



# Spatial Data Infrastructures in Lithuania: State of play 2011



SPATIAL APPLICATIONS DIVISION  
K.U.LEUVEN RESEARCH & DEVELOPMENT

Celestijnenlaan 200 E, B-3001 LEUVEN  
TEL.: 32 16 32 97 32 FAX: 32 16 32 97 60  
URL: <http://www.sadl.kuleuven.ac.be>



## Report meta-information

<b>Title</b>	Spatial Data Infrastructures in Lithuania: State of play 2011
<b>Creator</b>	Joep Cromptvoets (PMI), Danny Vandembroucke & Dimitrios Biliouris (SADL)
<b>Date Issued</b>	2011-09-01
<b>Subject</b>	INSPIRE State of Play
<b>Publisher</b>	K.U.Leuven (SADL + ICRI + PMI)
<b>Description</b>	This report summarizes the review of SDI in Lithuania
<b>Contributor</b>	Joep Cromptvoets (PMI), Danny Vandembroucke & Dimitrios Biliouris (SADL), Katleen Janssen (ICRI)
<b>Previous Contributor</b>	Marco Fritz, Catharina Bamps , Jos Van Orshoven, Danny Vandembroucke (SADL); Peter Beusen, Katleen Janssen (ICRI), Aldona Sjovall,
<b>Format</b>	MS Word 97/2000
<b>Audience</b>	INSPIRE stakeholders
<b>Identifier</b>	rcr11LTv132
<b>Language</b>	EN
<b>Coverage</b>	Summer 2010 – Spring 2011

<b>Version number</b>	<b>Date</b>	<b>Modified by</b>	<b>Comments</b>
1.0	2002-11-05	Marco Fritz (SADL) & Peter Beusen (ICRI)	First version
2.0	2002-12-15	Marco Fritz (SADL)	Adoption of harmonized template
3.0	2002-12-20	Jos Van Orshoven (SADL)	Completion & harmonization with 31 other country reports
4.0	2003-07-30	Catharina Bamps (SADL)	Consolidation of comments received from Dr. Aldona Sjovall of the National Land Service. Addition of : - Report meta-information - Executive summary - Abbreviations/acronyms
5.0	2003-08-07	Jos Van Orshoven (SADL)	Harmonisation with 31 other country reports
6.0	2004-06-10	Catharina Bamps (SADL)	Integration of information from limited review of web sites General review, correction and

			update Addition of table pointing to changes with regard to Version 5.
7.0	2004-06-28	Katleen Janssen (ICRI)	General review, correction and update of legal framework
8.0	2004-07-01	Jos Van Orshoven (SADL)	Consolidation
9.0	2005-07-28	Katleen Janssen (ICRI)	General review, correction and update of legal framework
9.1	2005-08-11	Danny Vandenbroucke	Review of the 2005 update and consolidation
9.2	2005-09-26	Danny Vandenbroucke	Final report based on comments from EC
10.0	2006-08-11	Aldona Sjovall	Update of the status of 2005
10.1	2006-12-22	Katleen Janssen (ICRI)	General review, correction and update of legal framework
10.2	2006-12-28	Danny Vandenbroucke	Review of the 2006 update and consolidation
11.0	2008-03-27	Katleen Janssen (ICRI)	Correction and update legal and organizational framework
11.1	2008-04-12	Danny Vandenbroucke, Ludo Engelen (SADL)	Integration results survey
11.2	2008-07-23	Danny Vandenbroucke (SADL)	Metadata and final changes
12.0	2010-03-25	Dimitrios Biliouris (SADL)	Review of the 2009 update
12.1	2010-04-21	Katleen Janssen (ICRI)	2009 update of legal framework
13.0	2011-08-05	Joep Cromptvoets (PMI), Saulius Urbanas (National Land Service), Jurate Kuciene (GIS-Centras), Lina Papsiene (GIS-Centras), Mindaugas Pažemys (GIS-Centras), Giedrė Beconyte (GIS-Centras), Irena Urbšienė (National Land Service)	Full revision Country report for the situation 2011
13.1	2011-09-12	Danny Vandenbroucke, Saulius Urbanas	Additional comments from Saulius integrated by Danny
13.2	2011-10-04	Joep Cromptvoets	Final revision

*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

This report presents the status of the NSDI and INSPIRE of Lithuania for 2011.

The Lithuanian SDI approach can be described as truly national. SDI building blocks have reached a significant level of operationality. The national coordinating body is the National Land Service (being also an important national data producer), and most of the implementing activities (in particular related to technical issues) are managed by State Enterprise GIS-Centras. The key data and service suppliers and/or players of LISI form the so-called LISI partners Consortium. It is composed by the public authorities National Land Service, SE GIS-Centras, SE Centre of Registers, Environmental Protection Agency, Lithuanian Geological Survey, State Forest Survey Service, State Protected Areas Service, Fire and Rescue Department, Lithuanian Road Administration and Vilnius Municipality in which National Land Service is taking the lead. The Ministry of Agriculture and National Land Service under the Ministry of Agriculture (NLS) are responsible for the policies related to the implementation of INSPIRE in the Republic of Lithuania.

Lithuanian information spatial infrastructure (LISI) has been designed as an open, shared national spatial data infrastructure for accessing and distributing geographic information products and services online. It connects major public sector information sources through LSIP. The Law on Geodesy and Cartography is recently amended (2010), which includes the transposition of the INSPIRE directive and Directive 2006/123/EC on services in the internal market. The amended law contains a definition of the Lithuanian SDI (LISI), and regulates public access to spatial data and services. Regarding LSIP, datasets are available under a licensing policy that allows a large part of the procedure to be performed in an automated way. For other use of the data sets available at LSIP, a pricing policy was developed based on a number of criteria. The sources of public funding are the authorities at national level. However, funding does not only come from the state budget, but also from EU. Activities that fall within the competence of the local authorities have to be funded from the state budget, the local authorities' budget or other resources.

Many spatial data sets exist that provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components. The INSPIRE 2011 MR confirms this statement by reporting 100 relevant data sets (38, 23 and 39 for Annex I, II and III respectively). The applied geodetic reference system and projection systems are standardised, documented and interconvertible. Algorithms are available to convert coordinates systems applicable in Lithuania to ETRS89 and to calculate Geoid heights for areas on Lithuanian. The Law on Geodesy and Cartography refers several times to the issue of interoperability. However, not many activities have been set up to make this really happen. Regarding the language issue, metadata is provided in Lithuanian. The LSIP provides access in Lithuanian and English, although the Lithuanian sites provide access to more information. The accompanying documents are available in Lithuanian and partly in English.

Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes. The INSPIRE Monitoring 2011 reveals that 87% of the listed datasets have metadata available. The National metadata catalogue is centralized at the LSIP. Metadata are collected from multiple sources and stored in a single database managed by the state enterprise “GIS-Centras”. The spatial data suppliers have to prepare metadata using National Metadata Profile corresponding to ISO 19115. Maintenance and updates are the responsibility of the data suppliers.

The National geoportal is the Lithuanian Spatial Information Portal ([www.geoportal.lt](http://www.geoportal.lt)).

Data at LSIP portal can be delivered as two ways: a downloadable dataset or electronic service. This portal includes currently discovery, view and download services. The current status of LSIP is that 81 datasets can be discovered, 52 datasets can be viewed with WMS, and 19 data sets be downloaded with WFS. The portals Geodetic Control Information Systems, Address Register, Real Estate Cadastre, Geological Information System GEOLIS, and the State Cadastre of Protected Areas include view and download services.

Several data sets and services exist for several environmental themes (MR 2011). LSIP includes data and services (WMS/WFS) provided by important environment public authorities (e.g. Environmental Protection Agency, Lithuanian Geological Survey, Fire and Rescue department, State service for protected areas, and state forest survey).

Standards are partially used. Standards related to data and data specifications have been partially developed in the LIGI project, but still work is needed to apply the INSPIRE implementing rules related to the data specifications of the themes. The National Metadata Profile has been developed and applied. This national profile is strongly based on ISO19115 and ISO19119 standards. The LSIP metadata editor is based on ISO 19139 (Geographic information – Metadata – XML schema implementation) standard. OGC WMS, WFS and CSW are the OGC-standards applied. Nevertheless, the issue of standardisation needs more attention.

# Table of Contents

<b>EXECUTIVE SUMMARY .....</b>	<b>5</b>
<b>TABLE OF CONTENTS .....</b>	<b>7</b>
<b>ABBREVIATIONS AND ACRONYMS.....</b>	<b>8</b>
<b>1 GENERAL INFORMATION.....</b>	<b>9</b>
1.1 METHOD.....	9
1.2 THE NSDI-SCENE IN LITHUANIA.....	9
<b>2 DETAILS OF LITHUANIA NSDI, LITHUANIA INFRASTRUCTURE FOR SPATIAL INFORMATION (LISI).....</b>	<b>12</b>
2.1 INTRODUCTION.....	12
2.2 COMPONENT 1: COORDINATION AND ORGANIZATIONAL ISSUES .....	12
2.3 COMPONENT 2: LEGAL FRAMEWORK AND FUNDING.....	18
2.4 COMPONENT 3: DATA FOR THEMES OF THE INSPIRE ANNEXES .....	25
2.5 COMPONENT 4: METADATA.....	28
2.6 COMPONENT 5: NETWORK SERVICES .....	31
2.7 COMPONENT 6: ENVIRONMENTAL THEMES AND ACTIVITIES.....	36
2.8 COMPONENT STANDARDS .....	37
2.9 USE AND EFFICIENCY OF THE SDI.....	37
<b>3 ANNEXES .....</b>	<b>43</b>
3.1 LIST OF SDI ADDRESSES / CONTACTS FOR LITHUANIA.....	43
3.2 LIST OF REFERENCES FOR LITHUANIA.....	44

## Abbreviations and acronyms

CSW	Catalogue Services for Web
EU	European Union
GCCIS	Geodetic and Cartographic Control Information system
GEOLIS	Geological Information System
GI	Geographical Information
GIS	Geographical Information System
GIS-Centras	National Centre of Remote Sensing and Geoinformatics
GML	Geography Markup Language
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
ISDC	Information Society Development Committee under the Government of the Republic of Lithuania
ISO	International Organization for Standardization
LCP	Lithuanian Contact Point
LIGI	Development of the Lithuanian Infrastructure for Geographical Information (project 2005-2009)
LISI	Lithuanian Infrastructure for Spatial Information
LSIP	Lithuanian Spatial Information Portal
MA	Ministry of Agriculture
NLS	National Land Service under Ministry of Agriculture
NMA	National Mapping Agency
NSGC	National Service of Geodesy and Cartography
NSDI	National Spatial Data Infrastructures
OGC	Open Geospatial Consortium
PPP	Public-Private Partnerships
PSI	Policy and legislation on access to public sector information
SDI	Spatial Data Infrastructures
SSC	Swedish Space Corporation
XML	Extensible Markup Language
WCS	Web Catalogue Service
WFS	Web Feature Service
WMS	Web Map Service

# 1 GENERAL INFORMATION

## 1.1 Method

This report summarizes the state of play of SDI in Lithuania, and reflects the degree to which the SDI in Lithuania is similar to the ideas set out in the INSPIRE-directive.

