



# Belgian landscape of academic education in geomatics and surveying

Philippe De Maeyer  
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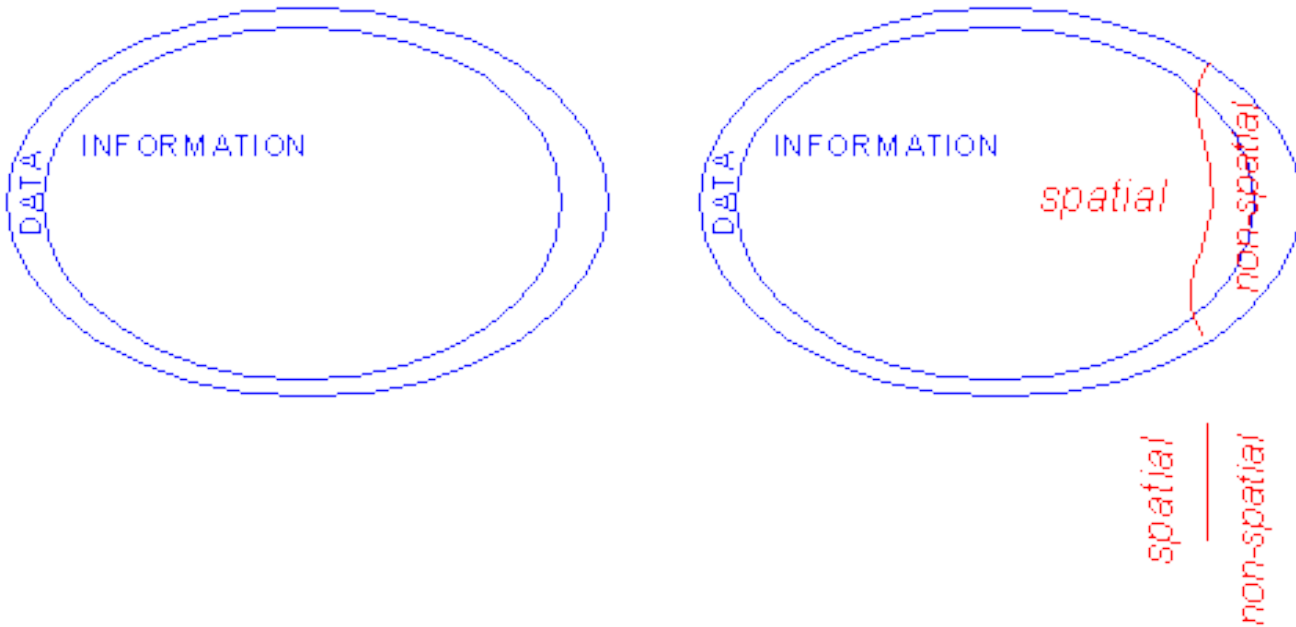
# Geomatics

*Canadian Institute of Geomatics :*

*Geomatics is a field of activities which, using a systematic approach, integrates all the means used to **acquire** and **manage** spatial data required as part of scientific, administrative, legal and technical operations involved in the process of the production and management of spatial information.*

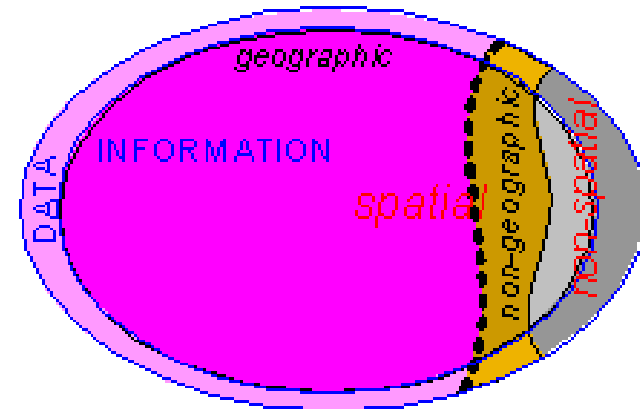
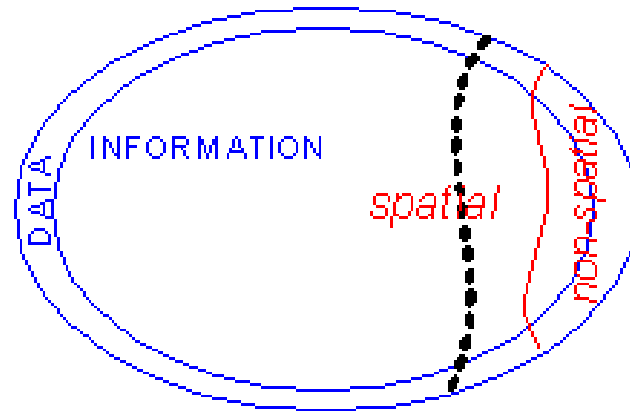
# Geomatics

