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**MODERNIZING GEODESY EDUCATION IN WESTERN  
BALKAN WITH FOCUS ON COMPETENCES AND  
LEARNING OUTCOMES - GEOWEB**

**INSTITUTIONAL FRAMEWORK FOR  
OPERATION OF ENGINEERING GEODESY IN  
THE REPUBLIC OF SERBIA – PROBLEMS,  
CHALLENGES AND PERSPECTIVES**

**Institucionalni okvir delovanja Inženjerske geodezije u Republici Srbiji -  
savremeni problemi, izazovi i perspektive**

**Branko Bozic, Zagorka Gospavic, Marko Pejic, Milutin Pejovic  
Mostar, 17.10. – 21.10.2017**

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- Employment opportunities
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- Chamber of Engineers – organization, membership, type of licenses
- RGA – Geodetic company and Personal Licensing
- The future of EG

# TS 3E – Needs of Changing Society – New Skills, Competences in Surveying

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[https://www.fig.net/resources/proceedings/fig\\_proceedings/fig2009/papers/ts03e/ts03e\\_gospavic\\_bozic\\_vasovic\\_3195.pdf](https://www.fig.net/resources/proceedings/fig_proceedings/fig2009/papers/ts03e/ts03e_gospavic_bozic_vasovic_3195.pdf)

**This is Peer Reviewed Paper  
FIG Working Week 2009**

**Development of Market of Geodetic Services  
and Geodetic Companies in the Republic of Serbia**

**Zagorka GOSPAVIC, Branko BOZIC and Olivera VASOVIC, Serbia**

TS 3E – Needs of Changing Society – New Skills, Competences in Surveying  
Zagorka Gospavic, Branko Bozic and Olivera Vasovic Development of Market of  
Geodetic Services and Geodetic Companies in the Republic of Serbia FIG Working  
Week 2009 Surveyors Key Role in Accelerated Development **Eilat, Israel, 3-8 May  
2009**

# Vermessung & Geoinformation

## 1/2009, p. 144 – 149

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*Vermessung & Geoinformation 1/2009, p. 144 – 149*



### Scope of Competences of Future Serbian Surveyors Educated under the New Master Study Program in Land Law and Economy

*Branko Bozic, Zagorka Gospavic, Serbia*

**Keywords:** Faculty of Civil Engineering, surveying education, master programme

[https://geo.tuwien.ac.at/fileadmin/editors/VGI/VGI\\_200923\\_Bozic.pdf](https://geo.tuwien.ac.at/fileadmin/editors/VGI/VGI_200923_Bozic.pdf)

# TS 3 – Engineering Geodesy for Construction Works, Industry and Research

*TS 3 – Engineering Geodesy for Construction Works, Industry and Research*

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## Institutional Framework for Operation of Engineering Geodesy in the Republic of Serbia – Problems, Challenges and Perspectives

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[http://www.geof.unizg.hr/pluginfile.php/7437/mod\\_book/chapter/173/TS3\\_1.pdf](http://www.geof.unizg.hr/pluginfile.php/7437/mod_book/chapter/173/TS3_1.pdf)

# Geonauka - magazine

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## **Geodetic Education and Practice in the Republic of Serbia – Past and Present**

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<http://geonauka.sgs.org.rs/articles/201506.pdf>

# Employment opportunities for geodetic professional

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- Public sector entities

RGA, Government institution, State owned companies with various engineering departments, municipal urbanism departments

- Private sector entities

Private surveying companies, Distributors of surveying equipment and companies where surveying is a secondary activity. In 2002 there were 92 private geodetic enterprises with 500 employees. In 2008 this number increased to 631, and the number of employees to 2000.

According to some estimations, the number of geodetic professionals is about 4500.