In comparison with the previous country reports, this report has been updated to the situation of Spring 2011. In order to achieve this, Joep Cromptvoets visited the GIS-Centras 9 June 2011, and had meetings with Saulius Urbanas (National Land Service), Mindaugas Pažemys (GIS-Centras), Giedrė Beconyte (GIS-Centras), Irena Urbšienė (National Land Service), Jūrate Kučienė and Lina Papsiene. Saulius Urbanas is the representative of the INSPIRE National Contact Point, and Director Cartography & Geodesy of National Land Service, and Mindaugas Pažemys is the Deputy director for projects and developments affairs of GIS-Centras. Starting point of discussion were the texts of the previous State of Play reports and INSPIRE Report Lithuania 2010, and the Monitoring results 2010. On the basis of this new information, the country report has been improved and updated. In addition, several websites were re-visited and the latest literature about the Lithuania NSDI was used. The updated text was sent to Saulius Urbanas for confirmation and where necessary modified. Finally, outdated information was removed, while a concluding paragraph regarding the status of each indicator was added for each component.

For more background about the method applied, see Vandenbroucke, D., Zambon, M.-L., Cromptvoets, J., and Dufourmont, H., 2008. Chapter 16, INSPIRE Directive: Specific requirements to monitor its implementation. In: J. Cromptvoets, A. Rajabifard, B. van Loenen, and T. Delgado Fernández (Eds.), *A Multi-view Framework to Assess Spatial Data Infrastructures*. The Melbourne University Press, Melbourne, Australia, pp. 327-355.

## 1.2 The NSDI-Scene in Lithuania

### 1.2.1 The Lithuanian Infrastructure for Spatial Information

The National SDI in Lithuania is formally named The Lithuanian Infrastructure for Spatial Information (abbreviated as LISI).

The objectives of this national spatial data infrastructure (LISI) according to the amended Law of the Republic of Lithuania on Geodesy and Cartography are:

- to collect metadata of spatial data sets supplied by state cadastres, registers, state and/or municipal authorities according to a common methodology;
- to disseminate spatial data sets and related metadata via the Lithuanian Spatial Information Portal;
- to ensure the quality of services provided via the Lithuanian Spatial Information Portal and other necessary technological solutions;

- to coordinate and monitor the use of spatial data sets/services and related metadata;
- to ensure the interoperability of spatial data sets.

The vision of national spatial data infrastructure (LISI) is to make it possible:

- to integrate spatial data sets from different state and municipal authorities as well as state authorities of different countries in a consistent way;
- to use spatial data sets applying various software tools;
- to link public georeferenced spatial data sets with spatial data sets created by municipal authorities;
- to be aware of the strengths of spatial data sets and use conditions.

The core components of LISI are strongly in line with the ones of INSPIRE being:

- Metadata created for data sets and services;
- Interoperability of data sets and services laying down the technical arrangements for the interoperability and, where practicable, harmonisation of spatial data sets and services;
- Network services
- Data sharing rules for sharing spatial data sets and services between public authorities;
- Measures for monitoring and reporting the NSDI-development

The creation of LISI was actually started during implementation of the project “Development of the Lithuanian Infrastructure for Geographical Information” (LIGI) in 2005–2009 resulting in a set of methodical and technical preconditions for LISI. The main achievements of LIGI were the following:

- A vision and a systematic management approach covering a wide scope of (scientific, technological, educational) issues
- A single set of conditions to use spatial data of public authorities.
- A prototype of the Lithuanian Spatial Information Portal (LSIP) so that spatial data in various formats are accessible via a single access point
- A single georeferenced data model and data harmonisation principles;
- A single methodology for describing spatial data using metadata (resulting into the National Metadata Profile).

During LIGI, much attention was given to attract of users. *Thematic areas*, i.e. media enabling various interest groups to collect links to available geoproducts, discuss, publish news and other information, were created as part of the prototype LISI-portal for this purpose. All users of the prototype were provided with links to sources of geographical information, software, technical documents (specifications, standards), legal acts and other information. In addition, LIGI dealt also with the long-term LISI development programme concerning different aspects such as: spatial coverage, institutional partnership, data themes diversity, functionalities, human resources, electronic network services, spatial data awareness, and the integration within the European Community and global spatial information infrastructures.

As a follow up of LIGI the portal prototype, the Lithuanian Spatial Information Portal ([www.geoportal.lt](http://www.geoportal.lt)), was launched in 2008. In addition, the results of LIGI formed the basis for the amendment of the Law of the Republic of Lithuania on Geodesy and Cartography in 2010 (Žin. [Official Gazette], 2001, No 62-2226; 2010 No 54-2649).

According to the ‘new’ law the National Land Service under the Ministry of Agriculture (hereinafter ‘the NLS’) is designated as the body in charge of the creation of infrastructure facilities for ensuring the functionality of metadata corresponding to the INSPIRE themes, data sets, network services, sharing services and access via the geoportal.

The state enterprise National Centre of Remote Sensing and Geoinformatics GIS-Centras (hereinafter ‘GIS-Centras’) is the manager of the national Spatial Information Portal (LSIP) and manages the implementation aspects of LISI.

Other important stakeholders are the Environmental Protection Agency, State Forest Service under the Ministry of the Environment, Lithuanian Geological Survey under the Ministry of the Environment, State Service for Protected Area under the Ministry of the Environment, the State Enterprise Centre of Registers, Lithuanian Road Administration under the Ministry of Transport and Communications, and Fire and Rescue Department under the Ministry of the Interior.

Although the amended Law on Geodesy and Cartography is strongly based on INSPIRE, the scope of LISI is seen as wider with different target groups and content.

### **1.2.2 Other SDI-initiatives**

The Lithuanian GI policy is part of a broader strategy to create an information-based society for which two bodies are responsible: The Information Society Development Committee under the Government of the Republic of Lithuania and The Committee of the Development of Information Society in Seimas (Parliament). The Information Society Development Committee under the Government of the Republic of Lithuania (hereinafter ‘the ISDC’) is also involved in the management of public spatial data sets and actively participates in the formulation of the state spatial information policies.

## 2 Details of Lithuania NSDI, Lithuania Infrastructure for Spatial Information (LISI)

### 2.1 Introduction

This chapter presents the component details of the NSDI of Lithuania which is named the “Lithuania Infrastructure for Spatial Information” (LISI). The following components of LISI are described in detail: Coordination and organizational issues, Legal framework and funding, Data for themes of the INSPIRE Annexes, Metadata, Network services, Thematic environmental data and Standards. It ends with the use and efficiency of LISI

### 2.2 Component 1: Coordination and organizational issues

The organisation chart as presented below of coordinating and implementing LISI is strongly in line with the one of the INSPIRE coordination/implementation including the INSPIRE Lithuanian Contact Point (LCP), a coordinating body, spatial data suppliers and users, the Information Society Development Committee under the Ministry of Communication of the Republic of Lithuania (hereinafter ‘the ISDC’) and other organisations dealing with the management of public spatial data sets and the formulation of the state spatial information policy. The coordination and LISI and INSPIRE are strongly integrated.

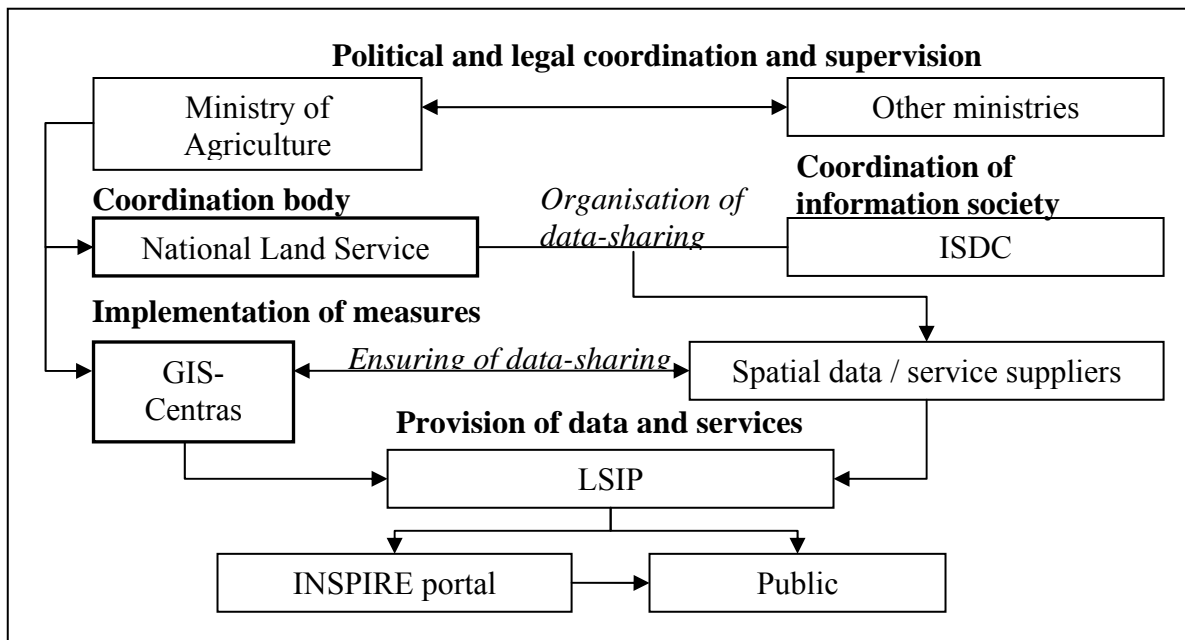


Figure: Coordination / Organisational structure of implementation of LISI and INSPIRE

The figure above presents the coordination / Organisational structure of LISI and INSPIRE. Each organisation presented will be introduced and its role, tasks and responsibility will be briefly described

In an effort to ensure the implementation of the provisions of the Directive, the National Land Service under the Ministry of Agriculture was established as the body in charge of creating the infrastructure facilities for ensuring the functionalities of metadata corresponding to the INSPIRE themes, data sets, network services, sharing services and access via the INSPIRE geoportal according to paragraph 2 of Government Resolution No 911 of 10 September 2008 on the establishment of responsible authorities to ensure the implementation of Directive 2007/2/EC of the European Parliament and of the Council. Through this Resolution, the Government of the Republic of Lithuania charged the Ministry of Agriculture with drafting a law amending the Law of the Republic of Lithuania on Geodesy and Cartography and implementing the legislation for transposing the provisions of the Directive into the legal system of the Republic of Lithuania. As presented in paragraph 3 of the Resolution, the Ministry of Agriculture was charged with acting as the representative in the INSPIRE committee and technical implementation working groups on issues covered by the Directive, as well as with monitoring the establishment and use of the infrastructure for spatial data and submitting reports to the European Commission.

The National Land Service under the Ministry of Agriculture is a public authority of the Republic of Lithuania that participates in the formulation and implementation of national policies in the areas concerning land management and administration, land reform, the real estate cadastre, geodesy, cartography, and geo-referenced database management. The National Land Services formulates the strategy for the public geodesic framework, national mapping and georeferenced database management, and it coordinates and controls the associated implementation. Other important tasks of the National Land Service are making of policies regarding GIS development; Harmonising GIS of the territory of Lithuania with other state cadastres and registers as well as with technical requirements and standards of the European Union; Supervising and quality control of creating and supporting the public geo-referenced databases.

