The Surveyor of the XXIst Century

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SURVEYING is an essential tool for the sustainable development of countries, the increase of their quality of life and the enlargement of their horizons in the XXIst century.

Scope of the professional activities

- Surveying, Engineering Surveying, ... 40%
- Photogrametry, Remote Sensing... 5%
- Cartography, GIS, Information Management...30%
- Land Administration, Land Management, ...20%
- Geodesy... 5%

Professional fields for the Surveyor

Surveyor

- Measurement
- Property
- Cadaster
- Valuation
- Land use control

Traditional fields

- Measurement Sciencie
- Land Management

Global drivers

Technological Development
The main, but not the only

- GPS
- Satellite images
- GIS
- TI:
  - www
  - Internet

Micro – Economic Reform : → Technology→Administration

Globalization:Dimension
- Social
- Economic
- Politics
- Educative

Sustainable Development: The engine of the future policy

Changes in the definition and nature of the profession

Changes in the University Education

International trends in Surveying

Generalization & Management versus Specialization

- Management = Core of education
- To manage IN the change and manage the change
- Data manag. = future
- Manag.capacity= outstanding factor

New Technologies make “easier” the data capture;

so, the new Surveyor should become a

DATA MANAGER

Future profile

Surveying,Geodesy Cartography,GIS.... have an engineering character

Cadaster,Land Adminis., Planning, Valuation,... have a juridical-administrative character

The identity of profession and its educational base should be in the Spatial Data Management ,although strongly linked with Technology and Social Sciences

Educational Profile of the Future

Foreseable trends in the technological sciences

GEODESY: Increasing of the reference frames.

New Cartograpy in the new systems, such as:

- ETRS'89 (European Terrestrian Reference System'89)
- SIRGAS (South American reference System)
- NAD'83 (North American Datum'83)
- AFREF (African Reference Frame)

all of them compatible with the new navigation systems (GNSS's)

Definition by GPS of the common vertical datums being included the definition of the geodetic model.

SURVEYING:

- **LAND SURVEYING:** Generalized use of GPS; new Total Stations; powerful software;....
- **ENGINEERING SURVEYING:** Use of GPS for setting out; the chalange of new infrastructures; extremely powerful software for designing; etc.
- **INDUSTRIAL SURVEYING:** Where very few microns are the tolerance allowed to most of the works,...

ENGINEERING SURVEYING

GPS for setting out

- Making up topographic tools for the management of coordinates in the work.
- Setting out of infrastructure works.
- Software for setting out.
- CAD in the equipments.
- Models of geoide.
- Integration of Total Staions – GPS receivers.
- Shortening the post-process and improving the efficiency of the GPS systems.

PHOTOGRAMMETRY : DIGITAL PHOTOGRAMMETRY, NEW AND MORE ACCURATE SCANNERS, NEW DIGITAL CAMERAS, GPS AIRBONE,...

CARTOGRAPHY : DIGITAL CARTOGRAPHY : Visualization of the result of analysis and modelization of enviromental,socio-economic,logistic,...problems

CARTOGRAPHY IN INTERNET : Easy accessibility
Interactive Maps
Dynamic presentations in multimedia
Easy updating

MULTIMEDIA : Presentation of 3D land models
Static and dynamic visualization
Possibility of measuring in 3D

INTEGRATION: From GENERAL to DETAIL;for instance: Navigating in a 3D map 1:25000 to a city,to a house (a museum,f.i.), to a picture,to a detail in the picture,....

METADATA : Every country must have its SDI (Spatial Data Infrastructure);so USA has FGDC, Europe, recently, adopted ISO TC211/ Geomatics.
The next step: Servers for maps

Geographic Information Systems:

Standards based in the concept of "interoperability" (norms of the OpenGIS consortium).

Every supplier is able to exhibit his data in the form of the so called "well known types" independently of data structure of his own.

Increasing importance of "Metadata".

Spreading of RDBMS (Relational Data Base Management System) based on enviroments,including OO (Object Oriented) Extensions, according to SQL3 version of the standards.

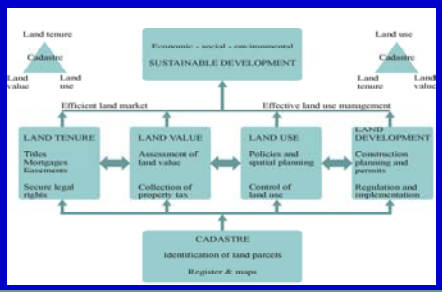
Enhacement of spatial analysis capabilities,being the main goal the evolution towards full spatial decission systems.

Cadaster, Land Administration, Land Management

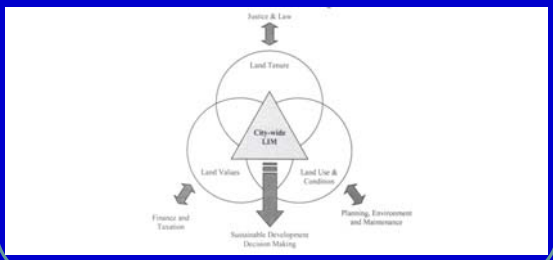
Land Administration is defined as the processes of determination, recording and disseminating information about

- Land Tenure
  - Adjudication, cadastral surveys
  - Security and transfer of property rights
- Land Value
  - -Assessment of value
  - -Land taxation
- Land Use
  - -Planning Control
  - -Implementation

Cadaster, Land Administration, Land Management



Land Information Management



Spatial data Infrastructures

Provides mechanisms for sharing geo-referenced information

- Conceptual mechanisms
  - design of organizational concepts for data sharing and custodianship
- Political mechanisms
  - provision of an effective institutional framework and the distribution of power between the governmental levels.
  - policies for access to data
- Economic mechanisms
  - cost recovery policies
  - strategies for distribution and maintenance

Cadaster, Land Administration, Land Management

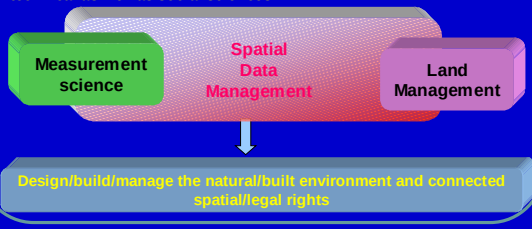
The concept of a global LAND MANAGEMENT approach raises some challanges to be met by the Surveying Community on the treshold of the third millennium.

