



# FIG WORKING WEEK 2019

22-26 April, Hanoi, Vietnam



"Geospatial Information for a Smarter Life  
and Environmental Resilience"



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# Integrated Geospatial Information Framework in Serbia in support of Government priority areas

Darko Vučetić, Republic geodetic authority

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## Republic Geodetic Authority

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Serbian Government

Ministries

Special Governmental Organizations

Ministry of Construction, Transport and Infrastructure

Republic Geodetic Authority

6 Sectors

Republic level

Municipal level

Real-estate Cadastre Offices - 170

By the official **Law on state survey and cadaster** RGA is national geospatial data provider **responsible** for:

- ✓ NSDI;
- ✓ Geodetic Reference Systems;
- ✓ State Survey;
- ✓ Real-estate cadastre;
- ✓ Utility cadastre;
- ✓ Registry of administrative Units;
- ✓ Addresses Registry;
- ✓ Topography and Cartography;
- ✓ Real-estate Mass Valuation;
- ✓ Registry of Geographic Names;
- ✓ Professional supervision and licensing of geodetic organizations;
- ✓ Geomagnetism and aeronomy;
- ✓ ....



Geocoded Addressing



Administrative Boundaries



Positioning



Place Names



Land Parcel and Property



Imagery



Transport



Water



Elevation



Land Cover



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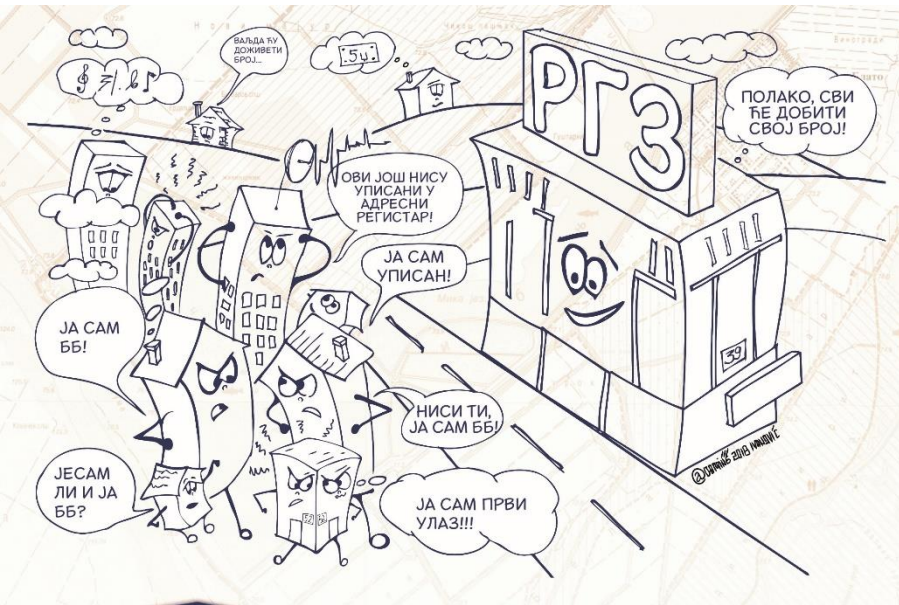
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## Address register (2015)

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- **Population: 7,020,858**
- 2.676.898 citizens leave in street without name and house number
- 3.028.020 citizens leave in street without house number
- 6.500 streets are not registered - estimation



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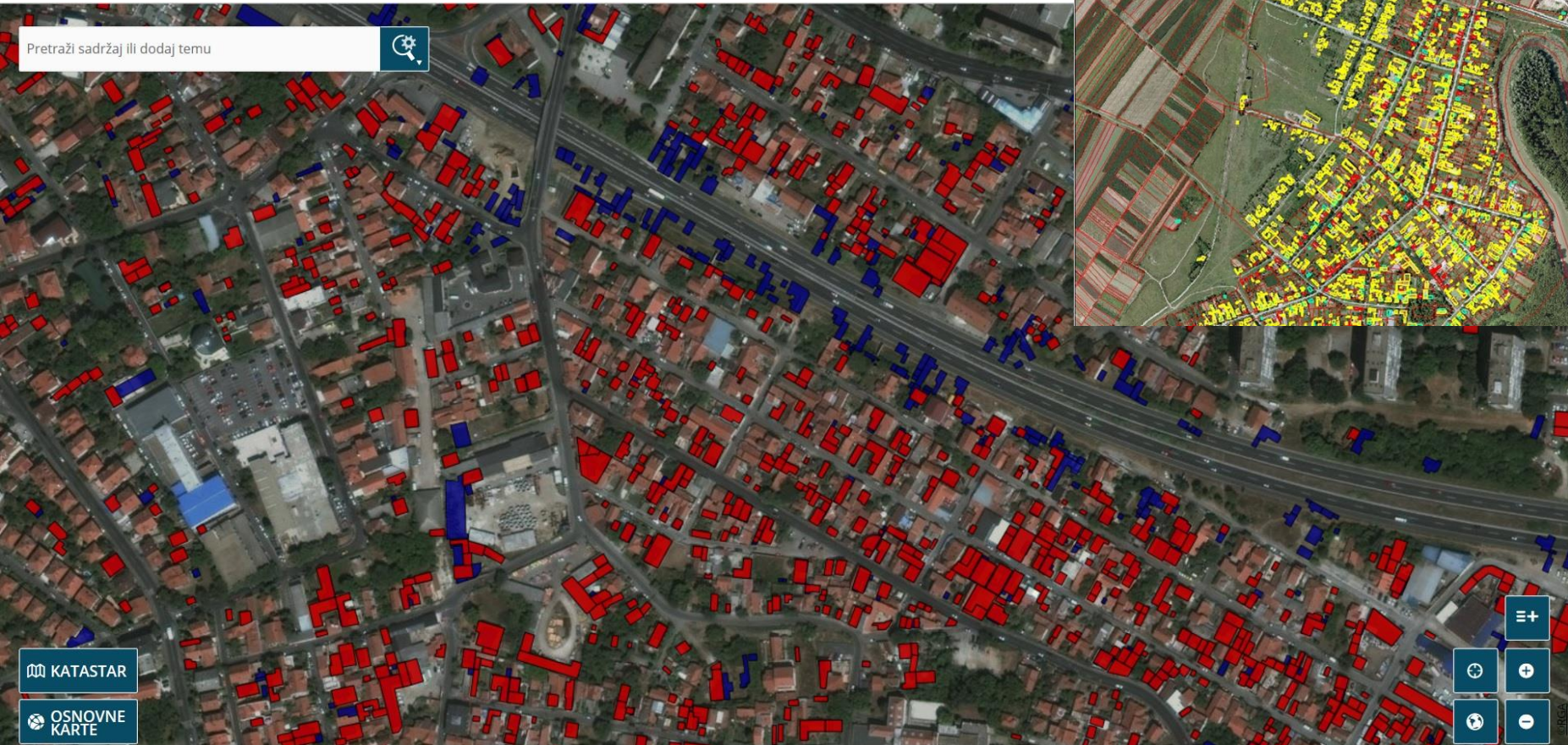
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## Real Estate Cadastre

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- Over 4,5 millions buildings are not registered!!!