Pursuant to the Law of the Republic of Lithuania on Geodesy and Cartography, the National Land Service is responsible for the implementation of the national policies of the Republic of Lithuania related to geodesy, cartography, public geo-referenced spatial data sets management and LSI:

1. prepare, in accordance with the procedure laid down in legal acts, policies for establishing, updating and mapping the public geodesic framework, and for ensuring the management and improvement of public geo-referenced spatial data sets and LSI as well as submit these draft policies to the government for approval;
2. Supervise the national and municipal geodesic and cartographic works and the works related to the public geodesic framework and public geo-referenced spatial data sets in order to strengthen LSI, and coordinate, the harmonisation and interoperability of spatial data sets and the services;
3. approve lists of public geo-referenced spatial data sets and geo-referenced base maps as well as the public geodesic network accuracy classes;
4. implement policies for establishing, updating and mapping the public geodesic framework, and prepare public geo-referenced spatial data sets and geo-referenced base maps;

5. organise the geodesic and cartographic works on the state border of the Republic of Lithuania;
6. manage and improve the Lithuania positioning system (LitPOS);
7. coordinate the implementation of international and national policies and projects geodesy, cartography and LISI;
8. coordinate aerial photography and remote scanning works with other authorities;
9. prepare and approve technical regulations and specifications for harmonising geodesic, cartographic and public geo-referenced spatial data sets base maps, and ensure their compliance with international standards and requirements of EU and the North Atlantic Treaty Organisation (NATO).
10. issue surveyor's qualification certificates, suspend and cancel qualification certificates in accordance with the procedure laid down in legal acts;
11. administer, in accordance with the procedure laid down in laws, the exclusive property rights of the authors of geo-referenced base maps, public orthophotographic maps and public geo-referenced spatial data sets;
12. establish procedures for submitting geodesic, cartographic material and public geo-referenced spatial data sets;
13. perform the public supervision and quality control of geodesic and cartographic works as well as public geo-referenced spatial data sets management, and ensure and improve LISI-functionalities;
14. store the public geodesic and cartographic material (material on establishing and upgrading the geodesic networks, maps, aerial photographs, space photographs, spatial data sets, etc.);
15. supervise the geodesic and cartographic works at municipalities.

According to the Law on Geodesy and Cartography the National Land Service serves at the National Contact Point, Its main functions are as follows:

- Maintenance of contacts with the Commission regarding the implementation of INSPIRE;
- Creation of LISI-facilities to ensure the functionalities for metadata corresponding to the themes referred to in the Directive, data sets, network services, sharing services and access via the INSPIRE geoportal.

In addition, the National Land Service monitors annually INSPIRE, and reports three-annually.

Staff members of the National Land Service were appointed by Order No 3D-565 of 4 August 2009 of the Minister of Agriculture to represent the Republic of Lithuania in the working bodies of European Union authorities.

On the basis of the Law of the Republic of Lithuania on Geodesy and Cartography, the National Land Service has become the overall LSIP manager, financier, and owner.

The Ministry of Agriculture of the Republic of Lithuania is a public authority of the Republic of Lithuania. The Ministry of Agriculture executes the state management functions for areas related to agriculture and food sector, fishery and rural development

as assigned by laws and other legal acts as well as implements the associated national policies.

The Ministry of Agriculture formulates the national policies concerning the geodesic, cartographic and public geo referenced spatial data sets and LISI.

Under Government Resolution No 911 of 10 September 2008, the Ministry of Agriculture was responsible to draft a law amending the Law of the Republic of Lithuania on Geodesy and Cartography, and implement the legislation for transposing the provisions of the Directive into the legal system of the Republic of Lithuania. It also acts as the Lithuanian representative in the INSPIRE committee and technical implementation working groups on issues covered by the Directive, monitors the establishment and use of LISI, and submits reports on the implementation of the Directive in Lithuania to the European Commission.

The Information Society Development Committee is presented in the organisation chart as a body formulating the information society development strategy, preparing long-term development policies and coordinating the implementation in Lithuania. The ISDC is responsible to:

- Coordinate the use of state-controlled information resources for ensuring their integrity, effectiveness and safety;
- Participate in the formulation of an information society development policy of the European Union together with other public authorities and bodies;
- Coordinate the establishment and implementation of the system of state registers (cadastres) and individual state registers (cadastres), monitor the establishment, management, reorganisation and liquidation of the systems;
- Register the regulations and specifications of state information systems and publish information on established state information systems;
- Monitor the compliance of products of information society service providers with the Law of the Republic of Lithuania on Information Society Services, and implement legislation, and perform other activities related to the supervision of providing the information society services.

The state enterprise National Centre of Remote Sensing and Geoinformatics GIS-Centras is a state enterprise and the LSIP implementation manager. The Law of the Republic of Lithuania on Geodesy and Cartography regulates its functions.

The National Land Service maintains relations with the ministries and public bodies concerned. It cooperates currently with third parties responsible for spatial data sets and services corresponding to the INSPIRE themes, and intends to make these resources accessible via the LSIP. These organisations can be considered as the key suppliers of spatial data and services of LISI. At this moment, those key LISI-suppliers are the following:

- Environmental Protection Agency under the Ministry of Environment;
- State Forest Survey under the Ministry of the Environment;
- Lithuanian Geological Survey under the Ministry of the Environment;
- State Service for Protected Area under the Ministry of the Environment;

- State Enterprise Centre of Registers;
- Lithuanian Road Administration under the Ministry of Transport and Communications;
- Fire and Rescue Department under the Ministry of the Interior;
- Vilnius City (as the supplier at municipal level); and
- National Land Service

These LISI data suppliers are public authorities and enterprises that control and manage many important Lithuanian national data sets (and services).

All these LISI-participants form the so-called LISI partners Consortium. In summary, it is composed by the National Land Service, State Enterprise GIS-Centras, State Enterprise Centre of Registers, Environmental Protection Agency, Lithuanian Geological Survey, State Forest Survey Service, State Protected Areas Service, Fire and Rescue Department, Lithuanian Road Administration and Vilnius Municipality. The National Land Service has the lead in this LISI-consortium.

Many key suppliers are authorities under the Ministry of Environment (Environmental Protection Agency, State Forest Survey, Lithuanian Geological Survey, and State Service for Protected Area). The State Forest Survey manages the forestry cadastre and the GI database of forest parcels. The Lithuanian Geological Survey (LGS) is responsible for creating and maintaining the geological databases at national level.

The State Enterprise Centre of Registers has been established by the Government of the Republic of Lithuania (Decision No. 742, 08 07 1997) and founded by the Ministry of Justice. It is financed by budgetary funds and self-financing contracts. The State Enterprise Centre of Registers provides the spatial databases relating to land cadastre, administrative units, settlements, streets and addresses.

It is also planned to start negotiating with the following organisations for providing their resources via LSIP:

- Department of Statistics under the Government of the Republic of Lithuania;
- Department of Cultural Heritage under the Ministry of Culture;
- Lithuanian Maritime Safety Administration;
- Lithuanian Hydro-meteorological Service under the Ministry of the Environment.

The functions of a spatial data supplier in LSIP are as follows:

- to supply and update metadata regarding their spatial data and data services, i.e. information on available data sets and instructions on how to access them; the metadata has to be prepared in accordance with the approved LISI standards and technical regulations;
- to ensure the quality of spatial data supplied and publish samples at the LSIP;
- to ensure access to spatial data supplied and related services if they are provided from sources other than the LISI central information system;
- to prepare rules for licensing, supplying and pricing spatial data and data services, which have to be harmonised with the approved LISI general rules for licensing, supplying and pricing spatial data and data services.

LISI distinguishes the following data and service suppliers:

- State public administration authorities at national levels managing cadastres, registers, and other relevant spatial data sets;
- Municipal administrations or other municipal public administration authorities managing spatial data sets;
- Other legal or natural persons that have received the LISI manager's permission to provide data to the LSIP, and have a data supply agreement with the LISI manager.

The registered LISI suppliers could receive, free of charge, state official georeferenced spatial data, except in cases where such data are used for creating commercial value-added services or products, and use geo-referenced data services in accordance with the procedure and conditions established by the LISI management body. They could also receive, free of charge, spatial data controlled by other data suppliers – state and municipal public administration authorities – and use the data services provided on the basis of spatial data, provided that this does not conflict with the relevant legal acts. In addition, the LISI data suppliers receive free of charge reports dealing with the ordering and actual use of their spatial data and data services, and could use services to communication with other the LISI partners. They will receive an overview of the paid spatial data and paid data services provided via the LSIP.

The LISI users are legal or natural persons using LISI data and services. They may include public and municipal authorities, business enterprises, non-governmental organisations, residents and anyone who finds spatial data to be important.

The LISI users have the right to:

- register themselves in LISI free of charge, receive metadata supplied via LSIP, review published samples of spatial data, receive publicly supplied spatial information, and use the services of metadata search and review as well as the directory of terms;
- use, free of charge, the services of LISI public communication among users, and communication with LISI management body and LISI data suppliers.

The Users registered in the LISI and identified in accordance with the established procedures have the right to:

- order, receive and use spatial data and data services provided via the LSIP as well as receive, free of charge, information on the conditions for their acquisition and use;
- receive, free of charge, information on the execution of their orders submitted and reports on the use of data services ordered;
- present proposals and comments on the quality of spatial data and data services provided via LISI as well as use communication services and spatial information intended for LISI registered users;

## **Conclusions of Component 1**

The Lithuanian SDI approach is truly national. SDI building blocks have reached a significant level of operationality. The national coordinating body is the National Land Service (being also an important national data producer), and most of the implementing

activities (in particular related to technical issues) are managed by State Enterprise GIS-Centras. The key data and service suppliers and/or players of LISI form the so-called LISI partners Consortium. It is composed by the public authorities National Land Service, SE GIS-Centras, SE Centre of Registers, Environmental Protection Agency, Lithuanian Geological Survey, State Forest Survey Service, State Protected Areas Service, Fire and Rescue Department, Lithuanian Road Administration and Vilnius Municipality in which National Land Service is taking the lead. The Ministry of Agriculture and National Land Service under the Ministry of Agriculture (NLS) are responsible for the policies related to the implementation of INSPIRE in the Republic of Lithuania.

Based on these conclusions 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 operationality (5)
- The officially recognised or de facto coordinating body of the SDI is a NDP, i.e. a NMA or a comparable organisation (Yes)
- 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 (No)
- Only public sector actors are participating in the SDI

## **2.3 Component 2: Legal framework and Funding**

### **2.3.1 Legal framework**

Since the mid-90s, there have been significant developments to develop a legal framework related to GI, including e.g. legislation establishing the registers on land and property (1996) and the responsibilities of NSGC (1997); legislation on the State registers (1996) and the population census (1997). A milestone for the development of GIS in Lithuania was the “Law on Geodesy and Cartography” which was adopted in 2001. The purpose of this law is to regulate the management of geodetic, topographic, and cartographic activities; the principles of creating databases of the GI systems and their integrity; the ownership of the geodetic control and cartographic material; and the main rights and duties of state and municipal institutions and enterprises involved in map production, geodetic survey, gathering of data, its record keeping, and use in the field of geodesy and cartography.

During 2007 – 2010, a new version of the Law on Geodesy and Cartography was prepared which includes the transposition of the INSPIRE directive and Directive 2006/123/EC on services in the internal market. The new law contains a definition of the Lithuanian SDI (LISI), and regulates public access to spatial data and services (unless other legislation applies).

On 27 April 2010, the Parliament of the Republic of Lithuania amended the (new) Law of the Republic of Lithuania on Geodesy and Cartography establishing the procedure for access to spatial data via the Lithuanian spatial information portal (LSIP). This law supplements the previous version of the Law with provisions on the use of LISI and LSIP. It covers the following issues:

- LISI spatial data themes;
- LSI portal regulations;
- LISP safety regulations;
- Security rules for the LSIP-management of digital information
- Continuity of LSIP activities
- LISI technical requirements
- Procedure for preparing and providing LISI metadata
- Procedures for monitoring LISI and preparing/submitting reports to the European Commission.

