Spatial Data Infrastructures in Romania: State of play 2011
Report meta-information

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<td>Danny Vandenbroucke</td>
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*This document does not represent the position of the Commission or its services. No inferences should be drawn from these documents as to the content or form of the current and future proposals to be presented by the Commission.*

*This document does neither represent the position of the Member States and countries under study.*
Executive summary

The development of the Romanian NSDI showed only slow progress until 2007, with many uncoordinated initiatives across the country. Since then the NSDI scene has changed dramatically. Several European, twin and other projects, together with the transposition and implementation of the INSPIRE Directive triggered the development of a more dynamic and coordinated Romanian NSDI. While the real use and usability of INSPIRE & the NSDI should still be proved, it becomes clearer that there are major benefits and new opportunities for improved decision making and service provision towards businesses, NGO’s and citizens at large.

Most of the developments over the last few years were linked to separate projects, initiated by different INSPIRE & NSDI stakeholders. This might have led in the past to some duplicated efforts and a less streamlined approach as it ideally should have been. However, the INSPIRE transposition process has brought the different SDI stakeholders together and improved the situation. Indeed, the coordination within the country between the public sector players dealing with spatial information (Environment, Statistics, Agriculture, Defence, …) has been stimulated by the INSPIRE initiative. One of the first attempts aimed to set-up an INSPIRE working group with 5 sub-groups aiming to coordinate the INSPIRE and NSDI implementation and to foster cooperation between the different SDI stakeholders. Several projects were initiated, for example the development of an environmental geoportal to improve access to spatial data sets related to the environment. However, some of these projects did not result in sustainable results.

It was with the transposition of the INSPIRE Directive in 2010, into Ordinance nr. 4/2010 that a joint Romanian National Spatial Data Infrastructure (INIS) was created. Its coordinating body, the Council of the National Infrastructure for Spatial Information (CINIS) is led by the ANCPI, the Romanian NMA. ANCPI also plays the role of INSPIRE NCP. All the other data providers and the main Ministries are involved and contribute in a consistent manner: the Ministry of Administration and Interior; the Ministry for Environment and Forestry; the Ministry of National Defence; the Ministry of Public Finances; the Ministry of Agriculture and Rural Development; the Ministry of Regional Development and Tourism; the Ministry of Transports and Infrastructures; the Ministry of Economy, Commerce and Business; the Ministry of Education, Research, Youth and Sports; the National Agency for Mineral Resources; the Ministry of Health; the National Institute for Statistics; the Special Telecommunications Service; the Ministry for Communications and Information Society; the Ministry for Culture and National Heritage and the Romanian Academy. Also the private sector is developing activities in the GI field, as data provider, application developer or developer of GI projects, and they have therefore an important contribution to the development of INIS.

Spatial data exist for most of the INSPIRE annexes. Some themes are still under development like the cadastral parcels and addresses. Several data providers contribute to the territorial coverage of the different themes. Specific products integrate several data layers, e.g. TOPRO5 (scale 1:5,000) which has been developed and is maintained by
ANCPI. ANCPI is still the major data provider although Ordinance nr. 4/2010 defines the roles and responsibilities of each of the public bodies.

Metadata exist for an important part of the spatial data sets. According to the INSPIRE MR figures (status end 2010), 47% of the spatial data sets falling under the annex I themes have metadata, while 39% have metadata that are conformant. These figures were at the end of 2009 32% and 19% respectively. The situation for the annex II data sets is even better: at the end of 2010, 58% of the data sets contained metadata, while 47% of the data sets had conformant metadata. This was only 46% and 31% at the end of 2009. The situation is similar for annex III data sets although metadata are usually not (yet) conformant to the INSPIRE implementing rules.

Since 2010 a national geoportal with a metadata catalogue has been made operational to make the spatial data easily discoverable and viewable. Indeed, metadata-based and other access services were developed rapidly over the last few years. In general however, the discovery of spatial data sets and services remains still weak. According to the INSPIRE MR figures (status end 2010) only 6% of all the reported data sets and 2% of the reported services can be discovered. And while the viewing services (type OGC) are clearly emerging, only a small part of all the reported data sets can be viewed (a little bit more than 10%) while about 4% can be downloaded. However, only 1% can of the reported data sets can be downloaded and viewed.

Nevertheless, during the last years numerous supporting SDI projects have been developed in Romania to help the Government towards the INSPIRE implementation. The focus of the most recent projects is on improving data harmonization and interoperability of spatial data sets and services through standardisation and rigorous data quality control mechanisms. It is expected that INSPIRE and NSDI will further develop at a much higher pace in the coming years through a joint effort of CINIS and its major stakeholders with a strong support from the private and potentially also from the academic sector.
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## Abbreviations and acronyms

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<td>AACR</td>
<td>Romanian Civil Aviation Authority</td>
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<td>ANAR</td>
<td>Administration for Romanian Waters</td>
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<td>ANCPI</td>
<td>National Agency for Cadastre and Land Registration</td>
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<td>API</td>
<td>Application Programming Interface</td>
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<tr>
<td>APIA</td>
<td>Agency for Payment in Agriculture</td>
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<td>ASRO</td>
<td>Romanian Standards Association</td>
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<td>CEN</td>
<td>Comité Européen de Normalisation</td>
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<td>CENELEC</td>
<td>European Committee for Electrotechnical Standardisation</td>
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<td>CINIS</td>
<td>Council of INIS, the Romanian SDI</td>
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<td>CNGCFT</td>
<td>National Centre for Geodesy, Cartography, Photogrammetry and Remote Sensing</td>
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<td>CSW</td>
<td>Catalogue Service for the Web</td>
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<td>DDNI</td>
<td>Danube Delta National Institute</td>
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<tr>
<td>DTM</td>
<td>Digital Terrain Model</td>
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<td>DTM</td>
<td>Directorate for Military Topography</td>
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<td>EC</td>
<td>European Commission</td>
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<td>ELA</td>
<td>Enterprise License Agreement</td>
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<td>ESRI</td>
<td>Environmental System Research Institute</td>
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<tr>
<td>ETSI</td>
<td>European Telecommunications Standards Institute</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<td>FGDC</td>
<td>Federal Geographic Data Committee of the US</td>
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<tr>
<td>G2B</td>
<td>Government to Business</td>
</tr>
<tr>
<td>G2C</td>
<td>Government to Citizen</td>
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<tr>
<td>G2G</td>
<td>Government to Government</td>
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<tr>
<td>GEMET</td>
<td>GEneral Multilingual Environmental Thesaurus</td>
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<td>GI</td>
<td>Geographical Information</td>
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<td>GIS</td>
<td>Geographical Information System</td>
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<td>GISEE</td>
<td>GIS-Technology and Market in South East Europe</td>
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<td>GNSS</td>
<td>Global Navigation Satellite Systems</td>
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<td>HTML</td>
<td>Hyper Text Mark-up Language</td>
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<td>IBIOL</td>
<td>Institute of Biology Bucharest</td>
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<td>IBIS</td>
<td>Integrated Biodiversity Information System</td>
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<tr>
<td>ICAS</td>
<td>Forestry research and Management Institute</td>
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<td>ICI</td>
<td>National Institute for R&amp;D in Informatics</td>
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<tr>
<td>IEC</td>
<td>International Electrotechnical Commission</td>
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<td>INIS</td>
<td>National Spatial Data Infrastructure</td>
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INSPIRE: INfrastructure for SPatial InfoRmation in Europe
INSPIRE MR: INSPIRE Monitoring & Reporting
ISO: International Organisation for Standardisation
JSON: JavaScript Object Notation
KML: Keyhole Mark-up Language
LCCS: Land Cover Classification System of the UN (FAO)
LPIS: Land Parcel Information System
NAACL: National Agency for Cadastre and Land Registration
NCP: National Contact Point
NGO: Non-Governmental Organisation
NOCGC: National Office of Cadastre, Geodesy and Cartography
NMA: National Mapping Agency
NMNH: National Museum of Natural History
NSI/INS: National Statistical Institute
NSDI: National Spatial Data Infrastructures
OGC: Open Geospatial Consortium
PPP: Public-Private Partnerships
PSI: Policy and legislation on access to public sector information
REST: Representational State Transfer (RESTful services)
ROSA: Romanian Space Agency
SDI: Spatial Data Infrastructures
SDIC: Spatial Data Interest Community
SOAP: Simple Object Access Protocol
STS: Special Telecommunication Service of Romania
UAICI: University of Iasi
UN: United Nations
URI: Universal Resource Identifier
URL: Universal Resource Locator
WCS: Web Coverage Service
WFS: Web Feature Service
WMS: Web Map Service
WPS: Web Processing Service
1 GENERAL INFORMATION

