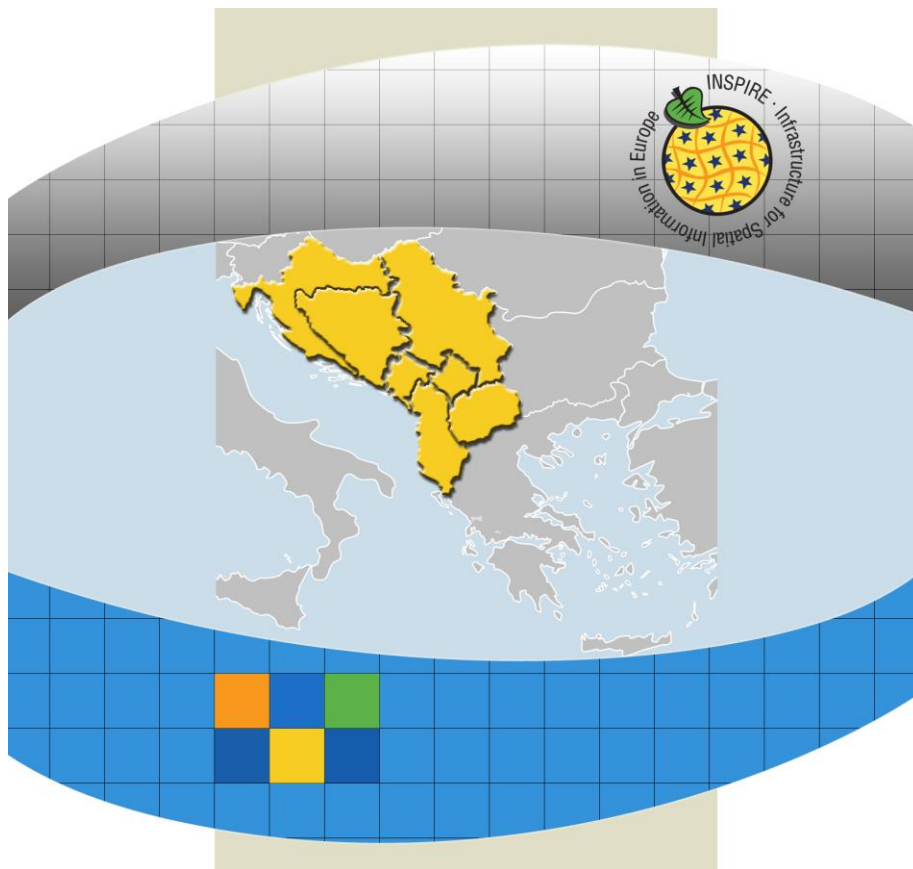




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J R C T E C H N I C A L R E P O R T S

# Report on the status of INSPIRE in the Balkan countries



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## INSPIRE Infrastructure for Spatial Information in Europe

# Report on the status of INSPIRE in the Balkan countries

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These are Dublin Core metadata elements. See for more details and examples <http://www.dublincore.org/>.

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## Acronyms / Glossary

Used Term	Definition
AL	Albania
BA	Bosnia and Herzegovina
BG	Bulgaria
DE&RD	Digital Earth and Reference Data Unit (DG JRC)
DG ENV	Directorate General for the Environment
DG JRC	Directorate General Joint Research Centre
EC	European Commission
EEA	European Environmental Agency
E&IA	Enlargement & integration action
ENP	European Neighbourhood Policy
ESDI	European Spatial Data Infrastructure
EU	European Union
EUROSTAT	Statistical office of the European Union
FBA	Federation of Bosnia and Herzegovina (Bosnia and Herzegovina)
HR	Croatia
IES	Institute for Environment and Sustainability (JRC)
INSPIRATION	INSPIRATION - Spatial Data Infrastructure in the Western Balkans (EU IPA2010 Multicountry Project)
INSPIRE	Infrastructure for Spatial Information in the European Community
IPA	Instrument for Pre-Accession
IPC	INSPIRATION Project Consortium
IR	Implementing Rules
ISO	International Organisation for Standardisation
JRC	Joint Research Centre (see JRC)
LAS	Land Administration System
MD	Moldova
ME	Montenegro
MK	Macedonia, The Former Yugoslav Republic of
MS	Member States

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NMCA	National Mapping and Cadastral Agency
NSDI	National Spatial Data Infrastructure
OGC	Open Geospatial Consortium
RO	Romania
RoS	Republic of Srpska (Bosnia and Herzegovina)
RS	Serbia
SDI	Spatial Data Infrastructure
SIDA	Swedish International Development Cooperation Agency
TR	Turkey
WB	Western Balkan
WCS	Web Coverage Service
WFS	Web Feature Service
WMS	Web Map Service
XK	Kosovo*

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\* Whenever Kosovo is mentioned in this report, this designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Advisory Opinion on the Kosovo Declaration of Independence.

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## Executive summary

The establishment of Spatial Data Infrastructures (SDIs) as frameworks facilitates the increased use of the spatial information that supports a large number of policies and activities across various levels of public authority in Europe. Setting up an SDI requires coordination of the stakeholders involved. Directive 2007/2/EC<sup>1</sup> of the European Parliament and of the Council, adopted on 14 March 2007, aims to establish an Infrastructure for Spatial Information in the European Community (INSPIRE) for environmental policies, or policies and activities that have an impact on the environment. Environmental policies, which are heavily reliant on spatial information, have been chosen as the starting point upon which to establish such a SDI.

INSPIRE responds to the need for quality geo-referenced information to help understand the complexity of, and interactions between, human activities and environmental pressures and impacts. It addresses the current general situation with respect to spatial information in Europe, where there is an urgent need to fill in gaps in data availability and to eliminate the duplication of information, as well as to compensate for the fragmentation of existing datasets and sources. Given the importance of data to a large number of policy and information themes across various levels of public authority, these obstacles make it difficult to identify, access and use the data that are available, to the detriment of environmental integration.

The INSPIRE Directive requires actions from the EU Member States and also has direct implications for the countries neighbouring the EU, regardless of whether or not they are candidate countries.

The main objective of this report is to give an overview of the status of National Spatial Data Infrastructures (NSDIs) in Western Balkan (WB) countries and their efforts towards the implementation of the INSPIRE Directive. As part of their EU accession, many of the WB countries have drawn up national programmes to bring them into alignment with EU legislation. The INSPIRE Directive is explicitly mentioned in some of these programmes.

Preconditions for EU membership, to which all the WB countries currently aspire, include the administrative capacity of the country to incorporate the EU *acquis communautaire*, fulfil adopted standards and execute obligations. The challenge of establishing NSDIs in the WB countries is compounded by the challenges of developing a market economy, governmental structures and institutions, including the modern National Mapping and Cadastral Agencies (NMCAs). The policy support given by the EU (including pre-accession funds) is expected to strengthen the efforts of these countries in this process.

Analysis of the existing conditions and status of NSDIs in WB countries clearly shows that in all countries there are ongoing initiatives on NSDI implementation

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<sup>1</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32007L0002:EN:NOT>

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in the line with INSPIRE. While the level of NSDI implementation differs between countries, they are all on the right track towards INSPIRE adoption. In all WB countries, NMCAs are recognised as the main drivers and coordinators of this process.

The Joint Research Centre (JRC) acts as the overall technical coordinator of INSPIRE and helps the Member States in its implementation. Through the Enlargement and Integration Action (E&IA), the JRC also supports enlargement and (European Neighbourhood Policy) ENP countries on the road towards EU membership, including providing support on INSPIRE implementation.

This technical report was prepared as a JRC IES Digital Earth & Reference Data Unit, Action 11602 - SHAPE (Sharing Policies for Environment) deliverable 2.4.1 in 2013.

**Key words:** JRC, INSPIRE, NSDI, Development, Support, Western Balkan, INSPIRATION



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## Purpose of this document

The main purpose of this document is to summarize on-going initiatives and activities in the Western Balkan countries to develop a National Spatial Data Infrastructures following the principles and provisions of the INSPIRE Directive. It also gives an overview of different JRC activities in the support of INSPIRE implementation in the Western Balkan.

The document is publicly available as a 'non-paper' as it does not represent an official position of the Commission, and as such cannot be invoked in the context of legal procedures.

## 1. Introduction

The WB region as a part of Balkan area covers following countries: Albania, Bosnia and Herzegovina, Croatia, the Former Yugoslav Republic of Macedonia, Montenegro, Serbia and Kosovo\* (Figure 1).