The Law of the Republic of Lithuania on Geodesy and Cartography defines the following conditions for the use and supply of spatial data sets via the LSIP:

- Access to spatial data via the Lithuanian spatial information portal must be public, unless access to spatial data is otherwise defined in other laws.
- Spatial data sets and services needed by European Union authorities, public authorities and municipalities for carrying out public tasks or submitting reports in accordance with European Union environmental legislation must be provided free of charge.
- State cadastre and register management bodies as well as state and municipal authorities managing spatial data sets have the right to restrict access to spatial data sets via the LSIP if this is written in other laws.
- Users of the spatial data sets and services of LISI must agree to the conditions established by spatial data and service suppliers or their authorised distributors.
- Spatial data set suppliers may be state cadastre and register management bodies or state or municipal authorities managing spatial data sets. Persons wishing to create value-added products using data from state cadastres, registers, geo-referenced spatial data sets or spatial data sets and thematic spatial data sets must be entitled to do so in accordance with the procedure established by spatial data set suppliers. Value-added products must be supplied to users by authorised distributors in accordance with the procedure established by spatial data set suppliers.
- In accordance with the procedure set in legal acts, access to spatial data sets and/or services via the LSIP must be provided to Member States' public authorities and enterprises and organisations that provide public services.

- Regarding payment services, the service provider must ensure that users from the Republic of Lithuania and other Member States are able to use e-commerce services.

During the LIGI project, GIS-Centras prepared typical documents describing the conditions of supply and use of spatial data in Lithuania:

1. Agreements on the granting of distribution rights on spatial data products and on supply of spatial data products to the LSIP. This is an agreement between the LSIP manager and a spatial data supplier. It presents the main terms, the legal basis of provision of spatial data and services via LSIP, the procedure for distributing spatial data services, the data supplier payment, the rights and obligations of the parties as well as the general procedure for providing spatial data and services to users. The annexes of the agreement contain structured forms with explanations for entering the descriptors of spatial data or services provided.
2. Model agreements on the use of spatial data and services. They set the main conditions for using spatial data and services based on which the LSIP manager makes licence agreements with the end users of spatial data and services. They provide for methods of approving licence agreements by a physical signature, electronic signature and clicking upon checking the person's identity. The licence agreement sets the procedures for providing spatial data and related services to users, the purpose and conditions for use as well as the payment procedure.
3. Conditions for using LSIP-services. These services are publicly applicable and free of charge. They are constructed more simply than licence agreements.

Finally, the Ministry of Agriculture and National Land Service under the Ministry of Agriculture (NLS) are responsible for a strategy implementing INSPIRE in Lithuania. There are some internal planning documents, which are used for communication to state data stakeholders and responsible authorities, but those documents are not approved as legal acts.

### **2.3.2 Public-private partnerships (PPPs)**

There are no real PPPs established in the domain of spatial data infrastructures in the Republic of Lithuania.

### **2.3.3 Policy and legislation on access to and re-use of public sector information (PSI)**

On 2 July 1996 the Law on the Provision of Information to the Public (no. I-1418) was passed. The latest amendment to this law was made in July 2006. Article 6 of this law states that "Every individual shall have the right to obtain from State and local authority institutions and agencies and other budgetary institutions, public information regarding their activities, their official documents (copies), as well as private information about himself" and "State and local government institutions must, in accordance with the procedure established by the Law On the Right to Obtain Information from State and Local Government Institutions and other laws, furnish public information as well as

private information held by them, except in instances specified by laws, when private information is not to be divulged.”

A version on the Law on State Registers has been in force since August 2004. The state registers are an important part of official public information. Currently the Law affects to more than 90 databases. In the near future this number of registers could increase to around 160. The law on State Registers defines the order of establishing, creation, managing, liquidation and distribution of the state registers. All data of the state registers are public and available for any citizen or legal person if it is not restricted by other specific laws. The data are available via Internet or could be downloaded by data flow channels. There is no standard license. The details of the distribution of the data of every register are described in the regulations of the register adopted by a Government Decree. The list of registers is available at [www.registrai.lt](http://www.registrai.lt).

Lithuania has transposed Directive 2003/4 on access to environmental information. Directive 2003/98 was transposed by the law of 10 November 2005 on Obtaining Information from Central and Local Government Institutions (Nr. X-383 of 10 November 2005). The law concerns the right of private companies and citizens to obtain information from central and local government and the re-use of it. The law defines the rights and modalities to use the information resources of public sector and also determines the obligation of central and local government to provide this kind of information to all concerned.

There are currently no valid official agreements.

#### **2.3.4 Legal protection of GI by intellectual property rights**

The Law on Copyright and Related Rights (Act no. VIII-1185) was enacted on 18 May 1999, entering into force on 9 June 1999 (amendments were introduced by the Act of 20 July 2000 - no. VIII-1886). The Copyright Act was a major step forward for the legal regime in Lithuania. It was drafted taking into consideration the EU directives and provisions of the Bern and Geneva Conventions. In the last decade Lithuania has transformed its copyright law from the old Soviet-style one into a system that complies to a large extent with modern bilateral and multilateral standards. Chapter 4 of the Copyright Law contains special provisions on the legal protection of databases (*sui generis* right). The 2001 directive on copyright in the information society has been incorporated in Lithuanian legislation.

Article 34 of the recent Law on Geodesy and Cartography of June 2001 contains special provisions regarding the copyright protection of GI. This article stipulates the following:

*“The Republic of Lithuania shall be the copyright holder of the exclusive economic rights to official maps and digital databases financed from the state budget and foreign assistance for the Republic of Lithuania. The authorised institution shall, within the limits of its competence, administer the exclusive economic rights of the authors to official maps and georeferenced databases.*

*The municipalities shall be the copyright holders of the exclusive economic rights of the authors to topographic maps, plans and georeferenced databases financed from the municipal budgets and shall, within the limits of their competence, administer the exclusive economic rights of the authors.*

*For the use of official maps and georeferenced databases, publishing of thematic maps or development of institutional digital databases, with the exception of their use for defence needs, an author's fee shall be charged and a copyright licensing agreement shall be made with the user. The remuneration received as the author's fee shall be used for adjustment of official maps and georeferenced databases. The rights to cartographic works, thematic and other maps and databases shall be protected following the procedure under law.*

*Original works of thematic cartography shall be regarded as research work and their publication shall be recognised as scientific publications.”*

Closely linked to article 34 are the stipulations made in article 7 on the ownership of geodetic, topographic and cartographic materials.

Article 35 stipulates with regard to the procedure on the use of geodetic, topographic and cartographic materials:

*“Geodetic, topographic and cartographic materials and georeferenced data shall be public and available to any natural and legal persons and enterprises without the status of a legal person. The authorised institution and executive institutions of the municipalities shall provide to the consumers geodetic, topographic and cartographic materials and georeferenced data following the procedure established by the authorised institution and executive institutions of the municipalities. Fees for the materials and data shall be charged in the manner stipulated by laws.”*

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

Lithuania enacted its Law on Legal Protection of Personal Data in 1996. This law has been amended several times throughout the years. The latest amendment dates from 22 January 2002, as to ensure the compliance of the act with the EU Directives on data protection. Directive 2002/58 on privacy and electronic communications still has been transferred into national law.

The Law on the Public Registers of 13 August 1996 (no. I-1490) determines the rights and duties of the institutions responsible for the management of public registers, the institutions directing their activities and exercising supervision over them, the rights and duties of the legal and natural persons providing data to the public registers as well as using the data of public registers, and the protection of these rights. It also determines the rights and duties of legal and natural persons whose data constitutes the object of the public registers and the protection of said rights.

Referring to article 23, section 4 of the Law on Geodesy and Cartography public institutions, responsible for administration of state registers, cadastres, state and

municipal institutions, responsible for management of spatial datasets have rights to limit an access to spatial datasets via LSIP if such described in other laws.

### **2.3.6 Licensing data framework**

The Law on Geodesy and Cartography lists a number of geodetic, topographic and cartographic activities that should be carried out. These activities are subject to licensing, and the licences for these activities shall be issued by the National Land Service. The National Land Service arranges the concession of licences for cadastral survey products, topography, geodesy and cartography activities. It administers the funds provided for these purposes.

Regarding LSIP, data sets are available under a licensing policy that allows a large part of the procedure to be performed in an automated way (see section 2.3.1). Standard agreements and licences are developed for different groups of stakeholders, with a description of the use conditions. LSIP lists the terms and conditions of the use of the data. It also presents the privacy statements describing the LSIP usage in general. Each spatial data set or service in LSIP is delivered to the end user by signing a licence agreement. Signing can be achieved in several ways: analogue (physical) signature, electronic signature or accepting license conditions on-line.

### **2.3.7 Funding model for SDI and pricing policy**

#### ***Funding***

The sources of public funding are the authorities at national level. However, funding does not only come from the state budget, but also from EU funding opportunities, EU structural funds and EU regional funds, in accordance with article 22 of the Law on Geodesy and Cartography. Activities that fall within the competence of the local authorities have to be funded from the state budget, the local authorities' budget or other resources.

An important problem regarding the INSPIRE-implementation is that no funds are earmarked for ensuring the compatibility of spatial data of European Community member states. State internal resources are not sufficient to ensure both internal exchange of spatial data for the needs of the state and quality supply of such data to Community institutions and bodies. The problem is partly solved by trying to harmonise national needs with INSPIRE requirements as much as possible.

Data suppliers often lack resources to be able to supply data in accordance with LISI and INSPIRE requirements. Owing to the incompatibility of spatial data specifications, it is impossible to fully automate data sharing. Therefore, it is difficult to ensure quality data supply. Attempts are being made to solve this problem by presenting data suppliers with precise procedures as well as metadata and unified data supply tools.

#### ***Pricing***

Based on the Law of Registers all public authorities shall exchange data between State registers free of charge. This principle is in most cases applicable to public databases for public use also, so for example National Land Service does not charge any governmental body (and municipalities) for the use of state spatial products.

For other use of the data sets available in LSIP, a pricing policy was developed based on a number of criteria: data type (raster/vector data sets, Web service); method of selecting the territory by the user (select map sheets, draw territories); rateable unit (map sheet, sq.km, click, period of time etc.); payment terms (after expiry of the license, before data production, periodically). In addition, the price also depends on the size of the selected territory, the number of selected map sheets, the number of clicks, the number of users, the licensing period, etc.

## Conclusions of Component 2

Lithuanian information spatial infrastructure (LISI) has been designed as an open, shared national spatial data infrastructure for accessing and distributing geographic information products and services online. It connects major public sector information sources through LSIP. The Law on Geodesy and Cartography is recently amended (2010), which includes the transposition of the INSPIRE directive and Directive 2006/123/EC on services in the internal market. The amended law contains a definition of the Lithuanian SDI (LISI), and regulates public access to spatial data and services. Regarding LSIP, datasets are available under a licensing policy that allows a large part of the procedure to be performed in an automated way. For other use of the data sets available at LSIP, a pricing policy was developed based on a number of criteria. The sources of public funding are the authorities at national level. However, funding does not only come from the state budget, but also from EU. Activities that fall within the competence of the local authorities have to be funded from the state budget, the local authorities' budget or other resources.