*Geomatics* → *dealing with spatial and geographic data and information*



# Geomatics

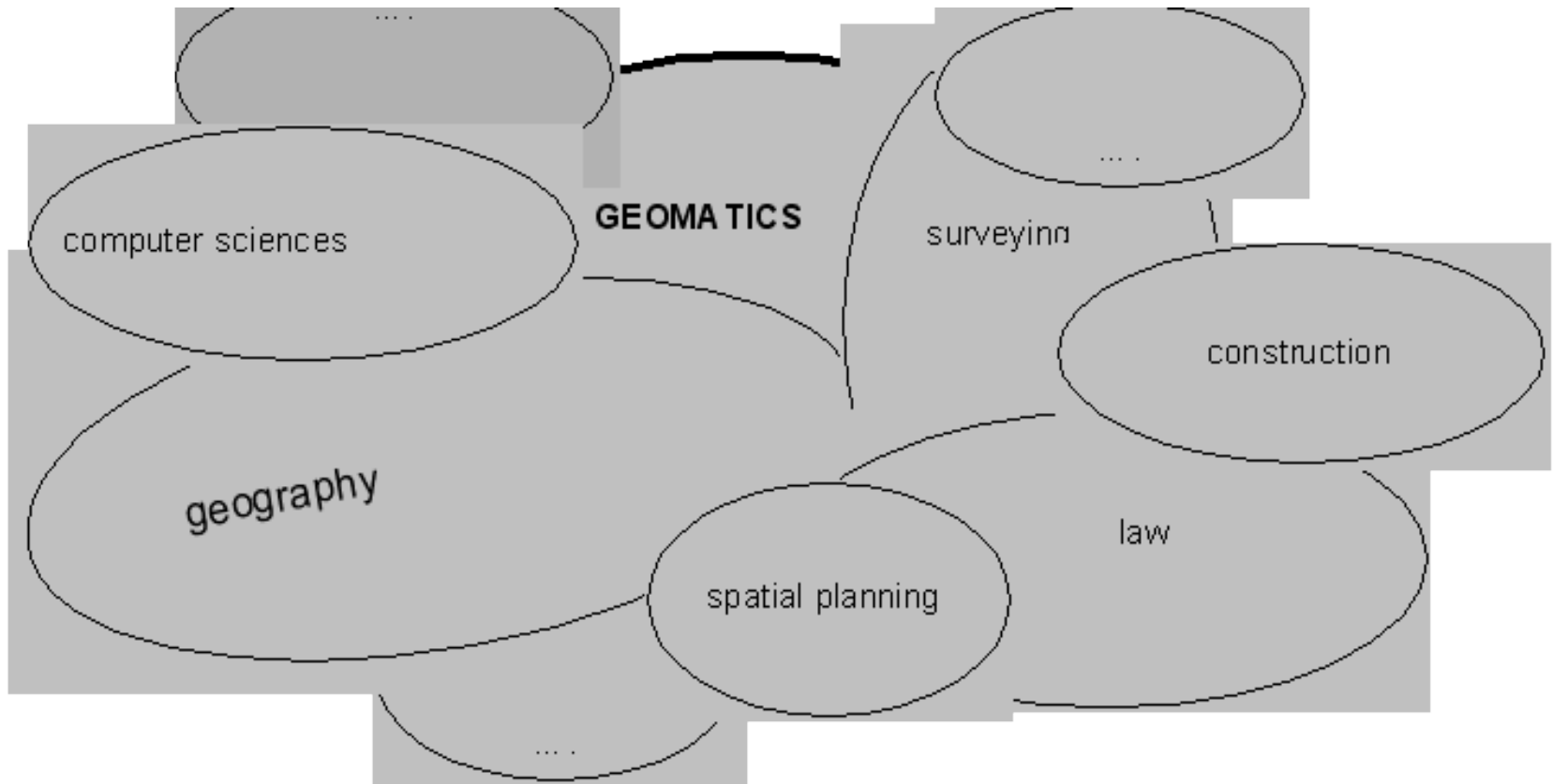
*Geomatics* → *dealing with spatial and geographic data and information*



geographic  
•••••  
non-geographic

# Geomatics

*Geomatics → dealing with spatial and geographic data and information*



# Geomatics

## *Geomatics*

- a lot of studies prepare to handle spatial / geographic data / information

surveyors

spatial [geographic] data [and information] *gathering* and *structuring*

GI – courses

*management, analysis* and *communication* of [spatial] geographic [data and] information

# Geomatics

**applied approach**

**theoretical approach**

**GI – courses**

```
graph LR; A([GI – courses]) --> B[management, analysis and communication of [spatial] geographic [data and] information];
```

*management, analysis and communication of [spatial] geographic [data and] information*

# Geomatics

GI – courses

*management, analysis and communication of [spatial] geographic [data and] information*

