INSPIRE

Infrastructure for Spatial Information in Europe

Report under Article 21(2)
of INSPIRE Directive 2007/2/EC

May 2013

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1 Introduction

Under Article 21(3) of Directive 2007/2/EC of the European Parliament and of the Council establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), the Member States are obliged to provide the European Commission with an INSPIRE report every three years. The purpose of the report is to provide the Commission with an overview of the following:

1. how public sector providers and users of spatial data sets and services and intermediary bodies are coordinated, and of the relationship with third parties and the organisation of quality assurance;
2. the contribution made by public authorities or third parties to the functioning and coordination of the infrastructure for spatial information;
3. information on the use of the infrastructure for spatial information;
4. data-sharing agreements between public authorities; and
5. the costs and benefits of implementing the Directive.

In addition to the report, the Member States shall monitor the implementation and use of their infrastructure for spatial information annually and make the results of this monitoring accessible to the Commission and to the public. In order to ensure that the information provided by all countries is uniform, on 5 June 2009 the European Commission adopted Decision No 2009/442/EC implementing Directive 2007/2/EC of the European Parliament and of the Council as regards monitoring and reporting. This Decision regulates the monitoring to be performed under Article 21(1) of the Directive as well as the INSPIRE report to be provided under Article 21(2) of the same.

This report was prepared on the basis of the Template for the INSPIRE Country Report provided by the European Commission. The report and the table of the monitoring results were prepared with the help of spatial database maintainers whose contact details are indicated in the Annex to this document. Spatial database maintainers provided the Land Board with overviews of their databases, which were prepared in accordance with the topics indicated in the Commission's Decision. The report mostly includes information on databases that fall under the spatial data themes listed in Annexes I and II to the Directive.

Chapter 3.1.3 also includes explanations on the monitoring table. The table regarding the monitoring of the implementation and use of the infrastructure for spatial information is based on version 2 of the Commission's Monitoring report indicators template. The table mostly lists spatial data sets which correspond to the spatial data themes of Annex I to the Directive, since the definition of data sets and databases corresponding to them is clearer under the regulation of the European Commission prepared with regard to the spatial data themes of Annex I to the Directive.

The report and the monitoring table describe the current situation. The monitoring table was prepared in Estonian and English; the report in Estonian. Both documents will be made available on the Land Board's geo-portal. Each Member State must update their monitoring table annually. The monitoring period is one year, and the results will be made public by 15 May of each following year. Each Member State will review and update their report every three years.

2 Abbreviations

AIP   Aeronautical Information Publication
AIRAC   Aeronautical information regulation and control
ARIB   Agricultural Registers and Information Board
EAD   European Aeronautical Information Database
EC   European Commission
EELIS   Estonian nature information system
ETAK   Estonian topographic database
ICAO   International Civil Aviation Organisation
KKM   Ministry of the Environment
KKR AT   Public service database of the environmental register
LG   Local government
MKA   National Heritage Board
NOTAM   Notice to Airmen
RIA   Estonian Informatics Centre
RIHA   Administration system of the state information system
RISO   Department of State Information Systems of the Ministry of Economic Affairs and
             Communications
RMK   State Forest Management Centre
X-Road   Data exchange layer of information systems

3 Coordination and Quality Assurance (Article 12)

3.1 Coordination (Article 12(1))

3.1.1 Member State Contact Point

Article 12(1)(a) the name and contact information of the Member State contact point

With Directive No 990 of 28 July 2008, entitled "Establishment of the contact point for infrastructure of spatial data in the European Community (INSPIRE) and coordination of the transposition of the Directive", the Minister of the Environment appointed the Land Board as the contact point for the European Commission. In accordance with the Spatial Data Act, passed on 17 February 2011, the contact point was also appointed to be the Land Board.

Name and Contact Details

Member State contact point	
Name of responsible authority	
Contact details:	Estonian Land Board
Postal address:	Mustamäe tee 51, 10621 Tallinn, Estonia
Telephone:	+372 665 0600
Fax:	+372 665 0604
E-mail:	maaamet@maaamet.ee
Authority's URL address	https://www.maaamet.ee
Contact person	Ülle Harak
Telephone:	+372 665 0617
E-mail:	Ylle.harak@maaamet.ee
Substitute contact person:	Peep Krusberg
Telephone:	+372 665 0621
E-mail:	peep.krusberg@maaamet.ee

Role and Responsibilities

Article 12(1)(a) the role and responsibilities of the contact point

Pursuant to its statutes, the Land Board organises activities in the field of cartography and photogrammetry, produces national orthophotos and topographic maps, establishes national and local geodetic networks, manages the Geodetic Point Database, maintains the national land cadastre, and coordinates activities pertaining to geo-informatics at the national level. The Land Board coordinates the acquisition of topographic spatial data – it prepares guidelines, performs quality control, maintains the Estonian topographic database (ETAK) and organises the production of topographic maps. The Land Board is subject to the jurisdiction of the Ministry of the Environment, which gives it direct contact with the producers and users of environmental data.

The Land Board also contributes to several international projects. For example, as a member of EuroGeographics, the European Association of National Mapping and Cadastral Agencies, the Land Board participates in the following joint projects:
- *EuroGlobalMap;*
- *EuroRegionalMap;*
- *EuroBoundaryMap; and*
- *EuroDEM.*

Estonia also transmits data to the EUREF Permanent Network (http://www.epncb.oma.be/), which is used as the standard precise GPS coordinate system throughout Europe (European Terrestrial Reference System 89).

Since the Land Board performs the duties of the contact point, it forwards draft regulations, translations and other documentation received from the European Commission to other managers of spatial databases in order for them to be able to comment on these. The Land Board informs the European Commission and various working groups of Estonia's positions. It also organises the completion of questionnaires and applications, coordinated the transposition of the INSPIRE Directive into Estonian law and continues to coordinate its implementation.

The Board also coordinated the creation of this report. All of the institutions which are known to manage databases falling under the spatial data themes listed in the Annexes to the Directive received the previous report and guidelines on how to complete it.

3.1.2 Coordinating Structure

Article 12(1)(b) the coordinating structure supporting the contact point of the Member State

At present, coordination duties are performed by the Land Board. At stage I of the reporting there has been no need to establish a separate coordinating structure since the spatial data indicated in Annexes I and II to the INSPIRE Directive were and are mainly collected within a single jurisdiction (the jurisdiction of the Ministry of the Environment) and cooperation between the relevant authorities has been smooth and long-standing. Transport networks is the only spatial data theme listed in Annex I which falls within the jurisdiction of another ministry (the Ministry of Economic Affairs and Communications); long-lasting cooperation was also established with the agencies of said ministry in previous periods and cooperation remains good without any additional structures. In respect of the data listed in Annex II to the INSPIRE Directive, the INSPIRE requirements have been introduced to several authorities (agencies of the Ministry of the Environment engaged in monitoring, the Ministry of the Interior, the ARIB – an agency of the Ministry of Agriculture, the National Institute for Health Development, the Statistical Office, etc.), but a coordinating structure that would bring together all the managers of databases falling under the spatial data themes listed in the Annexes to the INSPIRE Directive has not been established in the reporting period. The need for this has arisen as a lot of different agencies, who could better expound the needs for use of the spatial data managed by them during joint activities and solve the problems related to making the data available, are engaged in the spatial data listed in Annex III. In connection with the spatial data themes listed in Annex III, the Land Board has started consultations with various authorities for establishing a coordinating structure.

Role and Responsibilities

Article 12(1)(b) the role and responsibilities of the coordinating structure

So far, the tasks of the coordinating structure have been performed by the Land Board. Since the Land Board is the contact point for the European Commission, the most direct and also the fastest information source for it is the Commission. Coordination mainly means forwarding draft regulations received from the Commission to other database managers so that they can comment on these, and examining drafts. Furthermore, the nature and purpose of the INSPIRE Directive is introduced at public events. Plans have also been made to introduce the subject themes and obligations related to the data services listed in Annex III to the INSPIRE Directive in the future.
The Land Board also organised the creation of this report and the completion of the monitoring table.

Organisation Chart

Article 12(1)(b) the organisation chart of the coordinating structure

In Estonia the infrastructure for spatial information is closely linked with the state information system. The state information system consists of the information systems of various information holders, some of whom also manage spatial data, and of their support systems. Pursuant to the Public Information Act, the following support systems of the state information system have been established; it is mandatory to apply these when maintaining state and local government databases:
- the classifications system;
- the address data system;
- the data exchange layer of information systems;
- the geodetic system;
- the system of security measures for information systems; and

- the administration system of the state information system.