Based on these conclusions and the findings in the previous sections we score the indicators as follows:

- There is a legal instrument or framework determining the SDI-strategy or – development (Yes)
- 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 (No)
- There is a freedom of information (FOI) act which contains specific FOI legislation for the GI-sector (Yes)
- GI can specifically be protected by copyright (Yes)
- Privacy laws are actively being taken into account by the holders of GI (No)

- There is a framework or policy for sharing GI between public institutions (Yes)
- There are simplified and standardised licences for personal use (No)
- The long-term financial security of the SDI-initiative is secured (Yes)
- There is a pricing framework for trading, using and/or commercialising GI (Yes)

## **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**

Regarding the three INSPIRE annexes addressing the 34 spatial data themes, Lithuania is providing the following data sets

- Geographical names. Scales 1:10,000/50,000/250,000/1000,000. Supplier: National Land Service.
- Administrative units at scales 1:10,000/50,000/100,000/250,000/1,000,000 Suppliers: National Land Service and State Enterprise Centre of Registers.
- Addresses. Supplier: State Enterprise Centre of Registers.
- Cadastral parcels. Suppliers: National Land Service, State Enterprise Centre of Registers, and State Forest Service.
- Transport networks at scales 1:5,000/10,000/50,000/250,000/1,000,000. Suppliers: National Land Service and Lithuanian Road Administration.
- Hydrography at scales. Suppliers: 1:5,000/10,000/50,000/250,000/1,000,000. Suppliers: National Land Service, Hydro-meteorological institute, and Environmental Protection Agency.
- Protected sites at scales: 1:10,000/50,000/250,000. Suppliers: State Service for protected areas and National Land Service.
- Elevation at scales 1:50,000/250,000/1,000,000 + Laser scanning points. Supplier: National Land Service.
- Land cover at scales: 1:10,000/50,000/200,000/250,000 + CORINE. Suppliers: Environmental Protection Agency, National Land Service, State Enterprise Centre of Registers and Lithuania Geological Survey.
- Ortho-imagery with different resolutions (1:2,000/5,000/10,000). Supplier: National Land Service.
- Geology issues at scales 1:200,000 (e.g. Geomorphology, aquifers and bedrocks) and points. Supplier: Lithuanian Geological Survey.
- Statistical units. Statistics information system. Supplier: Department of Statistics.
- Buildings at scales 1:5,000/10,000 Suppliers: National Land Service and State Enterprise Centre of Registers.
- Soil at scale 1:10,000. Suppliers: National Land Service.
- Land use at scale 1:10,000 + documents. Suppliers: National Land Service and State Territorial Planning and Construction Inspectorate.
- Human health and safety at scale 10,000. Suppliers: Lithuanian Geological Survey and National Land Service.

- Utility and governmental services at scales: 1: 10,000/50,000/250,000. Supplier: National Land Service.
- Environmental monitoring facilities. Suppliers: Lithuania Geological Survey, Environmental Protection Agency, and Hydro-meteorological institute.
- Production and industrial facilities. Supplier: Lithuanian Geological Survey and Environmental Protection Agency.
- Agricultural and aquaculture facilities at scale 1:10,000. Supplier: National Land Service.
- Population distribution - demography. Scale . Supplier: Supplier: Department of Statistics.
- Area management/Restrictions/Regulation zones/Reporting units at scales 1:10,000. Suppliers: National Land Service and Lithuanian Geological Survey.
- Natural risk zones. Suppliers: Lithianian Geological Survey and Fire and Rescue Department.
- Atmospheric conditions. Hydro-meteorological institute and Environmental Protection Service.
- Meteorological Geographical features. Suppliers: Hydro-meteorological institute.
- Habitats and biotopes at scale . Suppliers: State Service for Protected Areas (Natura 2000).
- Species distribution at scale . Supplier: Ministry of Environment.
- Energy resources at scale 1:250,000. Supplier: National Land Service.
- Mineral resources at scale 1:200,000. Supplier: Lithuanian Geological Survey.

According to Monitoring & Reporting, most of the data sets have a full national coverage (98% overall). Most of the data sets are not compliant with the INSPIRE specifications. Several activities are planned to achieve compliancy.

In summary, these spatial data sets cover most INSPIRE themes, except for the following:

- Coordinate reference systems
- Geographical grid systems
- Oceanographic geographical features
- Sea regions
- Bio-geographical regions

The first two themes describe reference system requirements rather than data sets.

## 2.4.2 Geodetic reference systems and projections

The Lithuanian Coordinate System 1994 is based on the Geodetic datum ETRS89.

The applied projection system is the Transverse Mercator (conformal transverse cylindrical projection), central meridian 24°E, and scale factor 0.9998 at 24°.

For mapping purposes at national, regional and local levels, the Lithuanian Coordinate System 1994 is used. The main scales are 1:250,000, 1:200,000; 1:100,000; 1:50,000; 1:10,000 and 1:5,000.

Algorithms are available to convert coordinates systems applicable in Lithuania to ETRS89 and to calculate Geoid heights for areas on Lithuanian.

### 2.4.3 Quality of the data

The LSIP manager and data suppliers are responsible for the quality of data and network services in accordance with the procedures laid down in laws and other legal acts. For example, the Law on Geodesy and Cartography states that:

- the state cadastre and register management bodies, state and municipal authorities managing spatial data sets corresponding to the LISI themes must ensure that spatial data sets are accessible to users via the LISP.
- the spatial data sets must be created in accordance with the procedures established by the National Land Service (the body authorised by the government) and requirements approved by the European Commission.

Spatial data suppliers are not certified at present. The right to supply spatial data sets depends on legislation, spatial data supply conditions, and signed spatial data supply agreement with the LSIP manager.

Detailed requirements for the quality of data supply and metadata relevance are laid down in the LISI data supply agreements.

In addition, the following quality assurance procedures are implemented::

- Metadata validation is performed semi-automatically during the metadata entering.
- SDS configuration validation is performed by the portal manager after testing.
- SDS configuration parameters are agreed with data suppliers and both parties do not to change them without prior agreement.

There is no documented data quality control procedures.

### 2.4.4 Interoperability and harmonisation of data

According to the Law on Geodesy and Cartography, the spatial data sets must be compiled so that it is possible to collect, manage, store, integrate them with other spatial data sets in a systematic manner and according to general interoperability requirements as well as apply them in state cadastres, registers and information systems.

For the interoperability of geographic data on the basis of the GML protocol is currently not applied

### 2.4.5 Language and culture

Metadata is provided in Lithuanian. LSIP provides access in Lithuanian and English, although the Lithuanian sites provide more information. Accompanying documents are available in Lithuanian and partly in English. Many publications describing LISI are written in English.

## Conclusions of Component 3

Many spatial data sets exist that provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components. The INSPIRE 2011 MR confirms this statement by reporting 100 relevant data sets (38, 23 and 39 for Annex I, II and III respectively). The applied geodetic reference system and projection systems are standardised, documented and interconvertible. Algorithms are available to convert coordinates systems applicable in Lithuania to ETRS89 and to calculate Geoid heights for areas on Lithuanian. The Law on Geodesy and Cartography refers several times to the issue of interoperability. However, not many activities have been set up to make this really happen. Regarding the language issue, metadata is provided in Lithuanian. The LSIP provides access in Lithuanian and English, although the Lithuanian sites provide access to more information. The accompanying documents are available in Lithuanian and partly in English.

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 (Yes)
- The geodetic reference system and projection systems are standardised, documented and interconvertible
- There is a documented data quality control procedure applied at the level of the SDI (No)
- Concern for interoperability goes beyond conversion between different data formats (Partially)
- The national language is the operational language of the SDI
- English is used as secondary language (Partially)

## 2.5 Component 4: Metadata

### 2.5.1 Availability of metadata

Existing metadata of spatial data sets described according to the developed national metadata profile are currently available via the Lithuanian Spatial Information Portal (LSIP). This portal provides 135 metadata entries of which 35 have a formal data provision agreement; 27 refer to a kind of service, and 8 facilitate directly the data downloading. The INSPIRE Monitoring 2011 reveals that 87% of the listed datasets have metadata available.

According to the Law on Geodesy and Cartography, it is stated that public bodies managing state cadastres, registers and spatial data sets collected at different levels must

prepare metadata according to the LISI-metadata requirements as approved by National Land Service.

The Lithuanian Road Administration (1), Environmental Protection Agency (23), State Service for Protected Areas (9), Fire and Rescue Department (2), National Land Service (58), State Forest Survey (9), Lithuanian Geological Survey (16), State Enterprise Centre of Registries (9), and Vilnius City (8) have made their metadata available (between parentheses are presented the number of metadata entries for each supplier). However, the Lithuanian Road Administration, Environmental, Environmental Protection Agency, Fire and Rescue Department made their metadata available together with a data provision agreement.

## 2.5.2 Metadata catalogues

The national metadata catalogue is centralized in LSIP and managed by the state enterprise “GIS-Centras”. The spatial data suppliers have to prepare metadata using National Metadata Profile corresponding to ISO 19115 (Geographic information – Metadata) and to ISO 19119 (Geographic information – services) standards. The metadata editor is based on ISO 19139 (Geographic information – Metadata – XML schema implementation) standard

The metadata of LSIP can be entered in one of the following three ways:

- a) Entering manually using the online metadata editor application;
- b) Uploading the XML file by using the online metadata system interface;
- c) Harvesting (an automated procedure linking directly to suppliers’ database and reading the metadata file that is copied over old metadata file identified by the same unique identifier).

The metadata catalogue includes several options for searching. Searching can be achieved by supplier name, data theme, area and time. Once the spatial data set or service is discovered, the user is given options to browse a short summary or full metadata for that product. The metadata supplied are free of charge and publicly available. For specific cases, the data supplier has the possibility to limit metadata access to particular users’ groups.

## 2.5.3 Metadata implementation

According to regulation No. 1151, approved by the Government of the Republic of Lithuania at 23 September 2009: National Land Service under the Ministry of Agriculture is responsible for assurance of development of infrastructural means for INSPIRE themes metadata, datasets, network services, sharing services and access via INSPIRE geoportal.

According to the article No. 20 of Law on Geodesy and Cartography all state and municipal institution, responsible for administration of public spatial datasets, must produce metadata according to the requirements, approved by the Government designated institution (National Land Service) and the metadata should be available to public free of charge via LSIP.

National Land Service has produced a draft of National Metadata requirements, the national standardised description of metadata content. National Metadata Profile will be approved as an order of the director of National Land Service and to be used by all state spatial data developers.

The management of metadata implementation and the metadata catalogue as part of LSIP is mainly in the hands of GIS-Centras. This state enterprise has set up the metadata catalogue, collects metadata from multiple sources and stores them in a single database. The spatial data suppliers are responsible for the supply of metadata updates and/or maintenance.

Several data suppliers have created metadata. Not all their metadata are accessible via LSIP. Only metadata from Lithuanian Road Administration, Environmental Protection Agency, State Service for Protected Areas, Fire and Rescue Department provide metadata access via LSIP.

According to the Law on Geodesy and Cartography, the data suppliers responsible for the creation of metadata may expand the contents of metadata with additional information. Metadata must be exhaustive and accurate so that they can help to find, evaluate their quality and use spatial data sets and related services.

LSIP includes installed tools for monitoring and registering problems related to quality assurance. In addition, the metadata administrator has access to integrated tools for metadata core element validation. After initial automated validation procedures, the metadata administrator has the possibility to check metadata for semantic correctness and approves or rejects it correspondingly.

## Conclusions of Component 4

Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes. The INSPIRE Monitoring 2011 reveals that 87% of the listed datasets have metadata available. The National metadata catalogue is centralized at the LSIP. Metadata are collected from multiple sources and stored in a single database managed by the state enterprise "GIS-Centras". The spatial data suppliers have to prepare metadata using National Metadata Profile corresponding to ISO 19115. Maintenance and updates are the responsibility of the data suppliers.