# Engineering Geodesy - Definition and Core Competencies /Heiner KUHLMANN, Volker SCHWIEGER, Wolfgang NIEMEIER, Germany And Andreas WIESER, Switzerland

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- „Technical **measurements**, which are necessary in **connection** with **planning, execution, approval** and later **surveillance** of **buildings**.“ [FIG, 1971]
- „... all those **measurement** activities belong to engineering geodesy, which have to be conducted in connection with **technical planning, setting-out** and **monitoring** of technical **objects**. “ „...It [engineering geodesy] is the **practical utilization** of the entire realm of geodesy under the **complicating conditions** of turbulent practice when realizing technical projects.“[Rinner, 1971; Rinner, 1978]
- „**Surveying** in connection with planning, construction, approval and monitoring of buildings and other objects [FIG, 1997]
- „Engineering geodesy is the **production of geodetic information** necessary for the **planning** of technical projects, **setting out** of the project design, **control of the correct construction**, and **monitoring of deformations**.“[Brunner, 2007]
- “Survey in connection with the site surveying, project planning, setting out, acceptance and monitoring of structures and other objects.” Note: The term “engineering survey”, as a synonym for engineering geodesy, covers the **spectrum of surveying tasks** associated with technical projects of other trades and disciplines (e.g. building construction) [DIN 18710-1, 2012]



# What is the EG and how many GP work in that field

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- EG **survey** (*site surveying or production of the geodetic information*) necessary for the **planning, setting out, control** and **deformation monitoring** of engineering structures
- About 45 % of all geodetic professionals work in the field of the engineering geodesy

# Three characteristic EG periods

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- The second half of 20<sup>th</sup> century up to the dismemberment of Yugoslavia in 1991/92
- From 1991 to the end of 2000
- The beginning of 21<sup>st</sup> century up to the present time

Numerous works locally and abroad, big companies, good staff

War period, UN embargo, educated and experienced staff got abroad, significant economic problems, No market

Economic transition, Small companies, Insufficient solvency, difficulties to meet bidding condition, big foreign companies, home companies sub-contractors

# Chamber of Engineers

## Organisational Chart of the Chamber

Chamber Assembly

Secretariat

President of the Chamber

Management Board of the Chamber

Supervisory Board of the Chamber

Section of  
planners

Section of urban  
planning  
engineers

Section of  
designers

Section of  
contracting  
engineers

### Subsections

Graduate architecture engineers

Graduate civil engineers

Graduate mechanical engineers

Graduate electrical engineers

Other graduate technical engineers

# The members of the Chamber

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- The **university graduate engineers** of architecture, civil engineering, mechanical engineering, electricals, transport and **other technical engineers**, as well as
- The **university graduate space planners**,  
who hold the license issued by the Chamber

# To qualify for a licence in CE

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- Person must have a university or post-secondary higher degree
- Passed professional examination
- Minimum 3 years of work experience for the designers and contracting engineers, or
- Minimum 5 years for the planners, urban planning engineers and those with the post-secondary degree

# The Chamber issues the licences for

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- Responsible planners
- Responsible urban planning engineers
- **Responsible designers**
- **Responsible contracting engineers**

# **Post-secondary higher degree - only contractors, more than 1700 members**

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- Architecture
- Civil engineering
- Mechanical engineering
- Electrical engineering
- **Other graduate technical engineers**

# Types licenses for geodesy in CE

- *Responsible designers of geodetic projects* - 445 active licenses (382)
- *Responsible contractors of geodetic projects* - 304 active licenses (471)
- *Responsible contractors of geodetic projects in the field of low- and high-rise development* – 2 active licenses (771 spec.study) and 20 (871)



# General conditions for getting the license in CE

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- Graduated engineer of geodesy or Master for license 372 and 471
- Three or four years of undergraduate studies for licenses 771 (spec.) or 871
- Given professional experience
- List of references
- Professional exam

# License description

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- Geodetic Network Project
- Maps Project
- Expropriation Projects
- Setting Out Projects
- Geodetic Monitoring Projects
- Geometry Control Projects
- Projects of Special Purposes (urban, bathymetry,...)
- Projects of geodetic work in:
  - Reference networks
  - State survey and cadaster
  - Topography survey
  - Land Consolidation
  - Information systems
  - Metrology
  - Cartography