Figure 1. WB countries

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\* Whenever Kosovo is mentioned in this report, this designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Advisory Opinion on the Kosovo Declaration of Independence.

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The region of the WB is inhabited by some 26 million people and covers an area of about 275,000 km<sup>2</sup>.

Regarding the current status in the relationship with EU the situation differs<sup>2</sup>:

- Acceded country
  - Croatia (Member State as of 1st of July 2013)
- Candidate countries
  - The former Yugoslav Republic of Macedonia
  - Montenegro
  - Serbia
- Potential candidates
  - Albania
  - Bosnia and Herzegovina
  - Kosovo.

Although individual countries of the region are at different stages of EU integration, all of them see membership as their main political and development objective (Cetl et al. 2013). The focus and effort of the institutions in the WB countries are directed at meeting the criteria in order to achieve this goal. This huge and complex task includes the adoption and harmonization with EU *acquis*.

Environmental *acquis* comprises over 200 legal acts, ranging from international agreements to data streams to the EEA, covering horizontal legislation, thematic actions in water and air pollution, management of waste and chemicals, biotechnology, nature protection, industrial pollution and risk management, noise and radiation protection, etc.

INSPIRE Directive and implementation of ESDI is based on the existing initiatives taken at national (NSDIs) or regional level. As a part of EU *acquis*, INSPIRE Directive is part of the negotiation processes between EC and candidate countries. Croatia (HR) as an acceded country was required to transpose INSPIRE Directive into the national legislation before the formal accession. This also means that HR was ready to immediately follow the INSPIRE roadmap after becoming a full member state. Candidate and potential candidate countries do not have legal obligation for implementation; nevertheless they are interested in following, dissemination, and use the results of INSPIRE.

The fall of the iron curtain and the change of social and economic order in the WB countries have resulted in significant cultural change, especially in the perception of real property ownership and real property transactions (Cetl et al. 2012a). In order for the entire WB region to be able to support the growing real

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<sup>2</sup> <http://ec.europa.eu/enlargement/>

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property market and the security of investments it was necessary to reform the land administration system (LAS); to replace the heritage of the collective ownership that was in practice over 50 years in Yugoslavia and Albania. For this reason International institutions such as the World Bank have given priority to the LAS reform and why it has become the main driver in the development and improvement of existing NSDIs. Reform of LAS in the WB started at the end of the 1990's was mainly focused on the reorganisation of relevant institutions, digitalisation, systematic update of maps and registers, improving professional education and life-long learning and development of information and communication technology.

The NSDIs development was supported by the close cooperation and collaboration among NMCAs in the WB region that became even more intensive after the first regional conference in Croatia in 2008 (Roić et al. 2008). It was followed by other similar events in the Former Yugoslav Republic of Macedonia (Steiner et al. 2009), in Montenegro (Roić 2010), in Slovenia (Petek 2011), in Bosnia and Herzegovina (Bačić and Poslončec-Petrić 2012) and in Serbia (Ogrizović 2013).

In 2011 for the first time two of the WB countries, HR and MK, took part in the State of Play Reports<sup>3</sup> covering NSDI development in 2010 and 2011. To complement the study from 2011 this report provides further details on NSDI status in WB countries with emphasis on those countries, for which such comprehensive information was not yet available.

In addition an overview of the multi-country INSPIRATION project is given, which promotes SDI development and coordination of national implementation, with a view to preparing the beneficiary countries to satisfy the objectives of the INSPIRE Directive. In this context a summary of different activities carried out in the frame of the Enlargement and Integration Action (E&IA) of the JRC is also presented.

At the end of the report conclusions and recommendations for further developments are given, which should help and foster all WB countries in their efforts to develop NSDIs in the framework of INSPIRE and European environmental acquis.

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<sup>3</sup>The study and the report commissioned by DG ESTAT and ENV is available in <http://inspire.jrc.ec.europa.eu/index.cfm/pageid/6/list/4>

## 2. On-going activities in WB countries

All countries with the exception of BA have a truly national approach for their NSDI. BA consists of two entities created by the Dayton Agreement<sup>4</sup> in 1995: FBA and RoS. According to this structure there are two separate regional SDIs that should be interoperable at national level. These two regional SDIs together with their corresponding entities are treated separately in this report.

It should be also emphasised that NSDI establishment in majority of WB countries is under the responsibility of NMCAs or their respective ministries (Table 1).

*Table 1. NSDI responsible organisations in WB countries*

Country	Institution	URL
AL	State Authority for Geospatial Information	<a href="http://asig.gov.al/">http://asig.gov.al/</a>
FBA	Federal Geodetic Administration	<a href="http://www.fgu.com.ba/">http://www.fgu.com.ba/</a>
HR	State Geodetic Administration	<a href="http://www.dgu.hr/">http://www.dgu.hr/</a>
ME	Real Estate Administration	<a href="http://www.uzn.me/">http://www.uzn.me/</a>
MK	Agency for Real Estate Cadastre	<a href="http://www.katastar.gov.mk/">http://www.katastar.gov.mk/</a>
RoS	Republic Administration for Geodetic and Property Affairs	<a href="http://www.rgurs.org/">http://www.rgurs.org/</a>
RS	Republic Geodetic Authority	<a href="http://www.rgz.gov.rs/">http://www.rgz.gov.rs/</a>
XK	Kosova Cadastral Agency	<a href="http://www.kca-ks.org/">http://www.kca-ks.org/</a>

The role of organisations in the NSDI process is multiple. On the one hand they are making proposals for legal procedures according to INSPIRE Directive and on the other hand they are also responsible for technical support in implementation and for overall coordination with other interested stakeholders.

Very big and positive impact on the NSDIs development has the ongoing „INSPIRATION – Spatial Data Infrastructure in the Western Balkans” project (see Chapter 2.8). This multi-country project aims at promoting NSDI and coordinating its implementation in the WB countries with a view to prepare beneficiary countries to meet the objectives of the INSPIRE Directive. The main beneficiaries of the project are the NMCAs that also play the role of principal coordinators and focal points. Since the countries of the WB region are relatively small and have limitations in available resources, the regional cooperation between NMCAs is a key factor for better synergies and for division of tasks for mutual benefit.

<sup>4</sup> <http://www.state.gov/www/regions/eur/bosnia/dayton.html>

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In the next chapters the analysis of the status and the development of NSDI is follows the structure of the State of Play Report dedicating separate sections to the major aspects of NSDI:

- Legal issues and funding
- Coordination and organisational issues
- Spatial data sets
- Metadata
- Network services
- Interoperability and standardisation
- Use and efficiency.

## 2.1 *Legal issues and funding*

Many governments in WB region already have a legal instrument or other framework document determining the strategy and development of NSDI. Almost all countries except FBA have taken legislative commitments for NSDI implementation. FBA is in the phase of preparation of such legislative framework. Thereby NMCAs in the region are officially or de facto recognised as coordinating body of the NSDI development.

In the most cases, except AL and HR, NSDI legislation has been integrated as a chapter in the geodetic or cadastre law (Table 2).

*Table 2. NSDI legislation in the WB countries*

Country	Law	Year of adoption
AL	Organisation and functioning of NSDI in the Republic of Albania	2012
FBA	--	-
HR	Law on NSDI	2013
ME	Law on state survey and real estate cadastre	2007
MK	Law for real estate cadastre	2008
RoS	Law on survey and cadastre of the Republic of Srpska	2012
RS	Law on state survey and cadastre	2009
XK	Law on cadastre	2011

Laws are attuned to some but not to all provisions of INSPIRE Directive. Only HR as a new MS made a full transposition of INSPIRE Directive with the new

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law that was adopted in May 2013<sup>5</sup>. AL also adopted new law in 2012. Immovable Property Registration Office in AL was treated as NMCA during the INSPIRATION Project. In July 2013 according to the new Law State Authority for Geospatial Information (ASIG) was established which is now a formal NMCA in Albania and the organisation responsible for NSDI implementation. Apart from NSDI legislation it is important to mention that some countries also adopted NSDI strategy documents (AL, HR, MK, RoS and RS) and these documents are publicly available on the NSDI responsible organisations Web sites.

Regarding the legislation it must be taken into account that preparing INSPIRE conformant NSDI law is a big task, but implementing the obligations stemming from this law is an even bigger challenge. This is why even the relatively advanced countries of the regions (i.e. HR) also face major challenges (like many EU MS still do).

