

# PROFESSIONAL COMPETENCES OF SURVEYING (GEODETIC) ENGINEERS

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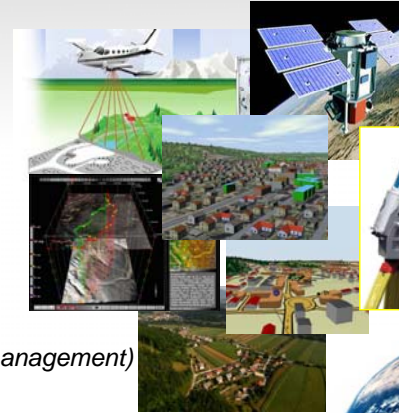
## INTRODUCTION

Technical development, globalisation, social economic conditions....



(higher) education, research

renovation of study programmes



## SURVEYING PROFESSION

- follow spatial information "revolution"
- maintain traditional services
- land related professional fields (such as land management)



## SURVEYING EDUCATION, historical background

From Surveying, Geodesy, Cartography



Peter Apian's Geographia, 1533

to Surveying, Geodesy, Geomatics, Geoinformatics etc.

Towards interdisciplinary paradigm  
**measurement science** and **land management**

supported by  
**spatial information management**



## COMPETENCY, COMPETENCY STANDARDS

"COMPETENCY" – the ability to apply knowledge and skills to produce a required outcome (Trinder, 2008).

Competency is expected to develop from the three components over an employee's lifetime:

- education,
- training and
- experiences.

### "PROFESSIONAL COMPETENCY STANDARDS"

- to test the effectiveness of education and training, improvement of education, training, working conditions etc.
- support for development of global (European) market place for services;

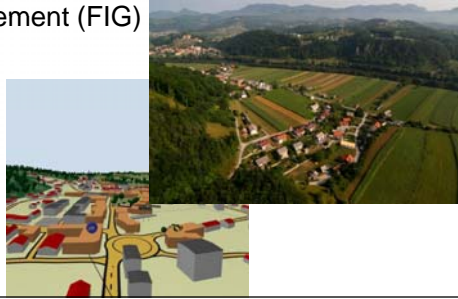




## COMPETENCY in SURVEYING PROFESSION

### SURVEYING PROFESSION:

- competences of surveyor vary in different (EU) countries
- originate in mapping and in definition of boundary for real estate units (influence of historical development of the profession)
- is not focused only to the technical aspects: it comprise measurement science and land management, supported by a broad paradigm of spatial information management (FIG)



## SURVEYING PROFESSION – HIGHER EDUCATION

- ❑ **Bologna declaration (1999) – European ministers of education:**  
build up a European Area of Higher Education until 2010
- ↓
- ❑ **Bologna declaration (1999) – main aims:**
  - to create a European space for higher education in order to:
  - enhance the employability and mobility of citizens and
  - increase the international competitiveness of European higher education.
- ❑ **Bologna declaration (1999) – main priorities:**
  - introduction of the three cycle system (bachelor, master and doctorate).
  - quality assurance, and
  - recognition of qualifications and periods of study.



## SURVEYING HIGHER EDUCATION in SLOVENIA

- ❑ **18th century:** technical education in Idrija mercury mine;
- ❑ **18-20th century:** in the framework of tradesman's education;
- ❑ **End of the 18th century:** surveying courses in the framework of humanistic educational programmes in Ljubljana;
- ❑ **1919 (University of Ljubljana - UL):** higher education of surveying (geodesy with some interruptions);
- ❑ **1945/46 (UL, Department of Geodesy):** 9 semester study programme
- ❑ **1956 (UL, Department of Geodesy) –** courses from public infrastructure, urban planning, spatial development were introduced;
- ❑ **1957 (UL, Faculty of Architecture, Civil and Geodetic Engineering, Department of Geodesy)**
- ❑ ....
- ❑ **Today (UL, Faculty Civil and Geodetic Engineering, Department of Geodesy)**