**applied approach**

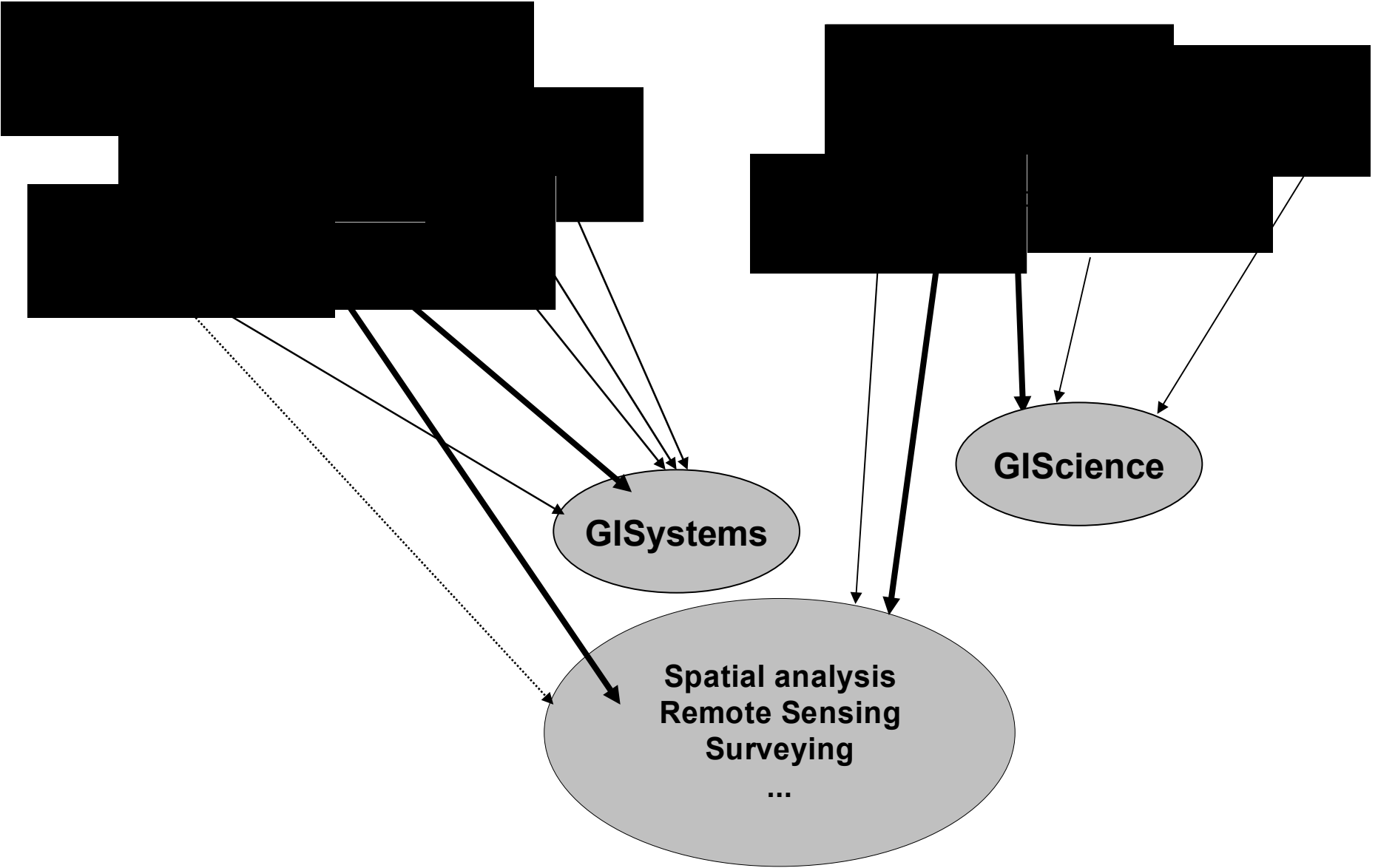
**theoretical approach**



# Geomatics

**applied approach**

**theoretical approach**



# Geomatics

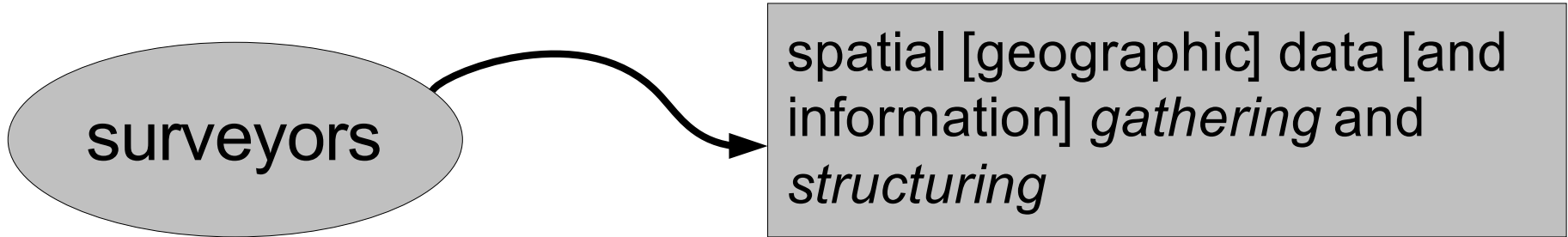
- Geomatics as an applied topic at universities in curriculum of
  - geographers
  - surveyors
  - agro-engineers (bio-engineers)
  - (engineers)
  - geologists
  - biologists
  - ...
- Geomatics as a research topic at universities in curriculum of
  - geographers
  - (mathematicians)
  - (engineers)
  - ...

# Geomatics

- example of curriculum in geomatics of geographer
  - UGent

• Ba1	Introduction Geomatics	5 ECTS	compulsory
• Ba2	GISystems	4 ECTS	compulsory
	GIScience	3 ECTS	compulsory
	Remote Sensing	7 ECTS	compulsory
	Topography	4 ECTS	compulsory
• Ba3	Spatial analysis	10 ECTS	compulsory
• Ma1	Applications GIS	7 ECTS	compulsory
• Ma2	GI management	5 ECTS	option
	Computercartography	5 ECTS	option
	Historical cartography	5 ECTS	option
	3D-Acquisition and visualisation	5 ECTS	option
	GIScience	5 ECTS	option
	Algorithms and datastructures	5 ECTS	option
	GIS-programming	5 ECTS	option
	Map projections	5 ECTS	option
	Photogrammetry	5 ECTS	option