KATASTAR

OSNOVNE KARTE

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## Status

- ⇒ Data are outdated
- ⇒ Heterogeneity of IT infrastructures
- ⇒ Duplication-cost and efforts
- ⇒ Lack of standards
- ⇒ Low accessibility
- ⇒ Data sharing not functional
- ⇒ Unclear regulation and licences
- ⇒ No coordination
- ⇒ Others – lack of technical knowledge, limited financial and human capacities....

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**NICE FACADE. BAD INFRASTRUCTURE!!!**

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**esri**



THE SCIENCE OF WHERE®

Source: *The Economist*, July 2003

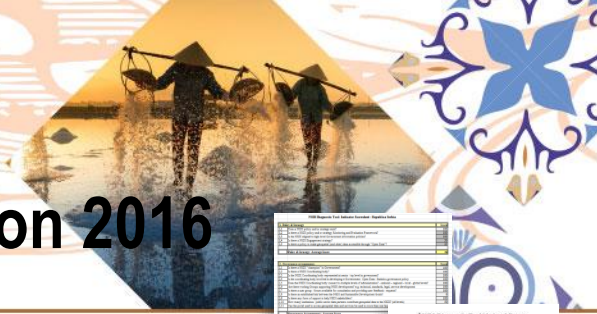


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## Assessment of the NSDI implementation 2016

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- Data exist on national level
- No clear definition of responsible institutions for some core data sets

### Core Data I

(DOP, adm.nistrative units, addresses, cadastral parcels, elevation., geographical names...)

- Data exist on national level
- Outdatedness of some data sets

### Core Data II

(stat. units, buildings, land cover, utilities...)

- Underway usage of NSDI for decision making in areas of planing and construction and environment protection
- No incentive in usage of NSDI in other areas
- Generally Public decision making is not based on udsage of NSDI
- „Crowd-sourcing“ solutions still not introduced

### Use of NSDI/Applications

- Developed capacities through development projects
- No clear strategy on CD within NSDI
- Insuficient engagement of educational sector
- Unsatisfactory capacities in public sector

- RGA Strategy adopted
- New NSDI Strategy under development
- NSDI in line with e-Gov
- No clear „Open Data „ policy

### Policy and Strategy

- Established NSDI Council, and TWGs
- Support and Access to data and services provided
- No estimation of reation : NSDI – SDGs
- Unsufficient participation of other institutions

### Governance arrangements

- New Law on NSDI under adoption
- Law s on lformation, Intellectual rights and Personal data Protection exist
- Inadequate legal basis for data sharing and exchange and data licencing
- No link between Laws on on data protection in case of geospatial information

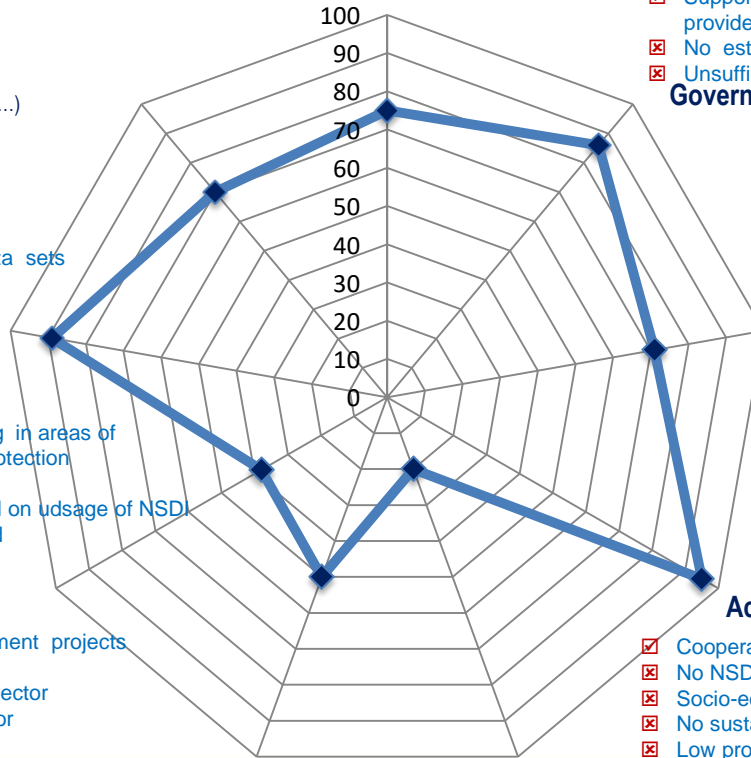
### Legal framework

- Spatial reference system and ICT infrastruacter established
- Standards on data , metadata and services exist
- National geoportal provided
- Technical performances of National geoportal low
- Transformation of data into unique coord.system to be done
- Low degree of spatial data access by inetnet technology

### Accessibility and Technical Infrastructure

- Cooperation with other institutions improved through agreements
- No NSDI business model
- Socio-economic impact never estimated
- No sustainable system of spatial data pricing ansd licencing
- Low provision of data and services based on NSDI by private sector