## SURVEYING HIGHER EDUCATION in Slovenia before “Bologna”

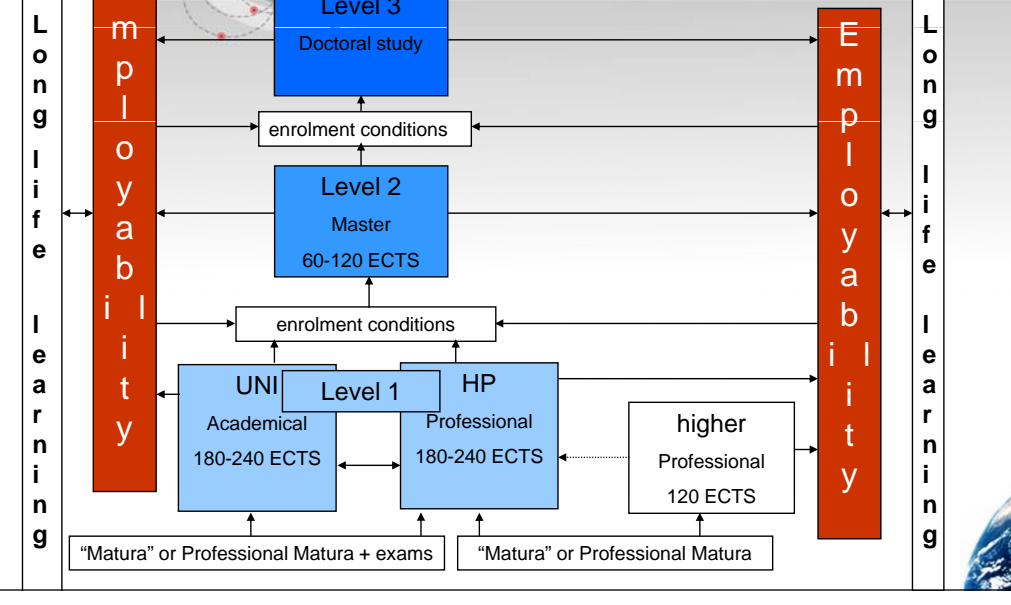
### Phare Tempus Programme (1996-1999):

- new courses from the fields of law, economics, land management
- “German system” of higher education
- ❑ **University study programme of geodesy (UNI):**  
4.5 years (9 semesters)  
“university diploma engineer of geodesy”  
(univerzitetni diplomirani inženir geodezije, Diplomingenieur(in) Univ. für Geodäsie)  
comparable to a master's degree in countries which use consecutive system of higher education.
- ❑ **Higher professional study programme of geodesy (VSŠ):**  
3 years (6 semesters)  
“diploma engineer of geodesy”  
(diplomirani inženir geodezije, Diplomingenieur(in) FH für Geodäsie)  
comparable to study programs at Universities or Colleges of Applied Sciences (in Germany Fachhochschulen).

Number of students-beginners and (university) diploma engineers in study programs of geodetic engineering in Slovenia in 2002–2008



Adoption of Bologna declaration



Bologna process at UL, Faculty of Civil and Geodetic Engineering

**Graduates' opinion (2005; 50 UNI diploma engineers and 48 VSŠ diploma engineers):**  
 Evaluation about the efficiency of study programs of geodetic engineering

- a) volume and pretentiousness of study courses,
  - b) an applicability of knowledge and skills obtained during the study,
  - c) an importance of knowledge and skills for the future.
- Suggestions for improvement of study programs.

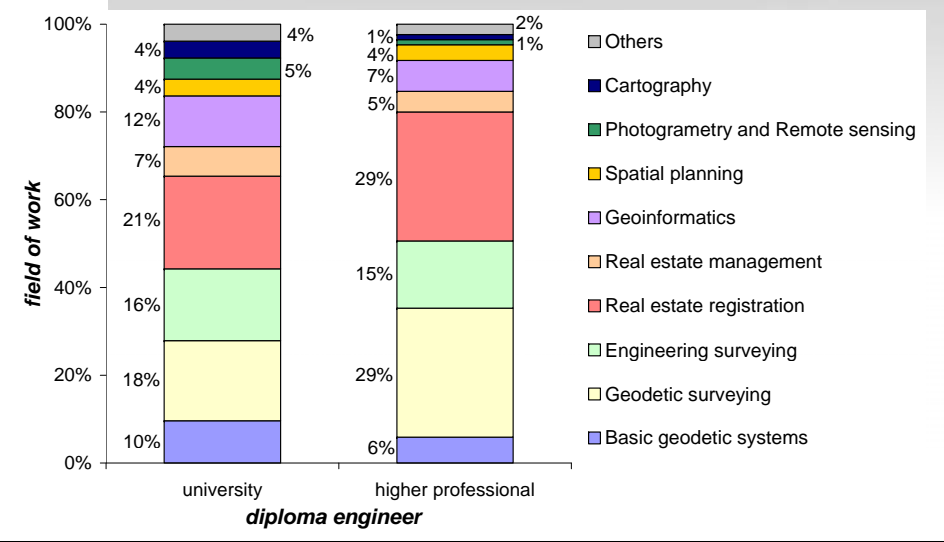
**Employers' opinion (2006; 50 employers):**

Evaluation of expected and achieved abilities, skills and knowledge

**International trend in surveying profession**

...