# Geomatics



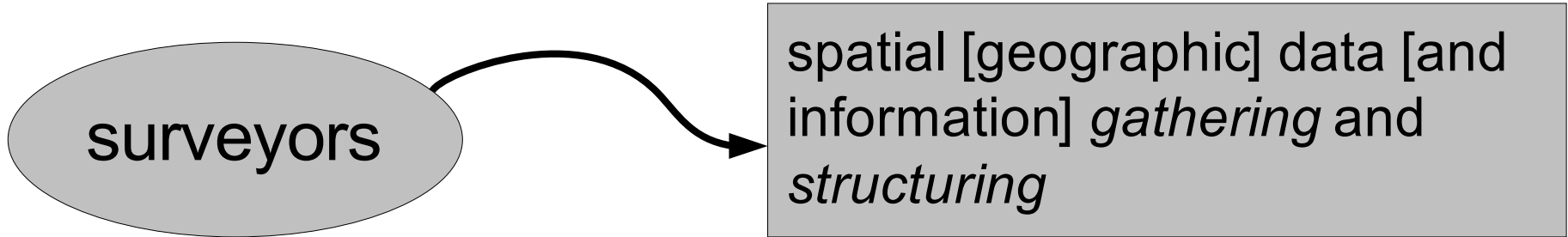
- definition of surveyor ? FIG

A surveyor is a professional person with the academic qualifications and technical expertise

to conduct one, or more, of the following activities;

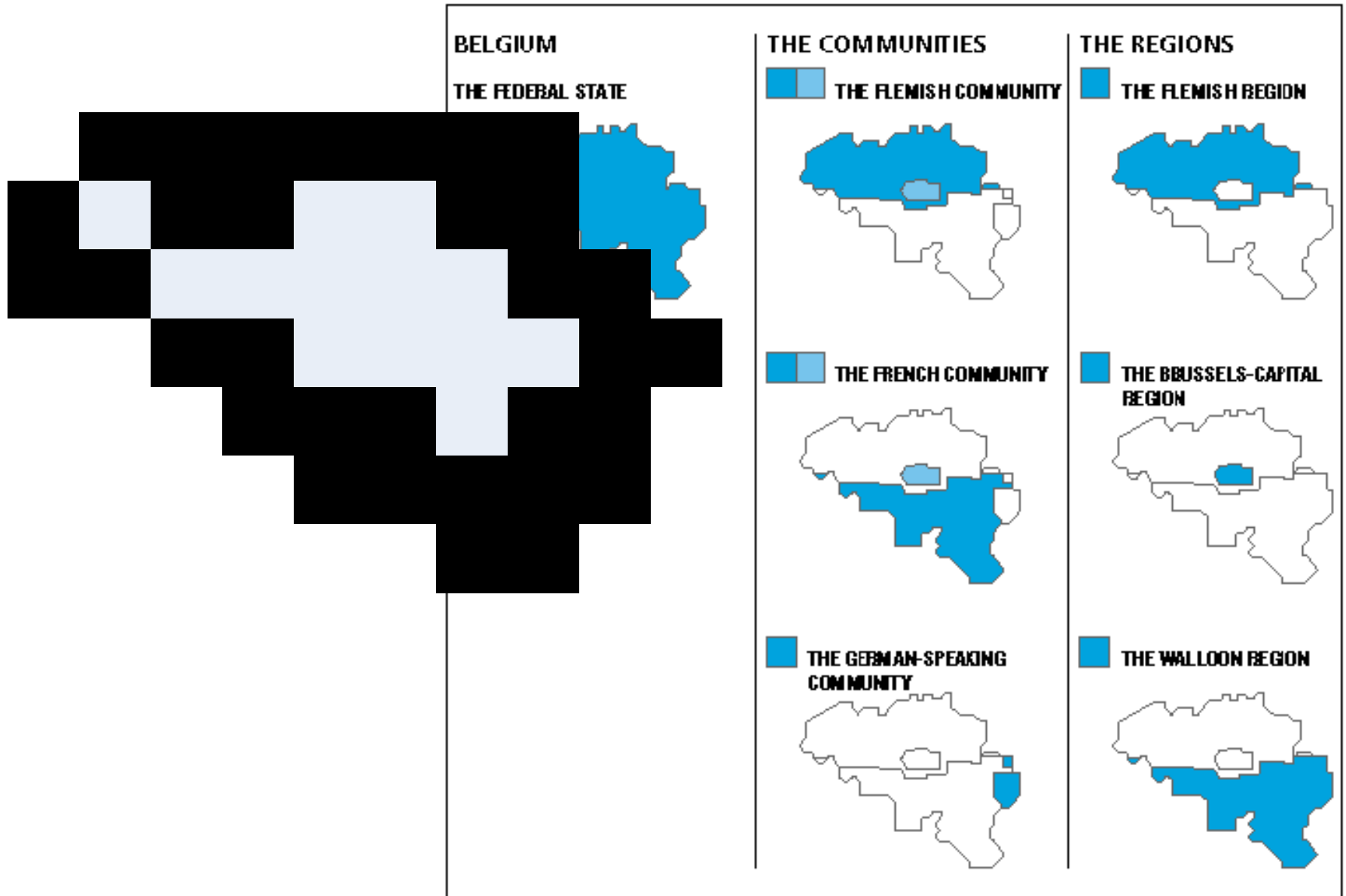
- to determine, measure and represent land, three-dimensional objects, point-fields and trajectories;
- to assemble and interpret land and geographically related information,
- to use that information for the planning and efficient administration of the land, the sea and any structures thereon; and,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

# Geomatics



- definition of surveyor ?
  - **defined by law**
    - **history**
    - **present situation**

# Surveyor in Belgium



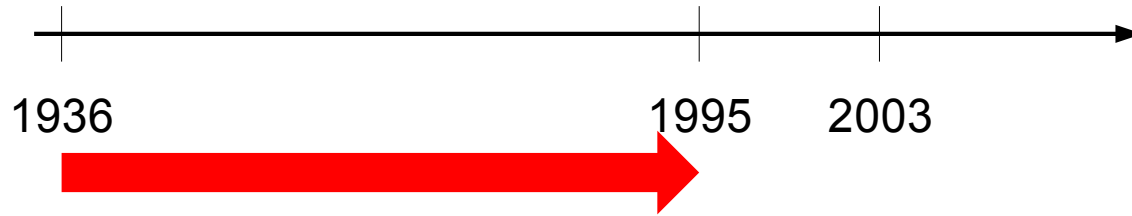
# Surveyor

- definition of surveyor ?
  - **defined by law**
    - **history**
    - **present situation**