1.1 Method

This report is summarizing the review of SDI in Romania, and reflects the degree to which the SDI situation in Romania is similar to the ideas set out in the INSPIRE Directive and its implementing rules and in other relevant INSPIRE documents.

The first version of the report goes back to 2003. It was at that time mainly based on the analysis of (limited) web site material readily accessible, on the reports and the results of the GIS workshop for the Phare countries of 2001 (EUROSTAT) and on documents presented on several workshops and conferences. For the subsequent updates of the report (2004-2009), a number of presentations and research papers found in proceedings of conferences were used along with relevant websites found on the internet and input was received from individual experts in the field (Angela Ionita - Research Institute for Artificial Intelligence, Romanian Academy and Ion Nedelcu - Romanian Space Agency). Other useful information could be found in the study of Geolink Ltd on the Romanian NSDI and INSPIRE. For the particular 2009 update, the survey on the coordination, funding and sharing measures which was answered by Romania through its NCP provided useful information.

In this 2011 version of the report, the structure was revised and the content was reviewed based on new material from the INSPIRE MR process, and the comments received from Romanian Experts (e.g. Mr. Cristian Vasile) and the INSPIRE NCP. The out-dated information was taken out and the overall report was simplified.

1.2 The GI-, GIS- and SDI-scene in Romania

Over the last three years, the SDI scene in Romania has dramatically changed. Although there was no fully developed SDI in Romania for a long time, many different SDI initiatives and projects have seen light in this period. Between 2008 and 2009 the Ministry of Environment established a geoportal to provide access to environmentally related data sets (Phare project). In parallel, a twin-project between Romania and The Netherlands was initiated and led by the National Agency for Cadastre and Land Registration (ANCPI) to define a strategy for INSPIRE & NSDI implementation. During this project a prototype of geo-portal was developed to be able to demonstrate the possible use of NSDI in Romania. This portal is not working anymore. To fulfil its tasks, ANCPI developed the INSPIRE Geoportal of Romania starting in 2010. It provides access to metadata, spatial data sets and services held by members of CINIS. Over the last 3 years also many efforts were made to develop and update key datasets which form the backbone of the Romanian SDI. Many other initiatives and projects exist. Some examples should be mentioned. There is the 112 emergency service developed by Special Telecommunications Service or STS (www.stsnet.ro). There is also a Romanian Water
Portal. There are many local portals, e.g. for natural parks and municipalities. The Agency for Payment in Agriculture (APIA) has a country wide up-to-date spatial database of physical blocks used for the implementation of the Common Agricultural Policy. Etc. Despite those efforts there was much fragmentation and even some duplication. With the transposition of the INSPIRE Directive into Romanian legislation this is gradually disappearing. Indeed, Government Ordinance no 4/2010 of 10 January 2010 on the establishment of the National Infrastructure for Spatial Information in Romania (INIS) transposes the INSPIRE Directive in national legislation. This legal act established the Council of National Infrastructure for Spatial Information (CINIS). The CINIS has the mandate to coordinate the implementation of the INSPIRE Directive. It comprises members of 20 ministries and institutions.

In practice, ANCPI (National Agency for Cadastre and Land Registration which is the former National Office of Cadastre, Geodesy and Cartography or NOCGC) runs the operational secretariat of this coordinated effort and plays the role of National Contact Point (NCP) for Romania. It is the most important player with regard to GI at the national level. ANCPI is an active member of EuroGeographics. It is an institution subordinated to the Ministry of Administration and the Interior, and is responsible for:

- Cadastre, Land Registration and Land Management;
- Geodetic Reference Network and National Mapping;
- Guidance, support and control on the enforcement of legal framework;
- Strategy development according to Government's policy;
- Representation at a national and international level in the specific fields.

Other Ministries with a role on the GI-scene that have a role as data custodian for particular INSPIRE themes are:

- The Ministry of the Environment and Forestry through the subordinated institutions “Apele Romane” National Administration, National Meteorology Administration, Delta Dunarii Biosphere Reserve Administration, Research and Forestry Arrangements Institute;
- The Ministry of Agriculture and Rural Development through the Paying and Interventions Agency for Agriculture (APIA) and the National Institute for Research and Development in Soil, Agro-Chemistry and Environment Protection;
- The Ministry of National Defence through its Directorate for Military Topography (DTM). This Directorate produces large amounts of spatial data for military and non-military use: e.g. the orthophotos for APIA;
- Ministry of Regional Development and Tourism is coordinator for land use and natural risk zones and;
- The Ministry of Communications and Information Society. The National Institute for R&D in Informatics (ICI) falling under the authority of this
Ministry played a certain role in the past\textsuperscript{1}, but this seems not to be the case anymore.

Also specific institutes play an important role. Besides the before mentioned STS, the National Institute for Statistics should be mentioned for the statistical units and the population distribution themes.

We can conclude that a lot of GI & GIS, and SDI activities are on-going in Romania, but that - despite the new legislation (Government Ordinance n° 4/2010) - they are still occurring very much as separate initiatives and projects, even if most of them contribute considerably to the development of INSPIRE and the Romania SDI. However, it is expected that due the new legislation those initiatives and projects will finally converge in one streamlined effort in the years to come.