### Socio-Economic impact



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Capacity Development

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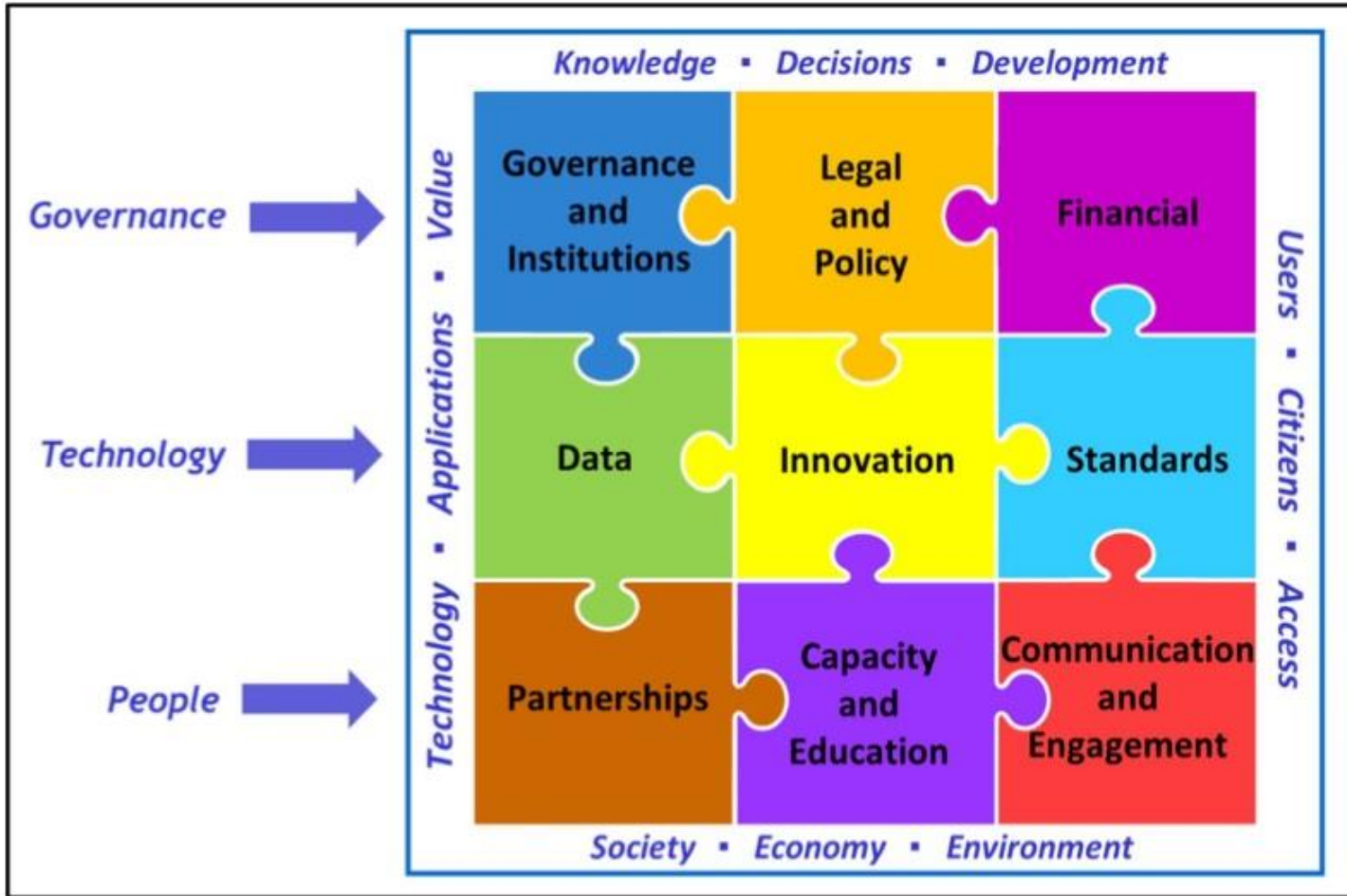


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## RGA Strategy 2016-2020

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СТРАТЕГИЈА  
РЕПУБЛИЧКОГ ГЕОДЕТСКОГ ЗАВОДА  
РЕПУБЛИКЕ СРБИЈЕ  
ЗА ПЕРИОД ОД 2016. ДО 2020. ГОДИНЕ

РЕПУБЛИЧКОГ ГЕОДЕТСКОГ ЗАВОДА  
за период од 2016. до 2020. године

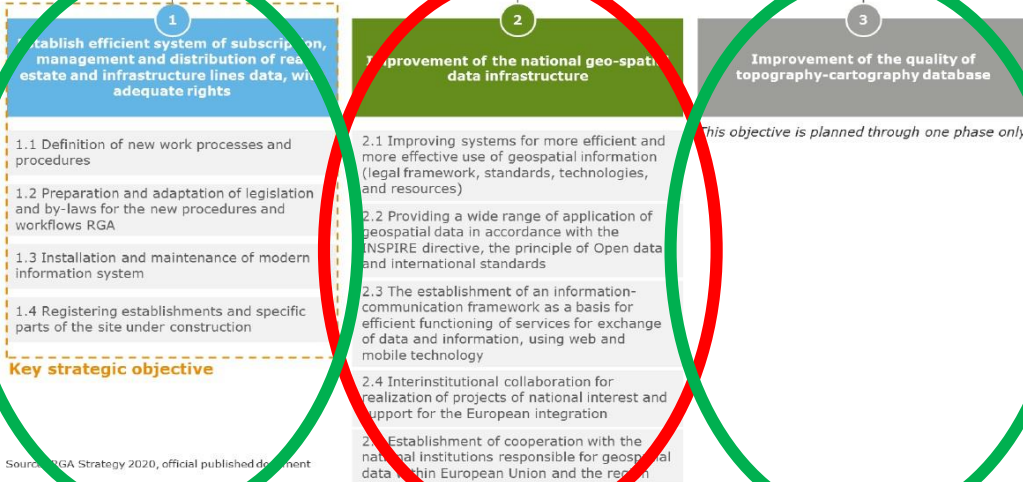
Београд, Јуни 2017

The **overall goal** - support the economic reform of the Government by effective provision of information in the sphere of real-estate and geospatial related activities for the **fast, easy and rightful decision-making at all strategic levels.**

### VISION

The Republic Geodetic Authority will provide reliable and updated geospatial and property data, in a standardized and readily accessible manner, for the purpose of sustainable social and economic development of the Republic of Serbia.

### STRATEGIC OBJECTIVES 1/3



Source: RGA Strategy 2020, official published document

### MISSION

The Republic Geodetic Authority is a respectable public service attending to citizens, economy, and state, adjusting its operation, volume, and quality of services and data to the international standards and norms, as well as with user requirements noted.