Consequently, the infrastructure for spatial information is also largely regulated by the systems coordinating the general information policy of the state. Several public authorities significantly contribute to the national infrastructure for spatial information and its coordination:
- the Land Board, as the coordinator of activities in the field of geo-informatics;
- the Department of State Information Systems of the Ministry of Economic Affairs and Communications (RISO), as the coordinator of national information policy; and
- the Estonian Information System's Authority (RIA), as the organiser and coordinator of the development and management of the state information system, etc.

The RIA, as the developer and manager of the state information system, plays the main role. The principal tasks of this authority include organising the implementation of development plans, coordinating central information systems, and instructing, managing and organising the development and management of both the X-Road data exchange layer and the administration system of the state information system (RIHA). RIHA is a complete and detailed map of the state information system. RIHA keeps records of the databases (information systems) and other components forming the state information system. The users, developers, managers/maintainers of information systems and citizens can find information here on state information systems, services, classifications and semantic assets. Information in RIHA is public (except for information to which access is restricted pursuant to law) and there is no need to enter RIHA in order to view this information. The chief processor of the database that entered data in RIHA is responsible for the authenticity of the data.

Relationship with Third Parties

Article 12(1)(c) a description of the relationship with third parties

The chief and authorised processors of the data themes of Annexes I and II to the Directive are mainly public authorities. Third parties in respect to said data themes are primarily consumers. With regard to several data layers, the public authorities contract third parties to collect and/or process the data either fully or partially. Third parties use the data and services intensively through the existing network services provided by public authorities in order to perform their duties, but they also provide spatial data services with new functions they have added.

Overview of Working Practices and Procedures

Article 12(1)(d) an overview of the working practices and procedures of the coordinating body

The tasks of the coordinating body are currently performed by the Land Board and, with regard to the general information policy of the state, by the RIA. The chief and authorised processors of the databases falling under the data themes listed in Annexes I and II to the Directives have been identified by the coordinating body. Several meetings and consultations (cooperation discussions, development activities, etc.) have been held with them. With regard to the spatial data themes indicated in Annex III, potential information managers have been identified on the basis of initial specifications, many of whom have been notified of the obligations arising from the INSPIRE Directive. Following the adoption (approval) of the data specifications it is possible to determine the information managers in more detail and to coordinate their work.

3.1.3 Comments on Monitoring and Reporting Process

Article 12(1)(e) comments on the monitoring and reporting process

The monitoring table was made in cooperation with managers whose databases corresponded to the spatial data themes indicated in the Annexes to the Directive. The table mainly includes the databases falling under Annex I and Annex II to the Directive, because it was easier to identify that they conform with the spatial data themes (the specification of the data listed in Annex I has been passed by a Regulation of the European Commission and the themes of Annex II are unambiguous). It was more difficult to complete the table with regard to Annex III, since the spatial data themes include information from several different databases and it is hard to identify that existing databases correspond to the description.

Some databases in the monitoring table are indicated as being the responsibility of several institutions. This is due to the fact that spatial images in these databases are managed and created by one institution and alphanumeric information by another. Some registers only include alphanumeric information; spatial images are provided by another register. The table mainly includes spatial data sets which form part of a larger information system or register.

In the case of the spatial data themes listed in Annex II and III there are situations where data that fall under the same subject theme but are at different scales have different information holders (e.g. geological maps). There may also be a lot of different authorities or organisations involved in preparing a single subject layer (e.g. plans and local governments). If the production or management concerns spatial data not included in a national register or a registered database, then it is time-consuming to bring them into conformity with the INSPIRE requirements, and to establish the services.

The indicators on the use of services are shown under the services for which such statistics could be obtained. Where the use index of a service is indicated as zero, such query statistics have not been generated.

The report was prepared on the basis of information received from the managers of databases. In addition, various websites listed in the Annex to this report were used. The report describes the distribution of data and services between different spatial databases, their target groups and cooperation, as well as other items indicated in Commission Decision 2009/442/EC of 5 June 2009 implementing Directive 2007/2/EC of the European Parliament and of the Council as regards monitoring and reporting.

3.2 Quality Assurance (Article 12(2))

3.2.1 Quality Assurance Procedures

Article 12(2)(a) a description of quality assurance procedures, including the maintenance of the infrastructure for spatial information

The quality of spatial databases and services is assured by each database manager on the basis of the applicable legislation, the guidelines developed and information technology solutions.

In the Estonian topographic database, the requirements for data quality, i.e. the necessary quality standards, are set out in the mandatory guidelines to be followed when information is updated. Furthermore, the quality assurance procedure and the related working procedures are regulated under agreements entered into by and between the topographic database maintainer (the Land Board) and the data updater. After passing the Spatial Data Act in 2011, the quality of collection, management and publication of spatial data has improved. Regulations that ensure that the data are interoperable and systematic have been established. Furthermore, the Spatial Data Act prescribes passing several implementing provisions which specify the area being regulated. For example, the statutes of the ETAK and the procedure for the acquisition of data are being developed; the statutes of the Estonian National Geo-portal and the regulation on the Address Data System are awaiting being passed and the statutes of the Geodetic Point Database have been passed and the regulation of the geodetic system has been updated.

The composition of data registered in the environmental register and the functioning of its public service database is regulated under the Environmental Register Act and Regulation No 2 of the Minister of the Environment of 13 January 2005 establishing a detailed procedure for maintaining the environmental register. The structure and data model of the public service database of the environmental register are developed in such a way that the occurrence of errors is significantly limited. It is presumed that when data are recorded in the public service database of the environmental register, the composition and quality of the data have been previously checked through online systems. Nevertheless, when importing spatial data, automatic geometry control applies; the database does not allow objects to be duplicated; there are mandatory fields, and if these are left blank, the system informs the user of the problem. Previously defined classifications have been used with regard to alphanumeric data, and the types of fields (text and number fields) are set out in guidance documents. Alphanumeric data are imported in .xml format with a predetermined structure, and the system does not import data files which are not validated.

The Estonian Technical Surveillance Authority has entered into an agreement for the maintenance of the railway traffic register with the developer of the register. Data entry clerks are responsible for accurate entry of data in the register; if necessary, the clerks will be trained further. A user manual regarding entry of data in the register has also been made. In order to minimise the risk of a data entry clerk making a mistake, the data fields are clearly defined, lists are used as much as possible, and mandatory fields cannot be left blank. In addition, an option has been created for data holders to enter the data in the railway traffic register themselves. For this purpose, a manual is being prepared about how to fill in data fields (in which form, format, etc.). There are also plans to organise a relevant information day.

The specifications, quality requirements etc. of certain databases are determined in international agreements; for instance, upon preparation and processing of aeronautical information, the requirements of the Chicago Convention of International Civil Aviation of 1944 are followed.

The state register of construction works is a document-based register; data are submitted to the register using the forms established by law. In order to ensure data quality, the state register of construction works is interfaced with these original data registers:
- the land register, to submit queries about ownership of land;
- the population register, to specify the name and personal identification code of natural persons;
- the commercial register, to specify a business name and register code;
- the register of economic activities, to verify the existence of activity licences; and
- the address information system, to determine the address of a building.

3.2.2 Measures Taken to Improve Quality Assurance

Article 12(2)(c) a description of the measures taken to improve the quality assurance of the infrastructure

A draft regulation of the Minister of the Environment has been drawn up regarding the updating of data in the Estonian topographic database, and the requirements laid down by the draft regulation must be followed when updating data. The currently applicable guideline also describes the quality standard or expected quality and sets out measurable criteria for evaluating compliance with the quality requirements. Technical means are provided for data updaters: software applications and a geo-database structure with predefined domains, classifications, field types, permitted values and topology rules. These ensure that no technical errors occur. Content-related errors are repeatedly checked when data updates are accepted and this is done until the errors are fixed. The logic behind the entire quality assurance procedure is preventive, i.e. the measures taken to ensure quality are created with the purpose of avoiding mistakes when new data are collected. This greatly decreases the number of non-conformities with requirements discovered during later quality control.

