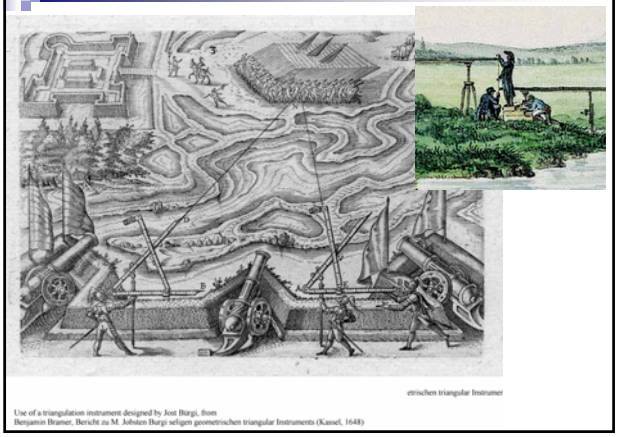
FIG President and Chair of Joint Board of Geospatial Information Societies
O. Univ. Prof. Dr.-Ing. Holger Magel
Director of TUM Institute of Geodesy, GIS and Land Management

on

From Surveying to Geomatics and Land Management. About Future Perspectives of a Changing Discipline and Profession

at the 14th International Conference on Geoinformatics (Geoinformatics 2006) – The 21st Century's Geoinformatics. October 28-29, 2006, Wuhan, China

Menna (Scribe of the fields of the Lord of the Two Lands) was an Egyptian noble who lived in the 18th Dynasty either during the reign of Tuthmosis IV or that of his successor, Amenophis III.



Use of a triangulation instrument designed by Jost Bürgi, from
Benjamin Bramer, Bericht zu M. Jobsten Burgi seligen geometrischen triangular Instruments (Kassel, 1648)

FIG Definition of the Functions of the Surveyor

Summary

A surveyor is a professional person with the academic qualifications and technical expertise to conduct one, or more, of the following activities

- to determine, measure and represent land, three-dimensional objects, point-fields and trajectories;
- to assemble and interpret land and geographically related information,
- to use that information for the planning and efficient administration of the land, the sea and any structures thereon; and,
- to conduct research into the above practices and to develop them.

FIG Definition of the Functions of the Surveyor

Detailed Functions

The surveyor's professional tasks may involve one or more of the following activities which may occur either on, above or below the surface of the land or the sea and may be carried out in association with other professionals.

1. The determination of the size and shape of the earth and the measurement of all data needed to define the size, position, shape and contour of any part of the earth and monitoring any change therein.
2. The positioning of objects in space and time as well as the positioning and monitoring of physical features, structures and engineering works on, above or below the surface of the earth.
3. The development, testing and calibration of sensors, instruments and systems for the above-mentioned purposes and for other surveying purposes.
4. The acquisition and use of spatial information from close range, aerial and satellite imagery and the automation of these processes.
5. The determination of the position of the boundaries of public or private land, including national and international boundaries, and the registration of those lands with the appropriate authorities.
6. The design, establishment and administration of geographic information systems (GIS) and the collection, storage, analysis, management, display and dissemination of data.
7. The analysis, interpretation and integration of spatial objects and phenomena in GIS, including the visualisation and communication of such data in maps, models and mobile digital devices.
8. The study of the natural and social environment, the measurement of land and marine resources and the use of such data in the planning of development in urban, rural and regional areas.
9. The planning, development and redevelopment of property, whether urban or rural and whether land or buildings.
10. The assessment of value and the management of property, whether urban or rural and whether land or buildings.
11. The planning, measurement and management of construction works, including the estimation of costs.

In the application of the foregoing activities surveyors take into account the relevant legal, economic, environmental and social aspects affecting each project.

FIG Commissions

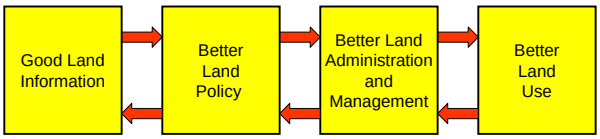
- **Commission 1 – Professional Standards & Practice**
- **Commission 2 – Professional Education**
- **Commission 3 – Spatial Information Management**
- **Commission 4 – Hydrography**
- **Commission 5 – Positioning and Measurement**
- **Commission 6 – Engineering Surveys**
- **Commission 7 – Cadastre & Land Management**
- **Commission 8 – Spatial Planning & Development**
- **Commission 9 – Valuation and the Management of Real Estate**
- **Commission 10 – Construction Economics and Management**

The very latest challenge:
Partner for UNEP in the field of „disaster and risk management“

Future Perspectives for Geodesy and Geoinformatics:

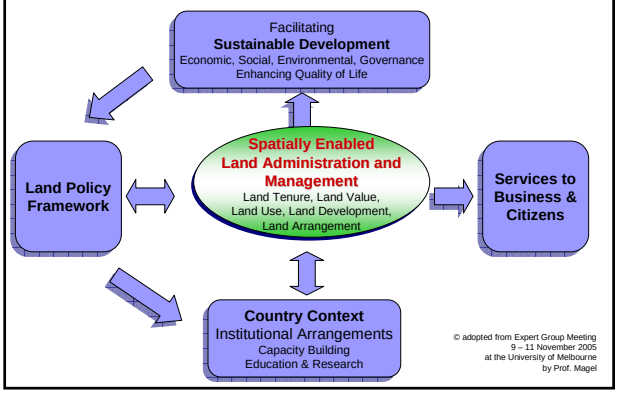
“From the single parcel to the planet Mars”

Sustainable development is not attainable without sound Land Administration and comprehensive Land Management



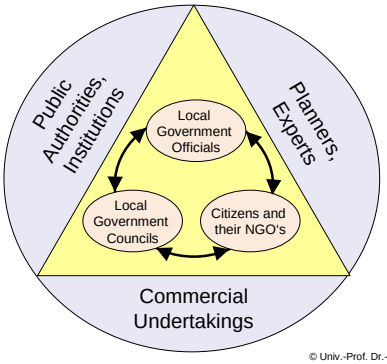
The Bathurst Declaration on Land Administration for Sustainable Development. FIG Publication No 21, 1999

A Land Management Vision



© adopted from Expert Group Meeting 9 – 11 November 2005 at the University of Melbourne by Prof. Magel

Growing civil society and subsidiarity



7 key factors of growing economy and wealth (and of innovation)

1. Natural resources
2. Human resources
3. Technical process
4. Capital
5. Knowledge and its marketing
6. Institutional framework (see D. North!!!)
7. Values, ethics, paradigm of commitment

Source: Prof. Roland Berger

Chinese-German Centre for Capacity Building in Land Development and Land Management

Sustainability and the status of geomatics

Since the Rio Conference in 1992, **sustainability has been the central principle of international development**. In August 2002 the World summit on sustainable Development (WSSD) was held in Johannesburg and **geomatics** was unconditionally recognised as a **significant part of the solution to making the world more sustainable**. In the final WSSD Plan for Implementation there are many references, which will need geomatics input, including need for:

- Land reform
- Land management
- Monitoring the environment
- Information and Planning for sustainable development

RICS Geomatics – research. March 2003. Page 5.

The Nairobi Statement
on Spatial Information
for Sustainable Development

2nd – 5th October 2001
Nairobi, Kenya

INTERNATIONAL FEDERATION OF SURVEYORS FIG
in co operation with
THE UNITED NATIONS

New Markets of GIS

1. Greater use of GIS in segments like insurance and risk underwriting
2. Online and ASP mapping markets are linked to traditional GIS markets
3. GIS usage in the personal navigation market

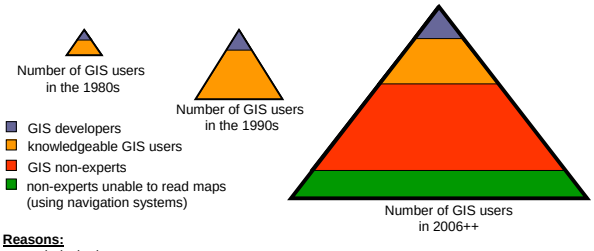
J. Renard. Infotech Enterprises Ltd.
In: GEOInformatics. July/August 2006

Currently there are three innovations promoting the technical progress in the field of Geo-information: web-services, mobile GIS linked to satellite positioning systems (GPS; GLONNASS, GALILEO) and so-called Earth-Viewer like Google Earth.

The opening up of the geo-information market of Google, Microsoft, Yahoo and other companies will vitalise the development and particularly modify the profitable geo-data market. I expect for this year the first contracts will be entered between land surveying offices and Google or Microsoft about the use of geo-data

Prof. Schilcher, TUM
Chair of the Round Table GIS e.V.
Greetings on „Geobasis-information – strategies, implementation, trends"
Stuttgart, July 2006

Global Trend: Spatial Information and GI technology become mass media



- GIS developers
- knowledgeable GIS users
- GIS non-experts
- non-experts unable to read maps (using navigation systems)

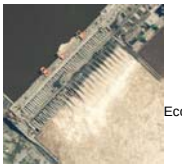
Reasons:

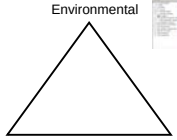
- technical advancements:
- web technology / interoperability
- data aquisition techniques: high resolution remote sensing sensors, high resolution airborne laser scanning
- SDI initiatives (not really yet)
- investment in data and technology from outside the traditional GIS segment: MICROSOFT VIRTUAL EARTH, GOOGLE EARTH ...