The Republic Geodetic Authority is a governmental institution competent for the official national register of properties and property rights holders.

The Republic Geodetic Authority is a governmental institution competent for providing services in the domain of geospatial data management for the purposes of society and state, actively participating and assisting other governmental organs to implement activities aimed at meeting pre-accession commitments in the Republic of Serbia European integration process.

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## Legal framework

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- **Law on National Spatial Data Infrastructure (2018)**
- **Law on Procedures for Real Estate and Utility Cadaster Registration (2018)**
- Law on eGovernment (2018)
- Law on spatial planning (2018)
- Law on DRMR (2018)
- Law on Administrative fees (2017)
- .....



### Legal framework

- **By-law on Address Register (2017)**
- **By-law on Internal organization and work places in RGA (2017)**
- .....

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## Strategic position of NSDI in Serbia

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### NSDI development is included in almost all strategic documents of Government:

- Economic Reform Programme of the Republic of Serbia 2018-2020
- Action Plan for Implementation of the Strategy of Public Administration Reform of the Republic of Serbia 2018-2020
- Action plan for DRMR
- Action Plan for *Implementation of the Government Programme.*
- Programme of the eGovernment Development
- Programme for position improvement on World Bank Doing Business list
- .....

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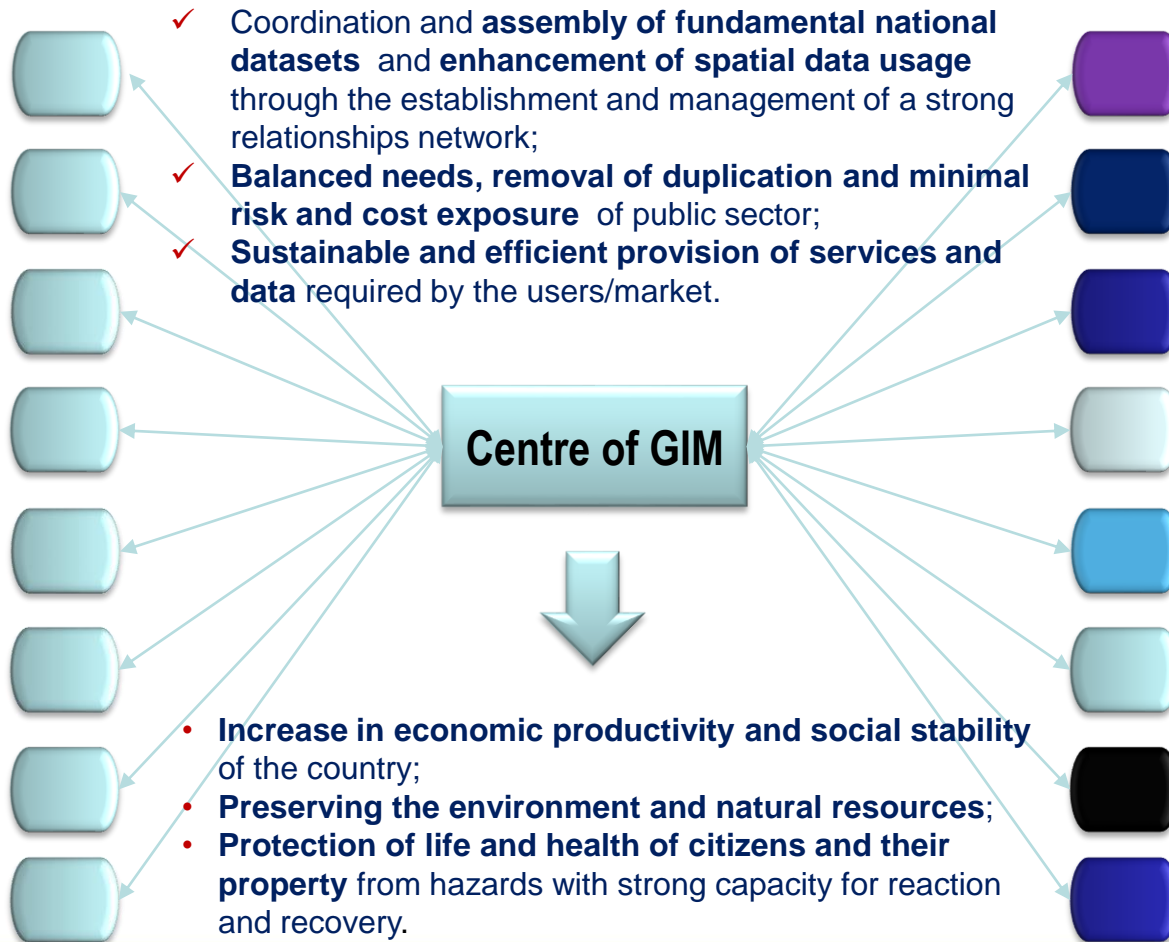
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## Efficient Model in Geosector supported by CGIM

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DATA PROVIDERS



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## FINANCE

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*"The information I have is not the information I want. The information I want is not the information I need. The information I need is not the information I can obtain. The information I can obtain costs more than I want to pay"*

[Peter L. Bernstein](#)

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## INOVATIONS

"Geospatial Information for a Smarter Life and Environmental Resilience"