When collecting aeronautical information, all of the prescribed requirements are followed in order to meet quality standards. Furthermore, in order to improve quality assurance, a common database is being established; this database should ensure that the information is complete, intact and provided on time. Standard Input Forms are being introduced so that data can be entered in the database electronically (data will be entered in the database by those who produce it). Upon conversion to an automatic procedure for the reporting of aeronautical information, the quality, integrity and availability of the information will improve. The automatic reporting procedure makes it possible to:
1. observe the development of metadata (who added, changed or deleted which data and when); and
2. check the conformity of data with the standards of the International Civil Aviation Organisation and its compatibility with databases.

The quality management systems of Lennuliiklusteeninduse AS, the Civil Aviation Administration and the Maritime Administration conform to the ISO 9001:2008 standard, which sets out internal quality control procedures.

The state register of construction works has introduced a business analysis platform called Business Objects. The Business Objects software gives the chief and authorised processors an opportunity to

gain a better overview of what is happening with registered data, allows them to submit various queries and improves the quality of decisions.

In order to better ensure data quality, there are plans to initiate the following with regard to the state register of construction works:
- the adding of missing spatial images of buildings in the register of construction works;
- the interfacing of the register of construction works with the land cadastre and land register; and
- the launching of an e-services project which significantly improves the quality of data recorded in the register of construction works.

It has been planned to update the railway traffic register, in addition to railways, also with the data of other railway structures.

3.2.3 Description of Certification Mechanisms

Article 12(2)(d) where a certification mechanism has been established, a description of that mechanism

No certification mechanisms have been established.

4 Functioning and Coordination of Infrastructure (Article 13)

4.1 Overview of Infrastructure for Spatial Information

The Government of the Republic has initiated the preparation of the Estonian Information Society Agenda 2014–2020. This is a state agenda defining the development trends of the information society; it is not expressly intended to be an implementation document of the INSPIRE Directive. However, the objectives arising from the INSPIRE Directive have been followed in the agenda.

The currently applicable Estonian Information Society Agenda 2013 is available at: http://www.riso.ee/et/files/IY_arengukava_2013_terviktekst_2009.pdf. An annual action plan is prepared on the basis of the agenda, in order to define specific operations for the development of the entire information society, taking into account, among other things, the operations and terms prescribed by INSPIRE. The latest of these is the action plan for 2012–2013 which is available at http://www.riso.ee/et/files/IYA_2013_RAK_2012_2013.pdf. Activities are also planned pursuant to the INSPIRE schedule in the work agendas of the authorities concerned.

4.2 INSPIRE Stakeholders

Article 13 (a) an overview of the various stakeholders contributing to the implementation of the infrastructure for spatial information according to the following typology: users, data producers, service providers, coordinating bodies

The infrastructure for spatial information is implemented through each database manager. Major spatial data producers and their databases, corresponding to the spatial data themes listed in the Annexes to the INSPIRE Directive, are the following:
   - the Land Board, as the state mapping and cadastral agency – coordinate reference systems, geographical grid systems, administrative units, addresses, cadastral parcels, elevation, land cover, orthoimagery, geology and mineral resources;
   - the Estonian Environment Information Centre as the maintainer of environmental databases – hydrography, protected sites, land cover, environmental monitoring facilities, habitats and biotopes;
   - the Road Administration, which manages everything connected with roads and transport networks – transport networks;
   - the Maritime Administration which manages databases used for preparing navigational information– transport networks;
   - the Statistical Office, as the state's statistics agency – population distribution in space aggregated by various socio-demographic indicators; and
   - the Technical Surveillance Authority as the manager of information related to rail networks.

Currently, the Land Board can be considered the largest provider of spatial data and related services in Estonia. The Land Board made the first online map application available to the public in 2001; through this application everyone could submit queries about cadastral parcels registered in the land cadastre and view the boundaries of cadastral parcels using various topographic base maps free of charge and without any restrictions.

Today, the Land Board offers several different map applications, many of which have been developed in cooperation with other state authorities, which show the data they maintain in geographic space using base maps. The following data managed by the Land Board have thus been made available to the public:
   - the boundaries of cadastral parcels;
   - addresses;
   - place names;
   - geodetic points;
   - price and fertility zones;

- administrative boundaries;
- orthophotos;
- topographic data and maps (at scales of 1:10 000 and 1:50 000);
- soil map;
- geologic maps;
- mineral deposits/mineral resources;
- digital terrain models (DTM) and altitude lines and points;
- etc.

In cooperation with other authorities, the following information has been made available to the public:
- information on cultural monuments;
- objects under nature conservation and nature conservation areas;
- locations of Natura 2000 areas;
- road-related information from the roads register;
- objects of heritage culture;
- marine areas;
- detailed plans, comprehensive plans, county plans, including thematic plans;
- different restrictions and objects causing restrictions (on land use), their limited management zones, etc.

In addition to the map application, the Land Board has, for more than five years, provided free WMS services to the public; through such services everyone can use the spatial data produced by the Land Board, which include boundaries of cadastral parcels and various base maps, including historical base maps and orthophotos. These services are offered using both the Estonian national coordinate reference system and geographic coordinates, which means that anyone in the world can use this service (for example, in Google Earth). The above listed map applications and services are available on the Land Board's geo-portal at http://geoportaal.maaamet.ee/ as well as on the Estonian National Geo-portal at http://inspire.maaamet.ee/.

The users of the services created by the Land Board can be divided into the following categories:
1. companies and state and local government authorities who use the services of the infrastructure for spatial information in their everyday working process;
2. owners of map applications or developers of map interfaces who use the base map and other services of the Land Board in their applications;
3. common people who view different spatial data (maps) and submit simpler queries in the geo-portal.

The services provided by the Land Board may also be used for business purposes. The only requirements are the obligation to credit the Land Board, and not to make mass queries which could hinder the stable provision of the services. The Land Board offers other public authorities the opportunity to use the map applications also for the purpose of spatial data management. For example, the National Heritage Board uses a map application developed especially for them in order to indicate the location of cultural monuments on the map and to draw limited management zones around them. Access to similar map applications is given to limited user groups so they can utilise the applications and produce data.

The data in the national register of cultural monuments (both text and map data) are used for various purposes; most queries are submitted to the register by notaries and owners of the monuments in order to check the existence of monuments on certain properties.

It is also important to mention the Estonian Information System's Authority as a service provider, because the authority manages the state data exchange layer (X-Road). This is a technical and organisational environment which means that a secure and provable web-based data exchange can be organised between digitally maintained (public and private) databases.

A major collector of environmental data is the Estonian Environment Information Centre, which is a state authority under the jurisdiction of the Ministry of the Environment. This authority collects, processes, analyses and publishes reliable and comparable environmental data, reports on the status of the Estonian environment and the factors affecting it, and maintains relevant databases. The

Estonian Environment Information Centre does not actually collect data itself; instead it receives them from data producers and providers (e.g. companies, the regions of the Environmental Board and institutions responsible for the national environmental monitoring programme) who enter the data in the information systems (the Estonian nature information system, the environmental permits information system, the waste reporting information system, etc.). These online systems of the environmental register allow the register to acquire data and are at the same time tools which environmental supervision officials use in practice when managing the fields in question and making decisions. The Estonian Environment Information Centre as the contact point of the European Environment Agency is responsible for the production of the Corine Land Cover (CLC) spatial data theme part in Estonia. The Environment Information Centre also provides the CLC WMS service to the public.

The Road Administration is the chief and authorised processor of the national roads register, which includes road data falling under the spatial data theme of transport networks indicated in Annex I to the Directive. The authorities submitting data to the roads register are the following:
- the Road Administration, with regard to national roads;
- local governments, with regard to local and private roads; and
- the State Forest Management Centre, with regard to forest roads.

Alphanumeric data on roads are collected in the roads register in the form of tables and they are publicly accessible. The spatial road-related data in the roads register are received from the Land Board's topographic database. With regard to the spatial images of roads, the Road Administration provides information on changes in the spatial images of roads as per the cooperation agreement between the Land Board and the Road Administration, and the Land Board records the changes.

The Road Administration is also the authorised processor of the state public transport register. The register records information on valid bus routes and their timetables, except for bus route permits, bus route public service contracts and public transport vehicle stopping points. Data are provided to the register by the Ministry of Economic Affairs and Communications, Road Administration, county governments, local governments and regional public transport centres (which may be authorised to perform the obligations of state or local governments related to organising public transport). Data recorded in the state public transport register are available to the public through a public web application (http://www.peatus.ee/). The spatial data of public transport routes is entered in the database of the public transport register. The spatial images of the bus routes were prepared using the spatial image data of the Estonian topographic database, which the Land Board made available to the Road Administration under an agreement entered into with the latter.