Funding NSDI seems to be a great challenge in all countries, which is further complicated by the current economic and financial crisis. Most frequently the financial support is provided by the state budget. Significant contribution is coming from donations and bank loans. The latter mainly comes from the World Bank. Specific projects are financed by donors from EU countries, from Norway, USA and Japan. Some countries also use EU funds (e.g. IPA and other). INSPIRATION project is financed through IPA. The inclusion of private sector through public-private partnerships represents a rarely used mechanism.

The external sources are complemented by own incomes, e.g. by charging fees for spatial data and services. However, there is a lack of clear licensing and pricing policy. Because of the crisis the business models of NMCAs has started to change, which is expressed in increasing self-financing and decreasing budgetary support. High percentages of self-financing are present in RS, RoS, and MK. There is no doubt that SDIs require a strong political will and contributions from all sectors of the society for its successful implementation.

## **2.2 Coordination and organisational issues**

As previously mentioned the main coordinators of NSDI processes in WB countries are NMCAs. Formal organisational structure is mostly regulated by national law. NSDI bodies are established in AL, HR, RoS, RS and XK, while in ME and MK this process is ongoing. The highest organisational level is often the NSDI Council, which is a political body. Members of NSDI Council are usually nominated by different ministries and are appointed by the Government. On operational and implementation level the coordinating entity is either an NSDI Board appointed by the Council (HR) or the NMCA itself (RoS, RS and XK). In some countries thematic working groups are established (HR, RoS and RS) under the auspices of NMCAs (Figure 2).

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<sup>5</sup> <http://www.nipp.hr/default.aspx?id=132>

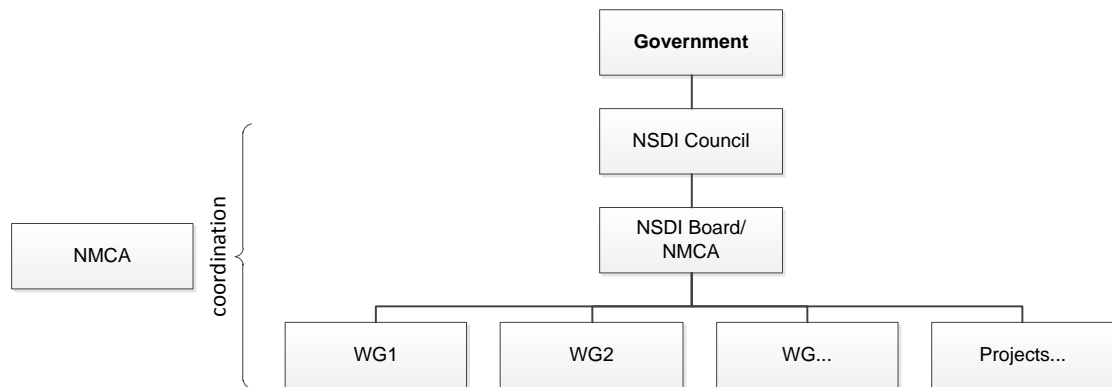


Figure 2. Typical NSDI organisational structure in WB countries

In all countries there are different operational and consultancy projects that are directly or indirectly connected with NSDI development. More information on them can be found on NMCA's web pages.

### 2.3 Spatial data sets

The thematic coverage of the three annexes of the INSPIRE Directive is quite good in all WB countries. Majority of datasets are in the digital form. Those still in analogue form are being digitized. Majority of datasets follow national standards, consequently they are not yet conformant to INSPIRE data specifications.

For majority of annex I and II themes NMCA's are responsible as main data producers/providers (Table 3). Other data themes, especially for annex III, are covered by other public organisations. It is a great challenge to achieve common data sharing agreements. Another challenge relates to technical field, to transform datasets in order to achieve conformity with INSPIRE.

Table 3. Responsibility of NMCA's for INSPIRE Annex I and II themes (Y=yes, N=no)

Country	Annex I									Annex II			
	CRS	GGS	GN	AU	AD	CP	TN	HY	PS	EL	LC	OI	GE
AL	Y	Y	Y	N	N	N	N	N	N	Y	N	Y	N
FBA	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	N
HR	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	N
ME	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N
MK	Y	Y	N	Y	N	Y	Y	Y	N	Y	Y	Y	N
RoS	Y	Y	N	Y	Y	Y	N	N	N	Y	Y	Y	N
RS	Y	Y	N	Y	Y	Y	N	N	N	Y	Y	Y	N
XK	Y	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	N

## 2.4 Metadata

The production and usage of metadata is still unsatisfactory in all WB countries. The reason is rooted in the past when no culture of metadata production existed. Descriptions on analogue map sheets cannot be regarded as standardised metadata records for various spatial datasets. However, for the last several years the situation has been improved thanks to the continuous digital metadata generation. Nowadays spatial datasets in many NMCAs are well covered by metadata (Table 4).

Table 4. Metadata existence in NMCAs

Country	Metadata existence		
	YES	NO	Partially
AL		X	
FBA		X	
HR	X		
ME			X
MK		X	
RoS			X
RS	X		
XK	X		

It should be noted that not all the metadata records are in line with INSPIRE metadata specifications. Most often they are based on ISO 19115 Metadata standard. Only HR has formally adopted INSPIRE Metadata Regulation<sup>6</sup> as a Government decision.

In terms of metadata further collaboration amongst the NSDI stakeholders is needed to create, maintain, and set up of appropriate software for creating metadata records and catalogues and put in place quality assurance for metadata production.

## 2.5 Network services

All WB countries had made efforts to launch network services even before the appropriate provisions of the INSPIRE Directive were published. Later, only HR adopted formally the INSPIRE Regulation as regards Network Services<sup>7</sup> as a Government decision.

<sup>6</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008R1205:EN:NOT>

<sup>7</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009R0976:EN:NOT>



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Establishing network services today is less demanding. In the WB region too, it could have been realised in short time with relatively low financial investment. However providing structured, quality and reliable spatial data sets together with the corresponding metadata to be made available through these services is more challenging both from technical and financial points of view. Therefore all the countries seek to optimally use existing resources and quickly put into operation what is already available. Most of the existing network services are based on homogeneous data sets where data is placed in one single database from the same provider. These solutions are pretty evident in existing implementations in the WB region where a number of discovery and view services run on different geoportals, which are managed by NMCAs (Table 5).

*Table 5. Geoportals (e-services) managed by NMCAs in WB region*

Country	Geoportal (e-services)	URL
AL	Portal	under development
FBA	Geoportal	<a href="http://www.katastar.ba/geoportal">http://www.katastar.ba/geoportal</a>
HR	Geoportal SGA	<a href="http://geoportal.dgu.hr/">http://geoportal.dgu.hr/</a>
ME	Geoportal Montenegro Realestate	<a href="http://www.geoportal.co.me/">http://www.geoportal.co.me/</a>
MK	AREC GIS Portal	<a href="http://webgis.katastar.gov.mk/arec/">http://webgis.katastar.gov.mk/arec/</a>
RoS	Geoportal RGURS	<a href="http://www.geoportal.rgurs.org/">http://www.geoportal.rgurs.org/</a>
RS	Geoportal geoSerbia	<a href="http://www.geosrbija.rs/">http://www.geosrbija.rs/</a>
XK	Geoportal	<a href="http://geoportal.rks-gov.net/">http://geoportal.rks-gov.net/</a>

The majority of services allow the users to search for data and services through metadata and also to visualize the hits. There are much less services for download and transformation.

The creation of cross border services is also complicated by incompatibility and inconsistency of data, for example, by the different coordinate reference systems used in the countries. Without transformation services neither the visual combination nor integrated processing of the data are possible. Adopting INSPIRE network services regulations at regional level would greatly improve the situation.

## **2.6 Interoperability and standardisation**

To be able to harmonise the existing datasets and to enable interoperable spatial data services that meet the needs of NSDI it is necessary to use standards. In all WB countries efforts have been taken to use ISO 19100 series and OGC standards. The level of uptake, however, differs from country to country. In some countries e.g. HR, RS the level of usage is already very high, while in the others is still in its infancy.

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The geoportals in the region, as a rule, have been established for serving a particular set or sets of data, which is maintained by the organisation hosting the portal (e.g. NMCA). Although they are using WMS, WCS or WFS standards, the overall level of interoperability between them is still low. This initial situation is likely to improve when common national geoportals are established.