<b>1825</b>	Program for exam of <b>surveyor</b>
<b>1921</b>	<b>title SURVEYOR</b> Min. Decree 04.12.1921 fixed the exam programme
<b>1936</b>	<b>SURVEYOR – VALUER REAL ESTATE</b> Roy. Decree 18.05.1936 of creation of the profession
<b>1995</b>	Roy. Decree 18.01.1995 protection of title and practice of profession regulated
<b>2003</b>	Law 11.05.2003 confirms the conditions of accessions to the profession & institution of Federal Councils of Surveyors

# Surveyor

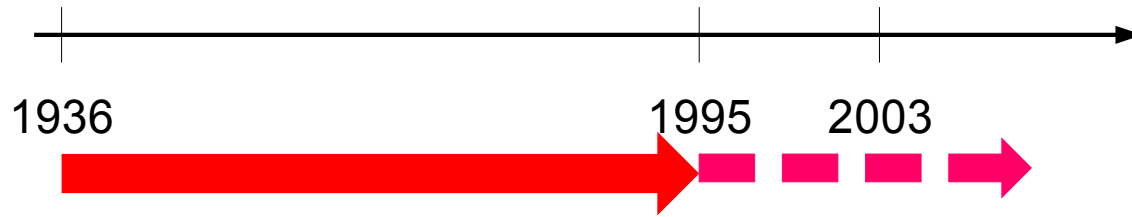
- surveyor ?



1st technical proof central examination board  
training period of 2 year  
2nd technical proof central examination board

# Surveyor

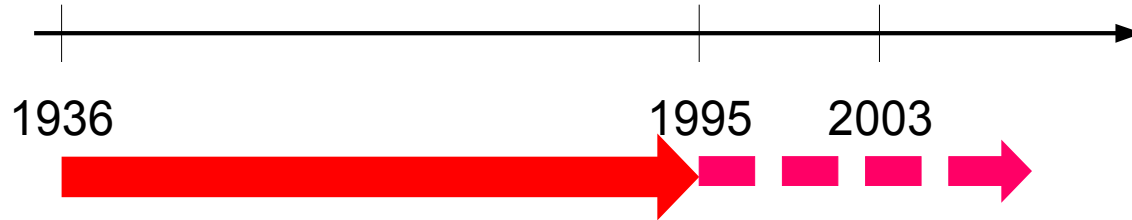
- surveyor ?



1st technical proof central examination board  
training period of 2 year  
2nd technical proof central examination board

# Surveyor

- surveyor ?



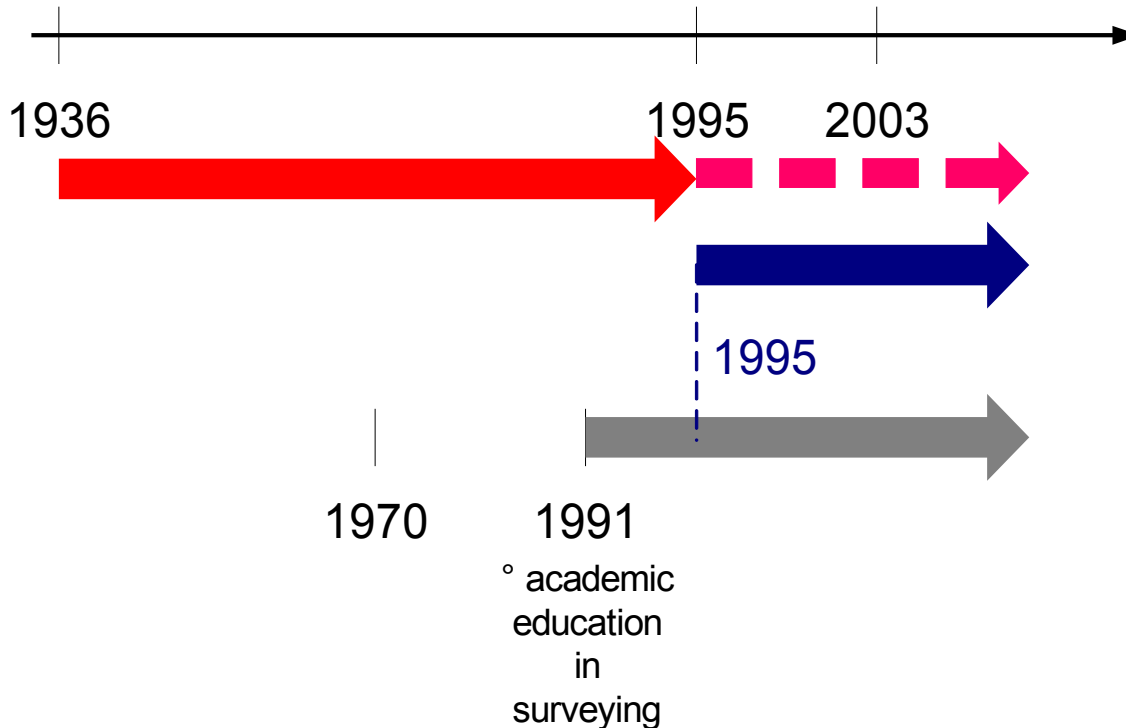
1st technical proof central examination board  
training period of 2 year  
2nd technical proof central examination board

1970

“graduate” degree (2 years) “topography”  
in 2004 → professional bachelor topography

# Surveyor

- surveyor ?



