The Studies of Surveying in Latin America
FIG Commission 2 WG 2.2

Meeting of the Educational Network for Latin America

San José, Costa Rica, 13–15 April 2004

Introduction

Since 13 to 15 April 2004 there was the yearly meeting of the Educational Network for Latinamerica, held by the Colegio de Ingenieros Topógrafos of Costa Rica.

The idea of creating this Network arose during the Symposium held in Puerto Rico by the Colegio de Ingenieros y Agrimensores de Puerto Rico (CIAPR) and the Mayagüez University before the problems, similarities, lacks and needs in most of the countries in that Continent. President Foster supported and underlined the need of such a Network. Members were elected in Mayagüez, trying to represent most of the present countries.

The main goals of this Network are:

- To establish strong links among the docent Institutions in Latinamerica
- To facilitate the free flow and exchange of ideas, projects and people among our docent Institutions
- To facilitate the harmonization of curricula, if such is possible and necessary
- To facilitate a “common educational base”
- To facilitate mobility among professionals, teaching staff and students
- To improve the conditions of our professionals, when and where it is necessary, and increase the work possibilities of our graduates
- This Network is born with spirit of permanence; it is not only an occasional work studying the state of the art in education in this continent, but being a permanent link among professional and educational Institutions
- The final results of this first step will be given in a final report to be spread out in the regional meeting to be held in Latinamerica in 2005

The first meeting was held last year in Córdoba (Argentina) under the presidency of the WG 2.2 Chair, Prof. Loyácano. During this meeting it was decided the work plan, the agenda and the countries under the responsibility of every member; it was designed the questionnaire to be sent to the different Associations and Universities. There were eight members attending the meeting during three days. The Federación Argentina de Agrimensores (FADA) was represented by its President Engineer Norberto Frickx. The atmosphere, the organization and the kindness with the participants were excellent.

Participants in the first WG 2.2 meeting in Córdoba (Argentina)

The second meeting was held in Costa Rica, under the umbrella of the Colegio de Ingenieros Topógrafos of this country, between 13 and 15 April this year. Members from Brasil and Uruguay could not attend the meeting, but sent information to work about.

There were representatives from Argentina, Colombia, Costa Rica, Chile, Ecuador, Guatemala, Panamá, attending, as well, the Chair of Commission 2.

The opening session was chaired by the President of the Colegio Federado de Ingenieros y Arquitectos de Costa Rica, Civil Eng. Irene Campos; Colegio de Ingenieros Topógrafos is a branch of the Colegio Federado. The President of the Colegio de Ingenieros Topógrafos, Eng. Juan M. Castro, the Executive Director, Eng. Luis Ramírez and Eng. Daniel Hernández, coordinator of the CPD Programme and now responsible for Accreditation of the studies with Canadian standards, were attending this first session, although Eng. Hernández was a full member of the meeting along the three days.

Eng. Castro gave a global vision of the profession in Costa Rica (a country with a 6.5% of the gross national product for education, with more teachers than policemen, without army, with an illiteracy smaller than 5%, with electricity in all villages as well as potable water,….); they are 1330 members; 880 in the liberal professional exercise, with 80 new professionals per year; there are two public Universities and one private with Schoolls of Surveying; during the meeting there were representatives of all Universities. After Eng. Castro there were short speeches of Prof. Loyácono, Chair of the WG 2.2, the President of the Colegio Federado and, finnally, the Chair of Commission 2 giving thanks for the hospitality and welcoming the Costarriqueans into the FIG.

It could be said that our colleagues in Costa Rica have an excellent position in the market, in the society and with optimum present and future; so they have “notarial certification” and exclusiveness in all cadastral works.