**3D data** – Basic Topographic Database in 3D

**LiDAR** – from 2012, currently flood prone areas and archeology

**Blockchain technology** – planned with UNDP

**Big Data** – DataCube federation

**Crowdsourcing** – Updating Address Register, Register of waste dump sites,

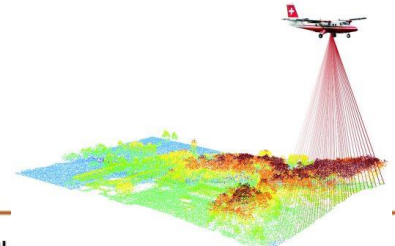
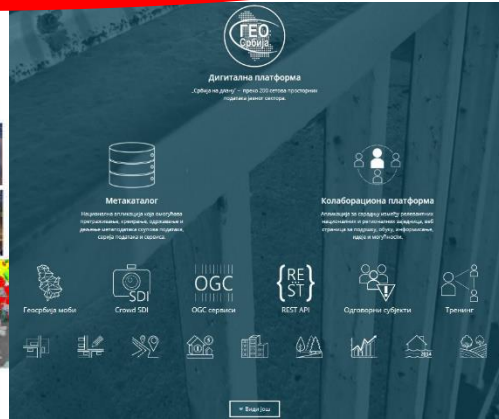
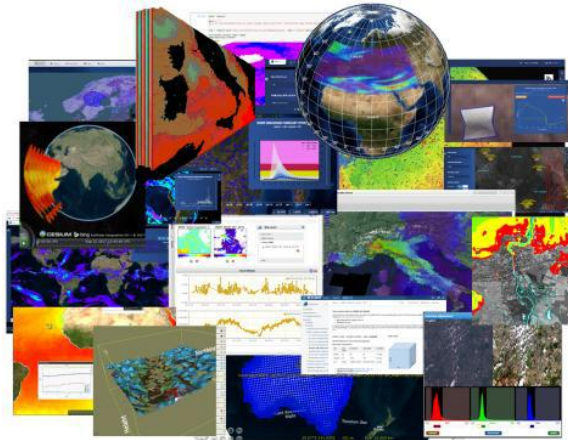
Archeological sites

**Digital platform** – Geoserbia, further developments



POŠALJI

OBRISI





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## GEOSRBIJA - GEOSPATIAL PLATFORM

"Geospatial Information for a Smarter Life and Environmental Resilience"



*“a plug-and-play business model that allows multiple participants (producers and consumers) to connect to it, interact with each other and create and exchange value. Also collections of services used for hosting, processing and distributing geospatial data are called platforms.”*

### Key components of the platform:

- ▶ Data standardisation – data schemas, quality rules, life-cycle rules, collection guidelines
- ▶ Automated Data tools for the producers – quality guard, data life-cycle management, error reporting, data updating tools
- ▶ Data portal – finding, evaluating data – situational picture, metadata search, quality dashboards
- ▶ Data distribution services, APIs, Analysis and processing services
- ▶ Support (community)
- ▶ Management of the ecosystem

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## GEOSERBIA - GEOSPATIAL PLATFORM

"Geospatial Information for a Smarter Life and Environmental Resilience"



### Services



#### Metadata catalog

A national application enables searching, creating, maintaining and sharing metadata for spatial data sets, spatial data set series and spatial data services.



#### Collaborative platform

National portal enables the cooperation between relevant national and regional communities, support, trainings and informing.



#### Digital platform

The national web GIS application enables the display, search, analysis, transformation, creation, sharing and maintenance of geospatial data of Serbia.



Geosrbija mobi



Crowd SDI



OGC services



Rest api



Stakeholders



Training



Geosrbija mobi

Android application that represents a fast link to the Digital Platform.



Download

Service for downloading standard data sets for easier exchange.



Harmonization

We create standard registers together! Assistance in the preparation of methodological guidelines for harmonization



Open data

3D view. Web application based on the Cesium platform.



crowdSDI

We create spatial registers together! Mobile application for data collection.



OGC Services

Overview of currently available standard OGC data exchange services.



REST API

An overview of the currently available standard REST services for networking registers.



Transformation

Spatial data transformation service and change of exchange formats.



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## Collaborative platform



Колaborациона платформа - Алфа тестирање



0 Тренинг за тренере



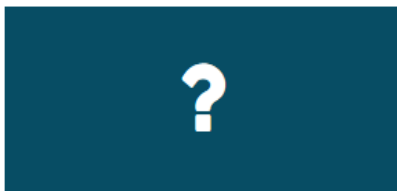
0 Општа дискусија



0 Питања за одговорне субјекте НИГП-а



0 Коментари и повратне и...



0 Примери добре праксе



0 Лабораторија идеја



0 Пријави грешку



0 Прекид рада



0 International cooperation



0 Политика садржаја / Content Policy



Our environment doesn't stop at the borders we make!

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## Services



### Geosberbia mobi

Android application that represents a fast link to the Digital Platform.



### Download

Service for downloading standard data sets for easier exchange.



### Harmonization

We create standard registers together! Assistance in the preparation of methodological guidelines for harmonization



### Open data

3D view. Web application based on the Cesium platform.



### crowdSDI

We create spatial registers together! Mobile application for data collection.



### OGC Services

Overview of currently available standard OGC data exchange services.



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An overview of the currently available standard REST services for networking registers.



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Spatial data transformation service and change of exchange formats.

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## NSDI DIGITAL PLATFORM

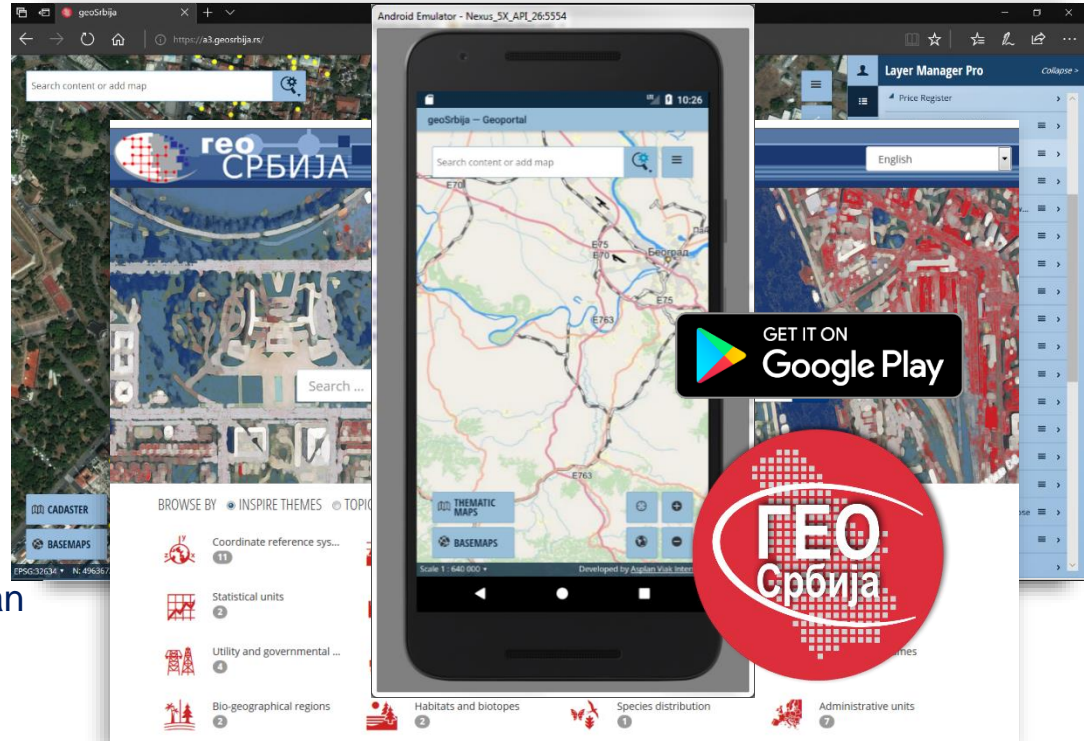
"Geospatial Information for a Smarter Life and Environmental Resilience"