Lennuliiklusteeninduse AS collects, processes and reports aeronautical information in Estonia. Among other things, various aeronautical charts are made, such as the following:
- flight procedure charts;
- airport maps;
- airspace charts; and
- other special charts and maps.

In Estonia, the data are received from aeronautical information producers, i.e. from airports, the Civil Aviation Administration, air carriers, ministries and the agencies under the jurisdiction of ministries. The information is provided either by post, e-mail or telephone/fax to a relevant specialist who in turn must forward the information to other specialists, including the managers of map data. The information received is processed and manually entered in various systems. Depending on the type of information, NOTAMs (Notices to Airmen), amendments to the Aeronautical Information Publication and maps/charts are prepared. The information received is disclosed as per the AIRAC (aeronautical information regulation and control) system of the ICAO and sent to all providers of aeronautical information. A date is set for publishing the information, taking into account the date when the information was received.

Under the statutes regarding the establishment and maintenance of the state railway traffic register, the chief processor of the register is the Ministry of Economic Affairs and Communications, which supervises the Technical Surveillance Authority as the authorised processor of the register. The owners and holders of railway infrastructure are legally obliged to submit data to the railway traffic register. Third parties are provided with the data on the basis of a request for information. If

necessary, the Data Protection Inspectorate is also given access to the data in order to carry out supervision.

The chief and authorised processor of the register of construction works is the Ministry of Economic Affairs and Communications, which organises the maintenance of the entire database and processing of data, and is responsible for the legality of the management and development of the database. The data providers and users are the same as for the other databases.

The authority that deals with agricultural facilities and regions is the ARIB, an agency of the Ministry of Agriculture.

The authority coordinating county plans is the Ministry of the Interior, whose jurisdiction includes preparing legislation related to the planning theme as well as developing formalisation requirements for plans, common data standards established for plans and the information system for plans. The contact points for the comprehensive plans are local governments.

Data about social objects are managed by the Ministry of Social Affairs (social and health care institutions) and the Ministry of Education and Research (educational institutions).

4.3 Role of Various Stakeholders

Article 13(b) a description of the role of the various stakeholders in the development and maintenance of the infrastructure for spatial information, including their role in the coordination of tasks, in the provision of data and metadata, and in the management, development and hosting of services

The Land Board, as the largest national spatial data producer and service provider, coordinates the development and maintenance of the corresponding infrastructure and hosts all of the necessary hardware. For this purpose, the Land Board has created the Estonian National Geo-portal. Development and maintenance work were generally outsourced and developed further by IT companies by way of public procurement. The Land Board has also offered public authorities the opportunity to manage their spatial data through the Land Board's web-based tools (map applications). In such a case the authority uses the hardware and software created by the Land Board. Data managers are responsible for the maintenance and availability of metadata.

The Estonian Information System's Authority as the organiser and coordinator of the development and management of the state information system offers, in the form of the X-Road and RIHA, a technical and organisational environment meant for all those maintaining public sector databases and information systems. Through this environment, services can be provided and registered, databases made available and information systems described.

The public service database of the environmental register has two user levels, in which at the public user level anyone interested can access the information. The other level is a restricted access level and is only available to certain groups of officials. When planning for developments, feedback from both groups of stakeholders is taken into account.

The creation of agricultural data services is coordinated by the ARIB.

4.4 Measures Taken to Share Spatial Data and Services

Article 13(c) a general description of the main measures taken to facilitate the sharing of spatial data sets and services between public authorities and a description of how sharing has improved as a result

Many state authorities find the viewing services that the Land Board provides through its map server (X-GIS) and that largely cover their spatial data needs very helpful. The WMS standard viewing services offered by the Land Board are also very popular; the information is viewed through the services using the most widespread GIS software. All of this has not only decreased the file-based orders of spatial data, but also allowed the public to see new data very quickly (no time is spent on material requests). Material data requests are free for state authorities, local governments and educational institutions, and applicants can download data from an FTP server after entering into a

standard contract. For example, updates to the boundaries of cadastral parcels are forwarded to public authorities and local governments that have agreed to the standard contract through the X-Road or an FTP server regularly and free of charge. At the start of each year, the Land Board also provides data on administrative and settlement division as at 1 January of that year, permitting them to be downloaded free of charge.

Through the downloading service of the public service database of the environmental register, spatial data can easily be downloaded, except for data which may not be disclosed pursuant to the law. Restricted data can only be downloaded by public officials with corresponding access rights. Data are downloaded in shape format by types of objects in the selected region. Alphanumeric data can be saved in .csv format. The spatial data available through the Estonian nature information system, which is the online system of the environmental register, are mainly tools for environmental specialists working under the jurisdiction of the Ministry of the Environment. The spatial data are also available in the form of MapInfo files.

The databases of the National Heritage Board and the Land Board are interoperable. A link in the national register of cultural monuments directs the user to the spatial data of the monument, and it is possible to go from the Land Board's map system back to monument data in the register of cultural monuments. Since monuments take up a certain area, it is very important that map information be included in the monument's data. Using a cadastral register number, it is also possible to go directly to the Land Board's map from the cultural monument database to check if there are any monuments on a certain property. The cooperation between the Land Board and the National Heritage Board has been smooth without them having concluded any cooperation agreement.

Data exchange between the Estonian nature information system and the national register of cultural monuments has been created through the X-Road. In the register of cultural monuments, a link to the Estonian nature information system has been added to monuments whose spatial data overlap with an object protected under nature conservation laws. Access is only provided to users with passwords.

The National Heritage Board provides extracts from cultural monument data by rural municipality and county. Extracts by rural municipality and county are made mainly for local government officials. Spatial data are mostly used to prepare comprehensive and detailed plans, as well as to carry out environmental impact assessments. Data exchange is electronic and takes place on the basis of a mutual agreement between public authorities.

In order to distribute and quickly update data entered in the state public transport register, a public transport information system has been developed; through this system data are submitted to the register. The Land Board and the Road Administration have entered into a data exchange agreement under which the Land Board provides spatial image data of roads and rail tracks recorded in the Estonian topographic database twice a year in order for the data to be used in the public transport information system.

The aeronautical information of Estonia is available to other public authorities in accordance with mutual agreements. Data are transmitted free of charge as and when necessary.

4.5 Stakeholder Cooperation

Article 13(d) a description of how stakeholders cooperate (e.g. written cooperation, working groups, leaflets and geo-portal)

Data regarding cultural monuments are mainly collected from literature and archives; information to be registered is rarely received from outside the organisation. The task of the national register of cultural monuments is to provide information to ordinary citizens, notaries and investigators. In order to specify the spatial data in the national register of cultural monuments, the cartographers of the National Heritage Board work with private persons, who help determine the exact location of a monument on their property. All of the immovable monuments recorded in the register of cultural monuments and visible in the Land Board's geo-portal and in the Estonian National Geo-portal are indicated on the map. This cooperation is voluntary.

Data submitted to the state public transport register by data providers are used to update of the information on the peatus.ee website regarding all valid bus routes on a daily basis. All data providers are responsible for the accuracy of the data they register.

The data recorded in the state public transport register are also used by the organisers of various levels of public transport to perform their duties. Among other things, the registered data enables them to plan mutually coordinated bus traffic (connected routes) and assess the effect of planned commercial bus routes on existing routes etc.

With regard to environmental data, the Estonian Environment Information Centre works most closely with the local regions of the Environmental Board. This cooperation takes place mainly in the form of annual environmental reporting. Within the framework of this reporting, environmental data are received from all over Estonia and, on the basis of these data, information is provided about the status of the Estonian environment to European and international organisations in order to perform the obligations Estonia has assumed. Important partners here are the Statistical Office, the Land Board, the institutions responsible for and that carry out the national environmental monitoring programme, research institutions and companies. Printed environmental overviews are available on the website of the Estonian Environment Information Centre at (http://www.keskkonnainfo.ee/main/index.php/et/vaeljaanded-ja-uelevaated/vaeljaanded-ja-uelevaated). The website also offers access to requests for information and to registers and databases (http://www.keskkonnainfo.ee/main/index.php/et/registrid-ja-infosuesteemid).

Various stakeholders cooperate well in the field of environmental monitoring, where those carrying out the monitoring report the results, including spatial data, to the environmental register by uploading the data to the environmental monitoring website at http://seire.keskkonnainfo.ee. After this, the data are verified and part of the information is entered in the register as set out in the Environmental Register Act.