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 (Yes)

## **2.6 Component 5: Network Services**

### **2.6.1 Geoportal(s)**

The Lithuanian Spatial Information Portal (LSIP), [www.geoportal.lt](http://www.geoportal.lt), is the state information system for centralised provision of metadata, spatial data sets and related services. It is established on the basis of the:

1. Law of the Republic of Lithuania on Geodesy and Cartography;
2. Rules for the establishment and validation of state information systems approved by Government Resolution No 451 of 19 April 2004 (Žin., 2004, No 58-2061);
3. Regulations of the National Land Service under the Ministry of Agriculture approved by Order No 194 of 14 June 2001 of the Minister for Agriculture (Žin., 2001, No 52-1852; 2008, No 150-6122).

According to the law on Geodesy and Cartography, state cadastre and register management bodies, as well as state and municipal authorities managing spatial data sets corresponding to the LISI themes must ensure that spatial data sets are accessible to users via the LSIP.

The spatial data supplied by LSIP and related services are public, except for cases laid down in laws and other legal acts. Any person can use spatial data and services provided in accordance with procedures set in the relevant laws and regulations.

The following main functionalities of LSIP are laid down in the Law on Geodesy and Cartography:

1. to collect metadata of spatial data from state cadastres, registers, state and municipal authorities and other organisations according to a procedure approved by the portal manager;
2. to provide metadata and spatial data sets to users on the Internet;
3. to provide services related to spatial data sets to users on the Internet;
4. to publish and promote the use of spatial data for implementing public administration sector tasks; to provide information regarding the possibilities for the public and private business entities to effectively use spatial data managed by the public sector;
5. to establish technological conditions for linking spatial data sets managed by different authorities and using them.

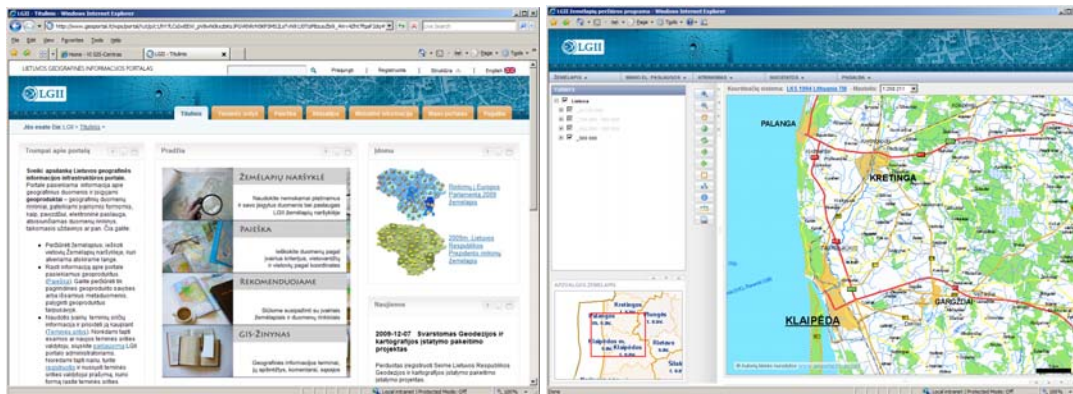


Figure: Screenshots of homepage and map browser pages of LSIP

A prototype of LSIP was created as a result of the LIGI project in 2008. The National Land Service and GIS-Centras asked HNT-BALTIC, an ESRI® GIS software supplier, to develop the LSIP-prototype. With the adoption of the law (2010), LSIP is formally the operational national geoportal for the Republic of Lithuania. The owner of LSIP is the National Land Service meanwhile the implementation manager is GIS-Centras.

Maintenance of LSIP is funded with a budget from the National Land Service budget. For 2010, the annual budget was around € 250,000.

The LSIP-implementation manager is the state enterprise GIS-Centras which manages the portal use interface, contents, and the collection, storage, processing, updates of metadata. In addition, it also manages the services and provides them to the users. The LSIP manager ensures the correct registration, management and transfer of all information published on the LSIP as well as the protection to illegal actions. The LSIP manager has the right to remove wrong information or information not meeting requirements without any warnings.

The LSIP consists of the following:

- a content management system;
- a metadata search and management system;
- Interface for ordering, placing, managing publishing and protecting spatial data sets and related services;
- Map browser;
- Registration/administration interface.

According to the law, LSIP must include the following network services (in the future):

- 1) discovery services for searching spatial data sets and services by means of metadata, and displaying metadata;
- 2) view services for displaying, navigating, zooming in/out, panning or overlaying spatial data sets as well as displaying them with legend information and/or any relevant metadata;
- 3) download services for downloading copies of (parts of) spatial data sets;
- 4) transformation services for transforming spatial data sets to achieve interoperability;

- 5) invoke spatial data services for invoking spatial data or services on the basis of other spatial data sets or services.

The current LSIP is arranged in a distributed environment at GIS-Centras, connecting nine diverse public agencies and one municipality's nodes. LSIP-users can receive the result in the forms of a copy of the data set that they can save on their computer, or service access. When ordering a data set, users can choose a data format and coordinate system coordinates. Having ordered services (WFS or WMS), users receive an address providing real-time access to spatial data formatted according to a specific GIS software (e.g. ArcGIS, AutoCAD) or web mapping applications.

Users' feedback is arranged in such a way that users can send their requests and complaints online and mark map errors

Finally, a survey is undertaken in order to check the quality of the portal's functionalities and content.

Other portals are Geodetic Control Information Systems (<http://www.gis-centras.lt/gkpis>) managed by the National Land Service, Address Register (<http://www.registrucentras.lt/adr/>) managed by State Enterprise Centre of Registers, Real Estate Cadastre (<http://www.registrucentras.lt/adr/>), Geological Information System GEOLIS ([www.lgt.lt](http://www.lgt.lt)) managed by the Lithuanian geological Survey, and the State Cadastre of Protected Areas (<http://stk.vstt.lt/stk>) managed by the State Service for Protected Areas.

## 2.6.2 Network services

As just presented, the current version of LSIP provides the following network services: Discovery services, View services, and Download services. It does not provide transformation services and invoke services. Prototypes of the provided services were developed and tested during the LIGI-project. None of the current network services is fully compliant with the INSPIRE rules. The network services are mainly used for finding spatial data, visualising spatial data, and downloading data. The spatial data and services flows of LSIP (was called LGII portal between 2008 and 2010) are presented in figure below.

The portals Geodetic Control Information Systems (<http://www.gis-centras.lt/gkpis>) Address Register (<http://www.registrucentras.lt/adr/>), Real Estate Cadastre (<http://www.registrucentras.lt/adr/>), Geological Information System GEOLIS ([www.lgt.lt](http://www.lgt.lt)), and the State Cadastre of Protected Areas (<http://stk.vstt.lt/stk>) provides view and download services. All the network services are publicly available, but not all free of charge.

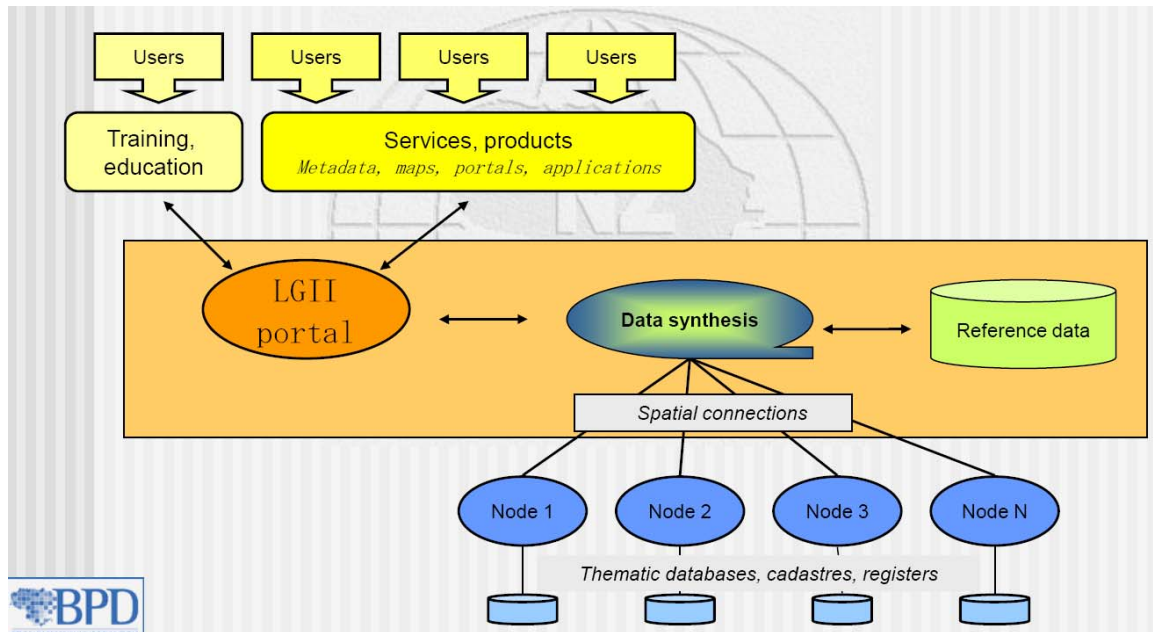


Figure: Spatial data and services flows of LSIP (Urbanas, 2009).

### 2.6.2.1 Discovery services

Discovery metadata is available for a significant part of the reference and core thematic datasets. The current LSIP includes one discovery service. In this portal 81 datasets can be discovered from Lithuanian Road Administration (1), Environmental Protection Agency (13) State Service for Protected Areas (3), Fire and Rescue Department (2), National Land Service (27), State Forest Survey (6), Lithuanian Geological Survey (17), State Enterprise Centre of Registries (9), and Vilnius City (3).

### 2.6.2.2 Viewing services

The current status of LSIP is that 52 viewing services are include from Lithuanian Road Administration (1), Environmental Protection Agency (13) State Service for Protected Areas (3), Fire and Rescue Department (2), National Land Service (26), State Forest Survey (3), State Enterprise Centre of Registries (2), and Vilnius City (2).

The portals Geodetic Control Information Systems, Address Register, Real Estate Cadastre, Geological Information System GEOLIS, and the State Cadastre of Protected Areas include viewing services.

### 2.6.2.3 Download services

The current status of LSIP is that 19 WFS are included from Environmental Protection Agency (5), National Land Service (8), State Service for Protected Areas (3), and State Forest Survey (3).

The portals Geodetic Control Information Systems, Address Register, Real Estate Cadastre, Geological Information System GEOLIS, and the State Cadastre of Protected Areas include viewing services.

#### **2.6.2.4 Transformation services**

Transformation services are not provided at present.

#### **2.6.2.5 Invoking services**

Invoking services are not provided at present.

### **2.6.3 Spatial Data Services and other services**

Web processing services, authentic services, payment, gazetteer services and others are currently not developed.

#### **2.6.4 Use of software**

The most used software are from ESRI, AutoCAD, and Mapinfo. No many open standard software are applied in Lithuania.

## **Conclusions of Component 5**

The National geoportal is the Lithuanian Spatial Informatyion Portal ([www.geoportal.lt](http://www.geoportal.lt)).