## ACADEMIC:

UNIVERSITIES 2 + 2 years

“Licentiate” in geographical sciences , option geomatics and geometrology (ULiège)

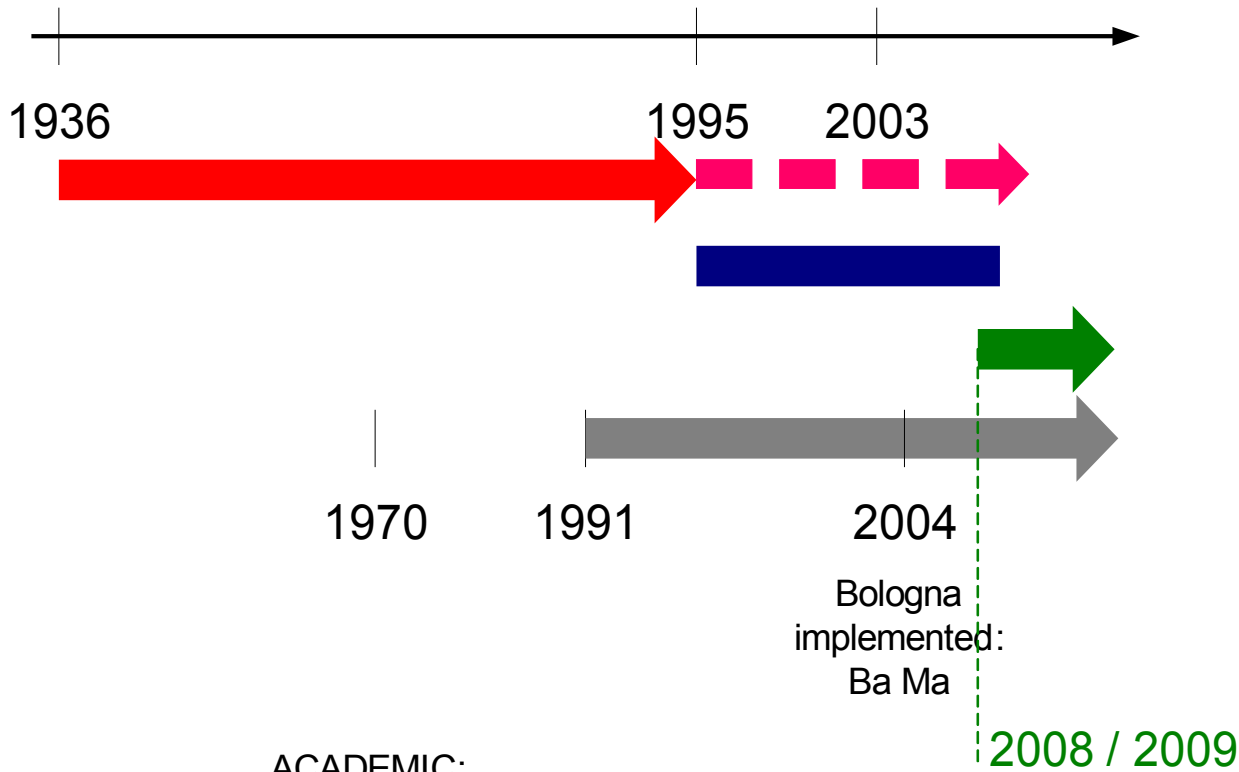
“Licentiate” in geographical sciences , option surveying (UGent)

ENGINEERING COLLEGES 2 + 2

Engineering degree in construction , option surveying

# Surveyor

- surveyor ?



## ACADEMIC:

UNIVERSITIES 3 + 2 years

Master in geographical sciences , option geomatics and geometrology (ULiège)

Master in geomatics and surveying (UGent)

ENGINEERING COLLEGES

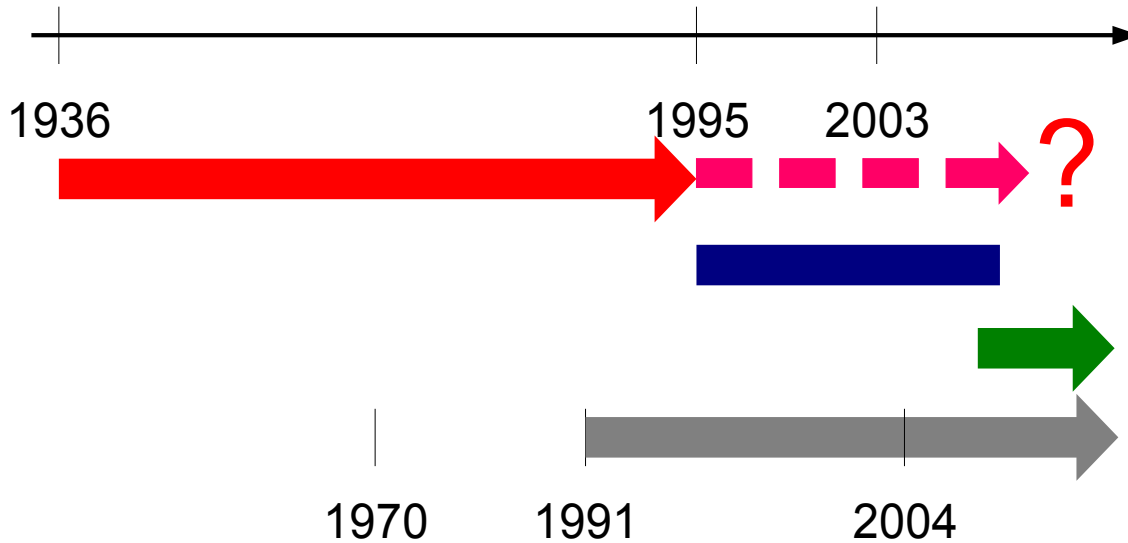
2 + 2 years Flemish Community

2 + 3 years French Community

Master degree Engineering in construction , option surveying

# Surveyor

- surveyor ?