## **2.7 Use and efficiency**

Since there are no concrete user requirements and user satisfaction surveys in the moment, it is impossible to assess the use and efficiency of existing NSDIs. However the trend in all WB countries is that day by day more and more spatial data sets, services and applications are available. INSPIRE Directive serves as a good trigger for many institutions to start opening their datasets and sharing them with other institutions. This is especially visible in NMCAs in the region but also in other public institutions.

## **2.8 Project INSPIRATION**

The „INSPIRATION – Spatial Data Infrastructure in the Western Balkans” is a EU- financed multicountry project that aims at promoting SDI and coordinating its further development in the WB countries<sup>8</sup>. INSPIRATION project has been initiated by the State Geodetic Administration of HR jointly with the NMCAs from other six WB countries (Bačić and Obradović 2010). The project is supported by the EC through IPA program<sup>9</sup>. The beneficiaries of the project that lasted from 1 January 2012 to 31 December 2013 are all WB countries. JRC has been involved in the project as a member of the Steering Committee.

The overall objective of the project is to contribute towards 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 WB countries. The purpose is to promote SDI and further coordinate its implementation with a view to prepare beneficiaries to meet the objectives of the INSPIRE Directive.

The project was subdivided in three main activities (IPC 2012):

- Activity 1 - Policy, Institutional and Legislative Framework Analyses
- Activity 2 – Capacity Building and Knowledge Transfer
- Activity 3 - Awareness - Raising and Communication.

INSPIRATION is expected to support improvement of NSDI legislation and harmonisation with the INSPIRE Directive; to build capacities (especially in NMCAs) necessary for establishing NSDIs and raise awareness of all stakeholders, comprising the potential users.

The main results of the project were:

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<sup>8</sup> <http://www.inspiration-westernbalkans.eu/>

<sup>9</sup> Reference N°: 2011/281-381, Project Identification No. EuropeAid/130907/C/SER/Multi

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- Results related to Activity 1:
  - More comprehensive and comparable information available within and between Beneficiaries on the status of LAS and SDI to guide reform priorities, policy development, legislative improvements, as well as exchange of knowledge
  - More efficient institutional frameworks and technical arrangements established
  - Legislation regarding SDI framework reviewed for implementation in each Beneficiary
- Results related to Activity 2:
  - Information on the state of play and needs in terms of capacity and skills. Needs for future improvement of training and education clarified; including areas for improvement of capabilities of the recipient NMCAS' officials for analysis, interpretation and policy response , as well as SDI implementation
  - Transparency of SDI/LAS procedures, systems and tools with views of accountability, as well as enhancing relevant expertise of the stakeholders.
- Results related to Activity 3:
  - Enhanced awareness about NSDI and INSPIRE among general public and government
  - Increased level of cooperation and exchange of information on SDI and INSPIRE within and between bodies of recipient jurisdictions resulting in better targeted support and more effective interactions.

Besides the NMCAs INSPIRATION is expected to directly deliver benefits for universities that provide education in surveying, geodesy and geoinformatics and for governmental bodies responsible for environment. In addition, other national SDI stakeholders such as ministries of agriculture, statistical offices, local authorities, geological and hydrographical surveys, private survey, GIS and geoinformatics companies, and research organisations may profit of the results of the project.

All participating countries had very high expectations from INSPIRATION that were well justified by the results of the project. Each beneficiary pointed out the improvement achieved in the harmonisation of the legal framework and in the elaboration of country-specific strategies towards INSPIRE implementation. Therefore the common efforts brought significant improvement of NSDI status in WB countries.

The final event of the INSPIRATION project - European INSPIRATION Conference took place in Sarajevo on 05-06 November 2013. Presentations related to the results of the INSPIRATION project and on the state of NSDI in the beneficiary countries clearly showed a significant progress. The most

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important impact is that the NMCAs are better positioned to lead the NSDI development and drive the implementation of the INSPIRE directive. In addition, the Memorandum of Understanding (MoU) on Regional Cooperation in SDI between all NMCAs is another important step towards cooperation and continuation of project activities.

Final Wrap up meeting was held in Zagreb on 12 December 2013. Main project impact is visible in several areas (INSPIRATON Consortium 2013):

Project impact is visible on several levels:

- By the end of the project the majority of Beneficiary countries have either legislation in place or draft legislation prepared to better align with the provisions of the INSPIRE Directive
- Core beneficiaries institutions are better informed and aware of the concrete challenges of creation of state of the art national SDI, meeting the countries' needs
- A wider circle of beneficiaries (secondary and tertiary beneficiaries, as far as they are public bodies) is informed about the roles to play in a national SDI and about obligations they have as data holders of one of the INSPIRE Annex data
- Private and academic sector are better informed about governmental sector's activities in the field of SDI and start thinking of how they can link to the process, including benefits they can get for their core business or task/function
- National representatives in the already existing regional co-operation are aware of the options available for intensifying the co-operation and have signed a joint statement expressing their interest in continuing activities in the form of a project extension in June 2013
- As the project deploys several EU MS administration experts, personal contacts between administration's experts could be established which create institutional ties and will remain also after the end of the project
- With the setting up of the regional Metadata Portal first steps towards provisions of a regional SDI are made
- The mash up application between cadastre and environmental data implemented in FYRO Macedonia as the winning idea of the ideas competition helps to make visible the concrete benefits of INSPIRE
- It is expected that a continuation of regional activities in the field of NSDI and INSPIRE is ensured by a regional project IMPULS to be financed by the Swedish Development Agency (SIDA).

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### 3. JRC support to INSPIRE implementation in enlargement countries

In frame of its enlargement and integration program DG JRC gives scientific and technical support to countries on the road towards EU membership, New Member States, and countries associated to the Research Framework Programme (FP) in order to facilitate the transfer of the EU legal framework (acquis communautaire) to national legislation and implementation<sup>10</sup>.

The role of DG JRC in INSPIRE is in line with its mission; providing customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies (Annoni 2011). As a service of the EC, DG JRC functions as a reference centre for science and technology across the Union. Close to the policy-making process, it serves the common interest of the MS whilst being independent of special interests, whether private or national. Within the JRC, Digital Earth and Reference Data Unit (DE&RD, here and after Unit) in the Institute for Environment and Sustainability (IES), is responsible for INSPIRE (Cetl et al. 2012b).

The Unit acts as overall scientific-technical coordinator of INSPIRE, guaranteeing the exchange of information between INSPIRE policy makers and stakeholders. Originally it was responsible for the preparation of the INSPIRE Implementing Rules for Metadata, Data specifications, Network services and for the development of the INSPIRE geoportal. The Unit was also active in coordination with other EU and international initiatives. In the meantime, the role of Unit has evolved adding new responsibilities such as, maintenance of the INSPIRE directive and the related technical guidelines and providing support for implementation.

With the support of E&IA, the Unit organised several activities in the period of 2012-2013 to help and support INSPIRE implementation in the enlargement and ENP countries (e.g. WB, Turkey, Moldova and Ukraine) but as well in the new MS (Bulgaria and Romania). The activities that are summarised in the following subchapters included:

- E&IA Workshop at INSPIRE Conference 2012 in Istanbul, Turkey
- E&IA Workshop at INSPIRE Conference 2013 in Florence, Italy
- E&IA Workshop at SDI Days 2013 Conference in Šibenik, Croatia
- Study visit of INSPIRATION Project beneficiaries (NMCAs) to JRC, Ispra, in October 2013.

#### 3.1 E&IA Workshop Istanbul

The E&IA workshop *INSPIRE and Environment* was organised as a special session of annual INSPIRE Conference which took place from Monday 25th –

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<sup>10</sup> <http://ec.europa.eu/dgs/jrc/index.cfm?id=1720>

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Wednesday 27th June 2012 in Istanbul, Turkey. Since the duration of the workshop was only one day, the participants had the opportunity to take part on the whole INSPIRE conference. This was especially useful for deeper involvement in the overall content of the conference and became familiar with issues related to INSPIRE and SDIs in a broader context.

### 3.1.1 Objectives and scope

The workshop was addressed to environmental communities to transmit the experiences and the lessons learnt in SDI implementation in the region in fields of land administration, cadastral and topographic mapping presenting a showcase of good practice examples. The thematic focus was set on Protected sites, Environmental monitoring facilities, Bio-geographical regions, Habitats and biotopes, and Species distribution INSPIRE data themes exploring the connection with other initiatives, such as Shared Environmental Information System (SEIS).