Anyone can upload information on their species observations to the nature observations database (http://loodus.keskkonnainfo.ee/LVA/). The observations entered in the database can be viewed by everyone on a public map with resolution of 10km^2 UTM squares. Those sites on which protected species have been discovered are checked and entered in the environmental register.

Ordinary users may view the data recorded in the register of construction works through a web service at https://www.ehr.ee/v12.aspx?loc=01 and, if necessary, they can submit a request for information. Citizens can also view the data in the register of construction works by using the eesti.ee state portal (http://www.eesti.ee/est/). The register's customer support assists all users, including data providers.

The Land Board works well with many network operators. Regular data exchange with them ensures that the information is up to date and that it does not differ in the databases of either authority.

There is also constant cooperation (correspondence, consultation, meetings) with the Land Board, local governments and the State Forest Management Centre in the field of updating and improving data in the roads register. Meetings have been held with the Ministry of Economic Affairs and Communications and with other authorities managing spatial data of INSPIRE.

No common working groups for the subject themes of INSPIRE have been formed, but there is a need for that.

4.6 Access to Services through INSPIRE Geo-portal

Article 13(e) a description of the access to the services through the Inspire geo-portal, as referred to in Article 15(2) of Directive 2007/2/EC

The Land Board has made the services for searching and viewing the data listed in Annex I and Annex II available through the Estonian National Geo-portal. The metadata listed in Annexes I and II have been introduced to the Estonian National Geo-portal and they are available through the search service (Discovery Service) which is located at:

http://inspire.maaamet.ee/geoportal/csw/discovery?request=GetCapabilities&Service=csw&language=eng.

The search service address has also been sent to the INSPIRE geo-portal and thereby the metadata of the services are also available through the INSPIRE geo-portal. The addresses and descriptions of the services are also set out on the website of the Estonian National Geo-portal: http://inspire.maaamet.ee/teenused.

The metadata of all the databases and viewing services introduced to the Estonian National Geo-portal can also be found through the relevant user interface http://inspire.maaamet.ee/metaandmed.

5   Use of Infrastructure for Spatial Information (Article 14)

5.1   Use of Spatial Data Services

Article 14(a) the use of the spatial data services of the infrastructure for spatial information, taking into account the general and specific indicators (may include comments on how the information is collected and how it should be interpreted)

The best proof of the use of the Land Board's map applications and services is the statistics on queries made to our servers. In 2012, an average of over 116 million queries a month were made to the Land Board's map application servers. In 2012, an average of 6 million queries a month were made to the public base map WMS servers. However, we cannot draw any conclusions on the number of map application users based on the number of queries. Since it is not necessary to identify the users of public map applications and services, we cannot count them; however, we can draw conclusions from the fact that the Land Board's services and map applications are used by approximately 50 000 unique IP addresses a month.

The statistics show that most queries are made to the land information service through which information on cadastral parcels can be searched for and viewed. The number of queries on restrictions and address data is also high. The number of queries also largely depends on how long the map application has been available. Therefore it is completely understandable that the land information service has the highest number of users, as it is one of the oldest services. The monitoring table sets out statistics only about the services which are in compliance with the INSPIRE requirements.

An overview of user statistics regarding the public service database of the environmental register can be found at
http://register.keskkonnainfo.ee/stat/. On average, 2 000 observations a year are entered in the nature observations database by private individuals. In recent years the number of users of the database has been about 100–150 persons.

Through the peatus.ee website, the public transport register has an average of 60 000 users per month.

5.2   Use of Spatial Data Sets

Article 14(b) the use of spatial data sets corresponding to the themes listed in Annexes I, II and III to Directive 2007/2/EC by public authorities, with particular attention to good examples in the field of environmental policy

The topographic data, maps and orthophotos produced under the direction of the Land Board are used by almost all public authorities and databases, as well as in planning, including in the field of environmental policy. Wherever there is a need to make location-related decisions, topographic spatial data are used.

Spatial data are used when issuing environmental permits, making plans and assessing environmental impact. Environmental impact assessments basically only rely on the data recorded in the environmental register. Several companies have become contracted clients using the spatial data of the EELIS online system of the environmental register, and they regularly receive new information.

On the basis of data related to mineral deposits, calculations of the security of supply of mineral resources have been prepared. According to the calculations, it is possible to either limit or support the commencement of use of new mineral deposits.

The database of the National Heritage Board is largely used by notaries through the e-Notary application, as well as environmentalists and those preparing plans. Through the e-Notary application, queries can be made to the X-Road, enabling the notaries to verify whether the property constituting

the object of a transaction is subject to any heritage-related restrictions. Queries can be made in the register on the basis of addresses and on the map on the basis of cadastral register numbers.

The organisers of various levels of public transport (the Ministry of Economic Affairs and Communications, the Road Administration, county governments, local governments and regional public transport centres) can use the spatial data of bus routes recorded in the public transport register to plan more efficient and coordinated public transport.

The location-based data generated during the population and housing census of 2000 represent the first geo-referenced census results regarding population and housing in Estonia. Along with the location-based data of the population and housing census of 2011 they form time series data, which can be used independent of administrative boundaries. The data enable spatial analyses related to population and housing to be carried out, and the spatial connection of population and housing data with the data of various other fields. The smallest units in terms of which the Statistical Office publishes data are grids. The grid-based statistics are used in creating development plans and other plans, analyses of environmental impact, scientific research, etc.

When assessing the risks of flood-prone areas, drawing up hazard and risk maps and developing management plans (Directive 2007/60/EC of the European Parliament and of the Council), the Land Board's topographic spatial data and results of the population census were used. The Land Board's address data was used to find out the companies in flood areas, and their areas of activity and number of employees.

The building permits and authorisation for use recorded in the register of construction works can be used to verify the legality of construction.

5.3 Use of Spatial Data by the General Public

Article 14(c) if available, evidence showing the use of the infrastructure for spatial information by the general public – indicators by all the data managers

The Land Board's public map applications and spatial data services are available to everyone free of charge and may be used without any licence agreement. Some map applications are in English. All of the map applications are accessible at http://geoportaal.maaamet.ee. Information on the public WMS service is available at http://geoportaal.maaamet.ee/est/Teenused/Avalik-WMS-teenus-p65.html.

For example, the following external information systems use the Land Board's WMS services:
 – the national public transport and route planning application at http://www.peatus.ee makes use of a WMS service developed by the Land Board especially for the purpose;
 – the map on the website of Estonia's largest daily newspaper at http://kaart.postimees.ee/ uses the Land Board's public WMS service in order to display orthophotos;
 – the map application of Delfi, the most popular Estonian news portal, at http://kaart.otsing.delfi.ee/, uses the Land Board's public WMS service to display orthophotos;
 – the Agricultural Registers and Information Board uses the Land Board's WMS base map service in their map solutions for information systems related to agricultural refund requests at https://kls.eesti.ee/pria_avalik_kaart/;
 – the public service database of the environmental register uses the Land Board's public WMS base map service to display base maps at http://register.keskkonnainfo.ee;
 – the Estonian Environment Information Centre has used the Land Board's base maps in its thematic landfill applications at http://ks.keskkonnainfo.ee/website/prygilad/;
 – the Ministry of the Interior has created the KOVTP service portal, which is a content management solution aimed at local governments, which also includes the Land Board's WMS service map application
   www.kovtp.ee/.
 – larger local governments have developed versatile map services (http://kaart.tallinn.ee, http://www.tartu.ee/kaart, http:/kaart.harku.ee), such as address search, transport, plans, services, etc.

It is also possible to use the Land Board's WMS base map services in global geo-portals, for example Google Earth and Arcgis.com.

In 2012, the Estonian National Geo-portal was created. The Estonian National Geo-portal is a portal through which spatial data within the jurisdiction of the Estonian state and local governments and other legal persons in public law are disclosed and made available.

The Estonian National Geo-portal is a part of the infrastructure for spatial information in Estonia, which, in turn, forms a part of the infrastructure for spatial information in the European Community (INSPIRE). The spatial data and data services listed in Annexes to the INSPIRE Directive and the metadata characterising the nature of the data are in compliance with the common requirements that help organise both the data and the services, and enable interoperability of spatial data from different countries. The Estonian National Geo-portal will consolidate all the INSPIRE network services of databases in Estonia.

