Market Report

Report about the market of surveying in Europe

Otmar Schuster – Emmanuel Ouranos – Martina Busch
Ernst Höflinger (†)

Editors

Comité de Liaison des Géomètres Européens
President Dipl.-Ing Klaus Rürup

Geometer Europas
President Dr.-Ing. Otmar Schuster

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Foreword

Some time ago the General Assembly of CLGE decided to produce a report about the market of surveying in Europe. It was meant to be a document to provide information to the public, to the European Commission and to decision-takers concerning our profession. The report will show the significance of the profession to our economy.

In the beginning the working party had to face enormous difficulties in collecting reliable data. Here I will give my full respect to our colleague Ernst Höflinger who worked very hard on this project in collecting data and creating models for meaningful results. Otmar Schuster, Emmanuel Ouranos and Martina Busch continued the work and finished this report.

Indeed the results of the report about the market and its importance to our economy are impressive. Nearly 25.000 million Euros is contributed to the Gross European Product. Half a million professionals are working on it. These figures show very clearly the importance of the surveying profession to the economy. And if one imagines the link to follow up investments, it makes even clearer that the surveying profession becomes absolutely undeniable.

Now I will thank all members of the working group for this report and I will thank all member countries which contributed with reliable data. I would like to encourage all our members to collect data in advance and provide them in case of a revised version in the near future.

Bottrop July 2003

Klaus Rürup
President of CLGE

Foreword

We have gladly taken up the approaches of the CLGE to determining the contribution made by the field of surveying to Europe's GEP[1], since it is also an important concern of the GEOMETER EUROPAS to make known the contribution, which is always underrated by the public, of the professional group as a whole.

As compared with previous attempts to determine the share of the professional group in the Gross European Product by means of surveys, we have concentrated on a training-related approach. In doing so we made use of the fact that the national regulations in the field of surveying pick up the people from the end of their training and accompany them through their working life. Also the special geodetic know-how is easy to demarcate from other professional areas – it "keeps people together". The differences between the forms of economic organisation in the individual countries: Continental, Anglo-Saxon, South-European, Central and Eastern Europe, are illustrated in the "Office Model". After all, such a vocational training-related model is time-based and is affected by the enormous upheavals of a political nature and yet it has been shown that that, for example, the Office Model selected here reproduces the situation well. After all, the development of the profession in the Continental core countries of the EU and Switzerland was adequately stable from 1972 until 2000, i.e. the range of university courses offered was accepted by state and private demand. This is shown in particular by the data for the Federal Republic of Germany and the Liberal Profession of the Public Appointed Surveying Engineer.

It is not surprising that the data from those countries are "leaner", in which the connection between training and professional qualification is less firmly specified. Altogether, though, a picture of Europe of informative value is obtained.

Following this up, a question of interest is why the results from the individual countries are so different? Publicly kept registers for land provide a wide market basis on which people of all training levels work. In those countries in which the land register and cadaster enjoys public faith, a strictly regulated, highly trained professional group is required as the core. If then the consistent data material prepared and managed by it is exploited on a "market-driven" basis, mainly in the form of the liberal appointed profession, these registers develop their added value in the economy. That applies to the housing cadaster in Italy as well as to the real estate cadasters in Germany. However, the supply of and demand for education and training influence each other, too, and, after all, what applies is, the better the starting qualifications are, the broader the economic effect of the overall professional group is.

Thanks are due to the management of the CLGE as well as to my comrades-in-arms, Emmanuel Ouranos and Martina Busch, but also to my wife Ute, who identified and extracted the data on European universities and other institutions of higher education from the Internet.

Mülheim an der Ruhr July 2003

Otmar Schuster
President of Geometer Europas

[1] GEP Gross European Product

The Market Report

describing the contribution of cadastre and surveying to the European Economy

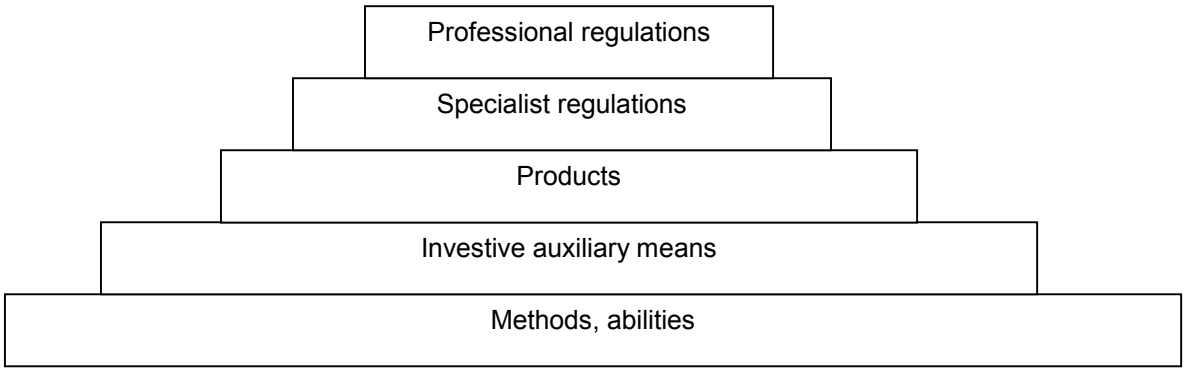
By Otmar Schuster, Emmanuel Ouranos, Martina Busch and Ernst Höflinger (†)

Aim of the market report

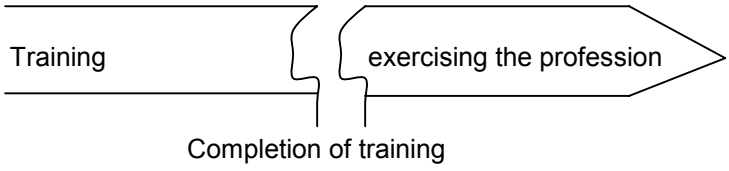
The aim of the market report is to describe the total economic activity which the economic field geodesy contributes towards the European gross national product as a sum of the national gross national products. This description serves to filter out the special requirements of this economic field and to have it taken into consideration in European politics.

Limiting the field

As the representatives of the profession are active in the different sectors of public authorities and private economy it is difficult to identify their contribution as a consistent economic field in the official statistics. The professional field is described as geodesy, land surveying and geoinformation as well as geomatics whereby numerous sub-divisions such as photogrammetry, remote sensing, cartography and land management are also included. In this report this economic field will be described as the "**Geodesy field**" and the individual gainfully employed person shall be referred to as "**geodetic professional**" or in short "**SG**". Within the different European countries, the individual divisions have been developed and trained in different ways, however, the methods are the same throughout Europe.



Furthermore, it is the investive auxiliary means, the products, the specialist regulations and the professional regulations which result in the limitations of the specialist area in the eyes of people. However, these are of no help when trying to ascertain economic limits. The basic idea of this report is based on the fact that those employed in this field have passed through all the relevant schools at different levels and have then contributed to the economy for 30 years or more.



In Europe in general and especially in central Europe, the specialist qualifications are the entrance requirements to performing this specific profession. This is frequently coupled with statutory authorizations which results in a clearly specified job description and area for those starting out in this profession. In some countries there are regulated self employed professions, which are based on a further formation and examination. These candidates are gainfully employed during the preparation time and in so far treated in this report as graduates of the universities. Of course their contribution in the economic field of Geodesy means a significant part. That is why the supplement of this report gives some information to the German scenario.

So the report deals with the professional starters as

- Graduates (incl. Engineers from high schools)
- Technicians, draftsmen
- Management personnel

This report attempts to describe and sum up the value adding phase of exercising this profession based on this fact. This way, one avoids the difficulty of having to describe and evaluate the different ways of exercising this profession and their contents. Naturally the authors are aware of the fact that the objects of the value added in the individual European countries have very different priorities even if they are based on the same methods, e.g.:

- The Italian Geometra earn their living with architecture and site supervision.
- The French colleagues earn their living basically by creating property boundaries and with topography as well all sorts of land management etc.
- The English land surveyors earn their living basically with topography and construction management [2].
- The German land surveyors earn their living with real estate cadastral surveys, construction management, regulations concerning agricultural land, real estate assessment, cartography etc.
- So do the Austrian collegues
- The land surveyors in the old Eastern block countries were occupied with mainly technical tasks until 1990, but were also very close to the state and involved in security tasks. Real estate as an economic merchandise did not exist. However, the picture has started to change since that time…..

The selected approach goes beyond the above and identifies those gainfully employed in this field in accordance with their successful training.

[2] All types of „surveyor“ as a whole cover the tasks of the publicly appointed land surveyors and the Consulting Engineers in Germany

Training Institutes Questioned

During the course of this investigation, the following training institutions were questioned:

Institution – Matrix

Country	University / college of higher education
Austria	Universität für Bodenkultur Wien, BOKU (University for Ground Culture, Vien na)
	Vienna Technical University
	Graz Technical University
	Universität Innsbruck (University of Innsbruck)
Belgium	Hogeschool Antwerp; IWT Industriele Wetenschappen en Technologie
	Freie Universität Brüssel (Free University of Brussels), Centre for Cartogra-phy and GIS
	Rijksuniversiteit Gent
	K.I. Hogeschool De Nayer
	Katholieke Hogeschool Sint Lievens
	B.M.E. Hogeschool
	K.I. Hogeschool West Vlaanderen
	Institut Supérieur Industriel ECAM
	Institut Supérieur Industriel Mons
	Institut Supérieur Industriel Liège
	Université de Liège
Bulgaria	University of Architecture, Civil Engineering and Geodesy, ACE&G- Sofia
	University of Mining and Geology M&G – Sofia
	Higher Military School of Transport "Todor Kableshkov"
Croatia	University of Zagreb
Czech Republic	Czech T U in Prague
	Charles University in Prague
	T U of Brno – VUT
	University of West Bohemia
	Masaryk University in Brno
	Military Academy in Brno
	University of South Bohemia
	T U Ostrava – VSB;
	Military Academy in Brno
Denmark	Aalborg University
Finland	Helsinki University of Technology
	Espoo-Vantaa Institute of Technology
	Mikkeli Poytechnic
	Rovaniemi Polytechnic
	svenska yrkehögskolan
France	Conservatoire National des Arts et Metiers CNAM
	EGST - Le Mans
	ENSAIS – Strasbourg
	ESTP – Paris