### 3.1.2 Participants

Workshop was attended by SDI experts and environmental professionals (the participants did not necessarily formally represent their national administrations). They had an opportunity for networking and sharing experiences. In total 25 participants from new EU MS, acceding, candidate, potential candidate, and framework programme associated countries were invited (Figure 3). The workshop was open to all conference participants so in total more than 50 participants attended.

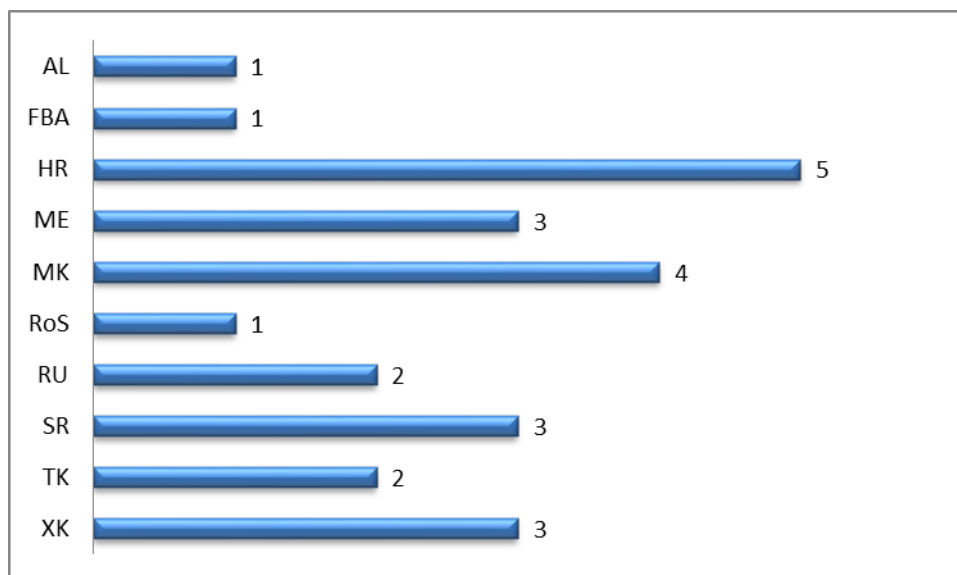


Figure 3. Istanbul workshop invited participants

### 3.1.3 Programme

The workshop was co-chaired by Katalin Tóth and Vlado Cetl from JRC. It was divided in two parts. First part was more general with the aim to emphasise overall relationship between INSPIRE/SDI and environment:

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- Cetl Vlado/Katalin Toth: Introduction to WS (welcome, objectives etc ...)
- Bernd Wild (DG Enlargement): Enlargement and Integration activities
- Hugo de Groof (DG Environment): INSPIRE and Environment
- Iurie Maxim and Daniel Urda: Harmonisation of the geographical distribution and range data for the species and habitat types of the Habitats and Birds Directives
- Luka Jovičić, Simon Vrečar, Vlado Cetl and Kiril Ristovski: Non-Governmental Organisations for Spatial Data Infrastructure - Environmental Democracy Case.

The presentations from the side of the EC services (DG Enlargement, Environment, and JRC) highlighted the environmental, economic, and societal benefits stemming from INSPIRE and environmental information systems in general. The participants were called to make use of the available EC and other funding and benefiting from the results of projects and programs already in place.

As good practice examples initiatives from RO and MK were presented. The Example from RO detailed a successful project where harmonised data retrieved from the NSDI yielded an efficient support for the Habitats and Birds directives. The presentation from MK allowed an insight how Non-Governmental Organisation could enhance environmental democracy through their access to the information and data included in SDIs.

In the second part of workshop, there were 9 flash presentations (each 5 minutes) that demonstrated the progress of Spatial Data Infrastructure and INSPIRE in the Enlargement Countries.

#### 1. Implementation of INSPIRE

- Ebru Alarslan and Halil Sogut: An Overview of Spatial Data Infrastructure of Turkey with a view to Complying with INSPIRE Standards
- Tomislav Ciceli, Ljerka Rašić and Željko Hećimović: Current status of the INSPIRE Directive transposition into Croatian legislation
- Perica Spasevski and Sonja Dimova: Building of the Macedonian NSDI Strategy in line with INSPIRE

#### 2. Capacity Building

- Fritz Kroiss, Christian Ansorge, Ivica Skender and Andreas Wytzisk: INSPIRATION - Capacity Building for NSDI and land management in the Western Balkans
- Gligor Ralev and Anders Östman: Capacity Building in the Cadastral Sector
- Bashkim Idrizi: Geo-SEE Association Activities for Promotion and Development of Spatial Data Infrastructures

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### 3. Applications based on SDIs

- Angela Ionita, Marcel Foca and Maria Visan: Geo-tools for spatial planning in geo-government
- Ismail Ceritli, Okan Erhan Oflazoğlu, Etem Akgündüz, Alper Dinçer, Tahsin Yomralioğlu and Gencay Serter: Implementing INSPIRE GeoPortal in Turkey
- Darko Šiško: Zagreb SDI as tool for sustainable spatial management.

Concerning INSPIRE implementation TR highlighted the role of conformity with standards. HR focused on the transposition of legislation, while FYROM stressed the importance of the national SDI strategy. Concerning capacity building MK accounted about the good examples that took place in the land management and cadastral sectors. The role of GI Association for South-Eastern Europe in promoting SDI development was presented. The main achievements of the INSPIRATION project in capacity building were presented too, with views of disseminating them to the wider public.

The last discussion block was devoted to technology, to geo-tools for spatial planning in RO, the TR geoportal, and tools for sustainable spatial development in HR.

After each block there was a discussion on the main issues. The overall impression was that the majority of WB countries and TR have already a good legislative framework to establish INSPIRE. The main obstacles for further development are related to the lack of capacity. These issues should be solved in the near future in all countries and might be the subject of further collaboration between them. The participants also acknowledged the input of the INSPIRATION project in capacity building and in the guidance given on the implementation of INSPIRE.

In the overall conclusions the importance of such workshops was emphasized, which facilitates networking between experts. It has an utmost importance in solving common problems connected to INSPIRE and national SDI implementations in the region.

All presentations and abstracts are available on the INSPIRE Conference 2012 web site<sup>11</sup>.

#### 3.1.4 Participants feedback

With the aim to collect feedback from participants, the evaluation form was prepared and distributed to participants in the second part of the workshop. In total 27 evaluation forms were provided from participants.

Regarding the content of workshop, the feedback was as follows:

- Content covered during the presentations (Excellent 44%, Very good 52%, Good 4%)

<sup>11</sup> [http://inspire.jrc.ec.europa.eu/events/conferences/inspire\\_2012/index.cfm](http://inspire.jrc.ec.europa.eu/events/conferences/inspire_2012/index.cfm)



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- Relevance of content to your requirements (Excellent 33%, Very good 56%, Good 7%, Fair 4%)
- Usefulness of activities conducted during the workshop (Excellent 27%, Very good 69%, Good 4%)
- Networking opportunities with other people available (Excellent 48%, Very good 37%, Good 15%)
- How satisfied are you with the duration of workshop (Excellent 22%, Very good 44%, Good 19%, Fair 15%)
- Overall experience at workshop (Excellent 46%, Very good 50%, Good 4%).

This feedback justifies the organisation of such workshops, which are important not only for the participants but also for the organisers. This was a good basis for organising follow up events.

As main benefits from the workshop, participants reported: new knowledge, clear overview of the situation in region regarding INSPIRE and SDI implementation, new ideas, and networking opportunities.

Main proposal to improve effectiveness was to have more time for presentations and to extend time for discussions. All of participants expressed their wish to attend similar workshops in the future to go deeper in more specific examples for INSPIRE/SDI implementation, costs and benefits etc.

### **3.2 E&IA Workshop Florence**

The E&IA workshop *INSPIRE in practice - Intelligent extensions and applications* was organised as a special sessions of annual INSPIRE Conference which took place from 23 - 27 June 2013 in Florence, Italy. Like to the previous workshop in Istanbul, the participants had the opportunity to take part at the whole INSPIRE conference.