According to the Estonian Spatial Data Act, the management and development of the Estonian National Geo-portal information system is ensured by the Land Board, which consolidates mandatory data about information holders and makes it available to the public through the Geo-portal, and forwards the data to the European Commission. The collection of data is a constant process and lasts for years. No uniform rules have been agreed on in respect of all the spatial data sets and the work will also continue in the years to come.

Spatial data can be created and shared with others through the Estonian National Geo-portal both by companies and by non-profit organisations, as well as by private individuals who apply for relevant access from the Land Board in advance and fulfil the user conditions established in the Geo-portal.

The Estonian leaders of the OpenStreetMap project (www.openstreetmap.ee) have been authorised to use the following public sector data, either directly or to derive data for the purpose of updating the OSM map:
 – the spatial data of the City of Tartu (City of Tartu);
 – CORINE data (Estonian Environment Information Centre);
 – addresses (address data system; Land Board);
 – all base maps available through the Land Board's geo-portal; and
 – navigation marks (Maritime Administration).

The text data in the national register of cultural monuments and the Land Board's spatial data are used by citizens who want to know whether a property is subject to heritage-related restrictions, i.e. whether there are any cultural monuments on the property. Some users are people who own cultural monuments. On the one hand, a cultural monument on a property causes some restrictions to be imposed under the Heritage Conservation Act; on the other, it gives the person an opportunity to receive financial aid from the state to perform the work necessary for the preservation of the monument. The information on the location of cultural monuments is also necessary for property development. The existence and location of monuments on a property may significantly affect both the construction of new buildings and planning for the future of a building already under protection as a monument. Archaeological excavations may be carried out and there may arise a need to hire a contractor holding a professional activity licence.

Educational institutions have also started to offer web map service solutions. For example, the Department of Geography of the University of Tartu has launched a project entitled "The launch of a lab/server for educational purposes and the use thereof in studies" (http://gisweb.ut.ee/). The purpose of an educational lab/server is to offer geo-informatics Master's and Doctorate candidates and other students significantly better study opportunities than those provided by the capacity of the current server of the University of Tartu, to practise and develop contemporary web-based geo-information systems and to link these with 'new medium' (Web2.0) applications. Furthermore, the purpose of the server is to make the data layers and/or samples created in the Department of Geography of the University of Tartu available as a publicly accessible web map service. When the lab is ready, there are plans to include the use of it in practical training on various courses.

Aeronautical data are directly available through queries from the European Aeronautical Information Database; however, ordinary users have restricted access to this. All of the data are also published in the Estonian AIP (Aeronautical Information Publication).

As today making geo-portals and smart applications containing base maps is quite simple thanks to the wide range of public or commercial software and WMS services, the number of applications related to spatial data is constantly increasing.

5.4 Cross-Border Use

Article 14(d) examples of cross-border use and efforts made to improve cross-border consistency of spatial data sets corresponding to the themes listed in Annexes I, II and III to Directive 2007/2/EC

Cooperation with other countries is mainly achieved through international projects or programmes. Various programmes help resolve cross-border issues. For example, the project entitled "Marine Protected Areas in the Eastern Baltic Sea" (LIFE05NAT/LV/00100) resulted in the harmonisation of data concerning the eastern Baltic Sea.

The Conference of European Directors of Roads is working on the TEN-T transport network or the map of the most important roads in Europe, to which Estonia also contributes.

A good example of cross-border cooperation is a map application which was developed by the Land Board, Maritime Administration and PRIMAR, and which integrates data on both land and marine areas in Estonia. The map application receives data on Estonian marine areas through a WMS service provided by a Norwegian organisation called PRIMAR. The map application is available on the Land Board's geo-portal at http://geoportaal.maaamet.ee.

In the EuroGeographics project there is constant cooperation and data exchange in respect of spatial data based on uniform data standards.

The results of the population and housing census of 2000 are used in the creation of the European population grid map. The census results of 2011 are also planned to be published as a European population grid map. To this end a working group has been formed with EUROSTAT.

In 2005, Lennuliiklusteeninduse AS signed a subscription contract with the manager of the European Aeronautical Information Database. As of the beginning of 2010 Estonia's status in the database was fully migrated.

Data of the railway traffic register are subject to Commission Implementing Decision No C(2011)6383 on the common specifications of the register of railway infrastructure. The information concerning public railway lines must be brought into a form that could be used through a central application by all railway undertakings of the European Union no later than by 2016. The establishment of the European railway infrastructure register has been started for similar purposes to INSPIRE, but the technical data in the register are sector-specific and therefore they are compatible with the INSPIRE data to a limited extent. As the railway infrastructure register is also a tool for the Technical Surveillance Authority, it is not expedient to create a parallel technical data system keeping in mind purely the needs of INSPIRE. An analysis of the commencement of use of the railway infrastructure register and of the calculation of the cost of the required activities will be carried out in 2013.

5.5 Use of Transformation Services

Article 14(e) how transformation services are used to achieve data interoperability

A coordinate calculator can be used on the Land Board's geo-portal in order to recalculate L-EST97 basic rectangular coordinates as ETRS89 geodetic coordinates and vice versa. The Land Board provides the public WMS map service using both the L-EST rectangular coordinate system and geographic coordinates. The original spatial data are provided using the rectangular coordinate system. Upon the provision of the WMS service, the data are transformed from the rectangular coordinate system into geographic coordinates.

A geoid calculator can be used on the Land Board's geo-portal as a transformation service in order to calculate normal height from the geodetic height

Geodesy calculators can be found on the Land Board's geo-portal page at:

http://geoportaal.maaamet.ee/est/Teenused/Geodeesia-kalkulaatorid-p142.html

6 Data Sharing Arrangements (Article 15)

6.1 Data Sharing Arrangements between Public Authorities

Article 15(a) an overview of data sharing arrangements that have been, or are being, created between public authorities

One way to share data is through requests for spatial data falling under the Land Board's standard data distribution procedure (most requests of this nature). Within the framework of the procedure, the Land Board delivers data which have been prepared for distribution. Furthermore, there are special agreements regarding data which cannot, due to their nature, be delivered under the standard contract (e.g. the data needs further processing). This mainly concerns state authorities and their extraordinary needs.

The Estonian Environment Information Centre and the Land Board have entered into a data exchange agreement. The Estonian Environment Information Centre has entered into agreements for the use of spatial data with several local governments, private companies dealing with environmental impact assessments and other parties; the agreements regulate the use of spatial data, and set out the terms and conditions for using the data, the parties' rights and obligations, the frequency of data provision etc. The data are accessible through the EELIS online system of the environmental register (as a geo-database or map layers) to the Ministry of the Environment and the authorities under its jurisdiction, as well as to contracted clients of the EELIS programme in universities and elsewhere.

The spatial data recorded in the register of cultural monuments and the spatial data related to nature conservation in the environmental register (EELIS) are exchanged between the databases. The two authorities have not yet entered into a cooperation agreement; however, they plan to do so in the near future. Information exchange between the EELIS database and the databases of cultural monuments will be regulated in an inter-ministerial agreement under which cooperation and electronic data exchange (which may also include restricted information) will continue. Preparations for the exchange of spatial data recorded in the register of construction works through the X-Road are also under way. If a structure is also a monument and vice versa, the databases will be interoperable. A form of cooperation is also planned to be established with the Land Board and the manager of the register of construction works, because database levels not publicly available are used.

The Land Board and the Road Administration have entered into a data exchange agreement under which the Land Board provides, twice a year, spatial images of roads and rail tracks recorded in the Estonian topographic database in order for the images to be used in the public transport information system. The spatial data related to the roads entered in the roads register are created in the Land Board on the basis of spatial images of roads received from the Estonian topographic database. With regard to the spatial images of roads, the Road Administration provides information on changes in the spatial images of roads as per the cooperation agreement between the Land Board and the Road Administration, and the Land Board records the changes.

In order to be able to use the population grid map data, a corresponding order must be placed. At the moment the data are for a charge (except the size of population), but in the future consumers can download grid data without charge from the output map application of the Statistical Office. The output map application is an Internet-based application for viewing different thematic maps, manipulating them and making spatial inquiries. The output map application has been developed also taking into account the INSPIRE Directive.

Pursuant to the Aviation Act, the producers of aeronautical information, Lennuliiklusteeninduse AS and the Civil Aviation Administration, shall enter into a tripartite service level agreement which indicates, in detail, the volume of aeronautical information, the data reporting procedures and the obligations and liability of the parties. According to the agreements, the database of obstacles to flight located in Estonian airspace is managed by Lennuliiklusteeninduse AS in cooperation with the Civil Aviation Administration.