\textsuperscript{1} They contributed to the development of a strategy for developing an SDI for Romania through particular projects like ABDS and PANEL-GI.
2 Details of INIS

2.1 General Information

Official address:
Council of the National Infrastructure for Spatial Information in Romania (CINIS)
CINIS Secretariat and INSPIRE NCP
National Agency for Cadastre and Land Registration (ANCPI)
202 A, Splaiul Independentei, sector 6
Bucharest, Romania
Telephone: +40 21 3172900
Fax: +40 21 3176399
Central e-mail: office@ancpi.ro

Contact persons:
INSPIRE NCP and President-General Director of ANCPI: Mihai Busuioc
INSPIRE NCP substitute: Victor Grigorescu
CINIS Secretariat: Gabriela Drăgan (starting from 2012)
CINIS Secretariat substitute: Simona Bunea (starting from 2012)

The objective of the Romanian NSDI is to encourage partnerships and the cooperation between the different parties involved, to integrate information, to reduce overlaps, to use resources more efficiently and to create a spatial data infrastructure as a basis for improving the productivity of the industry, the market of geographical information and information management at large.

2.2 Component 1: Coordination and organizational issues

After several attempts to initiate the organisation of the Romanian SDI\textsuperscript{2} Government Ordinance n° 4/2010 of 10 January 2010 established the National Infrastructure for Spatial Information in Romania (INIS) and its coordinating body, the Council of the National Infrastructure for Spatial Information (CINIS). The main tasks of CINIS are:

- to establish the Planning of activities for the development and update of INIS and to submit it to the Government for approval;
- to report to the Government of Romania on the implementing stage of the activities listed in the Planning of activities;

\textsuperscript{2} First in 2005 through the establishment of an INSPIRE working group which was coordinated by the Romanian Space Agency (ROSA), and later by the Project of DECREE (ORDONANTA) of the Ministry of Environment for establishing the infrastructure for spatial information in Romania.
• to establish and approve the spatial data themes, others than those referred to in Annexes 1 to 3 of Order No 4/2010;
• to establish the responsibilities of public authorities and third parties, as applicable, for the creation and update of spatial data sets, of their related services and of the metadata for the INIS themes;
• to decide with regard to the availability of spatial data sets in Annexes 1 to 3 in accordance with Government Ordinance No 4/2010 and of related services for the purpose of public access;
• to decide with regard to spatial data sets and to related services for which fees are applied;
• to decide with regard to spatial data sets and to related services for which licenses may be granted;
• to approve the reports of the INSPIRE NCP before their transmission to the European Commission;
• to approve the themes and sub-themes of the working groups established at the level of members of CINIS;
• to establish the actions and deadlines of the working groups established at the level of members of the INIS Council according to the planning of activities;
• to coordinate the activity of public institutions and of associated structures within CINIS.

In its activity, CINIS is assisted by a technical group. The technical group comprises experts appointed by the directors of the public institutions involved in INIS. The technical group provides technical expertise in support of the work of CINIS. CINIS holds meetings every month and decisions are binding for all its members. CINIS is composed of a number of National authorities/organizations:

• Ministry of Administration and Interior,
• Ministry for Environment and Forestry,
• Ministry of National Defence,
• Ministry of Public Finances,
• Ministry of Agriculture and Rural Development,
• Ministry of Regional Development and Tourism,
• Ministry of Transports and Infrastructures,
• Ministry of Economy, Commerce and Business Environment,
• Ministry of Education, Research, Youth and Sports,
• National Agency for Mineral Resources,
• Ministry of Health,
• National Statistics Institute,
• Special Telecommunications Service.
- Ministry for Communications and Information Society (http://www.mcsi.gov.ro)
- Ministry for Culture and National Heritage (http://www.cultura.ro)
- Romanian Academy (www.acad.ro or http://www.acad.ro/def2002eng.htm)
- Association of Communes in Romania
- Association of Municipalities in Romania
- Association of Towns in Romania
- National Union of County Councils

The coordinating body does not include private sector players, nor does it include a GI-association. One academic institution, the Romanian Academy is represented.

The presidency of CINIS is held by the Ministry of Administration and Interior through ANCPI and the vice-presidency by the Ministry for Environment and Forests. The Secretariat of CINIS falls under the responsibility of ANCPI. It also provides the INSPIRE NCP. ANCPI is the single authority in the area of cadastre, geodesy, topography, photogrammetry and mapping, which is subordinated to the Ministry of Administration and Interior. In subordination of the ANCPI are the following institutions:

- The County Offices of Cadastre and Land Registration which are organised as decentralised public services, with headquarters in the municipality of each county and
- National Centre for Geodesy, Cartography, Photogrammetry and Remote Sensing.

ANCPI and the Ministry of Environment and Forestry are the most active members in the INSPIRE implementation. Specifically ANCPI is responsible (among others) for the following tasks:

- to develop and maintain the geo-portal and guarantee the link with the INSPIRE geo-portal of the European Community;
- to monitor the implementation and use of INIS, to ensure the reporting to the European Commission and to make the results of the monitoring publicly available;
- to organise groups of experts;
- to develop, operate and maintain services to search, view, download, transformation, invoking and others;
- to ensure the technical conditions for public authorities to connect their spatial data sets and related services to the network of services;
- to create the technical framework required for the sharing of spatial data sets and related services by public authorities;
- to ensure the access of Community institutions and bodies to spatial data sets and services in conditions of harmonisation with the other Member States in compliance with implementing rules governing such conditions.
ANCPI created a separate INSPIRE department dedicated to those tasks.

2.2.1 Conclusions of Component 1

The Romanian SDI approach is truly national. As determined in Government Ordinance nr. 4/2010 transposing the INSPIRE directive, the Council for National Infrastructure for Spatial Information (CINIS) is the coordinating body established to implement INSPIRE and is composed of a number of National authorities/organizations. ANCPI is in charge of the coordination of the activities related to cadastre, geodesy, topography, photogrammetry and mapping. The Ministry of Administration and Interior (under which ANCPI falls) and the Ministry of Environment and Forest are the most active members in the INSPIRE implementation. Specifically ANCPI is involved in the creation of the Romanian geoportal and metadata, and it created a separate INSPIRE department dedicated to those tasks. Based on the development of the major SDI building blocks as described in the further sections, it can be stated that the Romanian SDI has reached a significant level of operability.

