COOPERATION FOR SPACE

INSPIRE and National Spatial Data Infrastructure in Montenegro
Why spatial data and spatial data infrastructure need cooperation?
Environmental problems do not stop at borders. The spatial data on which knowledge based environmental policies depends is held by many different organisations. A spatial data infrastructure, alike the one envisaged by INSPIRE, can only serve this purpose when those organisations holding environmental, geographical, geophysical and social-economic data cooperate to share between them and across borders their data, services and information on which good environmental governance depends.

Hugo de Groof, European Commission

In a global geospatial arena we are not playing alone. The only way towards a meaningful and sustainable SDI is by working together for a future development.

Vlado Cetl, Joint Research Centre

We have achieved successful GIS and NSDI implementations in close collaboration with our users, mostly NSDI stakeholders. Without that cooperation it would be impossible to turn technology into efficient systems.

Ninoslav Mitric, GDi GISDATA

Building a better tomorrow depends on us and on the information about the spatial data. To cooperate for the good of the region, together to build the spatial data infrastructure, sharing the knowledge and data.

Sonja Dimova, AKN, FYR of Macedonia

Spatial data is important because everything that happens, happens somewhere. That is why spatial data is important for everyone. Because it is important to all of us we need to work together, users and suppliers, industry and government, administrations and citizens, domains and disciplines. Together we are stronger; together we can make the best use we can of it for everyone and for every situation.

Dave Lovell, Eurogeographics

Spatial data and information are a common good and a Spatial Data infrastructure is a common effort! We aren’t implementing this for ourselves, but for our societies. Let’s share work and benefits!

Christian Ansorge, Umweltbundesamt, Austria

Spatial data and spatial data infrastructure can run the risk of losing impact without the cooperation. Let’s cooperate, share the effort, share the experiences and bring the added value solutions!

Martin Koska, SAZP, Slovakia

Spatial data infrastructure should represent common language for all parties involved in creating, sharing and usage of spatial data. This common language must be well understood among these parties so the need for cooperation in developing this language on all levels; legislative, technical and organisational is unquestionable.

Tomislav Ciceli, DGU, Croatia
Spatial Data have become an important part of our daily life. 80% of all data stored contains some reference to geography or location. Without it we couldn’t book flight tickets for our next vacation, couldn’t check the weather report for tomorrow or listen to traffic jam reports in the radio.
Spatial Data are very important and integral part of our everyday life. Technically speaking, spatial data refer to any kind of data, which have a spatial aspect or a spatial representation. However, spatial data often include not only spatial, but environmental, health or security data at the same time. Looking at the photo below, you may see a forest, a house, a bridge, a street and a river. These objects are represented in many different ways and many different aspects, as for example roadmap or building cadastre. But treating them as spatial data we introduce a simplification as the tree may be represented as point, the house may be represented as polygon and the road may be represented as line, in order to create a model of space. Each point, polygon and line has its location associated in the form of coordinates. This is the spatial aspect and the geographic representation of these real world objects.

Have you ever wondered why a search engine knows exactly where you are and how it can propose alternatives to your search in a place not far away from you? Because it works with Spatial Data and can check for alternative answers in a driving distance of e.g. 10 km from your location.

Where are spatial data in our daily life?
So far you could see that spatial data is interwoven with our daily live. In some cases the impact and the importance of spatial data is obvious, like when we are checking the map as web application to find ourselves and the place we are heading for, in order to decide for the best route. In other cases it isn’t that obvious as the spatial aspect is more hidden.

Location in space is determined using numerical coordinates. But the data we claim to be spatial, in most cases, don't include coordinates. Instead, we use reference to addresses, parcel numbers, kilometer stations at highways, districts or municipalities, or grid system units. In order to tie such a reference to location in space, or coordinates, we use reference datasets such as addresses, parcels, road network, administrative division or grid, which make an important part of the Spatial Data Infrastructure, in an operation called georeferencing.
Geospatial data are needed not only by businesses, the citizens or customers, but also by governments to take the right decisions. Policymaking needs reliable data to assess the current situation and the development so far. These data are to wide extent spatial, e.g. territory of local government jurisdiction or parcels and buildings owned by the government, and therefore implies the spatial component.