### New national geoportal GeoSrbija– WebGIS solution

<http://a3.geosrbija.rs/>

- ✓ Improved performances/"user familiar" interface
- ✓ Based on Open Source solutions (MapServer, Lucene, Open Layers, Sencha...)
- ✓ Improved search/indexin
- ✓ More data/2 levels of access
- ✓ Download data/Customised reports
- ✓ Digitalization/simple analysis
- ✓ WMS/WFS functionality
- ✓ Edit /collect data
- ✓ Import external WEB sevicees and data/media files
- ✓ Print/Save File/Embed map
- ✓ Users with dedicated permissions can easily set up new clients, defining their content, functionality, user interface etc.



Metadata Catalogue Service published <http://metakatalog.geosrbija.rs/geonetwork/>

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## NSDI DIGITAL PLATFORM

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### Collaborative work – crowdSDI desktop solution

<http://a3.geosrbija.rs/>

- ✓ Digitalization
- ✓ Simbology
- ✓ Media attachment (pictures, video, text files)
- ✓ Editing existing data
- ✓ Login/Authentication layer
- ✓ Collaborative work
- ✓ Crowd Sourcing functionality
- ✓ Collect and create new data sets
- ✓ Link with data owners
- ✓ Export Files
- ✓ Import external web services
- ✓ Import external data (link with Open Data portal)
- ✓ Users with dedicated permissions can easily set up new clients, defining their content, functionality, user interface etc.

The screenshot displays the a3.geosrbija.rs desktop application. It features a map view with a search bar and a toolbar. A data table is visible at the bottom, listing deponije (landfills) with columns for ID, Adresa, Tip deponije, Status deponije, Datum identifikovanja, and Datum ciscenja. The table contains four rows of data.

DEPONIJE	Adresa	Tip deponije	Status deponije	Datum identifikovanja	Datum ciscenja
5	Vinca	Jevnja	Aktivna		
6	Cukovac	Divlja	Aktivna	09/14/2017	
9	Grocka	Divlja	Ociscena	09/06/2017	09/19/2017
10		Divlja	Aktivna	09/01/2017	09/01/2017

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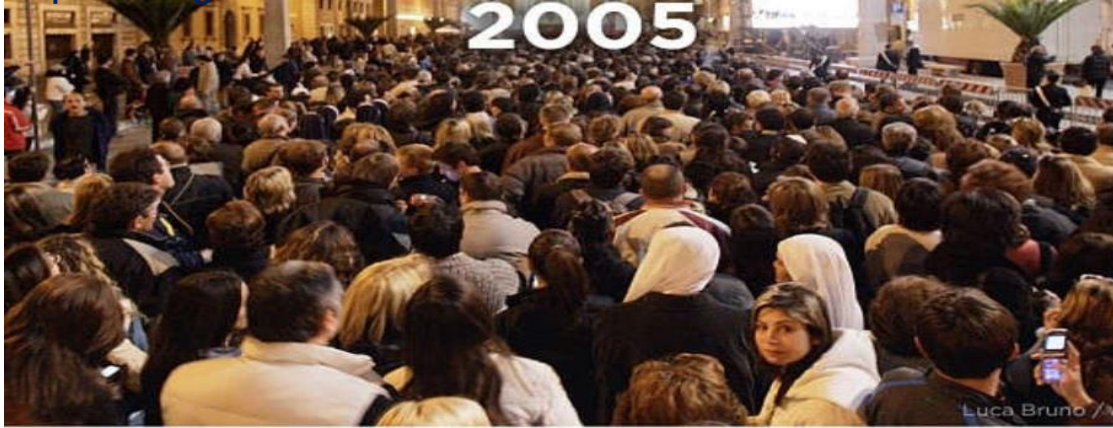
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## Technology

"Geospatial Information for a Smarter Life and Environmental Resilience"



### Pope inauguration



Source: Rумына Tonchovska, UN FAO

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## Crowdsourcing

"Geospatial Information for a Smarter Life and Environmental Resilience"



- The developed global reporting mechanism (UNSTATS, 2018) pointed to the need for data generated by civil society to be incorporated into the international process of monitoring and achieving the sustainable development goals.
- "Countries around the world will have to support projects that promote public participation in measuring progress towards the sustainable development goals."
- Crowdsourcing is a part of broader trends in the creation of "user content" and the way to collect new and update existing geospatial data
- Large resource in the work of the state administration for making strategic decisions as well as managing strategic resources among which the environment certainly has a significant place.
- It is necessary to establish a whole set of rules, organizational and legal framework, and to provide technical preconditions and procedures for the functional integration of the data thus collected by Crowdsourcing into the National Spatial Data Infrastructure of a country

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## Crowdsourcing

"Geospatial Information for a Smarter Life and Environmental Resilience"



### Mobile App – crowdSDI

- ✓ Mobile app for crowdsourcing
- ✓ Android and iOS
- ✓ Geolocation and secure connection
- ✓ Verification of collected data
- ✓ Location, time, weather conditions
- ✓ Offline mode
- ✓ Crowd Sourcing functionality
- ✓ Link with geoSrbija
- ✓ Link with data owners
- ✓ Users with dedicated permissions can easily set up new clients, defining their content, functionality, user interface etc.