Germany	University of Bonn
	T U Dresden
	University of Hanover
	University of Karlsruhe
	University of Stuttgart
	University of Darmstadt
	T U Munich
	T U Berlin
	UAS[3] Munich
	UAS Oldenburg
	UAS Würzburg
	University of Rostock
	Fachhochschule Anhalt
	UAS Bochum
	UASHamburg
	UAS Karlsruhe
	UAS Mainz
	UAS Neubrandenburg
	UAS Stuttgart
	UAS Dresden
Greece	National T U Athens
	Aristotle Univ. Thessaloniki
Hungary	Budapest University of Technology and Economics
Ireland	Trinity College Dublin
	Dublin I T (Inst. of Technology)
Italy	University of Rome
	Politecnico di Torino
	Politecnico Ing/Arch of Milan*
Luxembourg	
Netherland	T U Delft
	Hogeschool Utrecht
	Amsterdam Polytechnic
Norway	Agr. University of Norway
	Technical University of Norway, NTNU Trondheim
Poland	Agr. University of Cracow
	Mining Academy of Cracow
	Politechnika Slaska
	Warmia & Mazuria Univ.
	Warsaw U T
	Agr. University of Wroclaw
Portugal	University of Coimbra
	University of Lisboa
	Porto University
	Polytechnical Institute da Guarda
	Polytechnic Inst. of Beja
	Polytechnik Inst. Of Faro
Romania	Technical University of Civil Engineering, Bukarest, UTCB
Slovakia	Slovak T U of Bratislava
	T U of Kosice
	University of Zilina

[3] UAS = University of Applied Sciences

Spain	Universidad Politecnica de Madrid
	Universidad de Madrid, UCM
	Polytechnical University of Valencia, School of Geodesy, Cartography and Topography Engineering
	University of Jaén
	T U Cataluna
	University of Salamanca
	University of Extremadura
	University del Pais Vasco
	University of Oviedo
	University de Las Palmas
	University of Jaén
	Univ. de Alcalá de Henares*
Sweden	Royal U T Stockholm
	University of Lund
	University of Luleá
	University of Luleá (Kiruna)
	University of Gavle
	University of Trollhaettan
	University of Helsingborg
	University of Karlstad
Switzerland	Federal I T Zurich - ETH
	Federal I T Lausanne - EPFL
	Vaud, Yverdon-les-Bains
	FHBB Basel
United Kingdom	Anglia Polytechnic University/Department of the Built Environment
	University of Bradford
	Cambridge University/Department of Land Economy
	City University Business School/Department of Property Valuation and Management
	Oxford University
	De Montfort University/Dept of Land Management
	Dundee Institute of Technology
	University of Glasgow
	Harper Adams Agricultural College/Land and Farm Management Unit
	Heriot-Watt University Edinburgh
	Kingston University/Faculty of Design, School of Surveying
	University of Leeds
	University of Liverpool
	Loughborough University of Technology
	North Lincolnshire College/Dept. of Building and Civil Engineering
	Nottingham Polytechnic/Dept of Civil and Structural Engineering
	Nottingham Trent University
	University of Portsmouth
	Royal Agricultural College/School of Rural Economy and Land Management
	Royal School of Military Survey/Geographic Engineer Group
	School of Military Survey/
	Sheffield Hallam University/School of Urban and Regional Studies
	South Bank University/School of Land Management and Urban Policy
	Stockport College of Further and Higher Education/Faculty of Building and Civil Engineering

	Stoke on Trent College/Dept of Surveying
	The College of Estate Management/Postal Course Division
	The Robert Gordon University/School of Surveying
	The University of Brighton/Dept of Building
	The University of Nottingham/Institute of Engineering Surveying and Space Geodesy
	The University of Westminster/Faculty of Environment
	The University of Westminster
	University College London/Department of Geography
	University College London, UCL
	University College Swansea
	University of Aberdeen
	University of Central England in Birmingham/Faculty of the Built Environment
	University of Central England in Birmingham/School of Estate Management
	University of Central Lancashire/Dept. of the Built Environment
	University of East London/Department of Estate Management
	University of Glamorgan/Dept. of Science and Chemical Engineering
	University of Glamorgan/Dept. of Property and Development Studies
	University of Glasgow/Dept of Geography & Topographic Science
	University of Newcastle Upon Tyne/Department of Geomatics
	University of Northumbria at Newcastle/Dept of the Built Environment
	University of Paisley/Dept of Land Economics
	University of Plymouth/Institute of Marine Studies
	University of Plymouth/Seale Hayne Faculty
	University of Reading/Dept. of Construction Management & Engineering
	University of Reading/Dept of Land Management & Development
	University of Salford/Dept of Surveying
	University of the West of England, Bristol/Faculty of the Built Environment
	University of Ulster/Dept. of Surveying
	University of Wolverhampton/School of Construction, Engineering & Technology
	Wakefield College/Construction and Civil Engineering Sector
	Vauxhall College/Faculty of Business Computting & Management

Additional figures have been contributed by other sources, these have been used for control purposes or as an initial approximation in the case of missing figures. It also has been shown, that some of the named universities / colleges / high schools / “Fachhochschulen” do not teach “Geodesy” as a full professional basis, so that the sum of universities /…/ for some individual countries had to be reduced.
The surveying technicians / draftsmen or workers who are trained centrally, decentrally and dually, are a chapter for themselves. For example, for Germany, projections from a number of federal states were made, the results of which could be improved throughout the course of this study.

The slow return of data has shown that work is still required to improve this report over a long period of time in order to achieve as good a description as possible concerning the contribution of our field of work to the economy.

The authors were only able to find out a very small number of reasons why it was so difficult to obtain information, but the following reasons are included:

- Fear of publication from the training institutions
- No identification of the office responsible
- Missing, specific statistics at the training institutions

However, the authors are convinced that the data available can still be improved.
We thank all colleagues of the CLGE and GE – bodies and friends outside of these institutions who have contributed to the results.

The Office Model

The value added, i.e. the contribution to the gross national product takes place in small groups which contribute towards the product or the service. The technicians, engineers are surrounded by commercial and other auxiliary personnel (from measurement to evaluation, secretary and salary calculation personnel) which has to be included in the value added component. This Office Model should describe the working group both in the public sector as well as in the engineering offices and large companies.

The first approximation of the selected model is

D + T + (D + T)*0.15 = Office

D = number of graduates (bac + 4 and bac + 5)
T = number of technicians, draftsmen, qualified helpers

This model can have different distinctive features in different countries. It is not to be made final for the individual countries until all the data is available, but up to now it has been proven to adapt the real world very well in many countries.

Using the states with relatively good data available, the number of technicians per engineer has been set at 4 here. This figure however, will also be checked critically at a later date again. The number of technicians comprises the draftsmen and qualified helpers.

The more detailed information such as the proportion of women in geodesy / land surveying has been excluded as there is no original data available for this aspect.

The Decline Model

It is obvious that the graduates of an institution have not all remained in their profession permanently as individual circumstances did not permit this or some of them died. This part of the decline was taken into consideration by limiting the period in the profession to 29 years (1972 – 2000). Another effect, the promotion effect, also decreases the numbers, especially those of technicians and has been set at 20% for each year when calculating the number of technicians. The time the graduates need for additional formation for i.e. the examination as Ingenieurkonsulent in Austria or the time needed to become a “patentierter Ingenieurgeometer” in Suisse or to win the “Grosse Staatsprüfung” in Germany do not play a role here, because the candidates are working as employees during that time.

Disposable Data in October 2003

The situation concerning the disposable data in October 2003 is shown in the short description and the table below:

Austria

you can study at	3 universities / high schools (both further on called "FP[4]")
quality of the dates:	reliable number of graduates only for one FP for 1991 - 2001 estimated number of graduates for 1972 – 1990 and the other FP: 10 per year and FP
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Belgium

you can study at	11 FP
quality of the dates:	professionally estimated nationwide number of graduates from 1972 to 1991 reliable nationwide number of graduates from 1992 to 2001
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Bulgaria

you can study at	3 FP
quality of the dates:	estimated number of graduates: 10 per year and FP
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Croatia

you can study at	one FP
quality of the dates:	reliable number of graduates for the FP
office model:	D + T + (D + T)*0.5 = Office (with 2 technicians per engineer)

Czech Republic

you can study at	8 FP
quality of the dates:	reliable number of graduates for all FP
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Denmark

you can study at	one FP
quality of the dates:	reliable number of graduates for the FP
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Finland

you can study at	5 FP
quality of the dates:	professionally estimated nationwide number of graduates for 1972 - 1985 reliable nationwide number of graduates for 1986 - 2001
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

[4] FP = place of formation for master level (University, High school, "Fachhochschule", College)

France

you can study at	3 FP
quality of the dates:	reliable number of graduates for all FP
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Germany

you can study at	19 FP
quality of the dates:	reliable nationwide number of graduates
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Greece

you can study at	two FP
quality of the dates:	reliable nationwide number of graduates
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Hungary

you can study at	one FP
quality of the dates:	estimated number of graduates for 1972 - 1987: 10 per year reliable number of graduates from 1988 to 2001
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Ireland

you can study at	two FP
quality of the dates:	reliable number of graduates for all FP reliable number of technicians from 1972 to 1979
office model:	D + T + (D + T)*0.15 = Office (with reliable number of technicians from 1972 – 1979 and with 4 technicians per engineer from 1980- 2001)

Italy

you can study at	3 FP
quality of the dates:	estimated number of graduates: 5 per year and FP plus reliable number of new enrollment of the “Profes-sional Pension Fund” from 1982 to 2001
office model:	D + T + (D + T)*0.15 = Office consideration of the new enrolment in the number of technicians

Luxembourg
no FP

Netherlands

you can study at	3 FP
quality of the dates:	reliable number of graduates from one FP and estimated number of graduates for the other two FP: 10 per year and FP
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Norway

you can study at	two FP
quality of the dates:	reliable number of graduates for all FP
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Poland

you can study at	6 FP
quality of the dates:	estimated number of graduates for all FP: 10 per year and FP
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Portugal

you can study at	6 FP
quality of the dates:	estimated number of graduates for all FP: 10 per year and FP
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Romania

you can study at	3 FP
quality of the dates:	professionally estimated number of graduates for all FP
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Slovakia

you can study at	3 FP
quality of the dates:	reliable number of graduates for all FP
office model:	D + T + (D + T)*0.15 = Office (with 4 technicians per engineer)

Spain

you can study at	12 FP
quality of the dates:	reliable number of graduates for only one FP, estimated number of graduates for all other FP: 10 per year and FP
office model:	D + T + (D + T)*0.15 = Office (with only **one** technicians per engineer)

Sweden

you can study at	8 FP
quality of the dates:	professionally estimated nationwide number of graduates
office model:	D + T + (D + T)*0.15 = Office (with only 4 technicians per engineer)

Switzerland

you can study at	4 FP
quality of the dates:	reliable number of graduates for all FP,
office model:	D + T + (D + T)*0.15 = Office (with only 4 technicians per engineer)

United Kingdom

you can study at	15 FP
quality of the dates:	Estimated nationwide number of graduates
office model:	D + T + (D + T)*0.15 = Office (with only **one** technicians per engineer)