**Business Intelligence**

Spatial data are an important input for all sorts of business intelligence tasks to identify business potential and to take the most efficient decision. Have you ever asked yourself how the location of shopping malls or gas stations is planned? The most efficient location depends on various factors, e.g. on the customer’s density, their income, the range they have to travel to their jobs and on already existing gas stations etc.

All the necessary information has to be generated, maps of income levels in different areas of the city have to be created. Therefore surveys have to be conducted on the base of which such a map can be created. The same applies for the information, how far people in average have to drive to their jobs. So all these data become spatial data and they help to analyze the best locations for new gas stations and the number of potential customers they can attract. This is just one example where spatial data are used to take decisions. Check your car navigation system for the next gas station and don’t be surprised if it is closer than you expected.

**Emergency response**

In an emergency case the responding institutions have urgent need for reliable data. Here – most of all – the location is crucial as the reaction time has to be as short as possible. In a case of fire in a city area the fire department will use spatial data for all kinds of issues. Spatial data help to identify the shortest route to the emergency location, the best routes for evacuation, especially threatened facilities in the vicinity of the location (e.g. hospitals, gas stations, schools), the nearby fire hydrant locations... In a later stage supplies might have to be distributed most effectively or damages have to be detected. The list of use cases related to emergency response is virtually endless and spatial data plays a key role in all of them. You could see examples that demonstrate how actually spatial data play important role in our daily life and how they influence business, economy, administration, politics etc.

In some cases we take decisions directly by consulting spatial data such as maps or web applications. In other cases – the majority – spatial data are an invisible part of decision-making processes and are involved in all cases that have to do something with location. The nearest pharmacy, the gas station, the emergency transport or the public toilet, are planned or operating based on spatial data.
Spatial data have certain characteristics and provide certain views on things, but they also have certain needs in terms of managing and handling. Have you ever tried to open a bottle with scissors or to cut paper with a screwdriver? Or at least call a friend from your mobile phone without a SIM card in it? It may seem ridiculous, because obviously certain tools are dedicated to certain use cases. We usually need a toaster to roast toasts, use a coffee machine to prepare coffee or we use image-processing software to improve our digital images. But what these examples have to do with our main topic or with the Geographic Information Systems? Just like the coffee machine or the image processing software, Geographic Information System is a tool dealing with spatial data. What other tool would you choose for spatial data?

To be more precise, a GIS is a system, which captures, stores, manipulates, analyzes, manages, and presents different types of spatial data. All these functions a GIS can support and enable efficient decision making based on spatial intelligence. The term GIS is relatively broad and includes a variety of different use cases, processes and applications. A GIS is always designed to serve certain needs and it can vary according to its different look and specific functions. But what all GIS have in common is that they are designed around a map application as key module for representing the geographic information. From Google Earth or Open Street Map to a sophisticated business system with spatial components, it is all GIS.

Why are GIS important in everyday life?
Geographic information systems are important in our daily live even if sometimes not visible as such. We use them as tools to operate and analyse spatial data. If we argue that spatial data are important for effective decision making and therefore improve our quality of life, the same counts for GIS. Spatial data and GIS often go hand in hand and aren’t easily separable. The use cases of spatial data are the use cases of GIS.

Today, using computers, possibilities are endless. GIS became an important tool in areas like Geography, Archaeology, Marketing, Urban Planning, Criminology, Logistics or Resource Management.

GIS are tools, which are able to read, write and calculate geographic information resp. data. While in our modern times this almost automatically ends up in computer application, in principle these tools could also be a map, a tape measure, a ruler and a pen.