Participants

- Ing. Luis Fernando Ramírez Arguedas
  Director ejecutivo.- Colegio de Ingenieros Topógrafos.- Costa Rica
- Prof. Luis Navarrete Zúñiga
  Head of Department of Geomensura.- Universidad de Concepción.- Chile
- Ing. Jean-Roch Lebeau
  Administración de Tierras (utj-protierra).- Guatemala
- Ing. Daniel Hernández Jiménez, M Sc.
  Head of Department of CPD. Colegio Federado de Ingenieros y Arquitectos.- Costa Rica
- Prof. Fernando Silesky Guevara
  Dean. Faculty of Engineering. Universidad de Costa Rica.-
- Prof. Francisco l. Hernández T.
  Head of the Academic Programme in Surveying Engineering. Universidad del Valle, Colombia
- Prof. Edwin G. Solórzano C.
  Head of the School of Surveying Engineering. Universidad de Costa Rica
- Prof. Everardo MEZA
  Geomatic Engineering. Universidad Tecnológica de Panamá
- Prof. Rolando CERRUD
  School of Geodetic Sciences. Faculty of Natural, Mathematic and Technical Sciences, Universidad de Panamá
- Prof. Francisco LEÓN
  Polytechnic School of the Army. Faculty of Geographic and Environmental Engineering, Ecuador
- Prof. Graciela Loyácono
  School of Surveying. Universidad Nacional de Córdoba. CONEA. Argentina.-
  WG 2.2 Chair
- Prof. Pedro J. Cavero
  FIG Commission 2

Talking about FIG

Agenda

The proposed agenda for the meeting was unanimously accepted by the participants.

Meetings were programmed for Tuesday and Wednesday, with all day sessions, making a break down at mid morning, for lunch and with a reception late in the evening, all of them organized and paid by the Colegio de Ingenieros Topógrafos.

Thursday morning and afternoon there were the last sessions, finishing with presentations of the delegates from Guatemala and Chile, where they are living very interesting experiences; in Guatemala, University of San Carlos is preparing a new degree, at Bachelor level, on Cadastre, Land Administration, Land Management, which can be a model for the other Centralamerican countries (El Salvador, Honduras and Nicaragua), where a deep reform in Land Administration is being carried out. On the other hand, the Chileans Universities are involved in a process of change, trying to adapt their curricula to the most advanced educational experiences and giving the highest University level, finding many problems to implement their project.

Prof. Navarrete explaining the Chilean situation

Mr. Lebeau talking about Guatemala project

After closing the meeting participants, early in the evening, were invited to visit the School of Ingenieros Topógrafos in the National University (UNA). They were received by the Director of the School, Prof. Ricardo Uclés, who accompanied them to a visit to the School;This has excellent docent facilities (GPS, total stations, Digital Photogrammetry, Cartography, etc); during the visit there was the occasion of attending three excellent presentations, made by three Professors of the School, on Cadastre and GIS, GPS geodetic network and determination of the geoyde by gravimeter airborne. There are 27 Professors and 300 Students. The School have research activities in the following fields:

- National geodetic network and determination of geoyde
- Deformation of natural and artificial structures
- Industrial Surveying
- Borders Project: determination of the National Borders
- Geoyde Project
- Municipal Cadastres Projects

Generally speaking the School gives an excellent impression and could be and example to be followed by these countries trying to implement the studies of Surveying.

On Friday and Saturday participants remaining in Costa Rica were invited to visit the turtle's island, in the Pacific, a paradise in the sea, and a valley inland with absolute unbelievable landscape.

Goals of the meeting

The main goals of the meeting were:

- To study and analyze the collected documentation from Universities and Associations
- To know the state of the art in Education and Profession in every Latinamerican country
- To exchange experiences in every country about the strategies developed defending our Profession
- To try to prepare a scheme of a minimum common curriculum for the continent
- To define the contents of the final report

Sessions

Every responsible gave to Prof. Loyácono the information got from the different countries; unfortunately several countries have not given any information yet; such is happening with Paraguay, Perú, Bolivia, Venezuela, México, República Dominicana and Cuba; trying to get information from all of them, Prof. Hernández, from Colombia, accepted to contact some colleagues in Venezuela to get information about the Educational and Professional situation in that country; Prof. León, from Ecuador, Loyácono, from Argentina and Uclés, from Costa Rica, will do the same with Perú, Paraguay and México; regarding Cuba it is hoped to get information in Athens, where, surely, some Cuban representatives will be there for receiving their membership certificate; information from Puerto Rico and Santo Domingo should be updated.

Because this was the first time of meeting colleagues from Ecuador and Panamá, it was very interesting the reports given by the representatives of these two countries, at the same time we had information from the other members.