For the above mentioned reasons we score the indicators as follows:

- The approach and territorial coverage of the SDI is truly national
- One or more components of the SDI have reached a significant level of operability (Yes)
- The officially recognised or de facto coordinating body of the SDI is a NDP, i.e. a NMA or a comparable organisation
- The officially recognised or de facto coordinating body for the SDI is an organisation controlled by data users (No)
- An organisation of the type ‘national GI-association’ is involved in the coordination of the SDI (No)
- Producers and users of spatial data are participating in the SDI (Partially)
- Only public sector actors are participating in the SDI

2.3 Component 2: Legal framework and funding

2.3.1 Legal framework

The "Law of Cadastre and Real Estate Publicity" (law no. 7/1996) regulates the activities in the domains of cadastre, geodesy and cartography and founded ANCPI, which is organized according to Government Decree No.1038/1996 and its subsequent modifications (Romanian Government Decree No. 98/1999).
The organisation and functioning of ANCPI, the National Agency for Cadastre and Land Registration, is regulated by Government Decision No 1210/2004 of 29 July 2004. The Decision defines ANCPI as a public institution, with legal personality. It is the single authority in the area of cadastre, geodesy, topography, photogrammetry and mapping, and subordinated to the Ministry of Administration and the Interior.

In 2005, the emergency governmental ordinance No. 95/2005 laid the responsibility for the establishment of the national environmental spatial infrastructure for policy making with the national central public authority responsible for environmental management.

In 2010, the INSPIRE directive was implemented by Government Ordinance nr. 4/2010 establishing the National Spatial Data Infrastructure (INIS). Through this order the coordinating body for INIS is established, i.e. the INIS Council (CINIS). In one of the annexes (4) the responsible for the coordinating and collaborating public bodies of the INIS Council are listed. Government Ordinance nr 4/2010 also defines the roles and tasks of each of the participating bodies.

2.3.2 Public-private partnerships (PPPs)

In Romania, the PPP model is gaining importance in the form that ANCPI is the public body with overall responsibility and the private firms perform the bulk of the surveying/map production under contract (Geolink Consulting, Ltd, Romania: National Spatial Data Infrastructure and INSPIRE).

2.3.3 Policy and legislation on access to public sector information (PSI)

The “Act on the Free Access to the Information of Public Interest” of 12 October 2001 allows individuals to request public information held by government departments and requires government departments to respond to requests and provide information about their activities within 30 days.


2.3.4 Legal protection of GI by intellectual property rights

In 1996 Romania adopted a modern Copyright Law that went into force on 24 June 1996 (Law no. 8 of 14 March 1996). It explicitly protects three-dimensional works, maps and drawings in the field of topography, geography and science in general.
Article 9 of the Copyright Act states that official texts of a political, legislative, administrative or judicial nature, and official translations thereof, do not benefit from the legal protection accorded to copyright. Article 122 of the Copyright Act was amended to implement, directive 96/9 on database protection, as part of the effort to bring the Romanian legislation in line with the acquis communautaire.

2.3.5 Restricted access to GI further to the legal protection of privacy

Art. 26 of the 1991 Constitution states: "§(1) The public authorities shall respect and protect the intimate, family, and private life. §(2) Any natural person has the right to freely dispose of information on himself unless by this he causes an infringement upon the rights and freedoms of others, on public order, or morals."

Romania implemented directive 95/46 and enacted on 21 November 2001 Law no. 677 regarding the data protection (Data Protection Act) (OJ, Part I, no. 790 of 12 December 2001); and in 2005 Law no. 102/2005 regarding the setting up, organisation and functioning of the National Supervisory Authority for Personal Data Processing.

2.3.6 Licensing framework

The prices of distribution of GI products are regulated, but no further information could be found.

2.3.7 Funding model for SDI and pricing policy

Funding

ANCPI was a self-financing agency until 2009, but is also financed from the state budget since then (and through European and World Bank projects); while the National Center for Geodesy, Cartography Photogrammetry, and Remote Sensing receives financing from the state budget. The World Bank assisted the Romanian Government in the task of establishing a new cadastre and land registry system, for which a loan of an estimated $45-50 million was proposed.

In the future under Government Ordinance nr. 4/2010, transposing the INSPIRE directive, the public authorities responsible for the data sets have to ensure their own funding for performing their tasks under the Ordinance.

Pricing

It is considered a global strategic objective for the Romanian NSDI to set up the legal framework to enforce a uniform, accurate and operational system for fees on the basis of real ownership. Currently, the pricing of GI is oriented to cost recuperation. The price list for ANCPI products can be found in Ordinance 456 of 17 December 2004 which was updated by Order 39/2009.
2.3.8 Conclusions of Component 2

In 2010, the INSPIRE directive was implemented by Government Ordinance nr. 4/2010 establishing the National Spatial Data Infrastructure (INIS). There is not yet an implementation plan but the Romanian Contact Point for INSPIRE Directive (i.e. National Agency for Cadastre and Land Registration-NACLR) is going to develop a project financed from European structural instruments in order to develop an INSPIRE strategy in Romania. In Romania, the PPP model is gaining importance in the form that ANCPI is the public body with overall responsibility and the private firms perform the bulk of the surveying/map production under contract. In 1996 Romania adopted a modern Copyright Law that went into force on 24 June 1996. It explicitly protects three-dimensional works, maps and drawings in the field of topography, geography and science in general. In the future under Government Ordinance nr. 4/2010, transposing the INSPIRE directive, the public authorities responsible for the data sets have to ensure their own funding for performing their tasks under the Ordinance.

Based on these conclusions we score the indicators as follows:

- There is a legal instrument or framework determining the SDI-strategy or –development
- There are true PPP’s or other co-financing mechanisms between public and private sector bodies with respect to the development and operation of the SDI-related projects (Not so clear)
- There is a freedom of information (FOI) act which contains specific FOI legislation for the GI-sector (No Information found)
- GI can specifically be protected by copyright
- Privacy laws are actively being taken into account by the holders of GI (No Information found)
- There is a framework or policy for sharing GI between public institutions (No Information found)
- There are simplified and standardised licences for personal use (No Information found)
- The long-term financial security of the SDI-initiative is secured (No)
- There is a pricing framework for trading, using and/or commercialising GI (No Information found)
2.4 Component 3: Data for themes of the INSPIRE annexes

2.4.1 Data sets of different resolutions covering the INSPIRE and other themes

Romania is covering the majority of the data themes of INSPIRE. Based on information from the INSPIRE MR we can conclude that the themes of annex I are well covered. Only the addresses are missing although some data sets exist within the country. The cadastral parcels on the other hand are only covering a small part of the territory. Many data sets exist for the transport network (roads, waterways, as well as aeronautic), the hydrography (at different scale levels from 1:2000 up to 1:1,000,000; different data providers). All themes of annex II have spatial data sets. Especially the orthophoto imagery is well covered, including data sets for specific municipalities such as Bucharest, Pitesti, etc. For land cover it should be noticed that CORINE Land Cover exists along with the LCCS classification based data sets for 2003 and 2009. Also annex III themes are covered well. Only for human health & safety, and oceanographic features and sea areas no data sets are reported, although the two latter themes probably because they are not relevant for the country. For buildings, only a small part of the relevant territory is currently covered.