#### **3.2.1 Objectives and scope**

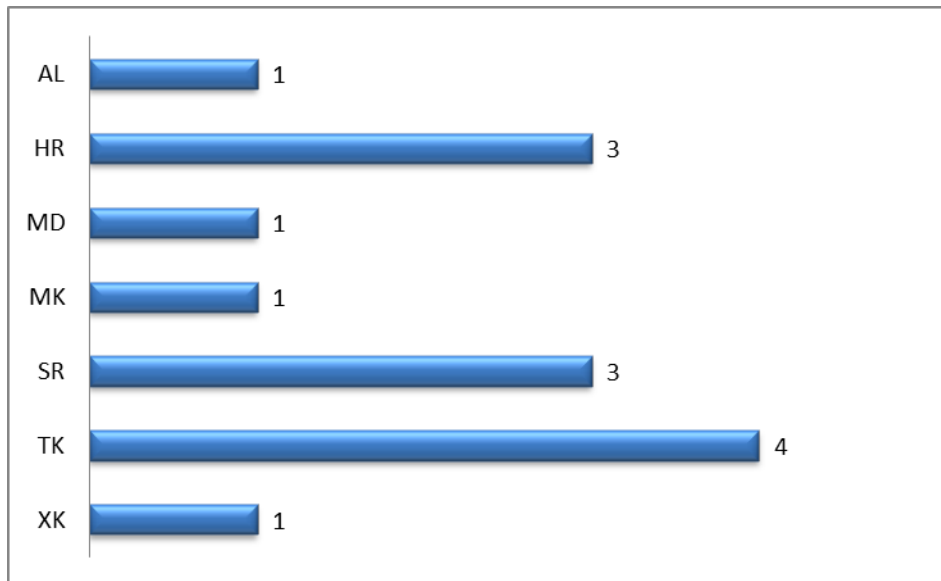
Last evidences show that formal implementation of NSDI strategies and policies under the provisions of INSPIRE Directive are ongoing or are already implemented in the WB countries. Therefore the next challenge is to put those aspirations into the practice that help to achieve real interoperability. With this aim the workshop was addressed to the SDI community to transmit and discuss the experiences and lessons learnt in more practical way, from the point of view of applications. The thematic focus was set on data transformation and manipulation, data representation, data usage, cross border usage of interoperable datasets, concrete existing applications and services.

#### **3.2.2 Participants**

The workshop was very well attended by more than 40 conference participants. 14 participants from enlargement countries were invited by the JRC (Figure 4).

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Please note that the participants did not necessarily formally represent their national administrations.



*Figure 4. Florence workshop invited participants*

It must be mentioned that representatives from World Bank and UN FAO were present.

### **3.2.3 Programme**

The introductory presentation by Vlado Cetl was devoted to the objective of the workshop and to the JRC support to INSPIRE implementation through E&IA. The subject matter agenda was divided in two parts. In the first part seven presentations (HR, RS, TR, MD, MK) about the state of the art of NSDI and INSPIRE implementation were given. In addition, an update about the on-going activities of the INSPIRATION project was presented.

- Tomislav Ciceli: Law on National Spatial Data Infrastructure: case study Croatia
- Marjana Zelić: The role of NSDI within e-Croatia
- Dragica Pajić: Stay of play in the Serbian geo-sector
- Christian Ansorge: INSPIRATION – Regional Perspective of INSPIRE Implementation
- Ezgi Sarmusak: INSPIRE Implementation in Turkey
- Ovdii Maria: Development of Strategy for National Spatial Data Infrastructure in Moldova
- Bashkim Idrizi: Increasing the understanding of need and benefits by utilization of INSPIRE directive in faculties of natural sciences: Chase study: FNSM-SUT, Tetova.

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Main topics discussed after these presentations were focused on HR experiences regarding the accession to EU as a MS.

The second part covered also 7 presentations showing more practical examples from SDI implementation in enlargement countries.

- Özlem Esengin: INSPIRE Capacity Building in Turkey
- Darko Šiško: Zagreb Geoportal for smart city management
- Gencay Serter: Geoportal of Ministry of Forestry and Water Affairs
- Sonja Dimova: Protection of the environment with mash up of data
- Vera Shiko: The Contribution of Transport in De-Carbonation and Climate Change aspects
- Ebru Alarslan: Turkey's SDI with respect to Settlements and Buildings at Risk in light of relevant INSPIRE Standards
- Ferim Gashi: Forest Management with GIS method
- Luka Jovičić: INSPIRE-ing Volunteered Geographic Information: Cases from the South East Europe.

Presentations showed that all countries are on the way towards INSPIRE implementation. However there are differences between them in the level of adaptation. The main challenges and obstacles that were mentioned included data sharing, awareness rising, lack of trained specialists, need for capacity building, knowledge exchange and need for better cooperation and collaboration.

The main conclusion of the workshop stressed the necessity to collaborate: to keep together and to share experiences and best practices.

All presentations and abstracts are available on the INSPIRE Conference 2013 web site<sup>12</sup>.

### **3.3 E&IA Workshop Šibenik**

The E&IA workshop *INSPIRE and Integrated Land & Water Management* was organised on 26/09/2013 in Šibenik, Croatia and was a part of the Croatian SDI days 2013. JRC was co-organiser of the SDI days 2013 event together with Croatian State Geodetic Administration and Croatian Chamber of Chartered Geodetic Engineers.

#### **3.3.1 Objectives and scope**

Workshop was addressed to the SDI community to transmit and discuss the experiences and the lessons learnt in the INSPIRE/NSDI implementation in the region. Through the data specifications, INSPIRE covers policy areas such as Cadastral parcels, Hydrography, Transport networks, Geology, Land Use, Land

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<sup>12</sup> [http://inspire.jrc.ec.europa.eu/events/conferences/inspire\\_2013/#home](http://inspire.jrc.ec.europa.eu/events/conferences/inspire_2013/#home)

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Cover, Sea Regions and many others that combine land with marine and inland water data. The challenge is to combine different data sources to achieve seamless, consistent, and efficient land-water data management.

The focus of the workshop was set at various thematic applications from integrated coastal management to biodiversity, from transport to agriculture and aquaculture, where interoperability and integration of different spatial data sets contribute to an effective and efficient solution of the related tasks.

### 3.3.2 Participants

Workshop was attended by the SDI experts, but due the specific topic, water and environmental professionals form ministries, public authorities, agencies, public enterprises, research institutions and the private sector were present. On behalf of JRC there were 17 invited participants and overall from the new EU MS, acceding, candidate, potential candidate and framework programme associated countries (Figure 5).

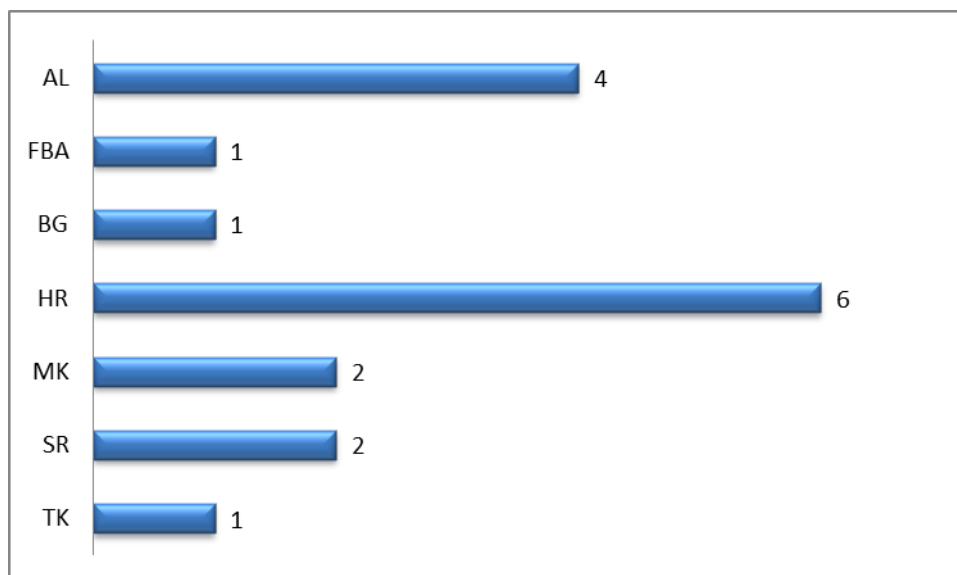


Figure 5. Šibenik workshop invited participants

In total, more than 60 attendees participated.