So, Prof. León, from Ecuador, exposed that the degree on Geographic Engineering, inside the Polytechnic School of the Army, with 170 students, is the only one in the country with three levels of Surveying. They have a more than acceptable docent equipment (modern Total Stations, GPS receivers, (some RTK), Digital Photogrammetry, etc). There is not any law regulating the surveying works; it could be said that the profession does not exist as such, and the Colegio de Ingenieros Geógrafos is wishing to take charge of Surveying, create the Profession and defend and represent that professionals, but it seems that Civil Engineers and Architects don't like such a solution. Prof. León is trying to organize, in the next future, studies of Surveying of three years, taught by virtual teaching, and to wake up the interest for our profession in the country, cutch students and, in the medium term, make a reality the presence of Surveyors in the national market.

Prof. Cerrud, from **Universidad de Panamá**, and Prof. Meza, from **Universidad Tecnológica de Panamá**, gave an overview of the situation in their country. In 1985, inside **Universidad Tecnológica de Panamá**, started, without any success, a process to implement the studies of Engineer in Surveying and Geodesy; there were 36 graduates and the studies disappeared. In 2002, **Universidad de Panamá**, Faculty of Natural Sciences, Mathematics and Technology, School of Geodetic Sciences, created the degree of Engineer in Surveying and Geodesy, with five years and a classical orientation; actually there are 60 students; there is a degree, at Technician level, of three years. In 2003 started, in **Universidad Tecnológica de Panamá**, Faculty of Civil Engineering, the studies of Engineer in Geomatics, with a curriculum of four years (the two first exactly the same as for Civil Engineers), and very much oriented into the Civil Engineering field; there are about 60 students. There are, as well, inside the **Universidad Tecnológica de Panamá**, studies, at Technician level, of 2.5 years, whose main field of activities is as assistants of Civil Engineers. The profession as such does not exist in the country and, hopefully, will be

created in the next years when the first graduates from both Universities come into the market.

During discussions it was evident the difference between both concepts of our Profession and whose names could be Ingeniero Agrimensor and Ingeniero Topógrafo; there is a slight difference between both conceptions of the profession; the first one is more oriented to Land Administration, Planning, Cadastre, etc., and the second one has a more technological orientation; to the first group belong Argentina, Uruguay, Paraguay and Guatemala in its new degree, and to the second one Colombia, Ecuador, Chile. Without being a substantial difference, both profiles can have influence in the design of curricula. The meeting allowed a wide debate about the inclusion of some subjects and their classification and it was generated a total agreement about the need of getting a curricular harmonization.

Two more agreements were reached: our profession belongs to the Engineering world and, inside this world, our profession, in both concepts (Agrimensor and Topógrafo), is a "particular engineering" and this fact should be reflected in the proposed curriculum, mainly in the group of Basic Sciences of Engineering.

Prof. Enemark's profile of our Profession for the XXIst century was fully accepted. In some countries this view of the Profession is being fully developed, due, mainly, to the pressure, among others, of descentralization, of the big projects in Cadastre and Land Administration and because of the lack of other professionals in the field of Rural and Urban Planning. The integration of these subjects into the classic field of Surveying, without implying a curricular revolution, is a challenge for our Profession in Latinamerica.

Before the big differences in the concept and significance of Credit among the different countries it was decided, after seeing and analyzing such differences, to talk about "hours of lecturing in classroom, laboratory or practice field" which, later, could be translated into "Credits", once these were defined.

Something similar happened when discussion was about the level of the studies; it was confirmed the existence of different levels of education: three, four and five years of University Education. Unanimously was accepted that it should be recommended to all Universities in the continent that the existing studies, and that to be created, should be of five years.

Definition of the professional profile

According to the professional reality today and, mainly, the foreseeable tendencies and needs in the future, bearing in mind both streams of our profession, there were defined the following "Professional fields of activity" or "Professional Profile" as a desirable, suitable and necessary reality in the next future:

Specific technologies	Project, execution and management of measurement processes, modelization, representation and visualization of physic characteristics in, over and under the terrestrial surface. Project, execution and management of information systems Project, execution and management in the handling and processing of images Project, execution and management of positioning, navigation and monitoring systems
Related technologies	Project, execution and management of processes and products for civil works and building Project, execution and management of processes and products applicable to environmental, agronomic, forestry, mining, industrial and hydrographyc engineering Project, execution and management of processes and products applicable to the information society (telecommunications and informatics)
Land Administration, Rural and Urban Planning	Project, execution and management of processes and products applicable to Cadastre, Land Registry, Land Administration, drainage, expertise and valuation Project execution and management of processes and products applicable to rural and urban planning and development

Draft of curriculum

To fulfil the requirements of the professional profile, it was decided that it could be interesting for the different Governmental, University and Professional Authorities to have a draft of a common core curriculum with the subjects which, at least, should appear in the different syllabuses.