Many data providers are involved. Government Ordinance no. 4/2010 states which body is responsible for which themes. The Ministry of Environment and Forestry and its subordinated agencies are coordinator for 12 themes, mostly related to annex III, but also hydrography and of course the protected sites (theme 8 and 9 of annex I). The Ministry of Administration & Interior together with its subordinated agencies (especially ANCPI) is coordinator for 8 themes, mostly related to annex I, but also the orthophoto’s of annex II, and the buildings and utility & governmental services themes of annex III. The Ministry of National Defence is coordinator for two themes from annex I and II, namely Geographical names and Elevation. The Ministry of Agriculture and Rural Development is a coordinator for 2 themes: Soil and Agricultural & aquaculture facilities. The National Statistics Institute is a coordinator for Statistical units and Population distribution & demography. The Ministry of Regional Development and Tourism is responsible for Land use and Natural risk zones. The other themes fall under the responsibility of other Ministries: Ministry of Transport and Infrastructure (Transport Networks); Ministry of Education, Research, Youth and Sport with the Geological Institute (Geology); the Ministry of Health (Human Health & Safety); the Ministry of the Economy, Commerce and Business Environment (Energy Resources); and finally the National Agency for Mineral Resources (Mineral Resources).

ANCPI remains the most important data provider and also supports the other data providers in maintaining the necessary data sets with the highest level of quality. ANCPI itself is developing - amongst others - cadastral services. The existence of a modern cadastre is considered a must in a market-oriented economy. A big effort is needed to register all the real estate properties which is an on-going effort (currently less than 20% of the territory is covered). An operational cadastral system can be considered as an important building block for an NSDI. But ANCPI is not only focusing on cadastre. The
National Center for Geodesy, Cartography, Photogrammetry and Remote Sensing (CNGCFT) which is part of ANCPI, developed country wide coverage of Romania with detailed spatial data corresponding to a scale of 1:5.000 (Reference Topographic Plan TOPRO5). It integrates many of the data themes of annex I. This data set is the basis of the ANCPI Geoportal. Actually CNGCFT is also working for creating data at cities and communes level for the national census foreseen for 2012. Also satellite born data are extensively created and used in Romania. There is a country wide coverage with SPOT imagery and a large range of other satellite imagery are used for different purposes (e.g. Landsat). In addition, there are different sets of country wide orthophoto’s (2005, 2008, 2009). Also integrated data sets at smaller scales are produced or exist for a long time.

Geographical Names are the responsibility of several Institutes, amongst them, the Romanian Academy Institute for Geography and of the Topographic Military Directorate. In the context of INSPIRE, the latter is responsible. Romania is also member of the UN Geographical Names Commission.

Other databases were developed within the framework of particular projects, or for a particular area in the country. Some examples are:

- Digital database of Bucharest at scale 1:2.000 (1997);
- Real estate cadastre for the City of Constanza at scale 1:500 (also quite recent – exact year unknown);
- Agricultural cadastre for the district of Fundulea at scale 1:2.000;
- Real estate cadastre for the municipality of Craiova at scale 1:1.000.

Also private companies and other organisations create spatial data sets. For example, the ESRI Community BaseMap, or Schubert & Franzke, a company that has data for a large number of cities, including Bucharest. MicroMapper, a Cluj-Napoca MapInfo partner, has many data sets of cities, including data at the building level. There are also NGO’s who create and own data.

### 2.4.2 Geodetic reference systems and projections

For all the civil maps and digital spatial databases, the reference system used in the definition of most of the data sets is “The Coordinates System 1942” (Krasovski ellipsoid of 1940, stereographical projection of 1970). The system of elevation is “Black Sea 1975” which is used for altimetry.

The Military Topographic Department also works with the WGS84 system.

### 2.4.3 Quality of the data

Most of the digitized topographic maps are dating from the eighties and only recently, with the development of TOPRO5, they are based on orthophotos and satellite imagery. Each institution prepared its own specifications and procedures for quality assurance and control of spatial data. They are sometimes insufficiently documented and generally
intended for draft acts prepared at a given moment within the institutions in question. So there is not yet a coherent Quality Assurance procedure across all the organisations although ANCPI is working in that direction through the establishment of new norms and guidelines.

The new TOPRO5 has been created in accordance with EN ISO 19113:2002 - Geographic information-Quality principles. Following data quality elements are considered: the exhaustive nature of the spatial data; the logical sequencing of spatial data; the accuracy of position/geometric accuracy; the time accuracy; and the thematic accuracy. ANCPI has developed a document for QA with regard to this product: “Norms for the development of the reference topographical plan in digital format according to the scale of 1:5000 (TOPRO5)”. The product is being updated on a continuous basis.

Other data providers have their own norms and procedures. The Directorate for Military Topography follows the NATO standards for QA (for example, STANAG 3809 - DTED, STANAG 2213 - Gazetteers). APIA follows the norms and guidelines of the European Commission (e.g. for developing the LPIS system). The Ministry of Transport follows specific legislative acts and regulations (e.g. for aviation).

ANCPI proposed to improve the quality assurance procedures and the control stages for the TOPRO5 product and for other products which will be developed internally in compliance with ISO 19113:2002 - Geographic information - Quality principles, ISO 19114:2003 - Geographic information - Quality evaluation procedures, ISO 19115:2003 - Geographic information - Metadata and with the present and future specifications prepared by INSPIRE for the themes listed in Annexes I, II and III.

2.4.4 Interoperability and harmonisation of data

In the framework of Government Ordinance n° 4/2010 ANCPI has the task to ensure the compatibility and interoperability of the national geo-portal with the INSPIRE geo-portal of the European Community.

By the end of 2010 no transformation services were available in order to achieve the interoperability of data, but they are planned to be developed and integrated as part of the national geo-portal.

TransDatRO software application is being developed by the National Agency for Cadastre and Land Registration, an application free of charge for users. It can be downloaded from the website of ANCPI. On the basis of some grids for planimetric corrections and abnormalities (in the case of quasi-geoid), they ensure the transformation of coordinates from the European reference system ETRS89 to the national reference systems Krasovski 1942 (S-42) with the Stereographical projection in 1970 (for the whole territory of Romania), Hayford 1910 with the Stereographical projection in 1930 (for Bucharest municipality) and to the system of normal altitudes for the Black Sea in 1975.
The Romanian SDI stakeholders and ANCPI in particular are very well aware of the challenges related to data interoperability. Technical differences were identified in terms of the data models and format of databases, as well as differences in the semantic definition of terms. Preparatory measures to reach data harmonization are currently being taken.

2.4.5 Language and culture

If there are documents with background information, they are mostly in the Romanian language although more and more English material can be found as well. In addition, the geoportal offers partial information in English. The metadata are only in Romanian.