Data at LISP portal can be delivered as two ways: a downloadable dataset or electronic service. This portal includes currently discovery, view and download services. The current status of LSIP is that 81 datasets can be discovered, 52 datasets can be viewed with WMS, and 19 data sets be downloaded with WFS. The portals Geodetic Control Information Systems, Address Register, Real Estate Cadastre, Geological Information System GEOLIS, and the State Cadastre of Protected Areas include view and download 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 (No)

- There are middleware services allowing data services to be invoked (No)

## **2.7 Component 6: Environmental themes and activities**

The Environmental Protection Agency (under the Ministry of Environment) collects data on the use of water resources, discharges of waste water, waste generation and treatment, pollution of ambient air and surface water. It also manages and develops the State Cadastre of Rivers, lakes and reservoirs of the Republic of Lithuania being a part of the Environment Protection Agency node. It creates a convenient environment for integrated management of water resources in Lithuania based on water catchments. There are links between the cadastre information system and other systems of this node making together an integral Surface water resources' GIS. In addition, data exchange and metadata management tools have been designed to facilitate the information sharing between the Surface water resources' GIS and the other registers/cadastrals.

The Fire and Rescue department under the Ministry of Interior has mapped the prognoses of the flood areas in the lower parts of Nemunas and chemical contamination areas.

The Lithuanian Geological Survey, State Forest Survey and State Protected Areas Service under the Ministry of Environment provides data from Geological information system (GEOLIS), containing information on boreholes, underground resources, potential contamination sources, excavations, geological processes and phenomena, geochemistry and hydrochemistry, groundwater monitoring, lithology and geotopes. GEOLIS collects, uses and systemizes all this information and includes Internet browsing facilities. It also contains the forestry cadastre information system and comprehensive information on protected areas of Lithuania (e.g. states cadastrals for protected areas).

The LSIP includes WMS as well as WFS services linked to environmental topics. The following 'environmental' information can be accessed by using OGC WMS and OGC WFS: CORINE water quality, river catchments, flood risks maps (of Nemunas), chemical contamination predictions, state cadastre for protected areas, and forest cadastrals.

Finally, the Hydro-meteorological institute under the Ministry of Environment provides information related to hydrography, environmental monitoring facilities, atmospheric conditions, and meteorological geographical features.

### **Conclusions of Component 6**

Several data sets and services exist for several environmental themes (MR 2011). LSIP includes data and services (WMS/WFS) provided by important environment public authorities (e.g. Environmental Protection Agency, Lithuanian Geological Survey, Fire and Rescue department, State service for protected areas, and state forest survey).

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 Standards**

Regarding the standards related to data and data specifications, work has been done to apply the standards according to the INSPIRE implementing rules. However, still much work needs to be done. Geography Markup Language (GML) is not applied. Finally, the

Law of Interoperability of state cadastres and registries states that the products of the state cadastres and registries can be exchanged

Regarding the standards related to metadata, the National Metadata Profile has been developed during the last years. This profile is strongly based on ISO 19115 (Geographic information – Metadata) and ISO19119 (Geographic Information – Services) standards. The metadata editor being part of the LSIP is based on ISO 19139 (Geographic information – Metadata – XML schema implementation) standards

Regarding the OGC standards, WMS, WFS and CSW standards are applied in support to LSIP. Web Map Service (WMS) is applied for providing web images; Web Feature Service (WFS) for retrieving or altering feature descriptions; and Catalogue Service for the Web (CSW) for the access to catalog information. Other OGC standards are currently not applied.

### **2.8.1 Conclusions of Component 7**

Standards are partially used. Standards related to data and data specifications have been partially developed in the LIGI project, but still work is needed to apply the INSPIRE implementing rules related to the data specifications of the themes. The National Metadata Profile has been developed and applied. This national profile is strongly based on ISO19115 and ISO19119 standards. The LSIP metadata editor is based on ISO 19139 (Geographic information – Metadata – XML schema implementation) standard. OGC WMS, WFS and CSW are the OGC-standards applied. Nevertheless, the issue of standardisation needs more attention.

Based on these conclusions we score the indicator as follows:

- The SDI-initiative is devoting significant attention to standardisation issues (Partially)

## **2.9 Use and efficiency of the SDI**

This section focuses on the use, costs and benefits of LISI. At the end, some examples of the use of LISI are briefly described.

In general, it is not very clear in what extent the LISI is used. For example, precise numbers of the use of the infrastructure cannot be given, only some indications of some components (e.g. number of registered LISI-users, LSIP).

The intended user community of INSPIRE is different than the one of the LISI. The intended INSPIRE community is only the public sector at national level and the academic & research sector. On the other hand, the LISI community consists of the public sector at all administrative levels.

The LISI is used in the following sectors: Environmental monitoring & management, Agriculture, Regional and spatial planning, Disaster/Emergency management, Research, Education.

According to the figure below, there are 284 registered users. They cover a wide range of organisations public authorities, municipal authorities, county administrations, state enterprises, and education and training institutions.

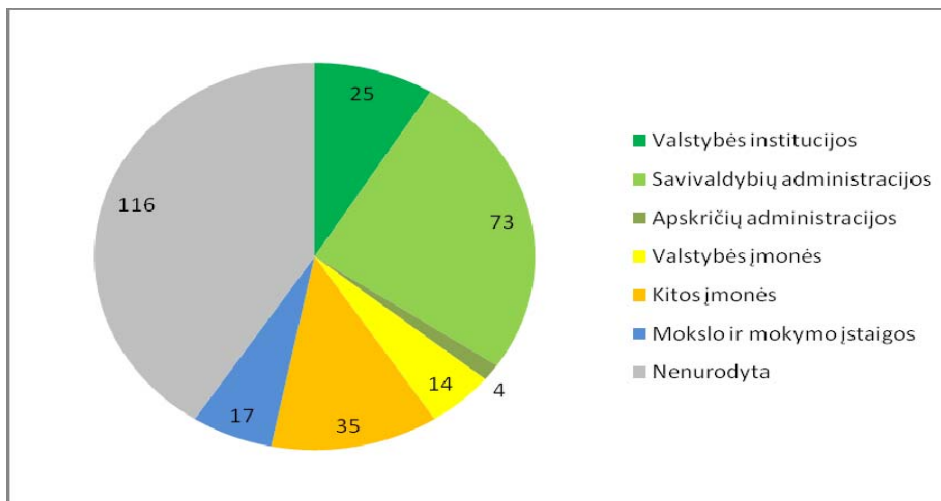


Figure: Distribution of active registered LISI users by organisation as at 1 May 2010

Valstybės institucijos	Public authorities
Savivaldybių administracijos	Municipal administrations
Apskričių administracijos	County administrations
Valstybės įmonės	State enterprises
Kitos įmonės	Other enterprises
Mokslo ir mokymo įstaigos	Education and training institutions
Nenurodyta	Not indicated

Regarding the use of LSIP, there are 1265 registered users. The number of unique visitors for 2009 was 6953, and for 2010 9569. Below some LSIP-statistics are presented covering the time range 1 January – 1 June 2011.

<b>Hits</b>	
Total Hits	388,976
Visitor Hits	371,230
Spider Hits	17,746
Average Hits per Day	2,559
Average Hits per Visitor	28.10
Cached Requests	0
Failed Requests	364
<b>Page Views</b>	
Total Page Views	371,039
Average Page Views per Day	2,441
Average Page Views per Visitor	28.09
<b>Visitors</b>	
Total Visitors	13,211
Average Visitors per Day	86
Total Unique IPs	7,710
<b>Bandwidth</b>	
Total Bandwidth	23.83 MB
Visitor Bandwidth	23.83 MB
Spider Bandwidth	0 B
Average Bandwidth per Day	160.53 KB
Average Bandwidth per Hit	64 B
Average Bandwidth per Visitor	1.85 KB

Twelve targeted LISI publicity events were attended by 750 people.

### *Costs*

LISI development costs were first estimated in a feasibility study prepared in 2004.

In addition, the cost for the work that needs to be done in order to implement properly the Directive in Lithuania was estimated (in 2010) on the basis of calculations and experiences gathered during the LIGI development project.

The following main cost categories for implementation of the Directive were listed:

- Preparation of metadata;
- Data harmonisation;
- Creation of network services;
- Monitoring and reporting;
- Preparation and implementation of coordination and horizontal measures.

Costs of works necessary for the implementation of the Directive are presented in the charts below according to these indicated categories.

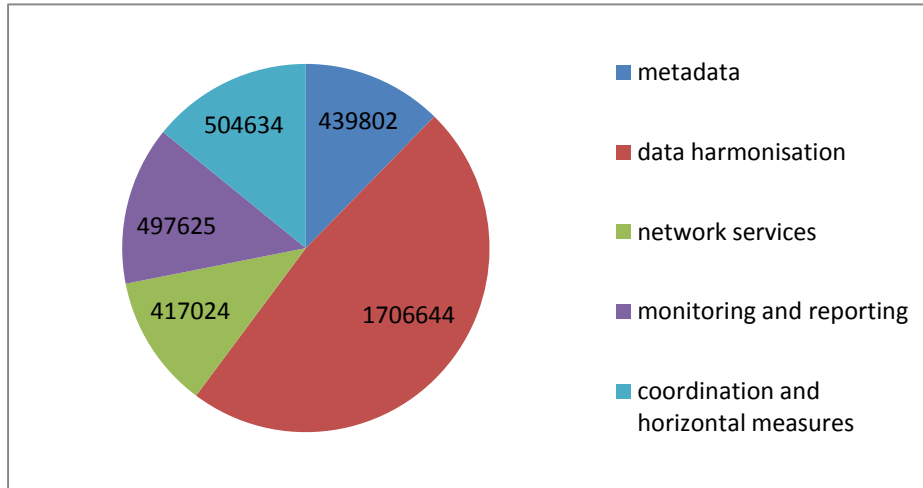


Figure: Establishment costs (EUR) by category, 2010–2015 (A total of LTL 12 311 750, EUR 3 565 729)

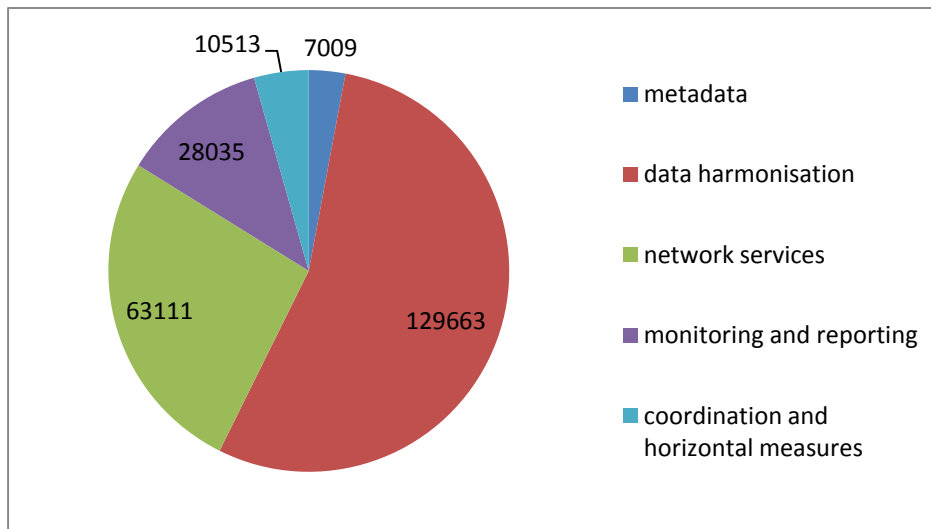


Figure: Maintenance costs (EUR) by category, annually from 2011 (A total of LTL 822 909, EUR 238 331)

It is difficult to estimate potential costs of management of data sets corresponding to the themes listed in Annexes I and II to the Directive at present. According to preliminary estimates, the management and supply of currently known data sets could cost the state approximately EUR 5 million.