### 3.3.3 Programme

The participants of the workshop were requested to present practical applications and concrete implementation examples. Special attention was given to the benefits of usage of integrated data management connected to and supporting EU policies and initiatives. Participants were also called to not omit the problems that still persist in these fields.

The workshop was divided in two parts with 14 presentations and the final discussion:

- Vlado Cetl: Welcome and introduction

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- The workshop was chaired by Vlado Cetl from JRC who made also introductory presentation on JRC, E&IA and activities and role of JRC in support to INSPIRE Directive and other EU policies.
- Željko Hećimović: Spatial intelligence, spatial reasoning and SDI
  - Overview on the spatial intelligence concept, related semantic and ontological approaches as SDI influence on the recent development.
- Andrej Abramić, Vlado Cetl, Vanda Nunes de Lima: Water management & INSPIRE
  - It was presented how the INSPIRE data models could be used for integrated management of the river basin and related coastal waters.
- Tea Duplančić Leder: The Hydrographic Dimension of Marine SDI
  - Informative communication that provided review on the Hydrography, related Marine SDI, current situation in Croatia and recent development.
- Bashkim Idrizi, Subija Izeiroski: Developing automatic line for geospatial analysis on assessment of small hydro power plants
  - Presented innovative method how spatial data can be used for efficient decision making process considering small hydropower plant projects development.
- Olga Nitcheva, Borislav Milev: Hydrological modeling by the Land Surface Schemes of the Global Climate Models
  - Presented research that includes development of the mathematical model that can provide country scale hydrological forecast.
- Ebru Alarslan: Turkey's SDI with respect to Settlements and Buildings at Risk in light of the INSPIRE Framework
  - Presented work described how the settlements and building at risk could be managed using national SDI and implementing INSPIRE framework.
- Vera Shiko, Ali Dedej: The Interoperability between the transport corridor and ports in the Albanian coastal areas
  - Introduction on the Albanian national strategy development related to the coastal zone management and the regional transport network. Presentation included resume on the port/transport strategy plans, related for the expected national economic development.
- Lyubka Pashova, Temenoujka Bandrova, Penka Kastreva, Bashkim Idrizi: Prospects for the development of Web Geo-Services between Bulgaria and Macedonia by applying the INSPIRE directive

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- Presented INSPIRE implementation process and development of the related national SDI, in Bulgaria and in the Former Yugoslav Republic of Macedonia.
- Miro Govedarica, Dubravka Sladić, Dušan Jovanović: Cadastral and Hydrographic Data in Spatial Data Infrastructure of Republic of Srpska
  - Communication on Republic of Srpska NSDI segment development. Implementation of the geoportal, related services and data modelled according to the INSPIRE specifications focusing on the hydrography data and related spatial objects was described.
- Ferim Gashi, Bashkim Idrizi, Pal Nikoli: Environmental soil sensitivity
  - Presented models that can assess potential of degradation on the aquatic environment, the nature and the land due the agricultural activity.
- Marina Tavra, Vlado Cetl: MSDI and Geoportals in Selected European States: A Comparative Analysis
  - Overview of several European geoportals related to the marine data and analysis of their functionality, capabilities and the scope. Focus of the analysis was on the data sharing and possibility to reuse of marine spatial data.
- Josip Lisjak, Slaven Gašpar: Comparison of „real“ data model created for management and needs of employees of marine Veruda, with INSPIRE data specifications
  - Elaborated and displayed research results about use of INSPIRE data models in project Marine Veruda GIS.
- Darko Šiško: Zagreb, Sava, Spatial Data
  - Presented use case of the population distribution and land use analysis, done for the city of Zagreb and related river Sava area.

In the discussion, after the sessions, several issues were addressed like: capacity building, lack of funds, problems and lack of political support, problems with data sharing and lack of collaboration. Especially problems in implementation of INSPIRE in Bulgaria were discussed with possible solutions for improving current situation. All participants agreed that there is a strong need for better networking and knowledge sharing in the region. This is the way how to overcome differences in the level of INSPIRE implementation between north-west and south-east European countries. There are plenty of best practice examples that can be reused to help south-east European countries in improving their current situations.

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All presentations and Proceedings with full papers are available on the SDI Days 2013 web site<sup>13</sup>.

### **3.3.4 Participants feedback**

With the aim to collect feedback from participants, the evaluation form was prepared and distributed to participants.

Regarding the content of workshop, the feedback was as follows:

- Content covered during the presentations (Excellent 60%, Very good 33%, Good 7%)
- Relevance of content to your requirements (Excellent 47%, Very good 47%, Good 6%)
- Usefulness of activities conducted during the workshop (Excellent 53%, Very good 40%, Good 7%)
- Networking opportunities with other people available (Excellent 87%, Very good 13%)
- How satisfied are you with the duration of workshop (Excellent 73%, Very good 13%, Good 7%, Fair 7%)
- Overall experience at workshop (Excellent 60%, Very good 40%).

Again, the evaluation shows the importance of such workshop both for the participants and the organisers. This is a good feedback and background for possible follow up events, which are already foreseen.

As main benefits from workshop, participants reported: overview of JRC activities and possibilities for collaboration with enlargement countries, overview of the current situation in INSPIRE and SDI implementation, new business opportunities for private companies, new ideas, networking, and knowledge exchange.

Main proposal to improve effectiveness was to extend duration and to invite broader community from different thematic fields.

## **3.4 Study visit of INSPIRATION Project beneficiaries to the JRC**

INSPIRATION project together with JRC organised a study visit of NMCAs representatives (INSPIRATION beneficiaries) to the JRC. The study visit was organised on the 8<sup>th</sup> of October and was hosted by the IES DE&RD Unit.

### **3.4.1 Objectives and scope**

The main objectives and benefits of this study visit for the beneficiaries of the INSPIRATION project was:

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<sup>13</sup> <http://www.event.nipp.hr/>

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- to get an overview of JRC activities in support of INSPIRE implementation
- to get insight and understand INSPIRE legislative framework and legal obligations
- to better understand INSPIRE implementation process (metadata preparation and publication, data harmonization, set up of geoportal and network services, monitoring and reporting, etc.
- to discuss practical issues in their National Spatial Data Infrastructure and INSPIRE implementation
- to establish contact and network with JRC staff responsible for supporting of INSPIRE.

Besides the regular sessions a separate meeting was organised for the participants from the Croatian NMCA who wanted to discuss in more details the issues about INSPIRE implementation. Croatia as a new MS since 1<sup>st</sup> of July 2013 must fully follow INSPIRE roadmap. The technical topics that were discussed included the relation of Croatian NSDI geoportal with INSPIRE geoportal, metadata, provision of data that are out of INSPIRE scope, network services, data specifications, spatial data transformation, contacts and possible future collaboration.

### 3.4.2 Participants

The study visit was attended by the SDI experts from beneficiary countries (Figure 6). They followed the programme that included presentations and discussions with staff from IES DE&RD Unit.

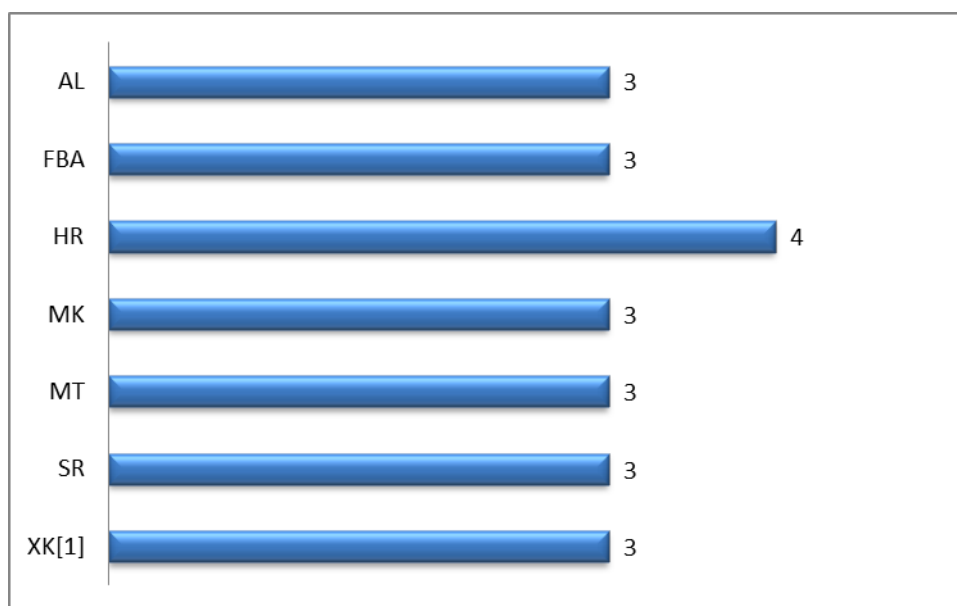


Figure 6. INSPIRATION Study Visit participants



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From the IES DE&RD Unit there were 14 staff members actively involved in the meeting through presentations and discussions. So the total number of participants was more than 30 (Figure 7).