Effects on sustainable development

High resolution spatial information and related technology are available to all citizens (GIS-non-experts)
→ spatial awareness
→ empowerment through better information
→ more participation


oil spill in Lebanon


embankment dam in China




Favela in Rio de Janeiro

About modern future oriented education and CPD

There is a common truth across the world:
Education should not only be focussed on modern survey technology and techniques and on data gathering and modelling etc. but also on the whole environment of neighbour disciplines and on understanding and collaborating with them.

„To be a good technician
it is not enough
to be a good technician only"

Spanish writer Ortega y Gasset

The educational aim should be:

A well grounded specialized

Generalist

to be more able to play in the first rows!

The Professional Challenges

The spatial information revolution and the evolving land management paradigm in support of sustainable development have had many influences on education and professional structures over the last two decades. Professions such as surveying are being re-engineered and re-invented to accommodate the spatial information revolution, while endeavouring to maintain traditional services.

The international surveying profession and the national associations will have to adapt to these challenges and develop structures that accommodate a modern interdisciplinary profile. …

Stig Enemark (FIG President – elect): Underpinning Sustainable Land Administration Systems
16th UN Regional Cartographic Conference for Asia and the Pacific, Okinawa, Japan, 14 – 18 July 2003

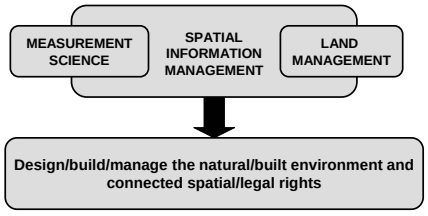
The Educational Challenges

Traditional education of surveyors has focused on geometry and technology more than on land use and land administration. Taking a land administration approach to surveying education, there is a need to change the focus from being seen very much as an engineering discipline. There is a need for a more managerial and interdisciplinary focus as a basis for developing and running adequate systems of land administration.

A future educational profile should be composed by the areas of Measurement and geodetic Science and Land Management and supported by and embedded in a broad interdisciplinary paradigm of Geographic Information Management.

According toStig Enemark (FIG President – elect): Underpinning Sustainable Land Administration Systems
16th UN Regional Cartographic Conference for Asia and the Pacific, Okinawa, Japan, 14 – 18 July 2003

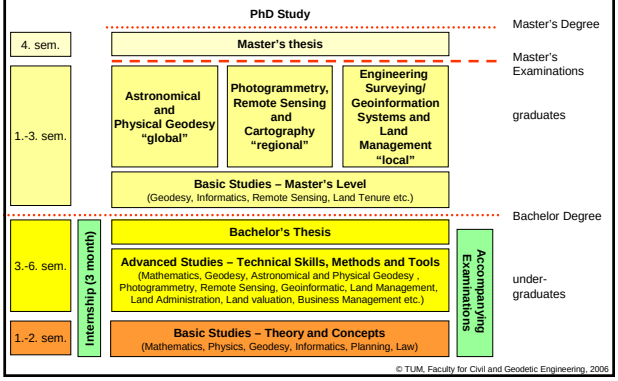
The Educational Challenges



Surveyors
EDUCATIONAL PROFILE OF THE FUTURE

Stig Enemark: Underpinning Sustainable Land Administration Systems
16th UN Regional Cartographic Conference for Asia and the Pacific, Okinawa, Japan, 14 – 18 July 2003

New Structure of the Curriculum for TUM-Geodesy and Geoinformation



Master of Science
Land Management and Land Tenure
postgraduate Master's Program

High Demand for Academic Education and Training in Land Management and Land Tenure

- Tenure Security for the Urban Poor
- Tenure Arrangements for Natural Resource Management
- Legal Pluralism, Customary Rights etc.
- Privatization of State Land since the early 1990s
- Governance in Land Administration
- New Approaches to State Land Management
- Urban Sprawl – New Ways of Urban Land Use Planning
- Need for Land Policies
- Need for Land Management Experts

Master of Science
Land Management and Land Tenure
postgraduate Master's Program

Our Target Groups

- Future Managers and Decision Makers
- Trainers, Lecturers, Research Assistants
- Experts with practical experience

In the Service of Society...

… whether academic or professional **surveyors should see themselves**

1. As **Stabilisers** of public order and their work as a precondition of a flourishing economy
2. **Guardians** of rights of property and user as well as a safe system of record in land administration systems
3. **Producers, administrators and distributors** of local, national and global spatial data infrastructures
4. **Managers** of land, water and other natural resources
5. **Enablers, mediators and advisors** for urban and rural planning and development, including conflict resolution
6. **Hinges (interfaces) in global, national and local early warning systems** for disaster prevention and risk management
7. **Active partners** in the development and use of e.g. “Global Navigation Satellite Systems (GNSS)“ or of high resolution imaging systems for observation of the earth and for navigation systems for drivers, wanderers etc.