“graduate” degree (2 years) “topography”  
in 2004 → professional bachelor topography



# geodetic - surveyor

## ACADEMIC:

### UNIVERSITIES 3 + 2 years

Master in geographical sciences , option geomatics and geometrology (ULiège)

Master in geomatics and surveying (UGent)

### ENGINEERING COLLEGES

3 + 1 years Flemish Community

3 +2 years French Community

Master degree Engineering in construction , option surveying



Université Liège (faculty sciences)  
(Liège)



Universiteit Gent (faculty sciences)  
(Gent)

# geomatics - surveyor

## ACADEMIC:

UNIVERSITIES 3 + 2 years

Master in geographical sciences , option geomatics and geometrology (ULiège)

Master in geomatics and surveying (UGent)

## ENGINEERING COLLEGES

3 + 1 years Flemish Community

**3+2 years French Community**

Master degree Engineering in construction , option surveying



Institut Supérieur Industriel Liégeois  
(Liège)



Ecole Centrale des Arts et Métiers  
(Bruxelles)



Institut Supérieur de Mons  
(Mons)

# geomatics - surveyor

## ACADEMIC:

UNIVERSITIES 3 + 2 years

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Master in geomatics and surveying (UGent)

## ENGINEERING COLLEGES

**3 +1 years Flemish Community**

3 + 2 years French Community

Master degree Engineering in construction , option surveying



Katholieke Industriële Hogeschool De Nayer  
(Mechelen)



Katholieke Hogeschool St Lievens  
(Gent)



Hogeschool Gent  
(Gent)



Katholieke Industriële Hogeschool West-Vlaanderen  
(Oostende)

# geomatics - surveyor



First Year Bachelor - Géomètre	
Course	Credits
General physics	9
General Mathematics, partim A	13
biology (diversity, evolution and environment)	9
Elements of General Chemistry	10
partim economic and social geography	3
partim geomatics and surveying	3
partim physical geography	3
Introduction to computer programming	6
English 1 (awakening and levelling course)	4

Second Year Bachelor - Géomètre	
Course	Credits
General statistics and data processing	6
General Physics II	6
Geology	7
Geomorphology and hydrography	5
Photointerpretation	2
English 2 (reading and hearing comprehension)	4
<b>Géomatique et Géométrie 1</b>	
Further General Mathematics	6
Geometric Geodesy and Positional Astronomy	5
Surveying : Equipments and Methods	6
Cartography and GIS	8
Further Computing	5

# geomatics - surveyor



Third Year Bachelor - Géomètre	
Course	Credits
Pedology	3
Space analysis and S.I.G.	6
Remote Sensing	6
Location of economic activities	6
English 3	4
Personal works	5
<b><i>Géomatique et Géométrie 2</i></b>	
Numerical methods in physics	4
Law of real estates	5
Introduction to Data Bases	6
Cartographic projections	3
Real estate markets	2
Workshop	4
Global Navigation Satellite Systems	3
Theory of Errors	3

# geomatics - surveyor

First Year Master - Géomètre	
Course	Credits
Photogrammetry	5
Geographical Information Systems	6
<i>Géomètre 1</i>	
Applied Surveying	6
Integrated Geomatics Project	8
Pratiques professionnelles du Géomètre expert	3
Hydraulique urbaine et environnementale	5
Analysis and management of landscapes	3
Séminars (1 <sup>st</sup> part)	4
<i>Géomatique appliquée 1</i>	
Space analysis and S.I.G	6
Remote Sensing	6
Surveying : Equipments and Methods	6
Cartography and GIS	8
Seminars (1 <sup>st</sup> part)	3

And choose an option between	
<i>Géomètre 2</i>	
Technics for the construction of buildings	4
Introduction to geotechnics	5
Policy off durable development	3
Projects	2
Determination and Recognition of Quality and Conformity	3
Topoclimatology	3
<i>Géomatique appliquée 2</i>	
Geometric Geodesy and Positional Astronomy	5
Numerical methods in physics	4
Further Computing	5
Introduction to Data Bases	6

Second Year Master - Géomètre	
<b>Course</b>	<b>Credits</b>
Special Questions of Geomatics	5
Introduction to Research	2
Report	20
Follow Up of the Report	3

<b>Choose between:</b>	
<b><i>Applied Geomatics</i></b>	
Cartographic projections	3
Global Navigation Satellite Systems	3
Seminars (2nd part)	2
Analysis and management of landscapes	3
Topoclimatology	3
Gestion des projets	2
<b>Choose one module between:</b>	
<b><i>Regional Planning</i></b>	
Policy off durable development	3
Ecology Applied to Urban Planning and Land Management (partim I)	3
Aménagement et gestion des territoires urbains et ruraux	4
Real estate markets	3
Studies of calamities	1
<b><i>Hydrology</i></b>	
Applied Hydrology	3
Modelling physical and chemical processes applied to the environment	3
Environmental Geology and Hydrogeology	3
Hydraulique urbaine et environnementale	5
<b><i>Other</i></b>	