*Figure 7. Group photo of INSPIRATION Study visit participants at the JRC*

### 3.4.3 Programme

As introduction, JRC staff gave presentations on the INSPIRE implementation process, related current projects run by JRC and INSPIRE legislative framework and legal obligations:

Morning session:

- Vlado Cetl and Paul Smits gave the welcome talk which included overview of JRC site, IES institute and Digital Earth Unit and continued with overview of the INSPIRE process
- Robert Tomas, Vlado Cetl and Andrej Abramić gave presentations on the INSPIRE data specification and relations to the international standards
- Chris Schubert made technical overview of the INSPIRE registry

Afternoon Session:

- Jean Dusart gave detail presentation on the INSPIRE network services, including metadata and geoportal overview
- Chris Schubert presented the INSPIRE Maintenance and Implementation project
- Alexander Kotsev presented the INSPIRE and Danube Reference Data and Service Infrastructure project
- Graham Vowles and Andrea Perego presented INSPIRE extension projects: European Union Location Framework (EULF) and a Reusable INSPIRE Reference Platform (AR3NA).

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After the presentations, a round table session was organised on country base. Representatives from each country provided a brief overview regarding the current situation in their country on NSDI, INSPIRE implementation, future challenges and what are their expectations from JRC. It was concluded that all beneficiary countries have made a significant improvement of NSDIs with the help of INSPIRATION project.

Main Future challenges that were highlighted and discussed included the development of the network services and national geoportals, data harmonisation, capacity building, communication and collaboration issues between public institutions.

The participants from beneficiary countries expressed the will that JRC should support their further NSDIs development by providing education and capacity building and giving continuous consultations and support on technical issues.

## 4. Conclusions and Recommendations

In this report, NSDI development trends identified within the WB countries in recent years are presented and analysed. Also, activities conducted by the JRC in the support to INSPIRE implementation in WB countries are summarised and presented.

Many WB countries already put in place either a legal instrument or another framework document to regulate NSDI development. During the transposition of EU acquis into the national legislation the INSPIRE Directive is seen as one of the main priorities in the WB countries. All WB countries need to accept the process of EU enlargement and integration as an instrument that underpins the transitional period and helps them to accelerate reforms. The external and internal factors that affect the achievement of this goal, can be summarised in the following SWOT analysis.

*Table 6. SWOT analysis of the status of INSPIRE in WB countries*

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>- Organisational framework</li> <li>- Legal framework</li> <li>- Existing reforms (e.g. LAS)</li> <li>- NSDI strategies</li> <li>- NMCAs capacity</li> <li>- NMCAs cooperation in region (exchange of the experiences and lessons learnt)</li> </ul>	<ul style="list-style-type: none"> <li>- Absence of funding models</li> <li>- Lack of data sharing</li> <li>- Licensing</li> <li>- Lack of interoperability</li> <li>- Usage of standards</li> <li>- Metadata catalogues</li> <li>- Cost/benefit analysis is missing</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>- INSPIRATION project</li> <li>- Stronger involvement in the different INSPIRE bodies (e.g. Maintenance and Implementation)</li> <li>- Involvement of broader spatial data interesting community (private sector)</li> <li>- Accession of HR to EU (reuse of existing best practices)</li> <li>- Different funding opportunities (IPA, donors, etc.)</li> <li>- Joint projects (cross-border cooperation)</li> </ul>	<ul style="list-style-type: none"> <li>- Lack of capacity on national level (other NSDI stakeholders)</li> <li>- Political changes (lack of political support)</li> <li>- Lack of funding</li> </ul>

Since many of WB countries are still in the process of transition, the major focus in NSDI development is actually connected with LAS reform. In order to secure property ownership and to boost the real property market and foreign investments it is necessary to develop modern and efficient LAS. There are lots

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of programs and projects, already completed or ongoing, with the aim to support both LAS reform, and also NSDIs in general. Consequently, the cadastral parcels are one of the core data themes in each NSDI as well as in INSPIRE.

NMCAs within the region have been formally or de facto recognised as main drivers of NSDI development. They are responsible for both the legislation issues and for overall coordination and implementation of NSDI. All NMCAs are already developing geoportals to make datasets publicly available under their responsibility (i.e. mostly for INSPIRE Annex I and II data themes). Existing services already offer discovery and view capability and they can be seen as a foundation for developing of national geoportals in the future.

It is important to emphasise that NMCAs in the WB region have already achieved close cooperation and collaboration. Collaboration was accelerated in 2008 with the first regional conference in Croatia and continued every year with the conference in different country. Most recently was in 2013 in Serbia. This cooperation was manifest in the preparation and initiation of the multi-country INSPIRATION project.

The INSPIRATION project lasted for two years and it ended in December 2013. The main objectives were to foster NSDI legislation, harmonisation with the INSPIRE Directive in the WB countries, to raise public awareness, and to build necessary capacity. The expectations of WB countries from INSPIRATION project were very high and were justified by the project results. During the final INSPIRATION conference held in Sarajevo in November 2013, the joint MoU was signed among all NMCAs in the region and it can be seen as a first step in the sustaining the results of the project. It is expected that a new project called IMPULS will start in the spring of 2014 backed by the Swedish International Development Cooperation Agency (SIDA). IMPULS will enable deeper involvement of a broader NSDI community. This critical element is necessary and is still missing (e. g. other public bodies and agencies, environmental sector, private sector, NGOs, research institutions universities, etc.). It will be more oriented towards practical implementation; especially for cross-border environmental applications and in closer support for e-Government.

Our overall conclusion is that NSDI structures in WB countries have been established or they are ongoing. Deeper analysis shows that a long and hard journey lies ahead in order for NSDIs to be fully operational and in the line with INSPIRE. However, this is generally viewed as a positive and exiting challenge. Based on our supporting activities we can propose the following recommendations for all WB countries:

- Continue with existing reforms and NSDI processes and seek EU and other support for example from pre-accession instruments
- Engage more environmental agencies and the broader spatial data interest communities in the NSDI processes and do not forget about the potential of the public-private partnerships
- Be more active in the different INSPIRE bodies (e.g. members of expert groups, observers in the INSPIRE Committee, etc.)

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- Put more efforts in standardisation
- Invest in building capacity
- Continue the cooperation between NMCAs in region; especially in exchanging the experience and lessons learnt. Joint projects (e.g. IMPULS) can be used for further development of NSDIs, streamlining various initiatives, and their optimisation
- Use experience and best practices built up within HR - as an example country that successfully navigated from non-EU to full EU membership.

INSPIRE development is now entering a new phase and the focus is now at the MS level. However EC will continue supporting INSPIRE implementation and evolution. One of the already ongoing activities is establishing of INSPIRE Maintenance and Implementation Framework, which is coordinated by the JRC. The main aim is support of INSPIRE processes within MS but also in the enlargement countries.

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## Abstract

The INSPIRE Directive requires actions from the EU Member States and also has direct implications for the countries neighbouring the EU, regardless of whether or not they are candidate countries. Preconditions for EU membership, to which all the Western Balkan (WB) countries currently aspire, include the administrative capacity of the country to incorporate the EU *acquis communautaire*, fulfil adopted standards and execute obligations.

The main objective of this report is to give an overview of the status of National Spatial Data Infrastructures (NSDIs) in WB countries and their efforts towards the implementation of the INSPIRE Directive. It also gives an overview of different JRC activities in the support of INSPIRE implementation in the WB countries. As part of their EU accession, many of the WB countries have drawn up national programmes to bring them into alignment with EU legislation. The INSPIRE Directive is explicitly mentioned in some of these programmes. The challenge of establishing NSDIs in the WB countries is compounded by the challenges of developing a market economy, governmental structures and institutions, including the modern National Mapping and Cadastral Agencies (NMCAs). The policy support given by the EU (including pre-accession funds) is expected to strengthen the efforts of these countries in this process.

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Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.