Quality of the data evaluated for university graduates

country		reliable information from universities	reliable information for the office model
Austria	A	+	+
Belgium	B	++ / since 1992 +++	++ / since 1992 +++
Bulgaria	BG	+	+
Croatia	HR	+++	+++
Czech Republic	CZ	+++	+++
Denmark	DK	+++	+++
Finland	FIN	++ / since 1985 +++	++ / since 1985 +++
France	F	+++	+++
Germany	D	+++	+++
Greece	GR	+++	+++
Hungary	H	+ / since 1988 +++	+ / since 1988 +++
Ireland	IRL	+++	+++
Italy	I	+	+ / since 1982 +++
Netherlands	NL	++	++
Norway	N	+++	+++
Poland	PL	+	+
Portugal	P	+	+
Romania	RO	++	++
Slovakia	SK	+++	+++
Spain	ES	+	+
Sweden	S	++	++
Switzerland	CH	+++	+++
United Kingdom	GB	++	++

(**+++** reliable number of graduates ; **++** professionally estimated number of graduates, **+** estimated number of graduates)

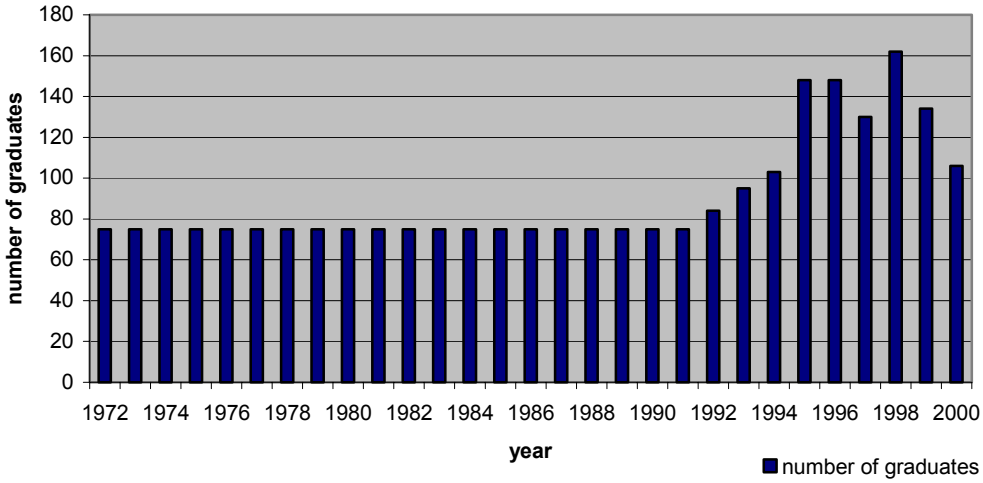
In addition, in the case of those countries showing an uncertain data situation, we have assumed that the training institutions have “brought forth“ an average of 10 graduates per year. We have already seen that this assumption is sometimes too optimistic, however, a more suitable assumption will be taken into consideration in the next calculation stage.

When collecting the data, more emphasis must be placed on recording the technicians or technical draftsmen as they still represent a special uncertainty factor at the moment.

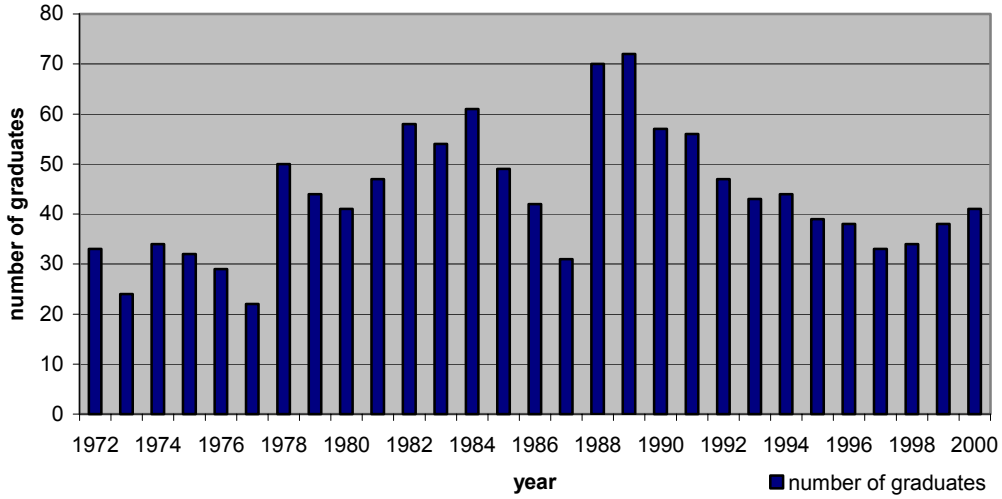
The following graphs take the data situation into account to the extent that the coloured labels identify the respective reliability of the result.

7. The absolute numbers of the professional starters 1972 to 2000

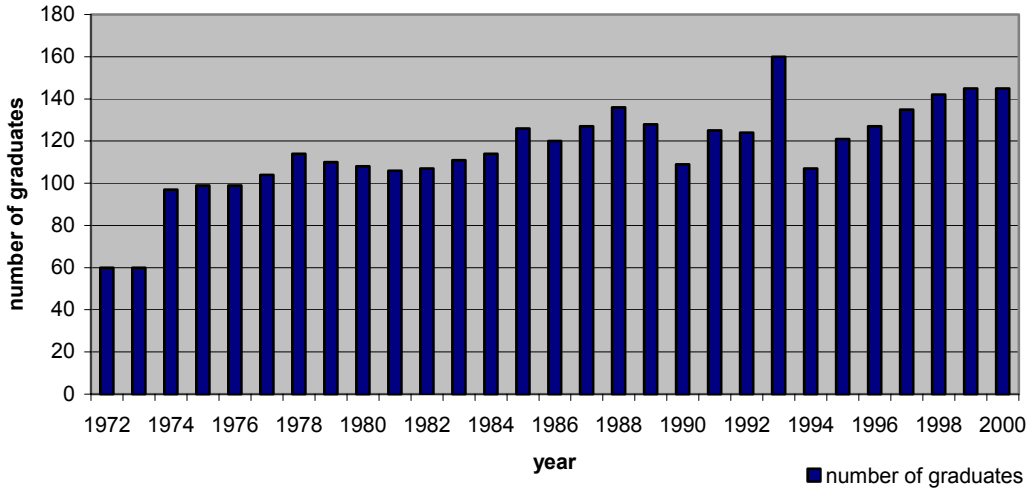
Graph 1 to 13 show the development of the number of graduates in those countries for which we have reliable data from universities and high schools. They also show the causes for the sometimes surprising results very clearly. The number of graduates in the different countries varies greatly.



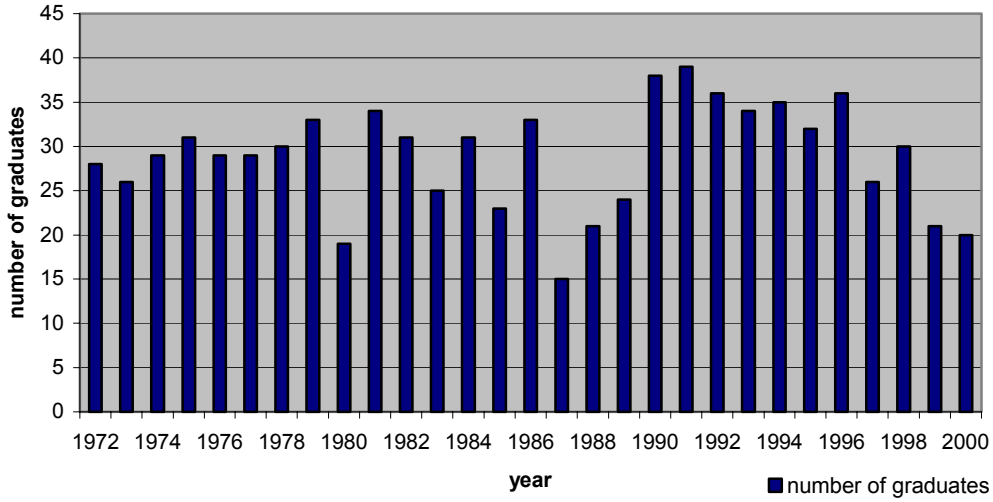
Graph 1: Absolute number of the graduates per year from 1972 to 2000 in Belgium



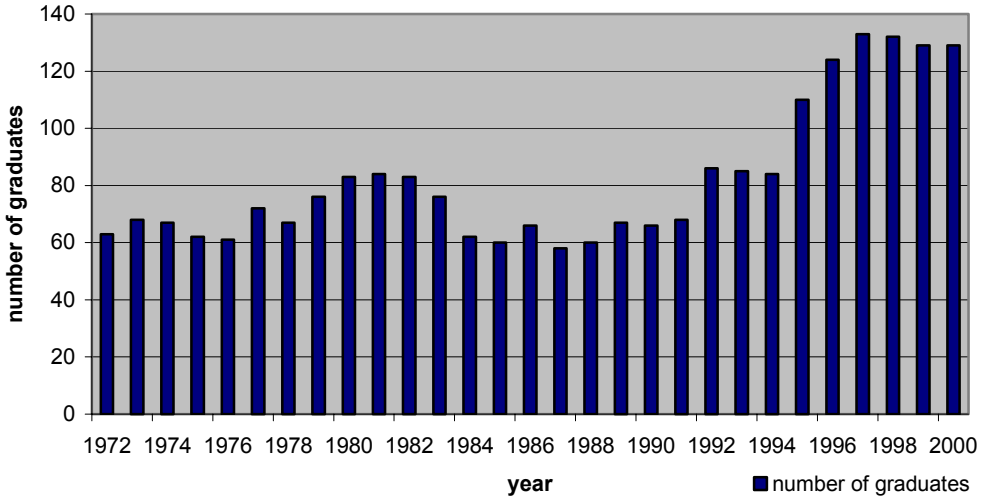
Graph 2: Absolute number of the graduates per year from 1972 to 2000 in Croatia



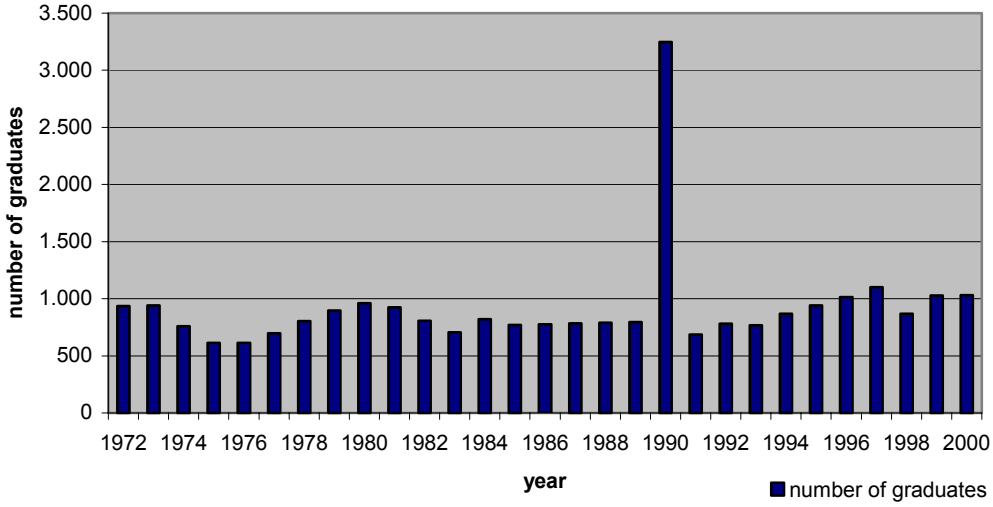
Graph 3: Absolute number of the graduates per year from 1972 to 2000 in Czech Republic