2.4.6 Conclusions of Component 3

Spatial datasets exist for almost all the INSPIRE data themes of the three annexes. They provide a good basis for contributing to the pan-European coverage. The INSPIRE 2011 MR results confirm the statement. 264 data sets have been reported 72, 36 and 111 for Annex I, Annex II and Annex III respectively. The geodetic reference system and projection systems are standardised, documented and interconvertable. For all the civil maps and digital spatial databases, the Stereographic 70 projection is used as reference system. Quality is stated as being high, and for the key spatial data products an extensive quality assurance mechanism is in place (even if it is not the same for all data products and data providers). If there are documents with background information, they are in the Romanian language, but more and more they are in the English language as well.

Based on these conclusions we score the indicators as follows:

- Geodatasets exist which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components
- The geodetic reference system and projection systems are standardised, documented and interconvertable (Partial)
- There is a documented data quality control procedure applied at the level of the SDI (Partial)
- Concern for interoperability goes beyond conversion between different data formats (Partial)
- The national language is the operational language of the SDI
- English is used as secondary language (Partial)
2.5 Component 4: Metadata

2.5.1 Availability of metadata

For a long time, there was a lack of metadata for spatial data sets in Romania although it has always been recognised as key for a good functioning SDI. Therefore, and under the stimulus of the INSPIRE initiative, important efforts were made during the past four years. Many spatial data sets have now metadata. According to the INSPIRE MR figures (status end 2010), 47% of the spatial data sets falling under the annex I themes have metadata, while 39% have metadata that are conformant. These figures were at the end of 2009 32% and 19% respectively. The situation for the annex II data sets is even better: at the end of 2010, 58% of the data sets contained metadata, while 47% of the data sets had conformant metadata. This was only 46% and 31% at the end of 2009. The situation for annex III data sets is similar although metadata are usually not (yet) conformant to the INSPIRE implementing rules: the figures at the end of 2010 were 48% and 17% for respectively existence and conformity (39% and 6% end of 2009). Taking all the data sets together, almost half have metadata (49%); but less than one third of the spatial data sets have conformant metadata. The latter is not bad at all taking into account that progress was mainly made over the past few years.

Standards that are applied to metadata for spatial data sets (and services) are ISO 19139/19115/19119, the INSPIRE Profile as defined in the implementing rules, the Dublin Core and the US FGDC metadata standard.

2.5.2 Metadata catalogues

In an initial stage, a prototype geoportal project with a catalogue containing the metadata of ANCPI was developed within the framework of a PHARE Twinning project (2008-2009). Furthermore, in this prototype project, the CatMDedit tool (developed by The Advanced Information Systems group of the University of Zaragoza and GeoSpatiumLab S.L) was used for Editing. There had to be some modifications (adding values to the used thesauri) to make the tool suited for the Romanian data sets. Metadata were published in catalogues. The catalogues, on top of which services are build, are the access points to search for specific datasets. Also these services are set up by using OGC standards for catalogue services (CSW). Once the metadata were created it was stored in a metadata data base of the eXcat, the server component for serving the metadata used for the prototype. (Bulens et al., 2009)

Since 2010 there is a more complete and revised catalogue for ANCPI data and for data from other data providers operational (accessible through http://geoportal.ancpi.ro/geoportal). This catalogue is one of the core components of the geoportal developed by ESRI-RO. The metadata elements are conformant with Regulation 1205/2008 and correspond to the elements in the INSPIRE implementing rules. A metadata validator allows to check metadata against the INSPIRE profile.
2.5.3 Metadata implementation

In order to further improve the existence and especially the conformity of the metadata, CINIS decided to allocate additional funds for the development of web based applications for metadata editing and verification.

ANCPI prepared a document setting out coherent procedures for the creation, update and administration of metadata at internal level in accordance with the INSPIRE Directive. After the preparation of this document, ANCPI created metadata in accordance with INSPIRE for the most important spatial data sets held (mostly for annex I and II). The metadata administrator of ANCPI will update the metadata every 6 months (or whenever necessary). The figure below gives a schematic view of how the metadata are administered by ANCPI.

![Figure 1: Administration of metadata within ANCPI (INSPIRE MR Romania, 2010)](image)

However, not only ANCPI is responsible for the creation and maintenance of metadata. In accordance with Government Ordinance No 4/2010, all public authorities and institutions that are members of the INIS Council must create and update the metadata for the spatial data sets and services related to themes they are responsible for. To support CINIS members ANCPI has created a user guide for the metadata editor and organised several work & demonstration sessions. So it can be stated that there is a distributed mechanism for managing metadata with strong guidance and support from ANCPI. Publishers can upload metadata or create metadata to publish it on the INIS geoportal.

2.5.4 Conclusions of Component 4

Metadata are produced for an important fraction of geodatasets of the themes of the INSPIRE annexes. The 2011 MR (status end 2010) reveals that for the reported datasets of INSPIRE 47%, 58% and 48% of the data sets have metadata for Annex I, II and III
respectively. Under the ANCPI geoportal there is a metadata catalogue. All INIS Council stakeholders have the task to create and maintain metadata. This work is coordinated and supported by ANCPI.

Based on these conclusions we score the indicators as follows:

- **Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes (Yes)**
- **One or more standardised metadata catalogues are available covering more than one data producing agency (Yes)**
- **There is a coordinating authority for metadata implementation at the level of the SDI (Partially)**

### 2.6 Component 5: Network Services

#### 2.6.1 Geoportals

Over the past years (2008-2010), several geoportals were developed within the framework of projects mostly funded by the EU (Phare), the Worldbank or within the context of twin-projects. An example is the geoportal of the Ministry of Environment developed in the context of a Phare project which provided access to many environmental resources ([www.roenv-geoportal.ro](http://www.roenv-geoportal.ro)). The geoportal was not online at the time of reviewing this report (spring 2011). Other examples include the Romanian Waters Portal ([http://www.rowater.ro](http://www.rowater.ro)), the Biodiversity Portal, the portal of the National Heritage Institute ([http://www.egispat.inmi.ro](http://www.egispat.inmi.ro)) and the portal of APIA ([http://lpis.apia.org.ro](http://lpis.apia.org.ro)). Since June 2010 there is a national geoportal operational, developed by ESRI Romania, which serves as a single access point for INIS. The geoportal contains many functionalities such as:

- Search and discover metadata records;
- Selection of geospatial information resources from different data producers;
- Preview of spatial data and maps;
- Prepare maps that combine geospatial information produced by others using a variety of map viewer technologies;
- Subscribe and receive automatic notification of new geospatial data resources that meets user-specified criteria;
- Publish and expose own geospatial information for discovery by other users;
- Registration of portal users.
The first version of the Romanian geoportal provided access to many spatial reference data sets: the Romanian reference map TOPRO5 at scale 1:5,000, orthophotos at 1:5,000 scale as well, but also other resources such as network services and applications.