Please take a look at the historic map about one of the first GIS analysis that took place long before we started speaking about information systems and spatial data as such. In 1854 John Snow analyzed cluster of disease distribution using a map during the Cholera epidemic in London to determine outbreak point. He was able to identify the source of the outbreak, a contaminated water pump.
What is Spatial Data Infrastructure (SDI)?

At this stage we already explained what are Spatial Data, highlighted their importance for our daily life and introduced the Geographic Information System as tool to capture, update and analyze spatial data. But one important and part in the picture is still missing, the infrastructure for spatial data. If we would talk in pictures we could see GIS as the train and the spatial data as passengers. However, our picture would miss something. Train needs rails to move and to bring passengers to their destination – hence, we need a Spatial Data Infrastructure to exchange spatial data.

Spatial Data Infrastructure – commonly referred to as SDI – is a concept that is difficult to understand if one expects a physical or virtual object. SDI is neither a piece of software nor is it data - it contains both, as the scope of SDI is to enable an effective and efficient communication and sharing of spatial data. Therefore, it builds a framework for geographic data and their respective metadata users and GIS tools. That framework defines agreements on different levels - technology, standards and policies – which should enable the efficient work with and sharing of spatial data, including:

- discovery
- acquisition
- processing
- distribution
- use
- maintenance
- preservation.

SDI is an agreement on commonly used procedures between a large number of stakeholders which - depending on its size - often implies extended organizational and administrative work which can greatly exceed the technology related work. Spatial Data Infrastructure exists on all different levels and for all different purposes. SDI develops from the need of the users to improve the sharing of data. The scale and the purpose of SDI are closely related and depending on each other. We can observe small size SDI in companies with a small number of users as well as global SDIs such as GEOSS or UNSDI (information and data infrastructures of global scale) including thousands of users around the world. They all try to achieve a certain degree of interoperability by using the same technology, standards and policies.

“An SDI is a coordinated series of agreements on technology standards, institutional arrangements, and policies that enable the discovery and use of geospatial information by users and for purposes other than those it was created for.”
(W. Kuhn, 2005)

What is metadata (in your opinion)?
This term, heavily used in the context of SDI an INSPIRE, refers to own kind of data, usually the official data about data, i.e. data describing data. Metadata typically contains information on data content, category, ownership, method of data collection and processing, spatial extent, etc. in order to empower potential user to search through catalogues without touching the data itself.
You might wonder what these two pictures on this page have in common? Do you recognize them? One is a painting of Pieter Bruegel the Elder showing the Tower of Babel (1563). Following the legend in the Bible (Gen 11,1–9) God punished the humans by making them all speak different languages and suddenly their joint project of the Tower of Babel was doomed to fail. The latter picture is the Mars Climate Orbiter. On September 23, 1999, NASA lost contact with Mars Climate Orbiter after about 9 months of its travel through space.

In a later published report NASA confirmed that the main reason for that costly fail was a mistake in calculation caused by different units of measurement different software components where using. A loss of $327.6 million!

You might ask what these two cases have in common. Both projects – the legend of the ancient tower and the Mars Orbiter – are stories of failed projects. And in both cases the reason of the disaster is located in failed communication and interaction of different parts of the system, be it humans or pieces of software, the so-called interoperability.

Interoperability was missing, a term heavily used in the framework of GIS, SDI and INSPIRE. Interoperability, generally explained, is the ability of different components, systems or organizations to communicate and work with each other.
What is INSPIRE?

We already introduced SDI as a framework for spatial data using agreements on technology, standards and policies to achieve interoperability. You also should already know that SDI can have different scales and different purposes, such as national and regional SDIs for administration or global SDIs for different social benefits. Now we would like to introduce INSPIRE as the Spatial Data Infrastructure for the European Union.


The core Directive is supported by five EU regulations, called Implementing Provisions, addressing certain topics and a wide range of specifications ranging e.g. from technical to semantic interoperability issues.

The sharing of data leads not only to economic values due to cost savings or successful business cases, it also increases our quality of life and supports the governmental system due to increased transparency and participation.