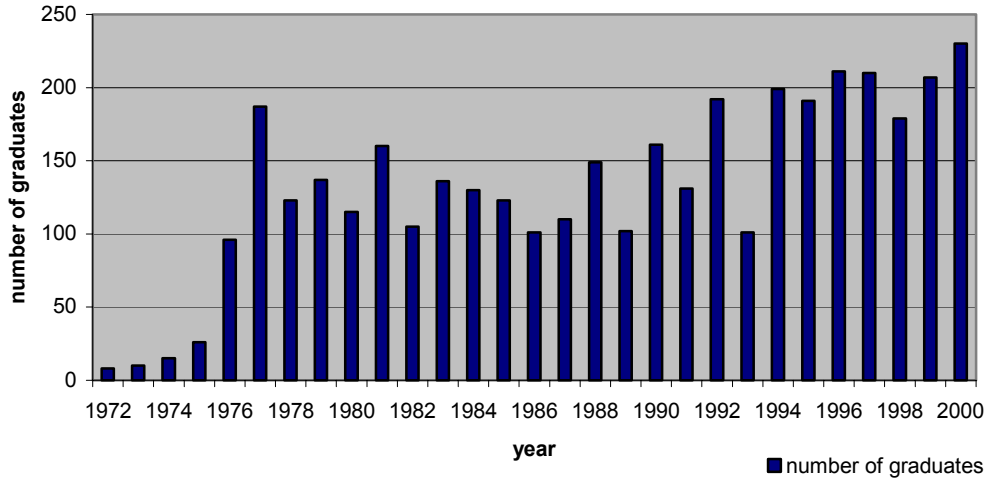
Graph 4: Absolute number of the graduates per year from 1972 to 2000 in Denmark



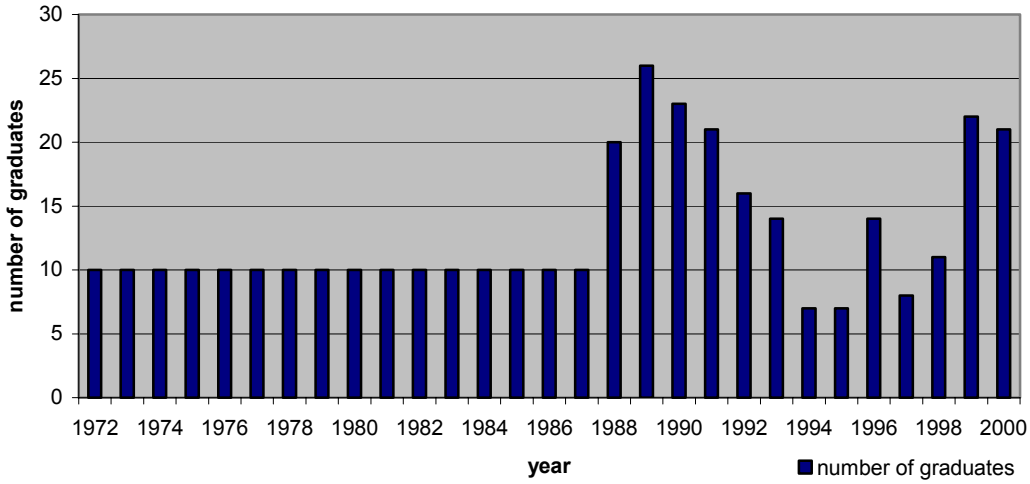
Graph 5: Absolute number of the graduates per year from 1972 to 2000 in France



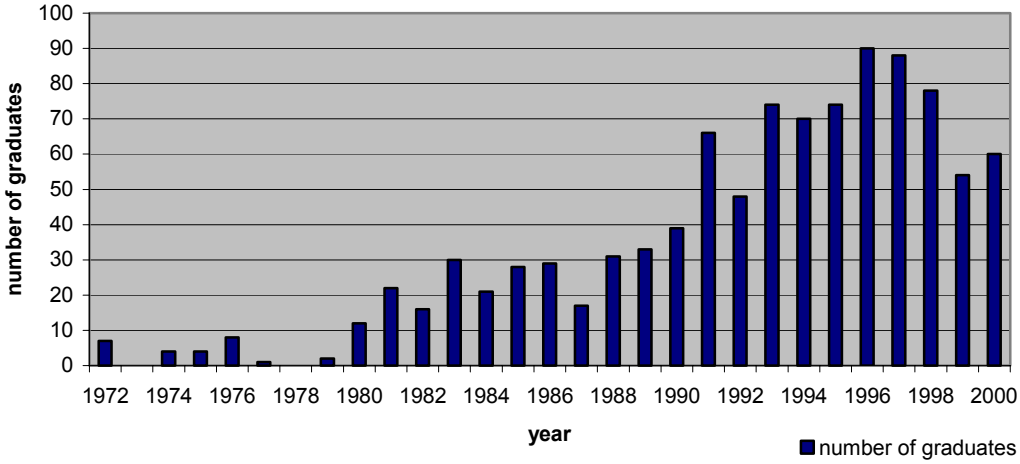
Graph 6: Absolute number of the graduates per year from 1972 to 2000 in Germany



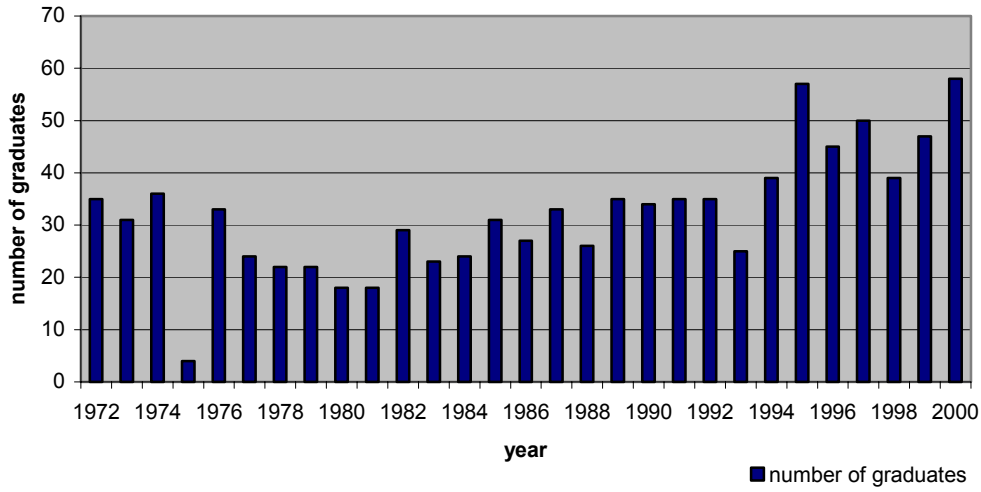
Graph 7: Absolute number of the graduates per year from 1972 to 2000 in Greece



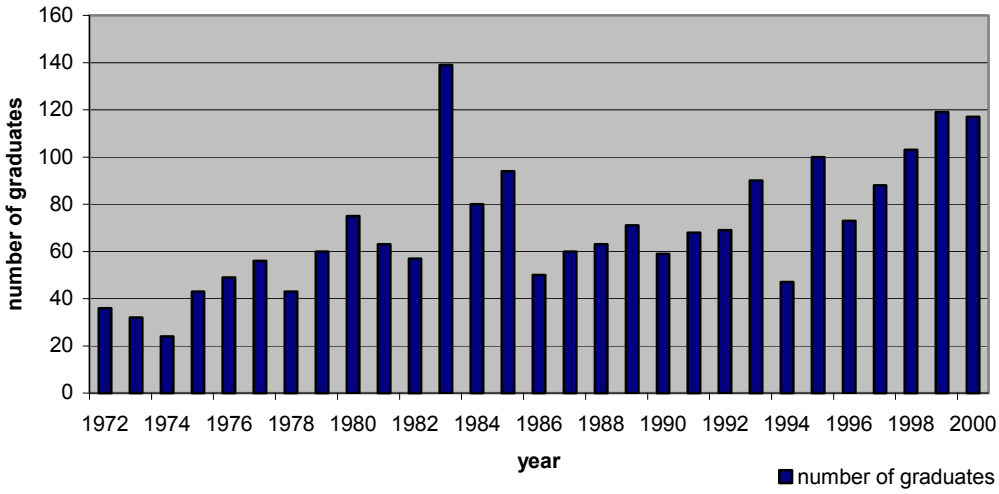
Graph 8: Absolute number of the graduates per year from 1972 to 2000 in Hungary



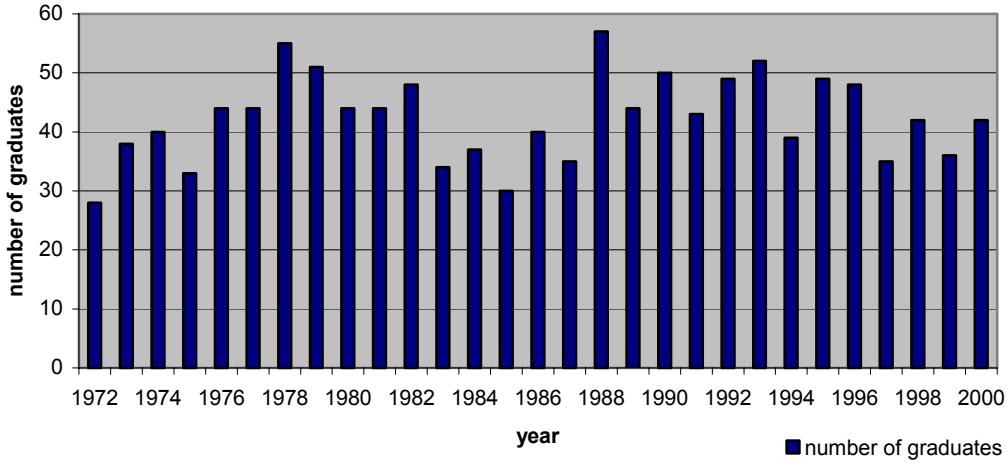
Graph 9: Absolute number of the graduates per year from 1972 to 2000 in Ireland