The proposed syllabus was divided into four different categories of subjects:

- Basic subjects
- Basic subjects for Engineering and Surveying
- Specific subjects for Surveying and Agrimensura
- Complementary and Humanistic subjects

After long and hard discussions it was reached an agreement about the subjects to be included in this draft.

It should be said that the Working Group did not want to determine neither time for every subject nor deepness and wideness of every one, leaving for a later meeting or, better, for Universities to fix these items, according to their needs, orientation,… but, bearing in mind, that the common feeling is that “some harmonization” should appear in the curricula of the next future.

The following table shows the proposed draft:

Basic Subjects	**Basic subjects for Engineering and Surveying**	**Specific subjects for Surveying and Agrimensura**	**Complementary and Humanistic subjects**
Mathematics Physics Computer Science and Telecommunications Chemistry	Sciences of Engineering Geosciences (Geology, Geotecnichs, Geomorphology, Land use, Enviroment,…) Urban Engineering Engineering Projects Engineering Drawing	Geoposition (Mathematical Geodesy, Physical Geodesy, Spatial Geodesy, Geodetic Astronomy, Adjustment, GPS, GNSS,…) Surveying (Instruments, Methodology, Applied Surveying) Valuation Photogrammetry And Remote Sensing (Photogrammetry, Photointerpretation, Remote sensing) Law (Civil, Administrative, Environmental, Property, Rural, Urban and Professional Law) Rural, Urban Planning and Land Management GIS Cadastre, Land Administration, Mensura	Economy and Management History Geography Foreign Languages Expression and Communication Technics Special expertises

Number of years and hours of the proposed curriculum

According to the above professional profile, the draft of curriculum, the number of lecturing hours/week, the number of weeks/year in that Universities whose information we had, an the accepted five years, the following decision was taken:

- **To propose 30 hours of lecturing / week (hours of 60 minutes)**
- **To propose 30 weeks / year**

- **The above proposals imply 30 x 30 = 900 hours of lecturing / year**

- **During five years of the proposed degree, there will be 4500 hours of lecturing in the whole degree**

Once the concept and contents of "Credit" is defined and accepted by all involved Institutions, these hours/year and hours for the whole degree will be translated into "Credits".

Final report

It was defined and approved the contents of the final report to be given in the FIG Regional Meeting to be held next year in a country to be determined.

1. **Introduction**
2. **State of the Art**
    a) **Profession**
    b) **Studies**
3. **Professional Profile for the XXIst Century**
4. **Draft for a new common core curriculum**
5. **Comparative analysis**
6. **Conclusions**
    a) **Similarities and dissimilarities between the new and the old curricula**
    b) **Needs and lacks**
    c) **Proposal of "harmonization"**

Conclusions

- There is a deep conviction that today's situation is undesirable for everybody, Professionals, Associations and Universities, mainly when the globalization process brings so many opportunities and problems.

- There is a strong wish of having some curricular harmonization which can facilitate mobility inside the continent.

- There is a big hope that this Educational Network can seriously help the different countries, Universities, Associations, Professionals, Professors and Students to a better knowledge of each other and, consequently, to facilitate the access to Graduate, Master, PhD, CPD courses inside the continent with much less problems (economic, linguistic, idiosyncratic, …) than going outside Latinamerica.

- It is fully accepted that this Network should be a permanent forum for all Latinamerican colleagues, where make possible contacts, exchange of experiences, problems, solutions,… and reinforce the links among themselves and widen this experience to the Sister Caribean Associations and Universities, although not

Spanish speakers, as well as to the North American countries when needed and suitable.

San José de Costa Rica, Madrid, 11th May 2004

Prof. Pedro J. Cavero
Chair of Comm. 2

Prof. Graciela Loyácono
Chair of W.G. 2.2