In order to achieve certain level of interoperability, which is needed to bring all national or regional SDIs together, INSPIRE lays down a number of technical specifications which regulate the technology and the standards the involved data providers should use. By doing so it enables everybody to communicate in the same way using terminology and models everybody understands.

As all EU directives the INSPIRE Directive has to be transposed into national law which leads to the development and update of several SDI acts which already changed the way and attitude of data sharing in Europe.

If SDIs are big and hard to describe as a whole it is even more difficult with INSPIRE as this European SDI is designed as a ‘system of systems’ with a much more decentralized approach. It builds on the establishment of smaller SDIs on national level, the so-called NSDIs, and understands itself as sum of all smaller pieces in Europe.
INSPIRE defines 34 Spatial Data Themes:

ANNEX I
- Coordinate Reference Systems
- Geographical Grid Systems
- Geographical Names
- Administrative Units
- Addresses
- Cadastral Parcels
- Transport Networks
- Hydrography
- Protected Sites

ANNEX II
- Elevation
- Land Cover
- Orthophotography
- Geology

ANNEX III
- Statistical Units
- Buildings
- Soil
- Human Health and Safety
- Environmental Monitoring Facilities
- Agricultural and Aquaculture Facilities
- Area Management / Restriction / Regulation Zones / Reporting Units
- Atmospheric Conditions
- Oceanographic Geographical Features
- Bio-Geographical Regions
- Species Distribution
- Mineral Resources
- Energy Resources
- Protected Sites
- Hydrography
- Transport Networks
- Administrative Units
- Addresses
- Cadastral Parcels
- Geographical Grid Systems
- Geographical Names

INSPIRE is one of the main tools for eGovernment in Europe as it shall not only empower public administrations, citizens or the economy to take informed decisions and develop business cases but it rather shall change the attitude of data sharing in Europe. The sharing of data leads not only to economic values due to cost savings or successful business cases. Data sharing can increase and boost the IT related economy, increase our quality of life and support the governmental system due to increased transparency and participation.

The INSPIRE implementation is organized and steered by the so called Group of Four which includes the DG Environment, the Joint Research Center, the European Environment Agency and Eurostat. Further information on INSPIRE are provided by the Joint Research Centre of the European Commission, http://inspire.jrc.ec.europa.eu/.
What is INSPIRATION?

INSPIRATION - Spatial Data Infrastructure in the Western Balkan is a multi-country project founded by the European Union that started in 2012. The project aims at promoting spatial data infrastructure (SDI) and coordinating its implementation in the Western Balkans with a view to preparing beneficiaries to meet the objectives of the EU INSPIRE Directive. There are seven beneficiary countries involved in the project - Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Montenegro, Serbia, and Kosovo*. INSPIRATION aims to contribute to a favourable environment for accurate, up-to-date, high-quality, well-structured and accessible spatial data in local, regional and state administrative bodies in the region. The project has three main objectives - institutional framework, capacity building and awareness rising - which are strongly linked to each other. The countries of the Western Balkans have become the focus region of European enlargement activities during the last few years. All countries are either EU candidate countries or potential candidate countries with exception of Croatia that joined the EU on 1st July 2013.

In the process of joining the European Union, accession countries have to adopt the EU legal framework and EU laws. One of the criteria for joining the EU is the establishment of EU conform legislation and administrative structures to be able to fully implement the INSPIRE Directive and the related implementing regulations as part of the Environmental acquis communautaire of the EU. For more information about the project you can visit www.inspiration-western-balkans.eu.