## **Rulebooks of particular importance for regulating the geodetic works in engineering-technical fields**

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- The Rulebook on content, methods, conditions, supervision and control of geodetic works performance in engineering-technical fields (“Official Gazette RS”, number 20/2002)
- The Rulebook on technical norms, methods of work for technical documentation production and control of technical documentation for geodetic works performance in engineering-technical fields (“Official Gazette RS”, number 20/2002)
- The Rulebook on terms and conditions for granting authorization for geodetic works performance and designing in engineering-technical fields (“Official Gazette RS”, number 20/2002)
- The Decree on technical documentations for geodetic works performance and granting authorization for geodetic works performance (“Official Gazette RS”, number 20/2002)

# The Republic Geodetic Authority – The Impact on Engineering Geodesy

- Issuing and revoking the **license for operation of surveying companies**
- Issuing and revoking the **geodetic license for the surveyor**

The screenshot shows the website of the Republic Geodetic Authority of the Republic of Serbia. At the top, there is a navigation menu with the following items: About Us, Legislation and documentation, Latest documents, EuroGeographics - Weekly News, International Projects, Magazines, Information Booklet RGA, Information of public importance, Internet service for submitting requests, Cartographic publications, Financial plan, and Public procurements, tenders and job. The main content area is divided into several sections: REAL ESTATE CADASTRE (with a sub-section ALL NECESSARY INFORMATION), eCADASTRE (with a house icon), REMARKS TO OPERATIONS OF CADASTRE, NATIONAL SPATIAL DATA INFRASTRUCTURE geoSERBIA, CARTOGRAPHIC PUBLICATIONS (with a world map icon), REAL ESTATE MANAGEMENT PROJECT WORLD BANK PROJECT, PRICE REGISTRE AND MASS VALUATION, NEW! eFrontDesk (with a person icon), SATELLITE IMAGES (with a satellite icon), MOST SUCCESSFUL LOCAL OFFICES OF 2016, and RGA's STRATEGY. At the bottom, there is a News section with a headline in Serbian: 'Дигитална платформа за Националну Инфраструктуру' (Digital Platform for National Spatial Data Infrastructure) and a date of 2.10.2017. There is also a Links section with a headline in Serbian: 'APLIKACIJA ZA EVIDENCIJU REŠENJA O RUŠENJU BESPRAVNO PODIGNUTIH OBJEKATA' (Application for recording of decisions on demolition of illegally erected objects).

# Geodetic Company

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- GC - legal entity or entrepreneurs who are **registered** with the **competent authority** for execution of geodetic works and who **meet legal requirements**
- APR does not recognize the surveying as separate activity, but under codes for "**other professional, scientific and technical activities**" (code 7490) and "**engineering activities and related technical consultancy**" (code 7112)
- Geodetic organization may be **outside** or **in the system** of **value added tax (VAT)**
- In addition to income tax and possibly VAT, the GC pays the contribution for: **1) pension and disability insurance, 2) health insurance, 3 unemployment insurance and 4) income tax for each employee**

# RGA - The license for geodetic companies

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- Organization has to be **registered**
- Employed **prescribed number** of geodetic professionals with the appropriate geodetic licenses
- Appropriate **working places** and the equipment
- Geodetic licenses issued to a surveyor are categorized as 1<sup>st</sup> and 2<sup>nd</sup> order licenses

# RGA - The license for surveying companies

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- 560 surveying companies are licensed
- The 1<sup>st</sup> order licenses have 470 geodetic surveyors,
- The 2<sup>nd</sup> order licenses have with 608 surveyors

# RGGA – Data about geodetic enterprises

Место: БЕОГРАД      Врста геодетске организације: --- Све геодетске организације ---      Назив организације: \_\_\_\_\_

Врста геодетских радова за које се издаје лиценца:

- 1 - Израда техничке документације и стручни надзор над извођењем геодетских радова за које је предвиђена израда главног пројекта
- 2 - Извођење геодетских радова за које је предвиђена израда главног пројекта
- 3 - Извођење геодетских радова у поступку одржавања катастра
- 4 - Израду геодетских подлога у инжењерско-техничким областима
- 5 - Израда пројеката геодетског обележавања у области урбанистике
- 6 - Реализација пројеката геодетског обележавања у области урбанистике
- 7 - Катастарско класирање, бонитирање и комасациона процена