The geoportal consists of two major parts and two supporting parts. One part allows to explore the metadata catalogue by searching, evaluating and pre-viewing the available spatial data resources. The second part is the web site itself and offers functional capabilities to publish and search metadata, to visualize and directly connect to geospatial datasets and services over a distributed network. The supporting parts relate to the content management and administration of the geoportal. Each user should register according to one of the four profiles that are available.

Two viewpoints are integrated in the geoportal: the public and the INIS Council users viewpoints. For each of the two groups a dedicated user interface has been developed.

### 2.6.2 Network services

So far, the focus of the service oriented architecture has been on discovery, viewing and to a certain extent also download services. Also other services are provided and made accessible through the geoportal.

#### 2.6.2.1 Discovery services

The geoportal contains a discovery service to easily find spatial data resources according to certain search criteria. If the users are registered in the geoportal, their search criteria can be saved and re-used in subsequent visits. There are two search options available: basic or advanced. The advanced search option provides more search functionalities, e.g. based on a text, spatial criteria or a combination of both, enabling to define more details for the user search. Users can see their research result through RESTful APIs, for example GEORSS, HTML, KML and JSON.
In general however, the discovery of spatial data sets and services remains still weak. According to the INSPIRE MR figures (status end 2010) only 6% of all the reported data sets and 2% of the reported services can be discovered.

2.6.2.2 Viewing services

A number of view services are available within INIS. The INSPIRE MR mention 29 such services. They are from different agencies and cover different sectors, for example: ANCPI, the Paying and Interventions Agency for Agriculture (APIA), the National Statistical Institute (INS), Romanian Civil Aviation Authority (AACR) and the National Administration of Romanian Waters (ANAR). However, some of them are web mapping applications, not necessarily according to the OGC WMS standard. Only a small part of all the reported data sets can be viewed (a little bit more than 10%).

2.6.2.3 Download services

The INSPIRE MR reports a few download services (9) from several stakeholders of INIS. However, the reported URLs or URIs only refer to different portals or applications. Most of the download functionalities are dedicated tools, rather than services. In case of the DTM of the Ministry of National Defence download services will be offered through its internal geo-portal in order to be compliant with the rules in force on copyrights and related rights.

The INIS geoportal allows the users to download spatial data from a published map service through the data download interface. This functionality is implemented by a tool which allows the users to specify the layers of data that want to be downloaded, the map projection of the data, the output file format they want to receive it in, and the desired spatial extent. The downloaded data are emailed to the user in a zipped file. By the end of 2012 a download service will be implemented as well.
Of all the reported data sets of the INSPIRE MR (status end of 2010) about 4% can be downloaded. And about 1% can be downloaded and viewed.

2.6.2.4 Transformation services

The INSPIRE MR does not report any transformation service (end of 2010). The INSPIRE MR report states that such services are planned and that they will be integrated in the national geo-portal.

On the other hand, TransDatRO, a software application has been developed by ANCPI to perform coordinate transformations. This application is free of charge for users and can be downloaded from the website of ANCPI.

2.6.2.5 Invoking services

No information was found.

2.6.3 Spatial Data Services and other services

The INIS portal also provides several other services like Image Services, Processing Services or Geometry Services.

2.6.4 Use of software

Several types of GIS software are used within Romania (Intergraph, ESRI, Autodesk, …). For developing (parts of) INIS, ANCPI has in place an ELA with ESRI. Oracle is the ANCPI database standard. SQL Server is used as well in some other organisations. Open source is used by more and more stakeholders to develop geoportals and other applications.

2.6.5 SDI user applications

The programme on the development of the “Information System pertaining to the area of Urban Real Estate and Databanks” is an example of the usage of the NSDI. It is designed to support the development of the urban and rural infrastructure. This infrastructure aims in turn at supporting the decision-making process for the elaboration of policies on sustainable territory development at local level and at regional level, and to create the conditions for the free movement of lands and constructions, to raise capital, to develop and consolidate mortgage credit. It is also designed for the purpose of determining the value of immovable goods, which is required in order to have an accurate system of taxes and fees in place (INSPIRE NCP RO, 2010). One example of Information System pertaining to the area of urban real estate and databanks (SISDIEBU) is the Information System of the Town Hall in Timisoara (TimSig). It is an example of the cooperation between city authorities and public utility companies.

Many other user applications exist, some of which are not country wide (rather project oriented) and some of which are focused on management and inventory of spatial data. However, over the past few years many additional efforts have been made. In many cases, applications have been developed by the private sector on demand of public
authorities (e.g. TeamNet, ESRI Romania, Intergraph). Several applications exist in the field of natural disaster management (e.g. flooding), nature conservation and biodiversity, emergency response, water management, transport & mobility, etc. In the context of nature conservation and disaster management, also several cross-border projects saw light.

2.6.6 Conclusions of Component 5

The INSPIRE MR reports 7 discovery services from different data providers and accessible through different geoportals (although the http://www.roenv-geoportal.ro could not be accessed at the time of writing this report). At the same time, there are many WMS services, also from different data providers. The MR further reports 8 download services (although it is not clear whether they are real service, or rather tools). Although a coordinate transformation tool exist, no information could be found on related services and none were reported in the INSPIRE MR list of services.

Based on these conclusions we score the indicators as follows:

- There are one or more discovery services making it possible to search for data and services through metadata (Yes)
- There are one or more view services available for to visualise data from the themes of the INSPIRE annexes (Yes)
- There are one ore more on-line download services enabling (parts of) copies of datasets (Yes)
- There are one or more transformation services enabling spatial datasets to be transformed to achieve interoperability (Not clear, not enough information)
- There are middleware services allowing data services to be invoked (No information found)
2.7 Component 6: Thematic environmental data

The Romanian Environmental SDIC has the mission to produce the environmental data themes according to INSPIRE implementing rules and to coordinate the INSPIRE implementation in relation with the environmental data themes. The RoEnv SDIC is including all the institutions that are contracted by the Romanian Ministry of Environment or its subordinated bodies in projects related to INSPIRE Directive implementation at the national level.

Part of the SDIC are: the Danube Delta National Institute – DDNI (www.indd.tim.ro) TeamNet International (www.teamnet.ro) Forest Research and Management Institute - ICAS (www.icas.ro) National Museum of Natural History “Grigore Antipa” – Antipa NMNH (www.antipa.ro) Institute of Biology Bucharest – IBIOL (www.ibiol.ro) Ioan Cuza University from Iasi – UAIC (www.uaic.ro). In addition, many NGO’s as well as several private companies are active in this SDIC and in the field of environmental information at large.

2.7.1 Conclusions of Component 6

The Romanian Environmental SDIC has the mission to (support) produce (the production of) the environmental data themes according to INSPIRE implementing rules and to coordinate the INSPIRE implementation in relation with the environmental data themes. The MR confirms that statement since 219 datasets are reported: 72 for Annex I (of which 11 relate to the protected sites), 36 for Annex II and 111 for Annex III.