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"Geospatial Information for a Smarter Life and Environmental Resilience"



**43 WD locations - 1h 42min = 2,5min/location!!!!**



The proposed approach is to divide the weight coefficients into three groups:

- The highest level of data reliability – state bodies and organizations, local government units and public enterprises
- The medium level of data reliability – non-governmental organizations, private organizations, voluntary organizations, organized group of citizens, etc.
- The lowest level of data reliability - anonymous individuals

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## Address Register

"Geospatial Information for a Smarter Life and Environmental Resilience"

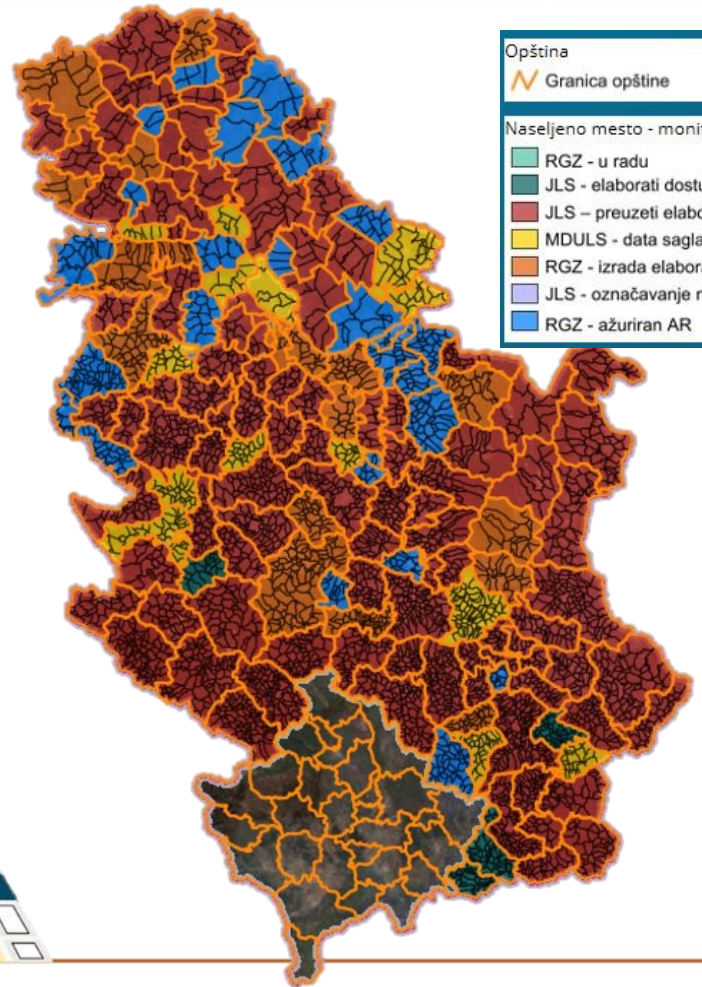


Geosrbija for street system  
crowdSDI for demarcation of house numbers

1,5 YEAR = UPDATED ADDRESS REGISTER!!



6



Opština	Granica opštine
Naseljeno mesto - monitoring	
RGZ - u radu	
JLS - elaborati dostupni za preuzimanje	
JLS - preuzeti elaborati	
MDULS - data saglasnost	
RGZ - izrada elaborata kućnih brojeva	
JLS - označavanje na terenu	
RGZ - ažuriran AR	

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## Building register

"Geospatial Information for a Smarter Life and Environmental Resilience"



Objekat_nov	Objekat_DKP	NaViseParcela	VrstaPromene
Ne	Uklonjen na terenu	Ne	Nepromenjen
Na vise parcela			

Objekat_nov	SHAPE	MatBrOpisna	MatBrOpisna	MatBrKO	InerKO_sir	InerKO_sir	Status_DKP	Asumost_DKP	OpisPodataka	VrstaPromene	NaViseParcela	PolozajList	SHAPE_Length	SHAPE_Area
52	Polygon	71242	744298	NAKAK	CAKAK	CAKAK	DQP	04/04/2017	Ortofoto 10cm 2011-2013	Novi	Ne	Uklonjen	33.071726	73.918813
53	Polygon	71242	744298	NAKAK	CAKAK	CAKAK	DQP	04/04/2017	Ortofoto 10cm 2011-2013	Novi	Ne	Uklonjen	36.021940	79.014664
54	Polygon	71242	744298	NAKAK	CAKAK	CAKAK	DQP	04/04/2017	Ortofoto 10cm 2011-2013	Novi	Ne	Uklonjen	16.827611	77.607018
55	Polygon	71242	744298	NAKAK	CAKAK	CAKAK	DQP	04/04/2017	Ortofoto 10cm 2011-2013	Novi	Ne	Uklonjen	36.273560	82.548151
56	Polygon	71242	744298	NAKAK	CAKAK	CAKAK	DQP	04/04/2017	Ortofoto 10cm 2011-2013	Novi	Ne	Uklonjen	41.435520	102.208952
57	Polygon	71242	744298	NAKAK	CAKAK	CAKAK	DQP	04/04/2017	Ortofoto 10cm 2011-2013	Novi	Ne	Uklonjen	18.458468	24.450337
58	Polygon	71242	744298	NAKAK	CAKAK	CAKAK	DQP	04/04/2017	Ortofoto 10cm 2011-2013	Novi	Ne	Uklonjen	37.503187	52.601913
59	Polygon	71242	744298	NAKAK	CAKAK	CAKAK	DQP	04/04/2017	Ortofoto 10cm 2011-2013	Novi	Ne	Uklonjen	54.404867	160.201718
60	Polygon	71242	744298	NAKAK	CAKAK	CAKAK	DQP	04/04/2017	Ortofoto 10cm 2011-2013	Novi	Ne	Uklonjen	38.108862	73.386258



VHR WorldView  
GSD 30 and 40 cm

App for MetaData on decisions on Building register  
demolition of illegal buildings

- ✓ Updated registers (inventory of changes on buildings - new, demolished, expanded; street names and house numbers definition for 4521 cadastral municipalities);
- ✓ Monitoring illegal construction and revision of spatial plans (over 4 mil of new illegal buildings identified – direct budget income from taxes over 500 mil euros);

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## EXAMPLES:

"Geospatial Information for a Smarter Life and Environmental Resilience"



- ✓ Updating Address Register street system – Government of Republic of Serbia
- ✓ Updating Waste Dump Sites Register – Ministry of Environment
- ✓ Register of Archaeological sites – Ministry of Culture
- ✓ Location for Greenfield, Brownfield and Grayfield investments – Local municipalities and Ministry of Spatial planning
- ✓ Expropriation planning – Local municipalities
- ✓ Risk Register - Disaster risk management and reduction – Sector for emergency situation
- ✓ Flood hazard maps – Ministry of Environment
- ✓ Updating Building Register – Republic geodetic authority
- ✓ Mobile operators / Internet providers
- ✓ Planning of geodetic field works – Private geodetic companies
- ✓ Analyze of the railway intersection - JSC Serbian Railways
- ✓ Vacation planning - Citizens
- ✓ ....