These challenges can be divided into three different groups:

- **The Educational Challanges**
- **The Professional Challanges**
- **The Institutional Challanges**

The Educational Challanges

The identity of the Surveying profession and its educational base should be in the management of spatial data, with links to the technical as well as social sciences.



"Lifelong learning" instead of "Learning for a life" → CPD

Need of capacity building in the area of interdisciplinary land administration, especially in developing and transition countries, for building sustainable infrastructures

The capacity building should ensure that the focus be more on education and building sustainable institutional infrastructures rather than building just high level IT infrastructures

The Professional Challanges

Professions such as Surveying are being re-engineered and re-invented to accommodate the spatial information revolution, while endeavouring to maintain traditional services

The modern Surveyor has to be capable not only of managing within change but managing the change itself

The skill of the future: Interpretation of data and their management

Adoption of ethical principles and model codes of professional conduct suitable for performing this modern role

The profile of the Surveying profession in the third millennium will include a mix of technical surveying and mapping professionals, business practitioners, spatial data managers, land and environmental resources managers (in public as well as private sectors) and legal and financial consultants on land management matters

The Institutional Challanges

Establishing appropiate institutional and organizational infrastructures is a crucial key for achieving sustainability in any society

Property right is an institution in society.
Cadaster plays the most important role to make the institution of real property right work.

"Sustainable development" = "The development which meets the needs of the present without compromissing the ability of future generations to meet their own needs" (World Comm. 1987)

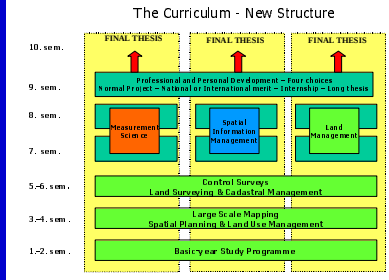
An efficient and efective land administraton system is important for many different and essential aspects of development

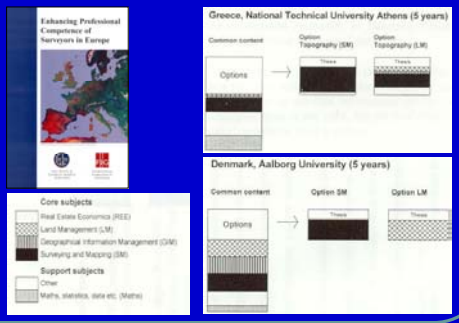
A fundamental institutional challange is related to understanding the value of developing appropiate institutional, legal and technical processes to integrate land administration and topographic mapping programmes within the context of a wider national strategy for spatial data infrastructure

The only constant is Change

The only constant is CHANGE →
- Flexible education
- Professional adaptation
- Capacity for solving new problems

New cirriculum in Aalborg (Denmark) University





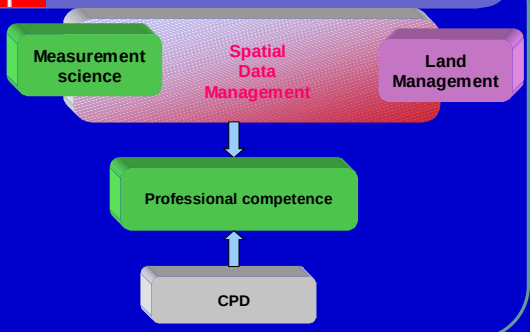
Continuous Professional Development

All these circunstances suggest that :

Continuous education instead of Temporary Education → CPD

University education is the first step in a long life learning process

Professional Competence



University Education

University is the place to acquire all needed capacities

Which University? :

- Campus Education ?
- Virtual ?

Both have advantages and disadvantages,supporters and detractors

Which kind of education ?

- Subject Education ? → Technical University of Madrid
- Project organised ? → Aalborg Univ. Concepción Univ.

As previously,there are adventages,disadventages,supporters,detractors and,mainly,the possibilities of setting up one or another

In all cases the university education must reach:

- Adaptability of subjects
- Adaptability of curriculum
- Adaptability of the graduates

Graduates must have the skills and competences needed to solve the new and unknown problems of the future

Skills for "learning to learn"

This new Professonal will need a deep knowledge,an excellent background, on basics:Math.,Physics,Adjustment,etc.

All software,all advances in technology, all facilities given by the new instrumentation, could carry out us to prepare not professionals but...,according to Prof.Czarnecki,

MONKIES PRESSING BUTTONS

Conclusions

New times → New subjects

Changes and/or enlargements : at what price...?

Future necessities :
- Development of profession
- Development in other countries → Education / Profession
- Exchanges of experiences University - Profession

PROPERTY IS ESSENTIAL FOR HUMANS

INFRASTRUCTURES ARE ESSENTIAL FOR PROPERTY

TECHNOLOGY AND PROPERTY MUST GO TOGETHER

ACCORDING TO THEIR SOCIAL-POLITICAL-ECONOMIC SITUATION EVERY COUNTRY WILL ADOPT THE MOST SUITABLE UNIVERSITY AND PROFESSIONAL SOLUTIONS