Without going to much in detail there are some facts you should know about INSPIRE:
- INSPIRE lays down general rules to establish an infrastructure for spatial information in Europe
- INSPIRE define 34 spatial data themes in three annexes ranging from Cadastre parcels to Habitats and biotopes
- The INSPIRE directive legally binds public institutions which hold or own data related to the 34 spatial annex themes to make their data accessible in accordance with the INSPIRE specifications.
- If your data is related to INSPIRE, the Directive asks you to publish it as view and download service for the purpose of reuse, as well as to provide metadata for discovery purposes

But
- INSPIRE does not require the collection of new data
- INSPIRE allows the possibility to limit the accessibility to certain users or to apply fees
Speedy development of contemporary society confronts us with growing challenges. Technology development opened door to modernization of government administration and a route towards e-society, and one of the basic elements in that process is spatial data infrastructure. More efficient planning, decision making and general improvement of society in which we live today is being more and more directed to usage, exchange and analysis of information on space. To properly arrange the information on space we create and use, establishing their infrastructure has become necessary. Defining and improving the existing national infrastructure of geospatial data has become not only a requirement, but also an obligation for all relevant stakeholders in Montenegro.

One of the ways to do it is Directive 2007/2/EC of the European Parliament and of the Council on establishment of spatial data infrastructure in the EU (Infrastructure for spatial data in European Community - INSPIRE), which entered into force on 15 May 2007. The purpose of this directive is establishing spatial data infrastructure in the EU for the needs of policies and activities which can impact on the environment. Although this directive is mandatory only for the EU member countries, keeping in mind Montenegro’s commitment to joining the EU and the significance of geospatial data in modern society, our strategic goal is to introduce INSPIRE directive into Montenegrin legal system.

In Montenegro, various institutions which function at local, regional, national and international level produce or use geospatial data, mostly about spatial planning, environment, tourist, agricultural, water management and manufacturing capacities. A high percentage of organizations obtain different kinds of geospatial data needed for their everyday operations from other institutions.

All this indicates the importance and complexity of establishment and maintenance of National Spatial Data Infrastructure which ensures the possibility of combining spatial datasets and services interaction. It is clear this is not a one-step task, but requires long-term cooperation of numerous institutions and a strong support from the Government of Montenegro, with the purpose of developing e-Government, to ensure conditions for exchange and usage of geospatial data, which shall produce benefits that will be reflected in public and private sector, the economy and citizens.
General condition of spatial data in Montenegro is characterised by division of datasets and data sources. Datasets are often not harmonized and available to public, which sometimes causes collection of the same data by different institutions, in an inadequate way and not in line with regulations.

Inventory of available data is not arranged, there is a lack of guidance and regulations for production of spatial data, and such situation itself limits usage of available data.

Quantity and quality of available data is not negligible, but it is necessary for each institution to define the type and quality of data they produce or use.

Montenegro doesn’t have a separate law regarding National Spatial Data Infrastructure and INSPIRE directive, but changes and supplements of the Law on State Survey and Real Estate Cadastre created foundation for establishment of the National Spatial Data Infrastructure (hereinafter: NSDI) in Montenegro.

According to aforementioned law, the NSDI stands for strategy, technology, rules, standards and human resources which are necessary for collecting, processing, keeping, accessing, exchanging and optimally using the geospatial data of Montenegro.

NSDI comprises digital geodata and appropriate geodata services in Montenegrin territory, which are jurisdiction of: organs of state and public administration, organs of local government, legal entities that perform tasks of public interest, legal entities that are entrusted with management of geodata and legal
Mandate of NSDI Council:
1) it provides the Ministry with opinion on defining NSDI subjects per domain field and type of data, criteria for establishing and maintaining NSDI, middle-term work programme, level of compensation for using NSDI geodata, approach to control of the establishment and functioning of NSDI;
2) it coordinates activities of NSDI subjects;
3) it adopts code of conduct;
4) it forms work groups for performing particular expert works;
5) it instructs subjects regarding work and organization of activities of NSDI, as well as other activities important for functioning of NSDI.

Role of the Council and working groups of NSDI is to initiate, in their respective domains, changes in legislation which refer to exchange of geodata between government and other bodies. This includes drafting of appropriate legal acts, as well as drafting of agreements on exchange, access and use of geodata for certain INSPIRE themes, work groups and ensuring of regulations. It is necessary to find a way how to define competent or responsible subjects for “complex themes”. Due to complexity of the data, inclusion of employees in preparation, processing and production of data should be a basis for cooperation and inter-connection when it comes to competence of institutions. Also, a significant segment is occupied by the private sector, which appears as both user and producer of spatial data.