Based on the information provided on the previous paragraph we score the indicator as follows:

- Thematic environmental data are covered by the described SDI-initiative or there is an independent thematic environmental SDI.
2.8 Component 7: Standards

Although Romania has a standardisation body - Asociatia de Standardizare din România (ASRO) - representing Romania in ISO, CEN, CENLEC, IEC and ETSI, it is not active anymore in the field of geo-standardisation. However, ANCPI and other public bodies, as well as private players in the GI-sector take the OGC and ISO series of geo-standards actively into account. Following standard are applied:

Metadata:
- EN ISO 19115:2003 - Geographic information – Metadata
- Dublin Core metadata profile

Services
- EN ISO 19119:2005 – Geographic information – Services
- OGC CSW
- OGC WMS, WFS, WCS and WPS

Quality control management:
- EN ISO 19113:2002 - Geographic information-Quality principles;
- ISO 19114:2003 - Geographic information - Quality evaluation procedures;
- EN ISO 9001:2008 – Quality Management: ANCPI designed and implemented a Quality Management System according to Certificate No C.2883.1/23 December 2009, which meets the requirements of this standard. Also other bodies like the Ministry of Transport and Infrastructure applied a comparable certification mechanism.

The INIS geoportal was developed taking all relevant standards and protocols into account. The current version of the geo-portal complies with the following standards:
- Standards for metadata, such as: ISO 19139/19115/19119, INSPIRE Profile, Dublin Core, FGDC;
- Technical standards defining the interface for integration with external map services, such as: WMS, WFS, WCS, ArcGIS Server, GeoRSS, KML/KMZ;
- Other interface standards and protocols such as Z39.50, OAI, WAF, CSW;
- Interfaces for communication, such as: OGC CSW 2.0.2, REST, SOAP, Open Search

2.8.1 Conclusions of Component 7

Based on the information provided in the previous section we score the indicator as follows:
- The SDI-initiative is devoting significant attention to standardisation issues (Partially)
2.9 Use and efficiency of the NSDI

The development of the Romanian NSDI showed only slow progress until 2007, with many uncoordinated initiatives across the country. Since then the NSDI scene has changed dramatically. Several European, twin and other projects, together with the transposition and implementation of the INSPIRE Directive triggered the implementation of a more dynamic and coordinated Romanian NSDI. While the real use and usability of INSPIRE & the NSDI should still be proved, it becomes clearer that there are major benefits and new opportunities for improved decision making and service provision towards businesses, NGO’s and citizens at large.

Most of the developments over the last few years were linked to separate projects, initiated by different INSPIRE & NSDI stakeholders. This might have led in the past to some duplicated efforts and a less streamlined approach as it ideally should have been. However, the INSPIRE transposition process has brought the different SDI stakeholders together and improved all these efforts. Applications like the “Information System pertaining to the area of Urban Real Estate and Databanks” has already led to improved decision making in the field real estate and sustainable territorial development. Another example is the LPIS web application that has proved to be a daily tool for public authorities and farmers in the context of the Common Agricultural Policy.

In the survey on use and usability, the INIS Council states that current developments makes the work of the NSDI more efficient due to the involvement of all the important data providers. They feel that the NSDI can be further be improved by: 1) making more data discoverable through the portal; 2) setting up communication channels to inform participants; 3) improving the interoperability and/or harmonisation of spatial data; 4) promoting the usage of the geoportal and 5) by focusing on the most relevant policies and pilot projects. Ultimately the benefits will become visible and obvious for G2G, G2B and G2C alike.
3 Annexes

3.1 List of SDI addresses / contacts for Romania

<table>
<thead>
<tr>
<th>National body</th>
<th>Web address</th>
<th>Organisational mailing address</th>
<th>Over-all contact person: tel./fax/e-mail</th>
</tr>
</thead>
</table>
| INIS Council (CINIS) | http://geoportal.ancpi.ro/geoportal | CINIS Secretariat 202 A, Splaiul Independentei, sector 6, Bucharest, Romania | INSPIRE NCP - Gabriela Drăgan  
Tel.: +40 731606261  
gabriela.dragan@ancpi.ro |
| ANCPI: Agentia Nationala de Cadastru si Publicate Imobiliara | http://www.ancpi.ro | 202 A, Splaiul Independentei, sector 6, Bucharest, Romania | Mr. Mihai Busuioc  
Tel.: +40 73 1606208  
Fax: +40 21 3176399  
mihai.busuioc@ancpi.ro  
Mr. Victor Grigorescu  
Tel.: +40 73 1606333  
Victor.grigorescu@ancpi.ro |

3.2 List of references for Romania

<table>
<thead>
<tr>
<th>Web sites</th>
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<tbody>
<tr>
<td><a href="http://geoportal.ancpi.ro/geoportal">http://geoportal.ancpi.ro/geoportal</a></td>
</tr>
<tr>
<td><a href="http://www.ancpi.ro">http://www.ancpi.ro</a></td>
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<tr>
<td><a href="http://www.roenv-geoportal.ro/GPT9/catalog/main/home.page">http://www.roenv-geoportal.ro/GPT9/catalog/main/home.page</a> (not operational at the time of reporting)</td>
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<tr>
<th>Publications</th>
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<tr>
<td><strong>Conference, Krakow.</strong></td>
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| Goverment Ordinance No 4/2010 of 10 January 2010 on the establishment of the National Infrastructure for Spatial Information in Romania |

<table>
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<tr>
<th><strong>Other</strong></th>
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<tr>
<td>Older material</td>
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<tr>
<td>Questionnaire filled in by the NMA and NSI of Romania in preparation of the Workshop for Candidate Countries on GIS, October 2001, EUROSTAT, Luxembourg.</td>
</tr>
</tbody>
</table>


| Ionita, A., I. Nedelcu, S. Andrei, V. Chendez, V. Craciunescu, M. Bichir and V. Gancz, Strengths and weaknesses in Geospatial Data Infrastructure in Romania, Bucharest, 2006. |

| Probert, M., Romania: National Spatial Data Infrastructure and INSPIRE, A study and report by Geolink Consulting Ltd. |


<p>| Luca, G., Report on the use of GI in the NMA in the Republic of Romania. Paper presented during the Workshop for Candidate Countries |</p>
<table>
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<th>Source</th>
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<tr>
<td>on GIS, October 2001, EUROSTAT, Luxembourg.</td>
</tr>
<tr>
<td>Vandenbroucke, D., Report of the visit to the NSI and the NMA of Romania, 26-31 July, 2001, EUROSTAT, Luxembourg. (In preparation of the Workshop for Candidate Countries on GIS, October 2001)</td>
</tr>
<tr>
<td><a href="http://www.spatial.maine.edu/~onsrud/gsdi/Romania01.doc">http://www.spatial.maine.edu/~onsrud/gsdi/Romania01.doc</a></td>
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