Graph 10: Absolute number of the graduates per year from 1972 to 2000 in Norway

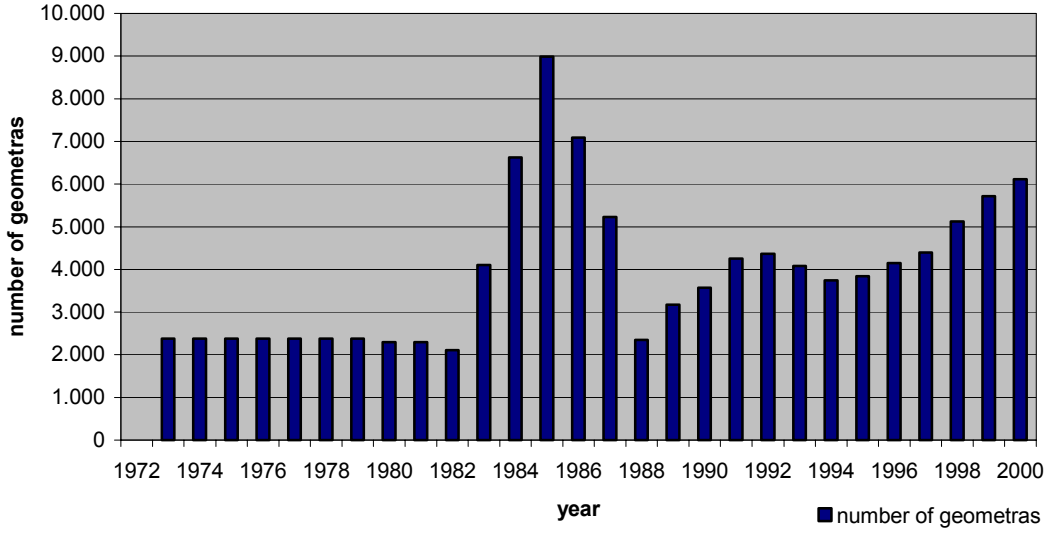


Graph 11: Absolute number of the graduates per year from 1972 to 2000 in Slovakia



Graph 12: Absolute number of the graduates per year from 1972 to 2000 in Switzerland

and for the special model in Italy:



Graph 13: Number of geometras per year from 1972 to 2000 in Italy

The absolute numbers are as shown quite different from country to country. But some influences can be assumed as most important:

- the need of geodetic professionals by replacement of pensioned or withdrawn people and
- the change of Business activity in the construction area.

There are also other influences likely to take place as

- the change in the transition countries or
- the change of the pension conditions in Italy,
- the German reunification, which let the figures of newcomers[5] swell up on a sudden and brought an impressive need of geodetic professionals,
- the influence of the technological transition to Geomatics, which encourages a lot of young people to study that branch of study,
- cadastral reforms like in Sweden

or at last missing or insufficient data.

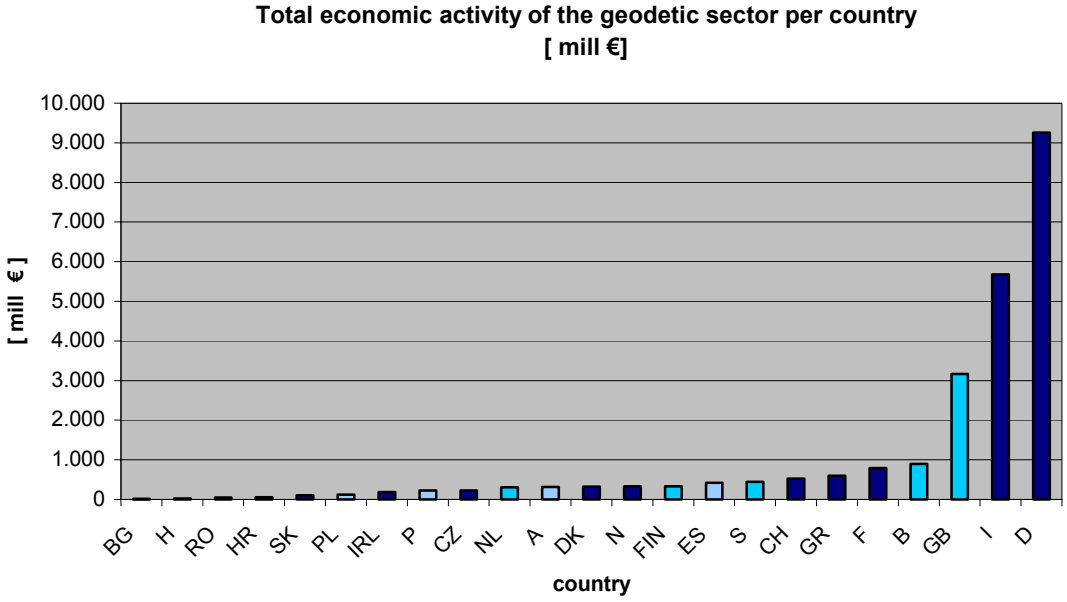
[5] The newcomers – old and young – mean a break in the model but this has been accepted in view of the limited time frame and the professionally estimated character of these new states data.

The Proportion of Geodesy in the Gross National Product (GNP)

The justified assumption has been made that on average a person gainfully employed in the field of geodesy will contribute as much to the gross national product as any other gainfully employed person in a country. This statement was based on a linear model according to which older persons contribute more and younger persons contribute less to the GNP than the amount determined by EUROSTAT.
However, one thing which has not been taken into consideration in the calculations is the fact that those gainfully employed in the field of geodesy / land surveying earn on average more than the average gainfully employed person. This fact is known from a number of individual investigations.

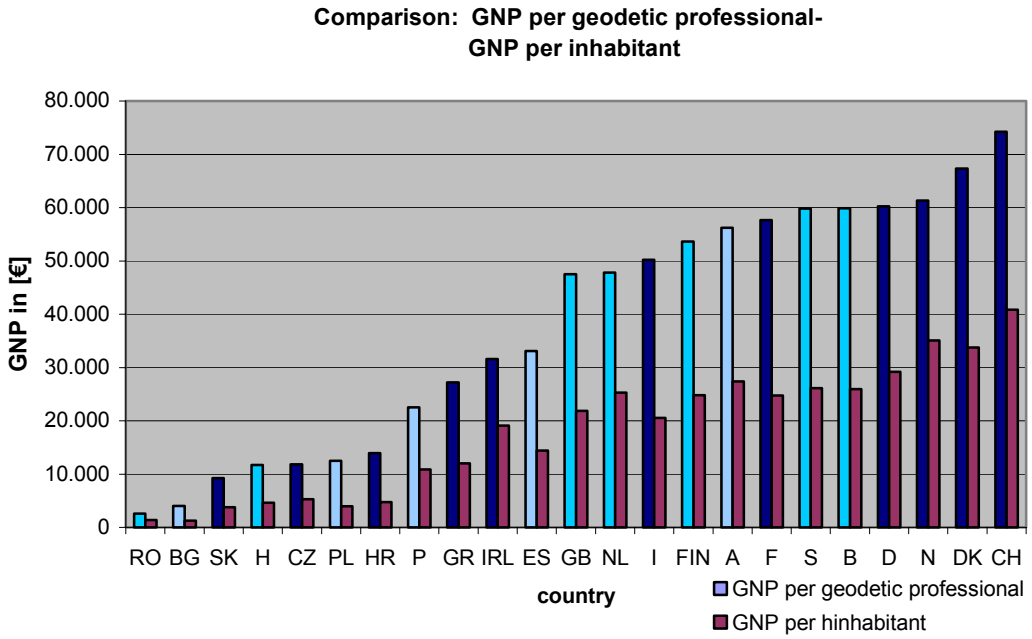
Based on this fact, the data currently available provides a surprising picture of the predominance of the German market volume (**Graph 14**).
In the following graphs different blue-tones are used to classify the data-quality.

- dark blue is used for reliable information,
- medium blue is used for professionally estimated information and
- light blue for estimate information.

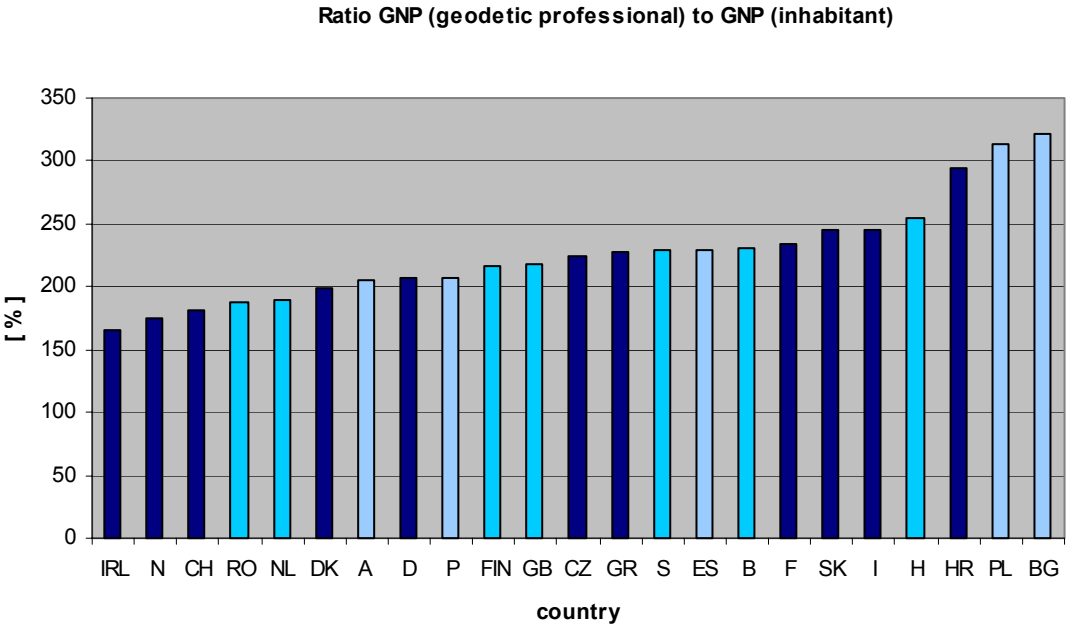


Graph 14: Total economic activity of the geodetic sector

Graph 15 and 16 shows the relationship between the contribution made by gainfully employed persons in the Geodetic economic field compared to that made by the contribution of an inhabitant. If general unemployment is not very high, the relationship in the different countries within Europe is approximately equal.