Fields of work of geodetic diploma engineers in Slovenia





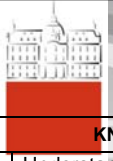
## NEW STUDY PROGRAMMES AT THE Department of Geodesy

- ❑ University study programme of the first (Bachelor's) degree **Geodesy and Geoinformatics (BSc)**
- ❑ Higher professional study programme of the first (Bachelor's) degree **Technical Real Estate Management (BSc)**
- ❑ University study programme of the second (Master's) degree **Geodesy and Geoinformatics (MSc)**
- ❑ University study programme of the second (Master's) degree **Spatial Planning (MSc)**
- ❑ PhD study programme (faculty's common programme) **Built Environment (PhD)**



## COMPETENCES OF GRADUATES

	BA TUN	BA GG	MA GG	MA SP
<b>GENERAL COMPETENCES</b>				
Understanding and solving technical and/or business related problems using high level thinking skills (applying theory into praxis); the capabilities for individual learning, critical evaluation of learning sources;	X	X	X	X
The possession of appropriate personal and professional values, behaviours and responsibilities; the abilities to make sound judgements in a professional and ethical context;	X	X	X	X
Advanced language, numerical and IT literacy; communication skills and appropriate public appearance; comprehensive knowledge of related fields and the ability for interdisciplinary work;	X	X	X	X
Understanding and using scientific methods; the abilities to define, research, understand and advanced solve practical and theoretical problems, principles;			X	X
Understanding and critical evaluation and use of professional/scientific literature; the abilities to critical, analytical and synthetic thinking; the abilities to professional and scientific expression;			X	X



### KNOWLEDGE (PROFESSIONAL SPECIFIC) COMPETENCES

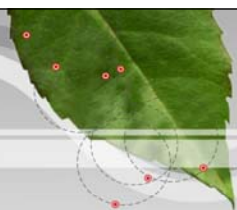
	BA TUN	BA GG	MA GG	MA SP
Understanding the role of surveying, geodesy, spatial data in society;	x	X	X	x
Understanding the role of technical real estate management in society;	X	x	x	X
Using advanced technology and methodology in surveying measurements;	X	X	X	
Maintaining basic geodetic systems; land cadastre measurements;	x	X	X	
Designing, establishing, maintaining, renewing of basic geodetic system;			X	
Advanced comprehension, critical monitoring of human environment etc.	X	X	X	X
Understanding of conceptual modelling and model presentations of the geographical environment, including intangible entities;	x	X	X	x
Designing, managing, maintaining geographical, cartographic, land information systems; advanced problem solving and research etc.			X	
Solving practical problems from the fields of spatial and land related data acquisition, valuation, presentation and maintenance etc.	x	X	X	x
Understanding, planning, implementing advanced spatial data acquisition; developing advanced solutions in spatial data management, IT solutions;		X	X	
Understanding, designing and maintaining real estate recording, LIS;	X	X	X	
Registering real estate: determining, presenting and recording technical characteristics of real estate and rights referring to the real estate (land).	X	X	X	
The familiarity with legal framework of surveying, spatial data acquisition, real estate recording & management; spatial planning, land management;	X	X	X	X
Valuation and appraisal of different values of real property;	X	x	x	X
Studying natural and social environments and surveying of land resources; critical use of spatial and land related data in spatial planning;	x		x	X
Policy making in spatial planning, land development;				X

LAND MEASUREMENT  
LAND MANAGEMENT  
SPATIAL DATA MANAGEMENT



## CONCLUSIONS

- Bologna process launched fundamental reform of higher education systems in Slovenia;
- The goal of the reform is to make studies more successful, compatible and comparable:
  - The success, in terms of Bologna reform, means to increase the number of higher educated people.
  - The **learning outcomes** are instruments which make studies more compatible and comparable.
  - Competency standards – measures of the effectiveness of new study programmes....
- Reality: every study is a compromise, influenced by personal, material, space conditions...



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