Real Estate Administration holds inevitably a central position in establishing the NSDI in Montenegro, both in regard to legislation and in regard to competence for many themes within the Annexes.

At the moment, for the sake of planning and realization of activities of transposition of INSPIRE directive into Montenegrin legislation, it is necessary to carry out an analysis of the current situation in the geoinformation sector, in cooperation with relevant institutions of public and private sector.

With the purpose of full transposition of INSPIRE directive, it is necessary to make a decision on implementation of existing, or preparation of new Law on NSDI, which shall transpose all the necessary Directive elements.

This is a very important decision!

Who is responsible for NSDI?

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The issue of availability of data which are the posses-
The role of the government and other bodies is defined in a series of laws, primarily in the Constitution of Montenegro, the Act on Free Access to Information and Law on Ratification of the Convention on Access to Information, and involvement of the public in decision-making and the right to legal protection in environmental issues, as well as other legislation regarding competence for geospatial data. Constitution and laws guarantee access to data which are possessed by government and other bodies; they also guarantee that general policy is directed towards public access to data in digital form.

Exchange of geodata between government and other bodies is arranged by Constitution, laws, and other general acts. The Act on State Administration prescribes a general obligation of state administration and other organs to cooperate and deliver data and information necessary for work.

Since the way of exchange is not regulated in detail by the law or sub-laws, in many cases the way of exchange of geodata is defined by state or other organs themselves, in accordance with agreement between state and other organs, or on the basis of previously concluded agreements. However, since certain INSPIRE themes are “complex” and comprise several geodata sets, several institutions can be responsible for a particular theme, or one institution can be competent for multiple themes or parts of data from certain themes.

Competence for a specific INSPIRE theme can be determined on the basis of systematic laws which anticipate the forming of databases and registers of geodata for certain expert fields, their organization and content. Those laws are on: environment, agriculture and rural development, energy, transport, railway, waters, hydro-meteorology, hydrography, forests, mining, geologic research, statistics, spatial planning and construction, agricultural land, cultural heritage, defence, register of spatial units.

<table>
<thead>
<tr>
<th>Competent institutions for themes from annexes of INSPIRE directive - example</th>
<th>Institution</th>
<th>Annex 1</th>
<th>Annex 2</th>
<th>Annex 3</th>
</tr>
</thead>
</table>
| Real Estate Administration | • Coordinate reference systems  
  • Geographical grid systems  
  • Geographic names  
  • Administrative units *  
  • Addresses *  
  • Cadastral parcels  
  • Transport networks *  
  • Hydrography * | • Elevation  
  • Orthoimagery | • Statistical units *  
  • Buildings  
  • Land use  
  • Utility and governmental services * |
How to reach the goal

Three steps important for the upcoming period shall be analysis of the situation in geosector, establishment of NSDI Council and production of Development Strategy for NSDI in Montenegro. As so far in Montenegro a quality analysis and overview of condition of current legislation regarding collection, exchange and usage of geodata still hasn’t been done, some of the next steps towards establishment of NSDI shall surely be analysis of current situation in the geoinformation sector. Such analysis is necessary for planning and realization of activities on transposition of INSPIRE directive into Montenegrin legislation and other activities of creating the institutional frame, such as defining agreement on cooperation and determination of responsible parties, i.e. leading institutions for certain datasets. Real Estate Administration also plans to spark an initiative for Strategy of Development of NSDI in Montenegro. Production of that Strategy requires inclusion of all institutions that produce or use spatial data, so that creation of NSDI ensures information, services and exchange of geospatial data in a part of public and private sector. The purpose of production of this strategy is definition of obligations, competence, spatial datasets and usage by means of services, cooperation and joint action in the field of production and use of geospatial information. It is also necessary to realize initiative for establishment of coordination bodies (the NSDI Council and expert working groups) and to define and conclude agreement on exchange, access and usage of geodata between government and other bodies, which is defined in the Law on State Survey and Real Estate Cadastre. In practice there are problems in the process of exchange of geodata between government and other bodies.