*Benefits*

Lituanian is beginning to experience the benefits of the NSDI. Having available metadata and public web services is a big step towards efficiency, flexibility and transparency, but the NSDI has not so far made positive impact on the data quality or management policies,

It is likely that LISI will produce significant benefits for the public, business and public sector:

- **The public.** Access to relevant spatial data collected by public authorities and improved quality of public services.
- **Business.** Possibilities to include the latest data in a common information system, for example, local restaurants, hotels and filling stations. In addition, supply of various value-added products to the market.
- **The public sector.** Possibilities to use data stored by other authorities and agencies as well as increase work efficiency in performing public administration tasks and delivering services to citizens.

Users need no more for physically signed contracts and licence agreement when data are ordered and delivered in the LSIP. The users can easily find and compare standard metadata related to numerous datasets, preview and choose the best one that fits their demand. The users become more aware of the GIS analysis possibilities and the use of spatial data increases.

The LISI is also useful to data suppliers:

- Data suppliers are guaranteed accessibility of data managed by them and a data-sharing mechanism;
- Preconditions for harmonising data of different suppliers and effectively exchange them are created;
- Data suppliers are able to represent their interests during the preparation of spatial information methodologies and standards;
- It is possible to create and develop new electronic services by using LISI tools;
- Additional LISI services can be delivered to data suppliers.

After the provisions of the Directive are introduced, geodesic and cartographic activities are facilitated and more clearly defined, and more specific requirements are established for persons engaged in geodesic activities. Regulation of service provision activities are simplified and the administrative burden on business is reduced.

Other benefits observed are:

- Starting the formation of a spatial information policy;
- Impact on the environmental policy: the obligation to handle existing data and collect new spatial data.
- Authorities' understanding of the benefits of spatial data and data integration when taking decisions has improved, thus creating preconditions for closer cooperation;
- The public is better informed and the need for spatial data services is on the rise.

### *Examples*

The Fire and Rescue Department under the Ministry of Interior manages, regulates and coordinates the state civil protection and rescue system in the country, and organizes fire and civil protection. It administers the registering of state significant and dangerous objects that is available to state institutions, economic entities and population through LSIP.

The Lithuanian Road Administration under the Ministry of Transport and Communications is an enterprise in charge of organizing and coordinating the

reconstruction, maintenance and development of the roads of national significance. The Lithuanian Road Administration aims to achieve that the transport on the roads of national significance would be safe, fast, convenient and environment-friendly. Interoperable data on Lithuanian roads, bridges and viaducts are available for route finding and planning, spatial analysis and decision making through the LSIP.

### 3 Annexes

#### 3.1 List of SDI addresses / contacts for Lithuania

Table: SDI contact list			
	Web address	Organisational mailing address	Over-all contact person: Tel./fax/e-mail
National Land service under the Ministry of Agriculture of the Republic of Lithuania	<a href="http://www.nzt.lt">http://www.nzt.lt</a>	Gedimino pr. 19 LT-01103 Vilnius nzt@nzt.lt www.nzt.lt	Director: Vitas Lopinys Tel. +370 5 239 13 06 Fax. +370 5 239 13 31 <a href="mailto:Kazys.Mak@nzt.lt">Kazys.Mak@nzt.lt</a>  Director Cartography & Geodesy: Dr. Saulius Urbanas saulius.urbanas@nzt.lt +370 5 239 84 40
Ministry of Agriculture of the Republic of Lithuania		Gedimino pr. 19 LT-01103 Vilnius www.zum.lt	Tel. +370 5 239 11 11 Fax. +370 5 239 1212 <a href="mailto:nerijus.gudelis@zum.lt">nerijus.gudelis@zum.lt</a>  Nerijus Gudelis +370 5 239 1118 <a href="mailto:nerijus@zum.lt">nerijus@zum.lt</a>
State Enterprise "GIS-Centras"	<a href="http://www.gis-centras.lt">http://www.gis-centras.lt</a>	Seliu g. 66 LT-08109 Vilnius	Mindaugas Pazemys Tel. +370 5 272 47 41 Fax. +370 5 272 77 23 <a href="mailto:info@gis-centras.lt">info@gis-centras.lt</a>  Jurate Kuciene ( <a href="mailto:j.kuciene@gis-centras.lt">j.kuciene@gis-centras.lt</a> )  Lina Papsiene ( <a href="mailto:l.papsiene@gis-centras.lt">l.papsiene@gis-centras.lt</a> )
State Enterprise Centre of Registers	<a href="http://www.registrucentras.lt">http://www.registrucentras.lt</a>	V. Kudirkos 18 LT-03105 Vilnius	Tel. +370 5 268 82 02 Fax. +370 5 268 83 11 <a href="mailto:info@registrucentras.lt">info@registrucentras.lt</a>
Ministry of Environment	<a href="http://www.am.lt">http://www.am.lt</a>	A. Jaksto 4/9 LT-01105 Vilnius	Tel. +370 5 266 36 61 Fax. +370 5 266 36 63 <a href="mailto:info@am.lt">info@am.lt</a>

### 3.2 List of references for Lithuania

Table: list of references used to compile the Country Report	
Web sites:	<p>[1]: <a href="http://www.am.lt">http://www.am.lt</a></p> <p>[2]: <a href="http://www.am.lt/VI/en/VI/rubric.php3?rubric_id=126">http://www.am.lt/VI/en/VI/rubric.php3?rubric_id=126</a></p> <p>[3]: <a href="http://www.gis-centras.lt">http://www.gis-centras.lt</a></p> <p>[4]: <a href="http://www.gis-centras.lt/gisweb/index.php?pageid=183">http://www.gis-centras.lt/gisweb/index.php?pageid=183</a></p> <p>[5]: <a href="http://www.gis-centras.lt/gisweb/index.php?pageid=232">http://www.gis-centras.lt/gisweb/index.php?pageid=232</a></p> <p>[6]: <a href="http://www.gis-centras.lt/gisweb/index.php?pageid=296">http://www.gis-centras.lt/gisweb/index.php?pageid=296</a></p> <p>[7]: <a href="http://www.nzt.lt/">http://www.nzt.lt/</a></p> <p>[8]: <a href="http://www.registrucentras.lt">http://www.registrucentras.lt</a></p> <p>[9]: <a href="http://www.lgt.lt/index.php?newlang=eng">http://www.lgt.lt/index.php?newlang=eng</a></p> <p>[10]: <a href="http://www.ada.lt/index.php?lng=en">http://www.ada.lt/index.php?lng=en</a></p> <p>[11]: <a href="http://www.ivpk.lt/main_en.php">http://www.ivpk.lt/main_en.php</a></p> <p>[12]: <a href="http://www.kam.lt/index.php/en/">http://www.kam.lt/index.php/en/</a></p> <p>[13]: <a href="http://www.lgt.lt">http://www.lgt.lt</a></p> <p>[14]: <a href="ftp://ftp.hnit-baltic.lt/public/outgoing/EUC_papers/sdi/SDI_Urbanas_Saulius.pdf">ftp://ftp.hnit-baltic.lt/public/outgoing/EUC_papers/sdi/SDI_Urbanas_Saulius.pdf</a></p>
Publications:	<p>ASTECC Global Consultancy (2004a). Availability Report. Development of Lithuanian Geographic Information Infrastructure (LEII) Project Preparation. Vilnius. 197 pgs.</p> <p>ASTECC Global Consultancy (2004b). Assessment for priority intervention needs. Development of Lithuanian Geographic Information Infrastructure (LEII) Project Preparation. Vilnius. 74 pgs.</p> <p>ASTECC Global Consultancy (2004c). Framework Report. Development of Lithuanian Geographic Information Infrastructure (LEII) Project Preparation. Vilnius. 73 pgs.</p> <p>ASTECC Global Consultancy (2004d). Feasibility Study. Development of Lithuanian Geographic Information Infrastructure (LEII) Project Preparation. Vilnius. 106 pgs.</p> <p>Beconytė G., Govorov M., Ningal T.F., Paršeliūnas E., Urbanas S. (2008). Geographic information e-training initiatives for national spatial data infrastructure Technological and economic development of economy. Baltic Journal on Sustainability, 14(1):11-28.</p> <p>Beconytė G., Kryžanauskas A. (2009). Cartographic communication for sustainable development of the society. M. Grasserbauer, L. Sakalauskas, E. K. Zavadskas (Eds.): KORSD-2009 Selected Papers. Vilnius, 2009, Vilnius: Technika. p. 52–57.</p> <p>Beconytė G., Kryžanauskas A., Papšienė L., Papšys K., Stankevičius Ž. (2009). Lithuanian infrastructure for geographical information: the road to a single</p>

	<p>geographic methodology. <i>Geography</i> 45(1): 1–10.</p> <p>Beconytė G., Paršeliūnas E., Pubellier C. (2006) Sustainable development of Lithuanian geographic information infrastructure. The 4th International Conference Citizens and Governance for Sustainable Development. Selected Papers. Vilnius: Technika. p. 151–155.</p> <p>Beconytė G., Paršeliūnas E., Pubellier C. (2007) Sustainable development of Lithuanian geographic information infrastructure. <i>Ekologija/Ecology</i> 53: 22–26.</p> <p>Beconytė G., Pubellier C. (2006). Geographic information infrastructure – towards interoperability of public data. <i>Geography</i> 42(1): 23-27.</p> <p>Beconytė G., Pubellier C. (2006). Geographic information infrastructure in Lithuania – components and data themes. <i>Geography</i> 42(2): 29-34.</p> <p>GIS-Centras (2004). Development of Lithuanian Geographic Information Infrastructure. Investment project. 76 pgs.</p> <p>Lithuanian government (2001). Regulations of the National Land Service under the Ministry of Agriculture approved by Order No 194 of 14 June 2001 of the Minister for Agriculture. <i>Žin.</i>, 2001, No 52-1852; 2008, No 150-6122.</p> <p>Lithuanian government (2004). Rules for the establishment and validation of state information systems approved by Government Resolution No 451 of 19 April 2004. <i>Žin.</i>, 2004, No 58-2061.</p> <p>Lithuanian government (2009). Resolution No 911 of 10 September 2008 on the designation of responsible authorities in order to ensure implementation of Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007. <i>Žin.</i>, 2008, No 109-4157; 2009, No 116-4940.</p> <p>Lithuanian government (2010). Law of the Republic of Lithuania on Geodesy and Cartography. <i>Žin.</i>, 2001, No 62-2226; 2010, No 54-2649.</p> <p>National Land Service under the Ministry of Agriculture of the Republic of Lithuania (2010). National Report on INSPIRE Monitoring. 25 pgs.</p> <p>Pubellier, C., Belickas, J., Parseliunas, E., Beconytė, G., Urbsys, A., (2004). Feasibility Study: Development of Lithuanian Geographic Information Infrastructure (LGII), Project Preparation Facility.</p> <p>Urbanas, S. (2006). National mapping and cadastral agencies' trends developing European Spatial Data Infrastructure. The 6th International Conference Environmental Engineering. Selected Papers Vol. II. Vilnius: Technika. p. 1018–1023.</p> <p>Urbanas, S. (2009) Step forward practically implementing national spatial data infrastructure in Lithuania. ESRI European User Conference Proceedings. ESRI Press.</p> <p>Urbanas, S., Pažemys M. (2008). Stepwise approach developing Lithuanian geographic information infrastructure. INSPIRE Conference abstracts. European Commission Publications Office, EUR 23388 EN. 110-111.</p>
--	---