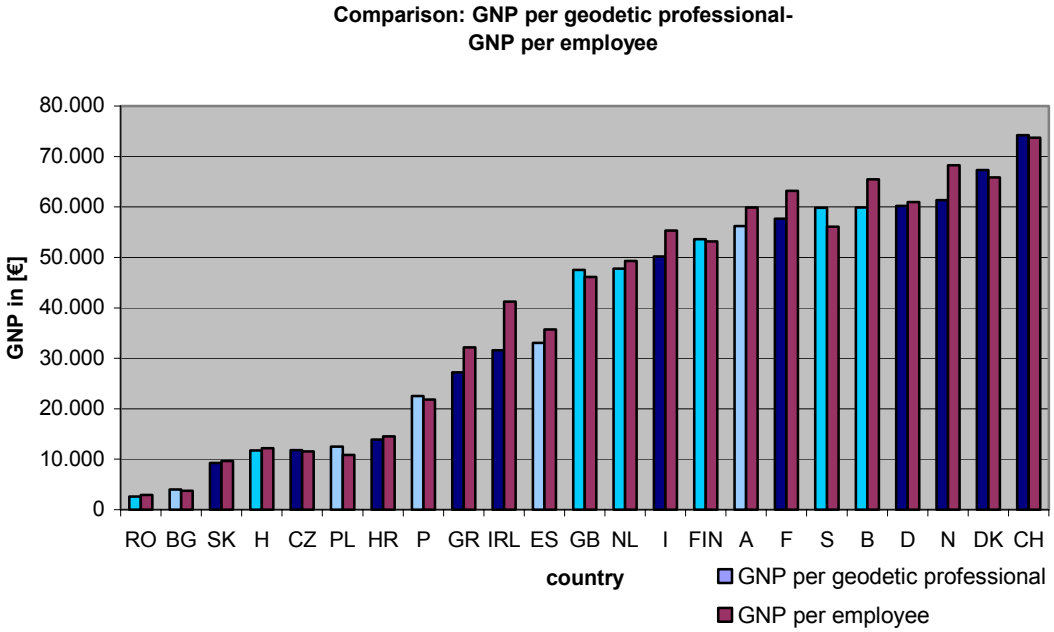


Graph 15: Comparison: GNP per geodetic professional / GNP per inhabitant

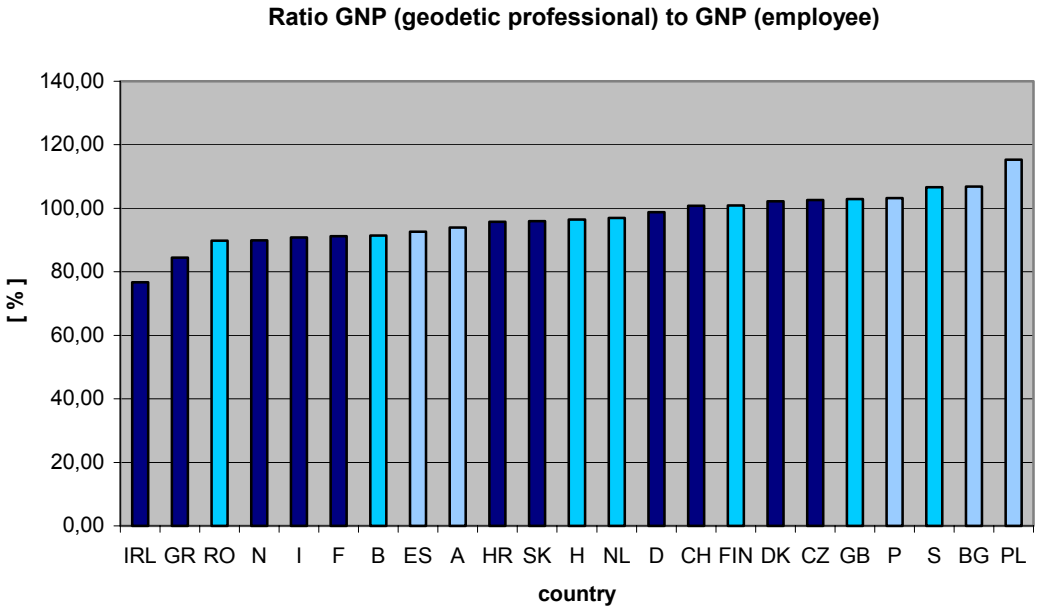


Graph 16: Ratio GNP (geodetic professional) to GNP (inhabitant)

Graph. 17 and 18 shows the absolute amounts of the contribution made by gainfully employed persons in the field of land surveying and for comparative purposes, the contribution made by the average gainfully employed person. The slight deviations of Factor 1 or 100% are a result of the relationships between the Graphs in the individual age groups. These will have to be dealt with later by refining the model (value added related to age group).

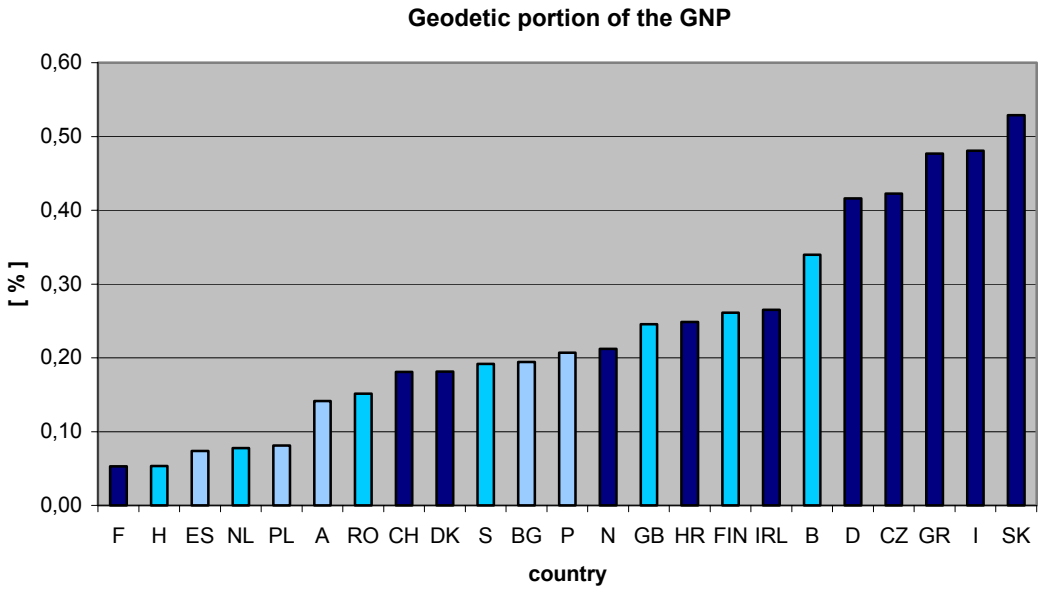


Graph 17: Comparison: GNP per geodetic professional / GNP per employee



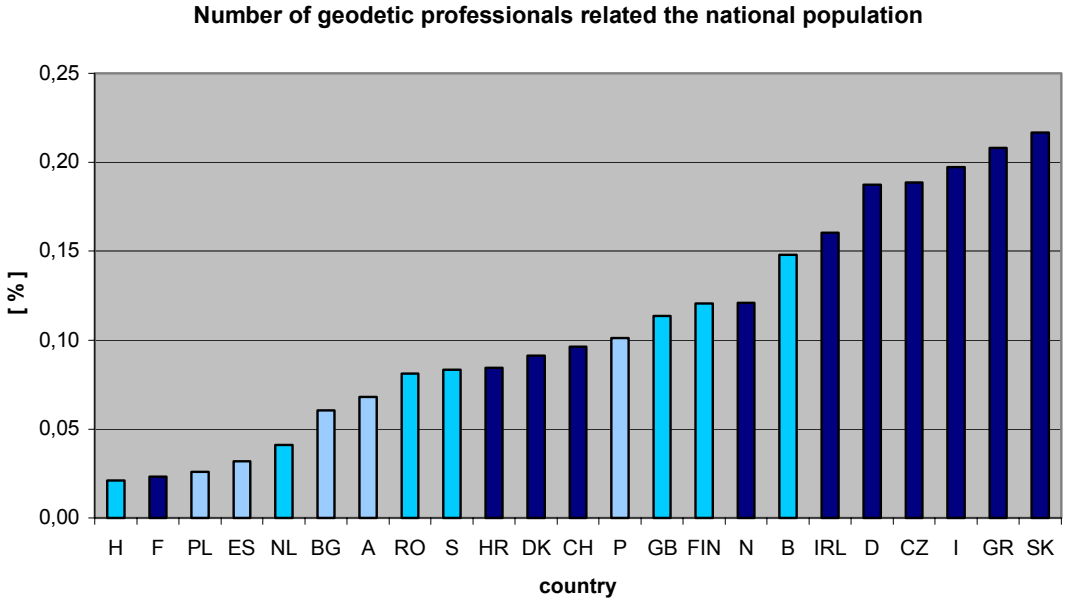
Graph 18: Ratio GNP (geodetic professional) to GNP (employee)

Graph 19 shows the proportion the field geodesy contributes to the gross national product of the respective countries. This value lies between 0.02 and 0.53 %. Here you can see what tasks the state has assigned to the land surveying field. A clear distinction can be seen between the different groups according to, for example, real estate land surveying or historical development. Due to the sometimes unreliable nature of the data(light blue colour), the ranking can still change.



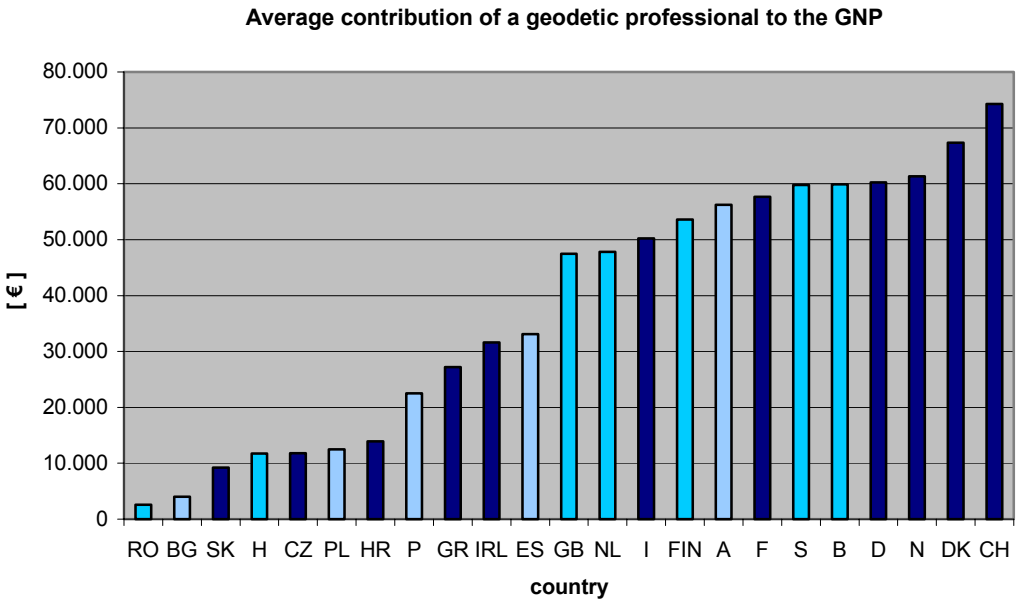
Graph 19: Geodetic portion of the GNP

The grouping of countries according to economic history and economic predominance of the field of geodesy is shown even more clearly in **Graph 20**. The predominance and therefore also extent to how well the field of geodesy is known, is far greater in many of the small countries than in the large countries.