Situation in practice

- Even though laws oblige government and other bodies to keep geodatabases and registers of geodata in digital form, the fact is, due to different circumstances (lack of funds, technical possibilities and expert personnel ...), in a certain number of cases geodata do not exist in digital form, and quite often they are unreliable and out-of-date.
- Due to lack of regulation on applying standards, collected geodata often aren’t suitable to be exchanged and used multiple times
- In most cases no deadlines are stipulated for delivery of data, way of use and data handover
- There are no generally accepted standards, technical capacities, appropriate services and alike
- No rules are defined for data protection

All this leads to exchange of data not being carried out systematically, and varying from case to case.

To change this, an appropriate legal framework is necessary, among other things. It is necessary to adopt regulations which arrange the exchange of geodata between government and other bodies in accordance with INSPIRE directive.

Conclusion and execution of agreements would make government and other bodies obtain the necessary geodata under conditions defined in advance and to have insight into accessible relevant geodata at one place through the national geoportal. That would ultimately mean creation conditions for better and more efficient decision-making on matters within jurisdiction of these bodies. The same process would further result in spreading awareness about the importance of geodata and could represent an important factor in further definition of state policy in this area through adequately financed geodata collection.

WHAT WOULD AGREEMENTS DEFINE?
1) Rights and obligations of NSDI subjects;
2) The way of geodata exchange (deadlines, technical issues ...);
3) Definition of compensation level for usage of geodata (if the legislation anticipates it) and of web services;
4) Definition of standards for geodata (which would enable interoperability);
5) copyright
6) other relevant issues
Deadlines

Law on State Survey and Real Estate Cadastre, as well as other systematic laws and strategies, create foundations for establishment of NSDI in Montenegro, leaning on INSPIRE directive. One can state that legal framework exists. Real Estate Administration initiated Establishment of NSDI Council as a coordination body, which is the first step, and it should happen as soon as possible as a prerequisite for all further activities. National NSDI implementation strategy should define activities, competences, services for usage of geospatial data, cooperation of public and private sector, goal and vision of benefits of data exchange and availability, and most importantly, the importance of mutual cooperation with the purpose of successful construction of high quality infrastructure.

As basis for production of the strategy, the analysis of current situation mentioned in a previous chapter shall be used, as well as the following documents:
• Strategy of public administration reform in Montenegro for period 2011 -2016 (2011)
• …

Deadlines for implementation of INSPIRE directive have been adopted by the European Commission and for the period 2010 - 2020 some 20 dates – deadlines have been set for completion of individual implementation phases of the Directive.

Therefore, the final date for implementation of INSPIRE directive provisions roughly corresponds with current assessment of Montenegro’s accession to the EU, and that gives a new dimension to this whole process, as well as an additional motive for participation in implementation of individual phases and meeting the adopted deadlines.

Current situation

The need for geospatial data has increased in Montenegro in the last few years. By accepting new trends and technological achievements, requests for data in analogue form are neglectable compared to requests for data in electronic form, which implies the conclusion that there is a need to digitize available data.

Better availability of spatial data through network services has been ensured in the previous period. Spatial information consolidated into common infrastructure prevent duplication and data inconsistency, and provide the possibility of efficient management, faster, easier access and decision making.

Common geospatial data infrastructure should be developed on the basis of available data, but it is necessary to keep the mutual compatibility in mind. Foundation for future national geoportal should be existing portals and data prepared in accordance with INSPIRE directive.