Садржи     Тачно

Прикажи    Поништи

**Подаци о геодетским организацијама (који задовољавају извршене)**

Назив	Место
■ АВА-GEODETSKA KUĆA	БЕОГРАД
■ ABLISA	БЕОГРАД
■ AGENCIJA KUM	БЕОГРАД
■ AGENCIJA PARS	БЕОГРАД
■ AGEO D.O.O.	БЕОГРАД
■ ALPINE DOO	БЕОГРАД
■ AR GRADNJA	БЕОГРАД
■ AZIMUT INŽENJERING	БЕОГРАД
■ BENT-PREMER	БЕОГРАД
■ БЕОГРАДСКИ VODOVOD I KANALIZACIJA	БЕОГРАД
■ БЕОPREMER	БЕОГРАД
■ BGA GEOMETAR	БЕОГРАД
■ BIRO ZA GEODEZIJU DOO	БЕОГРАД
■ ELEKTROISTOK - PROJEKтни BIRO DOO	БЕОГРАД
■ ENERGMONTAŽA AD	БЕОГРАД
■ EUREKA GEO	БЕОГРАД
■ EUROPARK	БЕОГРАД
■ EVROGEOMATIKA	БЕОГРАД
■ FALCON SURVEY DOO	БЕОГРАД
■ GAUSINŽENJERING	БЕОГРАД

1 2 3 4 5

Подаци о организацији - Mozilla Firefox

www.rgz.gov.rs/reg-go-public/GeoOrgPublicView.aspx?organizacijaID=94

РЕПУБЛИКА СРБИЈА  
РЕПУБЛИЧКИ ГЕОДЕТСКИ ЗАВОД

www.rgz.gov.rs | 16.5.2016 13:52:37 |

### Подаци о геодетској организацији

**Основни подаци:**

Врста организације:	Радња/предузеће
Назив организације:	EUREKA GEO
Адреса:	Вељка Дугошевића 36
Место:	БЕОГРАД
Телефон:	+381113436474
Email:	
Web site:	
Број лиценце:	03 0498 13
Датум лиценце:	23.09.2013
Број решења:	952-03-32/2010-2
Датум решења:	23.09.2013
Овлашћено лице:	Лука Грбић

Лука Грбић	3;4;5;6		
Милојица Марковић	3;4;5;6		
Југослав Бељин	1;2;3;4;5;6		
- -	3;4;5;6		
Радослав Јевремовић	1;2;3;4;5;6		



# The license description

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- Technical documentation and supervision of geodetic work for which the main project was required
- The execution of geodetic work for which the main project was required
- The Real Estate Cadaster
- Engineering Geodesy

# Engineering Geodesy trends (Heiner Kuhlmann, Volker Schwieger (Germany), Andreas Wieser (Switzerland) and Wolfgang Niemeier (Germany))

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- The object to be mapped or monitored is now often not represented by a few carefully chosen individual points but by a **point-cloud created by a laser scanner** or derived from **registered images of digital cameras**. The relevant object information is not extracted during the measurement but afterwards during **data processing**
- An increasingly close link is given with **photogrammetry**, regarding **image processing, object extraction**, or orientation and positioning algorithms, e.g. laser scanning registrations. Also the **newest total stations and scanners** or particular add-on systems of **laser trackers**, like probes and hand scanners include essentially photogrammetric concepts and solutions
- Often, the **measurement system is not static** anymore but **moves along the measured object**. This also holds for setting-out, when the planned geometry is transferred to the reality directly through a guided or controlled machine without marked waypoints

We expect that „engineering geodesy – continuous in space and time“ [Kuhlmann, 2004] will further develop and change in the future, providing innovative and exciting developments

# Conclusion – New definition of EG

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- Engineering geodesy is the discipline of reality **capture, setting-out** and **monitoring** of local and regional geometry-related phenomena paying particular attention to **quality assessment, sensor systems** and **reference frames**

<http://osgl.grf.bg.ac.rs/survey/accounts/login/>