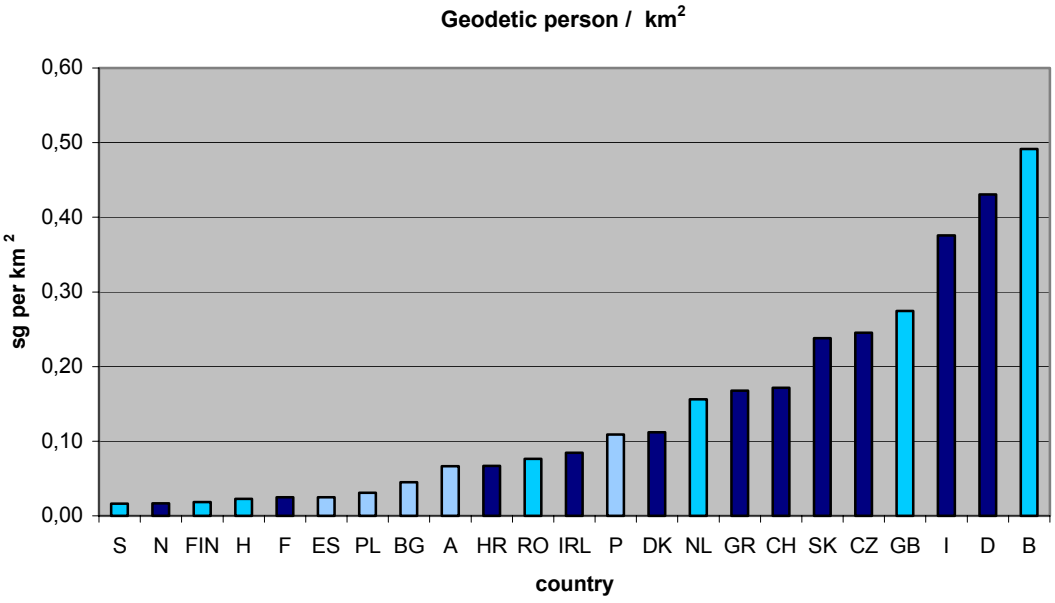


Graph 20: Number of geodetic professionals related the national population

The absolute contribution of a person gainfully employed in the field to the gross national product can be divided into a number of groups. However, they also indicate the difference which will require an economic balancing out after the 10 states have joined the European Union (**Graph 21**).



Graph 21: Average contribution of a geodetic professional to the GNP



Graph 22: Geodetic person / km²

Conclusions

There are some conclusions to be taken:

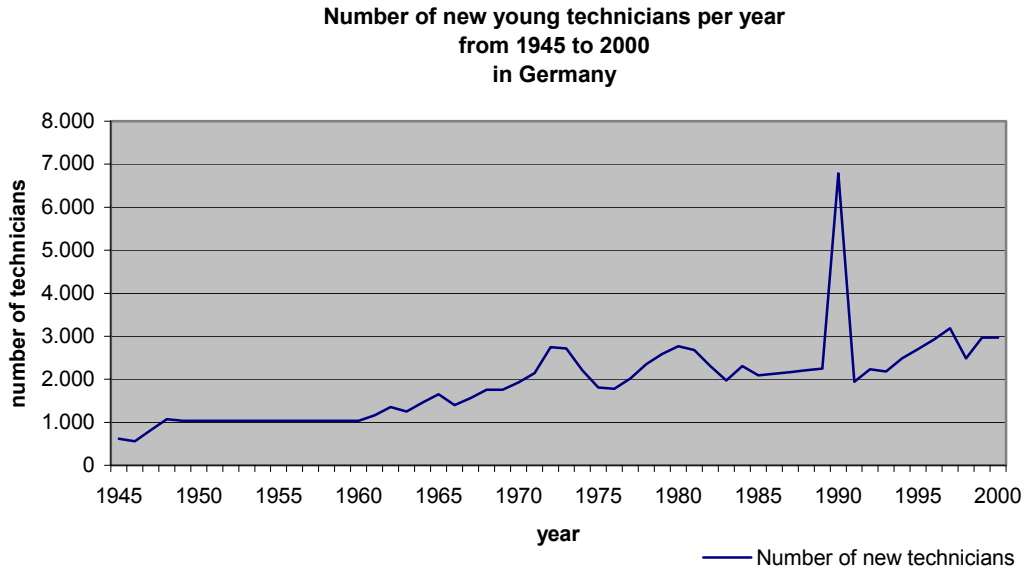
a) The economic role of the Geodesy is relative and in absolute figures very different from country to country. The reasons for that are mentioned above.
b) The contribution to the Gross European Product is about

24.375.795.661 € and comprises **526.095 Professionals**.

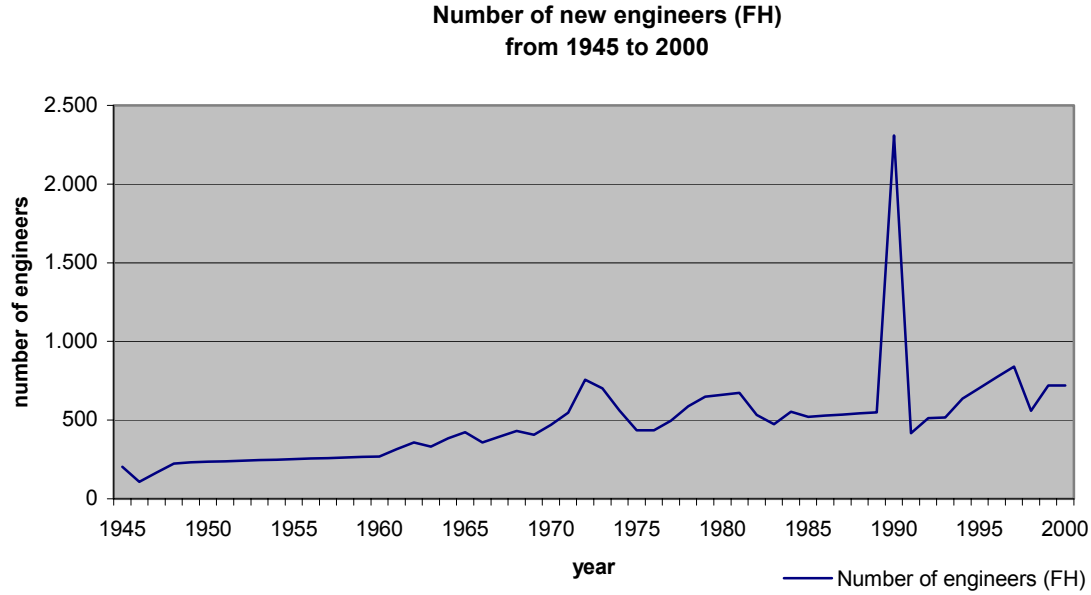
c) The more the economy of a country is dealing with results based on geodetic work the bigger is the geodetic community.
d) The size and nature of the authorities seems to play a big role. This can be especially seen in the countries in transition.
e) Legal authorities bring more stability than market oriented economy.
f) The results seem to describe a period of stability in the western countries, whereas the countries in transition are obviously in a different stage of change.
g) The role of the geodetic science (universities) can be assumed as very significant for the identification and size of the geodetic field on top of teaching technology at various levels.
h) A promotion pyramid with a broad basis means good stability instead of an overhang of graduates.

Attachment: The contribution of the self employed regulated professions

This report does not deal with legal and economic conditions inside the countries for the different groups of professionals. But it seems to be important for the unification process in Europe to analyse this situation in the European countries. This is a broad field of research, which should be done to steer the European unification process[6].

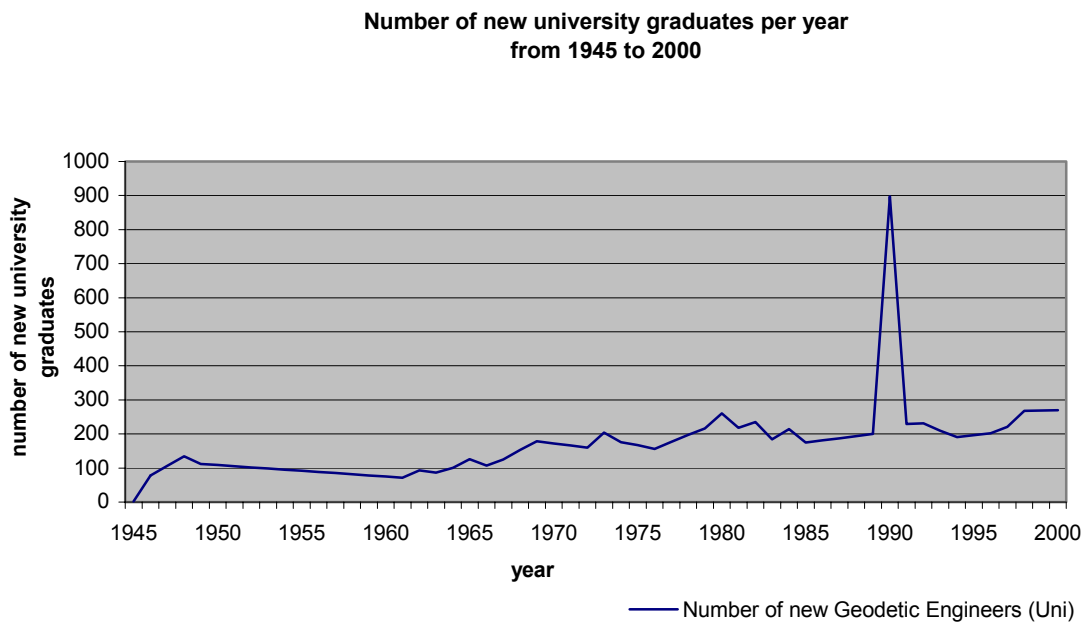


Graph 23: Number of new young technicians

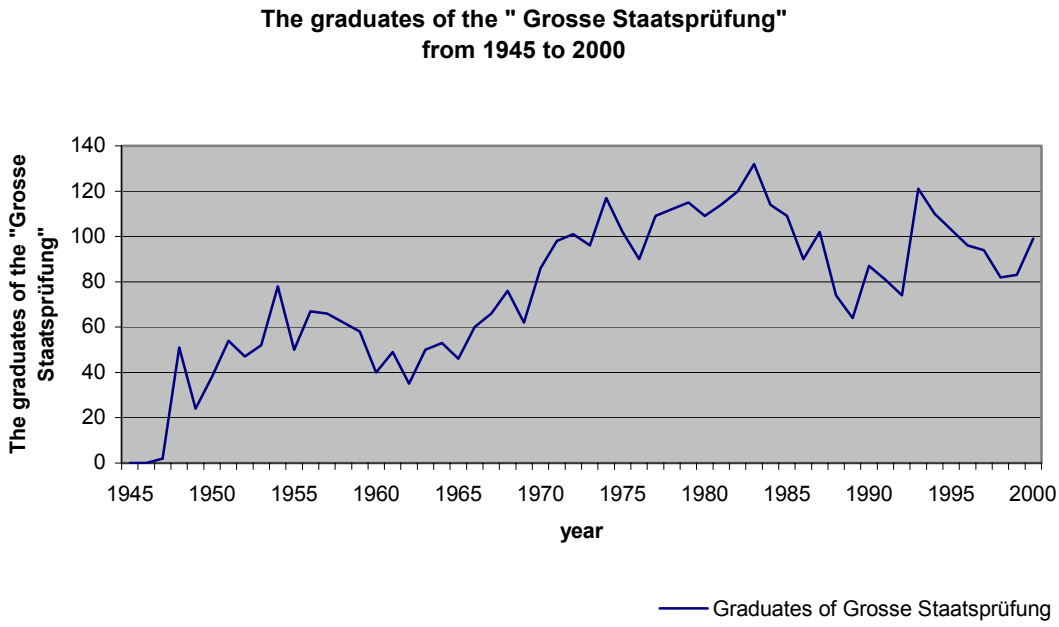


Graph 24: Number of new engineers (FH)