Some of the existing web services have the purpose of facilitating access to data for citizens and institutions, with ultimate goal of better information dissemination, decision making and planning activities. At national level, service networks for spatial data groups are being created, such as:
• Discovery services, which enable the search of spatial data;
• View services, which enable, as a minimum, display, navigation, zoom-in/zoom-out, panoramic view or overlap of spatial datasets which can be viewed and showing legend, as well as other relevant content of metadata;
• Download services, which enable the copying of spatial datasets, or their parts, and if needed, direct access;
• transformation services, which enable transformation of spatial datasets for the purpose of achieving interoperability;
• services which enable invoking of spatial data services

Initial version of the national geoportal published by Real Estate Administration with data available from its jurisdiction was launched in 2010, and it can be found at [www.geoportal.co.me](http://www.geoportal.co.me) (Figure 1)
Network services are implemented for the following set of spatial data:
- Ortho-photos of Montenegrin territory from different shooting periods (last update 2010-2011)
- Digital map 1:25000
- Data on cadastral parcels and buildings from real estate cadastre records. (Figure 2)

Access to network services is provided through geportals which for the moment only have local character, with the ambition of forming the national geportal.

Apart from activities of updating and completing the geospatial data which are already available at the geportal, the Real Estate Administration is also devoted to preparing publication of data and services for other INSPIRE themes such as: geographic names, spatial reference, land use, elevation models, register of spatial units and address register.

Another portal of local character is the Portal of the Ministry of Sustainable Development and Tourism of Montenegro, available at www.mrt.gov.me/ministarstvo, which contains spatial information regarding planning documents, issued urban-technical conditions and building and use permits. In the part "planning documentation and issued urban-technical conditions" the available data are:
- Issued urban-technical conditions
- State studies
- Plans of land use allocation
- Plans of allotment and regulation
- other planning documents
When geoportals of local government are concerned, we could mention the following: At Podgorica City portal, NSDI data are available under Office for planning, spatial planning and environmental protection www.old.podgorica.me. Here you can find Planning documentation, Spatial planning programme, Report on the situation of spatial planning, Urban-technical conditions, Building permits, Use permits and other documents.

Tivat Municipality portal at www.opstinativat.com/component/content/article/58.html, makes available the Spatial urban plan of Tivat Municipality, Spatial planning, State level planning documentation, Currently valid planning documentation, Urban-technical conditions, Building and Use permits and Planning documentation in development.

Web portal of Bar Municipality is available at www.bar.me/index.php?action=wppp, and here you can find General urban plan of Bar, Detailed urban plans, Urban designs, Local location studies.

Exchange of geodata is not on satisfactory level, approach, and creation of new cooperation model between state and other organs. There is good communication and cooperation between state and other organs, which is an encouraging step, although just the beginning of NSDI development.

SDI shall firstly enable better functioning of the public sector, while integrated infrastructure shall enable benefits to both private and public sector. NSDI implementation, in accordance with INSPIRE directive, shall have a large spectre of interested parties:

- Public sector – policy makers: they shall have a quicker and simpler access to information on space, as prerequisite for making optimal decisions. Examples include planning economic and residential development, monitoring climate change effects, preserving endangered resources, optimization of land usage. This refers to several levels of the public sector;
- Public sector - services: they shall have benefits from information exchange. Examples are responses to emergency situations, traffic management, fight against crime etc;
- Citizens: they shall have better information on locations in Montenegro, as well as different type of information on them, and also benefits from improved public sector services;
- Private sector: opportunities to create additional value to their services, using or producing standardized information and integrated data groups
- Academic sector: access to integrated data groups, which are often necessary for research work.
Thank you for showing interest in this brochure. We hope we managed to present you how “cooperation for space” is crucial for building up an efficient SDI. We - both the Real Estate Administration of Montenegro and team of the INSPIRATION project - are aware that a lot has been achieved already but much more still needs to be done to catch up with the INSPIRE roadmap and to create the benefits mentioned in this brochure. Therefore, cooperation both inside Montenegro and between the countries of the region must continue also after the INSPIRATION project. With this brochure provided during the last phase of the project we want to motivate all stakeholders to continue their work.

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* This designation is without prejudice to positions on status, and is in line with UNSCR 1244/99 and the ICJ Opinion on the Kosovo declaration of independence.