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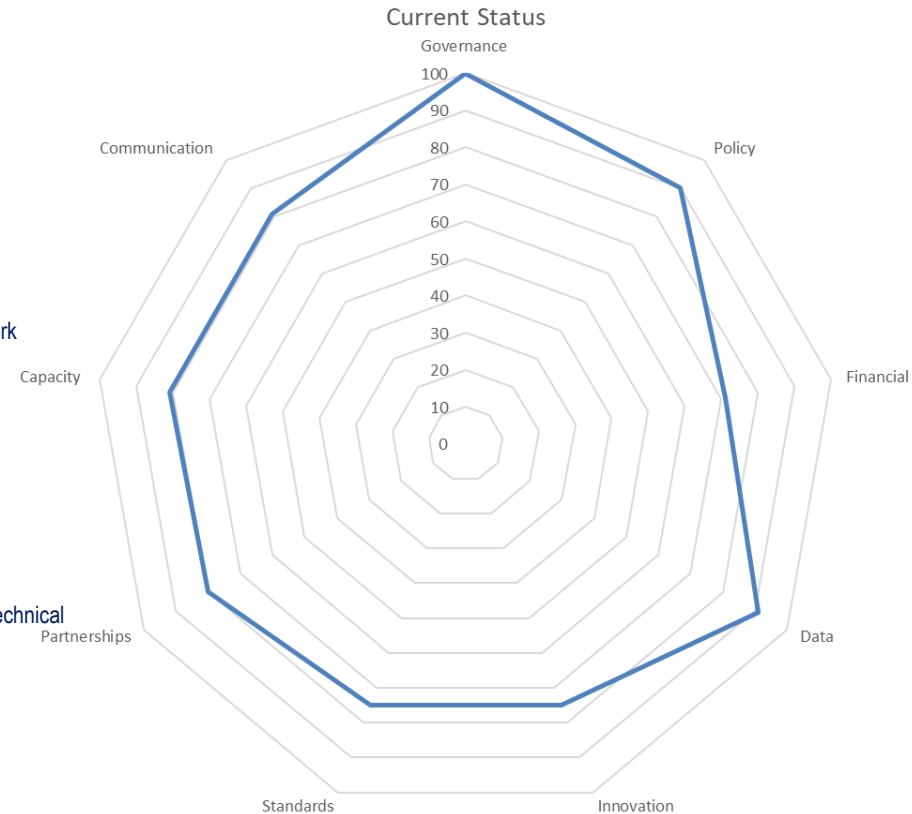
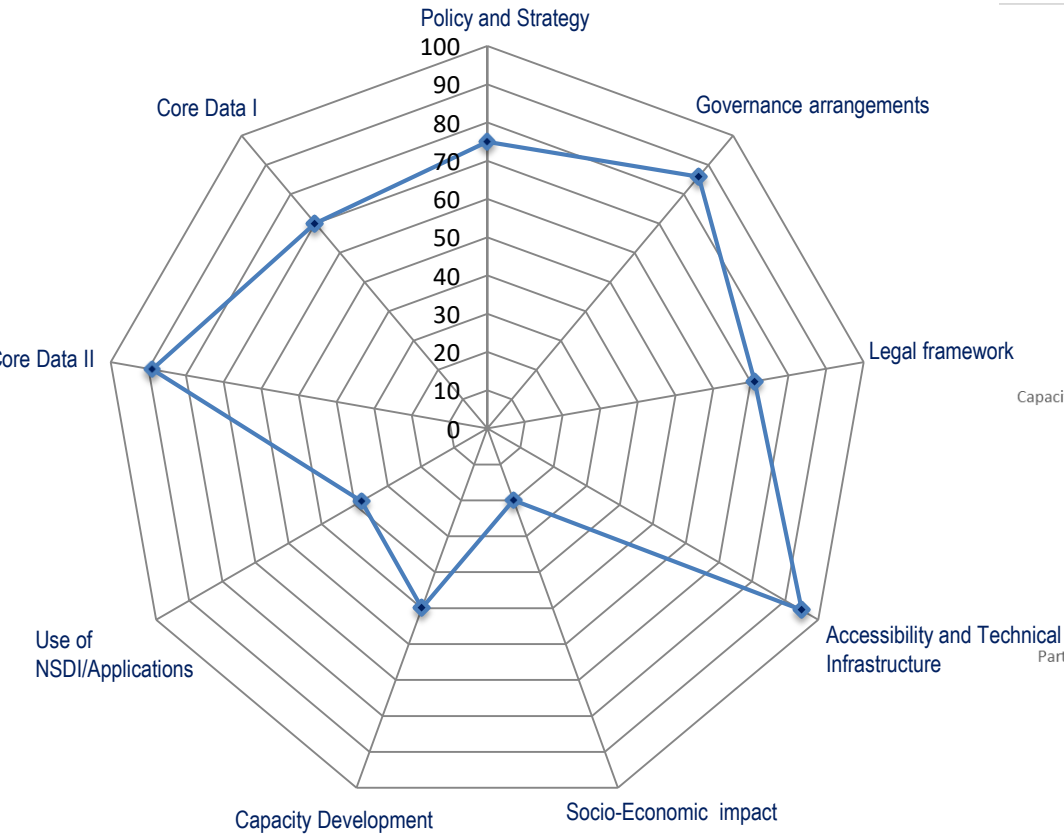


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## Status 2016 vs 2019

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"Geospatial Information for a Smarter Life and Environmental Resilience"



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[www.rgz.gov.rs](http://www.rgz.gov.rs)  
[darko.vucetic@rgz.gov.rs](mailto:darko.vucetic@rgz.gov.rs)

[www.geosrbija.rs](http://www.geosrbija.rs)

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