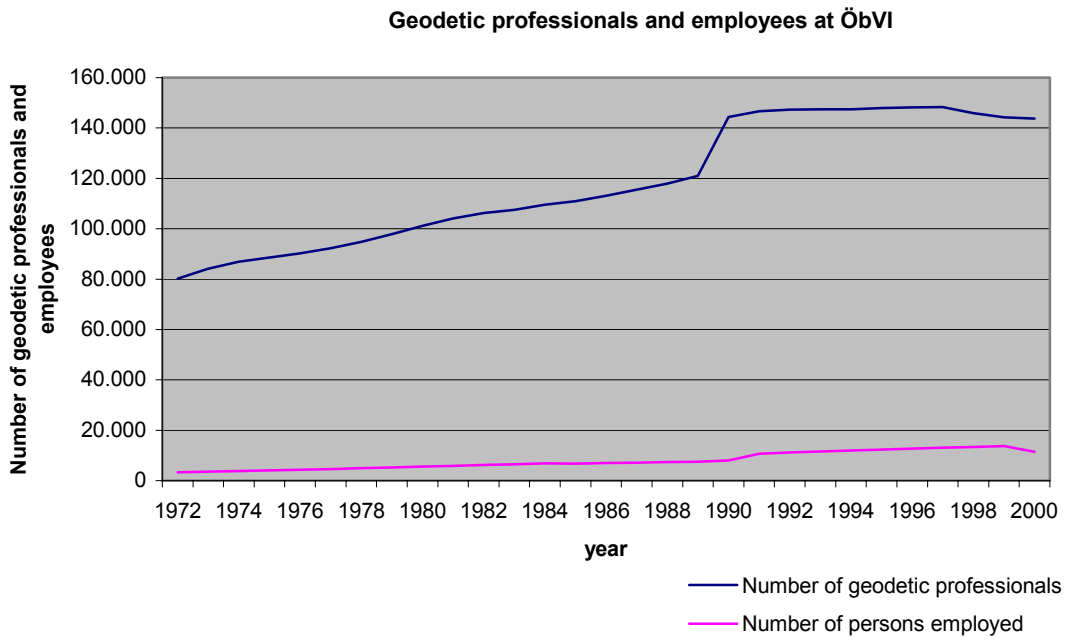
[6] see also: Schuster, Otmar: Geodesy in the Economy, European Journal of Economy 01/2003



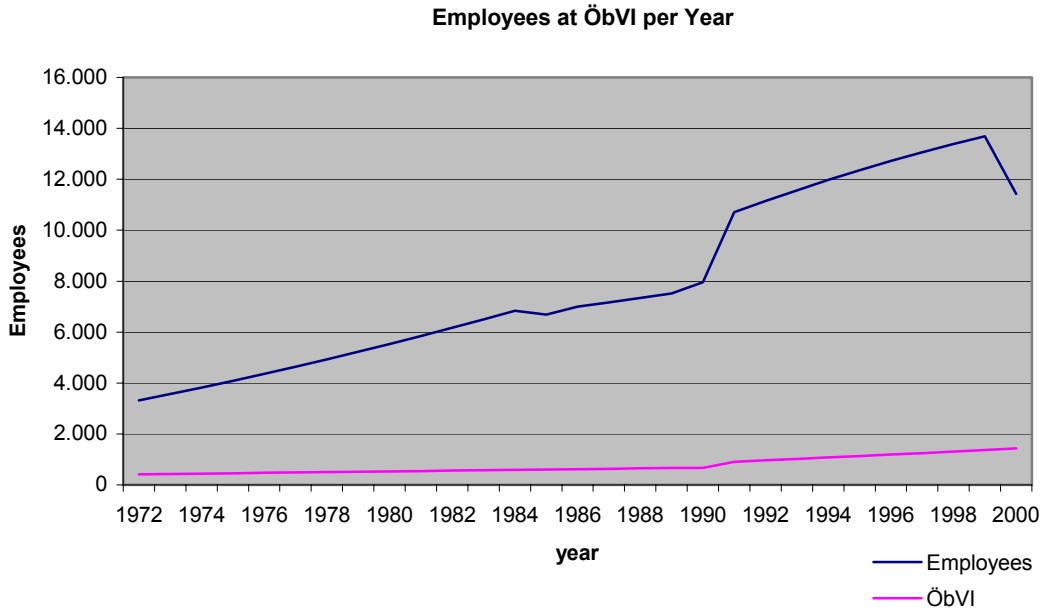
Graph 25: Number of new Geodetic Engineers (Uni)



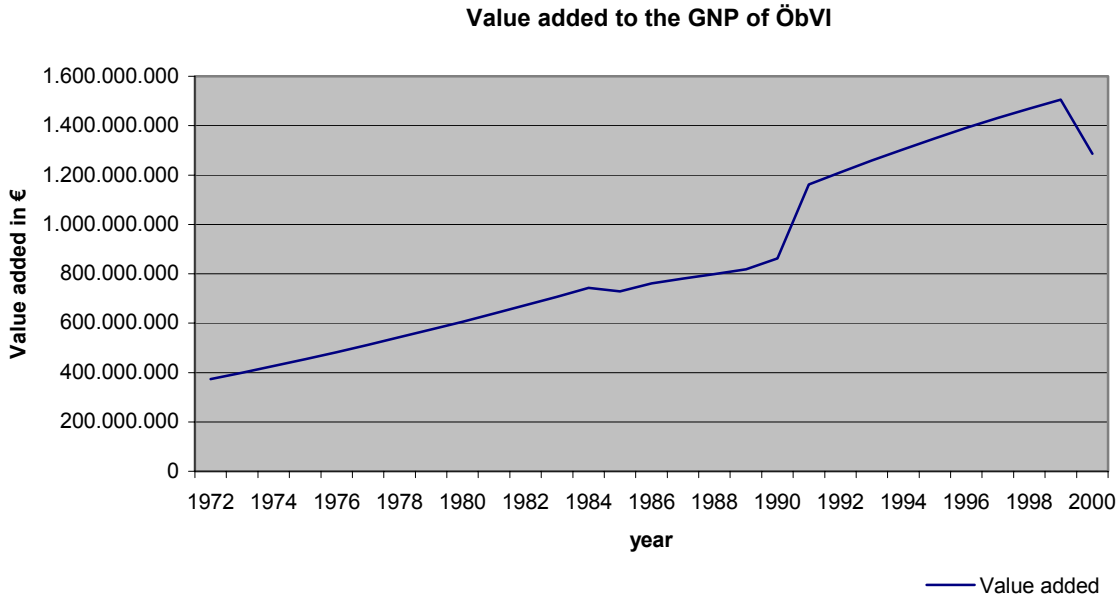
Graph 26: The graduates of the “Grosse Staatsprüfung"



Graph 27: Number of geodetic professionals and employees at ÖbVI



Graph 28: Employees at ÖbVI per year



Graph 29: Value added to the GNP of ÖbVI

There are some interesting conclusions possible:

a) The yearly numbers of technicians and High school engineers depend heavily from the business activity in the construction area.
b) The number of graduates is rather stable
c) The number of candidates, who passed the big state examination (Grosse Staat-sprüfung) is half of the number of graduates.
d) The number of employees of the liberal profession "Öffentlich bestellter Vermes-sungsingenieur" is about 10 % of all professionals, but
e) This liberal profession absorbs half of the number of the "Assessors", who passed the big state examination.

So this liberal profession in Germany can perform his public duty as a intermediary between the citizen and the public authority on the basis of his good formation. This trait one can find in all GE – countries.

The estimation of the value added to the national GNP is refraining.

Mülheim an der Ruhr, in October 2003

Dr. Otmar Schuster Manuel Ouranos Martina Busch

Attachment II

The Surveyor and his activities

A Surveyor is a professional person with academic qualifications and technical expertise whose responsibilities are:

- to practise the science of measurement
- to assemble and assess land and geographic related information
- to use that information for the purpose of planning and implementing the efficient administration of the land, the sea, and structures thereon;
- and to instigate the advancement and development of such practices.

International Federation of Surveyors, FIG 1992

Profile of the Survey Profession: Functions and Applications

Functions:

- Land and Geodetic Surveying
- Earth & gravity science
- Hydrography
- Photogrammetry
- Remote Sensing
- Land Information Systems
- Minerals & Mining Surveying
- Engineering Surveying
- Metrology
- Cartography
- Tacheometry
- GPS
- Laser Scanning
- Optical Survey Techniques
- Statistics & Stochastics

Applications:

- National Control Network
- General Purpose Provision of Mapping & Charting
- Geographical Information Management
- Environmental Land Information Management
- Land & Marine Resource Management
- Urban & Rural Land Consolidation
- Administration of Urban and Rural Land Use
- Cadastral Management
- Spatial Planning & development
- Construction Survey
- Quantity Surveying
- Building Maintenance
- Property Valuation & Management

See: The Establishment of the Profile and Definition of the Geodetic Profession to meet the Requirements of the General Public and the Commission of the European Union, published by the Comité de Liaison des Géomètres, printed and Marketed by RICS International Section; ISBN No: 0-85406-782-5, May 1996

Comité de Liaison des Géomètres Européens

22 Mitgliedstaaten

President:
Dipl.-Ing. Klaus Rürup
Droste-Hülshoff Str. 8
D-46236 Bottrop
Tel.: 0049-2041/1883-0
Fax: 0049-2041/1883-16
Klaus.RUERUP@t-online.de
http://www.clge.org

Geometer Europas
Intern. Verband belgischen Rechts
6 Mitgliedstaaten

President
Dr.-Ing. Otmar Schuster
Löhberg 78
D-45468 Mülheim an der Ruhr
Tel.: 0049-208/45000-0
Fax: 0049-208/45000-32
dr.schuster@geohaus.de
http://www.geometer-europas.org