6.2 Arrangements between Public Authorities and Community Institutions

Article 15(b) an overview of data sharing arrangements that have been, or are being, created between public authorities and Community institutions and bodies, including examples of data sharing arrangements for a particular spatial data set

The Estonian Environment Information Centre is the Estonian contact point for the European Environment Agency and a member of the European Environment Information and Observation Network (EIONET). Data and/or reports are also provided to the United Nations Environment Programme (UNEP), OECD, the European Commission, etc.

The Land Board is a member of EuroGeographics – the European Association of National Mapping and Cadastral Agencies – and as such provides information for the EuroGlobalMap, EuroRegionalMap, EuroBoundaryMap and EuroDEM projects. The data from these projects are used by several Community institutions.

The Estonian Statistical Office forms part of the European Statistical System. The Statistical Office is a member of the European Forum for GeoStatistics.

6.3 Barriers to Sharing of Spatial Data and Services between Public Authorities

Article 15(c) a list of barriers to the sharing of spatial data sets and services between public authorities and between public authorities and Community institutions and bodies, as well as a description of the actions which are taken to overcome those barriers

The main barrier to the use of spatial data is the lack of know-how related to spatial data and the lack of GIS software. This problem is most prominent in local governments. Sometimes it is also difficult to find common ground and the interest necessary for cooperation. So far the problems have been solved through the development of various web-based map applications by the Land Board; this allows authorities with limited means to view data that they are interested in, submit queries and also manage the data.

In addition, the specific nature of the existing databases and information systems has also constituted a barrier to data sharing. The current information systems were created to perform certain tasks and they do not correspond to new needs. This problem can be solved by creating new developments; however, this in turn is complicated due to the authorities' resources, budget and synchronisation of mutual development-related actions.

The main problem in the collection and sharing of spatial data of railway infrastructure has been the lack of a common standard, how and with what precision the coordinate points need to be marked (especially on curves). The lack of a common approach has so far also hindered the entry of spatial data of linear objects (railway lines) in the railway traffic register. In addition, the implementation of the developments is also hindered by the lack of financial resources. The few existing resources are used particularly for improving substantial functions of the railway traffic register; the collection and communication of spatial data in the GIS format is particularly an additional functionality and of lower priority in the conditions of limited financial resources.

7 Cost and Benefit Aspects (Article 16)

7.1 Estimated Costs of Implementation of INSPIRE Directive

Art. 16(a) has required an estimate of the costs resulting from the implementation of Directive 2007/2/EC about the period of 2010–2012. To facilitate correct understanding of the report, please indicate what has been included in the costs (e.g. hardware, software, working time of the staff) and how you performed the assessment (e.g. indicate which part of the costs is related to INSPIRE or associated initiatives, like e-government).
Please indicate about the list set out below either financial costs (e.g. hardware or staff) and/or the working time of the staff (days, months).

IT infrastructure (hardware and software main components) – total EUR 156 684: hardware EUR 59 527 and software EUR 97 157.
- Installation costs – included in the acquisition cost of the infrastructure.
- Administration – none within 5 years, as the costs were included in the acquisition cost of the infrastructure.

Metadata
- Creation costs (non-recurrent costs) in an estimated amount of EUR 30 000;
- Administration costs (recurrent annual costs) in an estimated amount of EUR 7000;

Interoperability/harmonisation of data included in INSPIRE Directive and monitoring tables
- Creation costs (non-recurrent costs) in an estimated amount of EUR 190 000;
- Administration costs (recurrent annual costs) in an estimated amount of EUR 19 000;

Network services included in the INSPIRE Directive and monitoring tables
- Creation costs (non-recurrent costs) in an estimated amount of EUR 96 745;
- Maintenance of services in accordance with the INSPIRE requirements (recurrent annual costs) in an estimated amount of EUR 44 000;

The costs arise from the first development project that was related to bringing the data in the database that fall under the spatial data themes listed in Annex I as administered by the Land Board into line with the INSPIRE requirements, making search and viewing services for the data and initial creation of the Estonian geo-portal. The current forecast of the cost of the second stage is EUR 535 000 plus a significant increase in fixed costs. It is currently difficult to assess the costs related to making data of the spatial data themes listed in Annex III available as information holders already specify the costs related to INSPIRE.

The transport spatial data theme of Annex 1 to the INSPIRE Directive also includes information on waterways as kept by the Estonian Maritime Administration. The Estonian Maritime Administration (the EMA) has ordered an ex-ante analysis of their databases for the creation of the spatial data infrastructure of the INSPIRE Directive. The cost of the ex-ante analysis was EUR 2250. According to the analysis, the EMA databases include data covered by the transport network theme listed in Annex I to the INSPIRE Directive. The initial estimated cost of hardware, software and work of the EMA data is up to EUR 250 000, of which the main part accounts for licences for the server and the application, operating systems, administrative means (certificates, web server software), hardware, backup, security systems, work, installations, maintenance, support, trainings.

The implementation of the INSPIRE Directive generates additional costs for all information managers and the level of the costs is currently being determined.

7.1.1 Monitoring and Reporting

Monitoring and reporting has yet not led to any additional costs as officials do that as part of their day-to-day work.

7.1.2 Coordination and Horizontal Measures

Establishment of coordination structures, activities of national contact points
Activities related to the obligation to share data and services

So far, coordination costs have been the salary costs of two employees in the Land Board, who coordinate the entire implementation of the INSPIRE Directive in Estonia. The costs will certainly increase due to the coordination of the process of making the data of the spatial data theme listed in Annex III to the Directive available, because the increase in the workload means that the work can no longer be done by only 2 employees.

7.2 Examples of Benefits Observed

Article 16(b) examples of the benefits observed, including examples of the positive effects on policy preparation, implementation, evaluation, examples of improved services to the citizen as well as examples of cross-border cooperation.

The main purpose of providing the public with free map applications and WMS services is to make land-related information more accessible to society. By creating electronic public services we have saved a considerable amount of money and time on customer service, which would otherwise have been spent on replying to people's inquiries, making copies of map data and other such operations. However, costs related to the maintenance of the powerful IT systems that are required are rather high.

Benefits are primarily indirect and can be estimated at the national level. Land-related information is conveniently accessible to everyone free of charge; this saves people time and prevents possible land- and property-related fraud. Decision-making has become simpler in fields where maps, cadastral information and other spatial data form essential basic material. The use of map applications by other institutions for the management of spatial data has probably saved money which would otherwise have been spent on the development and maintenance of separate geo-information systems in these institutions. It is likely that the public nature and availability of information has prevented the duplication of spatial data sets.

The Land Board's map applications and services, which were created by third parties, are a good example of better services provided to the public. The fact that people are satisfied is evidenced by the intensive use of the services.

A good example of cross-border cooperation is a map application which was developed by the Land Board, Maritime Administration and a Norwegian organisation called PRIMAR which integrates data on both land and marine areas in Estonia.

A distinction must be made between data made available through geo-portals and INSPIRE. The benefit of INSPIRE will become apparent when there is a sufficiently large quantity of different spatial data services provided by various information holders in compliance with the requirements. If only two or three institutions bring spatial data into compliance with the INSPIRE requirements, this would not result in any direct benefit at the national level. These are rather resources that require huge financial and IT competence that a large part of institutions cannot provide. At the same time INSPIRE is a motivating means in the harmonisation and publication of data. The Directive inspires institutions to cooperate and exchange the best know-how among themselves. It is necessary to find solutions that would be inexpensive but also effective. It is certainly easier to find the required spatial data through search services, regardless of whether the spatial data themselves have already been made available as a viewing service or not. The introduction of downloading services along with the facilitation of the procedural acts related to fees payable for licences and data will certainly contribute to improving the availability of spatial data. At first the data exchange takes place mostly in the form of traditional file exchange (e-mail, ftp, etc.).

For example, constant development of the railway traffic register (including the collection of spatial data) gives a better overview at the national level of the current railway infrastructure and through that more effective planning of state supervision. Through e-services the development of a railway traffic register also provides railway infrastructure managers with a better overview of the railways and railway structures in their possession.

The development of the European railway infrastructure register will provide market participants with a better overview of the railway network of different European countries and is thus aimed directly at the development of the interoperability of the European rail network.