# geomatics - surveyor

Second Year Master - Géomètre	
Course	Credits
Special Questions of Geomatics	5
Introduction to Research	2
Report	20
Follow Up of the Report	3

<i>Specialisation in Geometry</i>	
Constructions : matériaux et entretien	6
Introduction to Computer Networks	5
Training courses	9
Seminars (2nd part)	3
Pathology of the buildings	3
Choose between:	4
Ecology Applied to Urban Planning and Land Management (partim I) -	3
Applied Hydrology	3
Installation and management of the urban and rural territories	4
Modelling physical and chemical processes applied to the environment	4
Environmental Geology and Hydrogeology	3
Natural risk management	3
Study of Calamities	1

# geomatics - surveyor

## Bachelor Industrial Sciences Construction Ba 2

Course Unit	Group	Credits
		3
		7
Structural mechanics 1		5
Construction technology 1		6
Topography		3
Statistics		3
Thermodynamics-fluidomechanics		4
Construction		5
Organic Chemistry I		3
Material Sciences		3
Electricity II		6
Electronics		3
Information- en Communication technology II		3
Economics and communication		6

## Bachelor Industrial Sciences Construction/Topography Ba 3

Course Unit	Group	Credits
Building technology-bouwfysica 2		3
Gebouwentechiek-constructies 2		3
Philosophy and ethics II		3
Structural mechanics II		5
Concrete construction I		7
Steel construction I		3
Geotechnics I		4
Construction technology II		5
Applied hydraulics		6
Topography II		4
Law		3
Applied informatics		4
Projects		4
GIS		3
Geodesy		3

## Master Industrial Sciences Construction/Topography

Course Unit	Group	Credits
Photogrammetry		3
Hydrographics		3
Industrial measurement		3
Optional courses		6
Final Project		20
Law-management		9
Practical training		7
Urban development		3
Road design		3
Philosophy and Ethics III		3

# geomatics - surveyor

→ period 1991 – 2001 10 institutions (now 9) delivered 129 diplomas / year !!!

Flemish community:

**UGent** 15 / year

**KAHO StL** 26

**De Nayer** 20

**HoGent** 14

**HoAntwerpen** 11

**KIHWVI** 7

*total* 93

French community:

**ULiège** 10 / year

**ISIL** 10

**ISI** 10

**ECAM** 6

*total* 36

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French community:

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**ISIL** 10

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**ECAM** 6

*total* 36

today:

example UGent 2007 – 2008

Ba1 19 (49)

Ba2 13 (26)

Ba3 19 (34)

Ma1 9 (27)

Ma2 - (-)

# geomatics - surveyor

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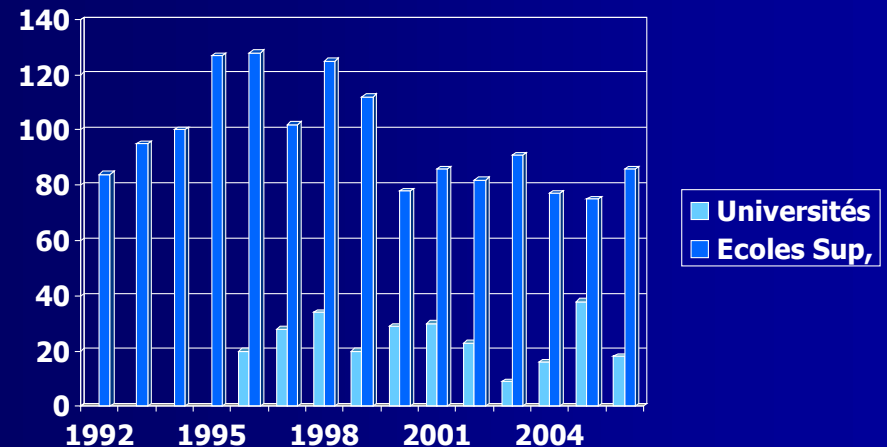
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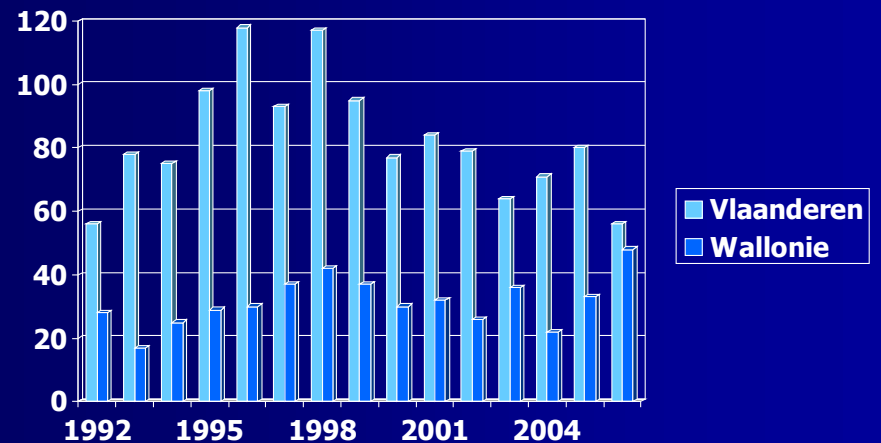
**ULiège** 10 / year

**ISIL** 10

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*total* 36



# geomatics - surveyor

- now 9 institutions (beginn. 10) delivering < 120 diplomas / year !!!
- international trends
- limited number of PhDs and in **geography** not always in **geomatics**
- 3 pillars:
  - acquisition
  - information management, analysis and communication
  - real estate (construction, law, planning, ...)

## FIG

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.