engineer. Available at http://www.asibei.net/documentos/declaraciones.pdf
Dimensions Ibero-American Engineer

Ibero-American engineer characterization in terms of “dimensions” is associated with four fundamental aspects, closely related, which are necessary to achieve the desired profile of this professional stature. It starts with the process of training through the academic dimension in universities and higher education institutions. Recent graduates, applies his practice solving the problems that society needs, characterizing the so-called professional dimension. Within his exercise it highlights his sustainable production preserving natural resources for future generations and a great responsibility to maintain the balance between the protection of these resources and the satisfaction of basic needs, characterizing the environmental dimension of the engineer. Finally, the social dimension, which includes the above dimensions, with the responsibility of solving the problems of the communities and regions to which it belongs, with the intervention of professionals with political vision, in other words, engineers fitted with imagination, vision of the future and ability to execute.

- Knowledge about the social, economic and cultural reality of the environment, to lead and solve the basic problems of the Ibero-American region.
- Knowledge of the environment and technology, for the production and development of sustainable engineering projects to preserve the environment.
- Implementation of the training acquired by the performance activities of the specialty, characterized and regulated by each of the countries in the Ibero-American region.
- Forming process in which the knowledge, skills, aptitudes and attitudes, in the areas of scientific, professional and humanistic education is acquired.
Dimensions Ibero-American Engineer

Academic dimension

It is defined by the knowledge gained from a solid scientific-technical, comprehensive and holistic training to assimilate and develop, from an international and global perspective, new technologies both evolutionary and disruptive, with an innovative and creative approach to identify and resolve problems. These attributes make up the curriculum, which is based on different educational models that promote skills development, project-based and social interest in learning problems, among others.

The development of the academic dimension in the Ibero-American engineer allows you to:

- Contribute to the generation of technological developments and innovations focused on Ibero-American issues.
- Apply knowledge of natural sciences, mathematics and engineering sciences.
- Designing systems, products and processes subject to economic, environmental, social and ethical constraints.
- Identify, plan, monitor, develop and coordinate projects and engineering services.
- Effectively use the tools and techniques in engineering application.
- Communicate effectively in written, oral and graphic form, in at least two languages—being one of them English—, the technical aspects involved in the practice of the profession.
- Acting in inter, intra and multidisciplinary teams, and accompany training processes as an agent of change.
- Leading multidisciplinary teams that can apply learning to address problems of companies and in local, regional and global markets.
- Encourage creativity, critical thinking and entrepreneurship as part of their personal development.

Professional dimension

This dimension are the skills required to meet the own performance of the profession and act in products, systems, material processes, and human resources. They are qualities related to project management, economics and business, adaptability and exercise and professional judgment as well as its relationship between his work and regulations.
With the skills formed in this dimension the engineer will have the ability to:

- Project his/her knowledge, experience and technological capability out of the borders of his/her country, especially in Ibero-America, always looking for economic performance and social welfare to transcend its territory.
- Keep updated throughout life, scientific and technological advances in their field to ensure the quality of services offered to society.
- Identify, formulate and develop projects that promote regional integration.
- Apply foresight, planning, organization, conduct and control of organizations related to engineering.
- Transfer technological advances to commercially viable products and services.
- Integrating technical education and socio-humanist with his/her ability to plan, direct, coordinate, motivate and innovate and globalized territorial organizations related to engineering.
- Behave with justice, integrity, honesty, diligence, loyalty, respect, reliability, discretion, responsibility, integrity, dignity, good faith and in strict adherence to legal and ethical standards of their profession established in the country in which it performs.
- Creatively solve social problems related to their profession.

**Environmental dimension**

In the environmental dimension converge knowledge of the environment and relevant and appropriate technology for the design and development of engineering projects that preserve and sustain the environment. It is essential that the Ibero-American engineers identify the proper limits of nature and provide the best possible magnitude of the effects and changes in ecosystems that may be generated by their projects, always looking for the suitable balance between production, consumption, and the use of available resources.

Under the environmental dimension, the Ibero-American engineer acquires the ability to:

- Help to control and minimize the impact of construction and engineering projects on climate change, the exploitation of non-renewable resources, water use, waste generation, among other particularly sensitive environmental variables in the region.
- Find the balance between different aspects of human development, conservation of natural resources and the environment from a sustainable perspective, taking the rights of future generations.
- Estimate the risk of affecting the various environmental components because of the development works and projects.
- Acting in accordance with principles of prevention, health and safety at work, observing standards of protection of human life and the environment.
Social dimension

It is related to the knowledge about the social, economic and cultural reality of the Ibero-American region. Involve the active participation in political decisions in the region to contribute from the practice of engineering, to obtain optimal solutions from technical and technological, relevance and high social impact and respect for the Ibero American cultural heritage.

The implementation of the social dimension will allow the Ibero-American engineer:

- Acting with ethics, professional responsibility and social commitment, considering the great economic and social impact of the intervention of engineering in society.
- Leading the discussions and decisions that are made to define public policies of a country or region in relation to economic sectors where he/she practices his/her profession.
- Politically formed to serve the society to which it belongs to.
- Consider human development goals (as the Millennium Development Goals) in the planning and implementation of projects, so that mean significant benefits for the companies involved.

Synthesis

This new document from ASIBEI, result of work done in the Strategic Amendment 2, sustained and consistent evidence of ASIBEI, finding consensus to build a common regional space in engineering education.

The characterization of the Ibero-American Engineer profile in terms of the four dimensions, academic, professional, environmental and social, contribute to the discussion and reflection in academic units and engineering education associations of the region, in order to improve and strengthen the processes of training of Iberoamerican engineers.