8 Summary

This report was compiled by spatial database maintainers. The information received from public authorities was compiled by the Land Board. In accordance with the Spatial Data Act, the Land Board has also been appointed as the contact point for the European Commission. A separate coordinating structure has not been established in Estonia for the implementation of the INSPIRE Directive; the tasks of such a structure are currently performed by the Land Board. It is planned to establish a coordinating structure which brings together all the managers of databases falling under the spatial data themes listed in the Annexes to the INSPIRE Directive.

In Estonia the infrastructure for spatial information is closely linked with the state information system. The state information system consists of information systems of various information holders, some of whom also manage spatial data, and of their support systems. Many public authorities, such as the Land Board, the Department of State Information Systems of the Ministry of Economic Affairs and Communications and the Estonian Information System's Authority, significantly contribute to state infrastructure for spatial information and its coordination.

A data exchange layer called the X-Road and the administration system of the state information system (RIHA) have been introduced in Estonia. RIHA is a complete and detailed map of the state information system. Both of these systems have been well received by database maintainers and are actively used in practice.

The trends of the state information society are determined by a longer-term development plan called the "Estonian Information Society Agenda 2013", which is not meant to be an implementation document for the INSPIRE Directive *per se*. However, the objectives arising from the INSPIRE Directive have been followed in the agenda. Under the agenda, an annual implementation plan is prepared; the plan defines specific actions for the development of the entire information society, taking into account, among other things, the operations and terms prescribed by INSPIRE. Preparations are being made for the new European Union programming period, under which the new "Estonian Information Society Agenda until 2020" will be completed.

The infrastructure for spatial information is implemented through each database manager. Major spatial data producers and their databases corresponding to the spatial data themes listed in the Annexes to the INSPIRE Directive are the following:
- the Land Board, as the state mapping and cadastral agency – coordinate reference systems, geographical grid systems, administrative units, addresses, cadastral parcels, elevation, land cover, orthoimagery, geology and mineral resources;
- the Estonian Environment Information Centre as the maintainer of environmental databases – hydrography, protected sites, land cover, environmental monitoring facilities, habitats and biotopes;
- the Road Administration, which manages everything connected with roads and transport networks – transport networks;
- the Maritime Administration which manages databases used for preparing navigational information– transport networks;
- the Statistical Office, as the state's statistics agency – population distribution in space aggregated by various socio-demographic indicators; and
- the Technical Surveillance Authority as the manager of information related to rail networks.

Currently, the Land Board can be considered the biggest provider of spatial data and related services in Estonia. At present, the Land Board offers several different map applications, many of which have been developed in cooperation with other state authorities, which either link their alphanumeric data with spatial objects in the Estonian topographic database or show the data they maintain in geographic space on base maps. In addition to map applications, the Land Board has, for two years, provided free WMS base map services to the public; through these services anyone can use the various base maps of the Land Board.

An important collector of environmental data is the Estonian Environment Information Centre, which manages the environmental register and also provides information to the public through its public

service database. The spatial data in question are used when issuing environmental permits, making plans and assessing environmental impact. Environmental impact assessments basically only rely on the data recorded in the environmental register. Several companies have become contracted clients using the spatial data of the EELIS online system of the environmental register, and they regularly receive new data.

The Road Administration is the chief and authorised processor of the national roads register, which includes road data and corresponds to the spatial data theme of transport networks indicated in Annex I to the Directive. Alphanumeric data on roads are collected in the roads register in the form of tables, and these are publicly accessible. The spatial road-related data in the roads register are received from the Land Board's topographic database. The Land Board and the Road Administration have entered into a data exchange agreement under which the Land Board provides spatial image data of roads and rail tracks recorded in the Estonian topographic database twice a year in order for the data to be used in the public transport information system

Lennuliiklusteeninduse AS collects, processes and reports aeronautical information in Estonia. Among other things, various aeronautical charts (e.g. flight procedure charts, airport maps and airspace charts) are prepared. The aeronautical information of Estonia is available to other public authorities in accordance with mutual agreements. Data are transmitted free of charge as and when necessary.

The national register of cultural monuments of the National Heritage Board is interoperable with the Land Board's databases from which the spatial data of the monuments is received.

The Land Board's map applications and services, including those in English, are accessible to anyone free of charge at http://geoportaal.maaamet.ee. The data and services of other databases are also accessible to the public free of charge, with the only restrictions on access arising from the Public Information Act. In 2012, the Estonian National Geo-portal (http://inspire.maaamet.ee/) was created. The Estonian National Geo-portal is a portal through which spatial data within the jurisdiction of the Estonian state and local governments and other legal persons in public law are disclosed and made available. The Estonian National Geo-portal will consolidate all the INSPIRE network services of databases in Estonia.

An example of cross-border cooperation is a map application which was developed by the Land Board, Maritime Administration and PRIMAR and which integrates data on both the land and marine areas in Estonia. The map application receives data on Estonian marine areas through a WMS service provided by PRIMAR, which is a Norwegian organisation.

The Public Information Act applicable in Estonia imposes an obligation on state authorities to make the data recorded in their databases available to the public (unless legal restrictions on access apply). The procedure for making available, administration and collection of spatial data is regulated by the Spatial Data Act. The publication of spatial databases is somewhat different from that of other databases since, in order to make spatial databases public, an appropriate environment is needed and services must be provided. Therefore, the main benefit of INSPIRE is the harmonisation of data publication. By creating electronic public services we have saved a considerable amount of finances and time on customer service, which would otherwise have been spent on replying to people's inquiries, making copies of map data and other such operations. However, it must also be taken into account that the costs incurred in maintaining powerful IT systems are not minor, although interoperability and comprehensive cooperation between state authorities help to minimise them.

More work on the creation of the infrastructure for spatial data in the European Union remains to be done. Pursuant to the Directive and the implementing acts of the European Commission, preparations for this work are under way. National infrastructure for spatial information is developed at the same time as adoption of Commission legislation and in accordance with the schedule established.

9 Annexes

9.1 List of Organisations – Names and Contact Details

Authority/Company	Contact person	E-mail
Estonian Land Board	Ülle Harak	ylle.harak@maaamet.ee
	Peep Krusberg	peep.krusberg@maaamet.ee
	Viljo Roolaht	viljo.roolaht@maaamet.ee
	Sulev Õitspuu	sulev.oitspuu@maaamet.ee
	Eduard Pukkonen	eduard.pukkonen@maaamet.ee
	Kristian Teiter	kristian.teiter@maaamet.ee
Estonian Environment Information Centre	Tiina Dislis	tiina.dislis@keskkonnainfo.ee
National Heritage Board	Urve Russow	urve.russow@muinas.ee
	Kalle Lange	kalle.lange@muinas.ee
Road Administration	Jaan Ingermaa	jaan.ingermaa@mnt.ee
	Ingmar Roos	ingmar.roos@mnt.ee
Maritime Administration	Tõnis Siilanarusk	tonis.siilanarusk@vta.ee
	Olavi Heinlo	olavi.heinlo@vta.ee
Technical Surveillance Authority	Viljar Luhthein	viljar.luhthein@tja.ee
Statistical Office	Berit Hänilane	Berit.hanilane@stat.ee
	Ülle Valgma	Ylle.valgma@stat.ee
AS Lennuliiklusteenindus	Aigar Tarre	Aigar@eans.ee
Ministry of Economic Affairs and Communications	Valentina Konks	Valentina.konks@mkm.ee

9.2 Reference Material Used in Preparation of Report

http://inspire.maaamet.ee/

http://geoportaal.maaamet.ee

http://geoportaal.maaamet.ee/est/Teenused/Avalik-WMS-teenus-p65.html

http://www.keskkonnainfo.ee/publications/315_PDF.pdf

http://www.keskkonnainfo.ee/index.php?lan=EE

http://register.keskkonnainfo.ee/stat/

http://register.keskkonnainfo.ee

http://loodusvaatlused.eelis.ee

http://www.riso.ee/et/

http://www.riso.ee/et/files/IY_arengukava_2013_terviktekst_2009.pdf

http://www.riso.ee/et/files/IYA_2013_RAK_2012_2013.pdf

http://www.ria.ee/index.php

https://riha.eesti.ee/riha/main#r5YnFNLulr6CU56BGtmyWmSiY5INHP

http://www.peatus.ee

http://kaart.otsing.delfi.ee/

https://kls.pria.ee/pria_avalik_kaart/

http://gisweb.ut.ee/

www.openstreetmap.ee