Spatial Data Infrastructures in *Sweden:* State of play 2010

Report meta-information

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11.0	2010-03-25	Dimitrios Biliouris (SADL)	Review of the 2009 update
11.1	2010-04-13	Katleen Janssen (ICRI)	2009 update of legal framework

Change matrix 2010 versus 2007

A concise graph is added to indicate changes of the various paragraphs compared to the previous report. Two colours are used: Green and Yellow indicating major and minimum changes respectively compared with the 2007 State of Play. This graph does not reflect the country situation. It merely represents our findings/changes per section from our preparation of the desktop analysis.
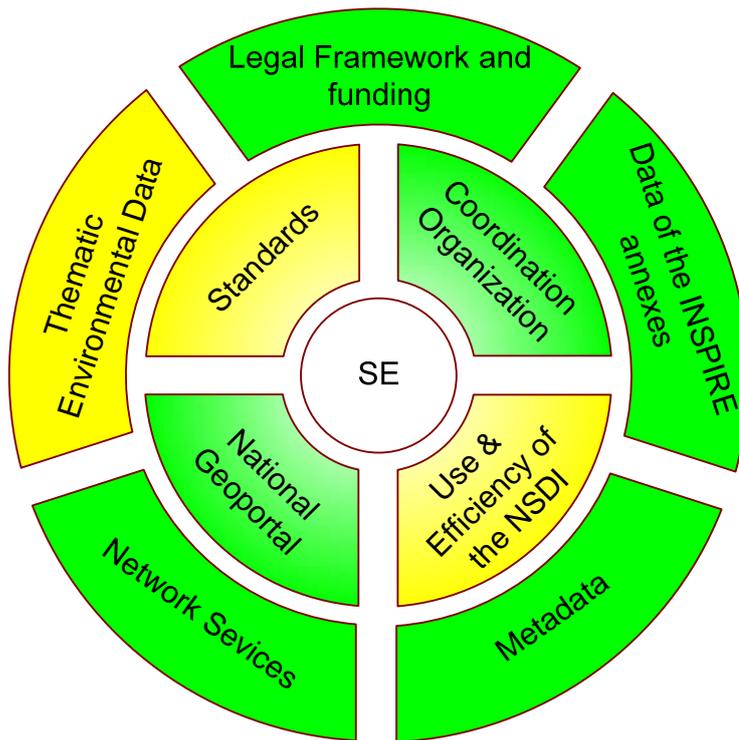
Executive summary

The NSDI in Sweden is highly visible and accessible to the broad user community through publicly accessible Internet sites such as MapStore, MapSearch and Property search services, the various environmental portals as well as the new Geodata Portal.

Much of the information contained in the Swedish SDI is developed out of the Land Data Bank System (LDBS), the Land Use Map and the Topographic Map service together with the environmental databases provided by SEPA, SMHI and other organisations. . As such, the NSDI forms an essential part of the country's Public Sector Information.

The basic components of the Swedish NSDI are:

- Information - different datasets with specific focus on reference datasets that form the foundation on which other spatial data sets are built. Metadata forms another important part of the information that recently received a boost development;

- Legislative and institutional frameworks;

- Human resources, technical systems and processes;

- Strategies and action plans.

The Swedish approach regarding the capture, storage and use of data and especially geographic data is one where the national, regional and local levels appear to be well interlinked. The Swedish NSDI strongly incorporates cadastre-based information.

Additional drivers for the NSDI include the needs of stakeholders such as Municipalities which migrate their Master Plans and their planning processes into GIS environments, as well as the Swedish Environmental Protection Agency which is working together with NLS to build up the components for its own thematic SDI.

The County Administrative Boards are also important drivers for the NSDI as GIS users and producers at regional level.

A National Geodata Strategy has been developed covering all strategic issues related to the handling of geodata in Sweden. This strategy is intended to provide guidance for all players in the GI field in Sweden. The strategy is based on well defined goals and time frames.

The vision for the national geodata strategy, in a 10-year perspective, is that organisations that manage geodata should:

- Generate *increased benefits for society* through the use of geodata based on co-operation across organisational boundaries at the lowest possible price.
- Link *information resources in a network* and make them available via homogenous services and uniform descriptions of the information.

- *Serve* the public and private sectors and citizens and *satisfy demands* at local, regional, national, European and global levels.

The Geodata Strategy was first published in March 2007, and has been updated every year since then.

Several goals in the strategy have already been fulfilled.

The architecture of the future co-operation model was presented in June 2009, while cost benefit analysis including client/supplier needs, agreement and licence models, financing and price models was also produced.

The first version of a Geodata Portal is now in use including WMS services and metadata published by a number of producers. A proposal for a Swedish profile for the metadata standard, SS-ISO 19115, has been decided while an application which makes it possible for respective authorities to create metadata is available.

As far as the INSPIRE transposition is concerned, the government has proposed that it should be implemented in Swedish legislation through an Act and an ordinance.

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Abbreviations and acronyms

CEN	European Committee for Standardization
CT	Core Thematic Data
EUREF	European Reference Organisation for Quality Assured Breast Screening and Diagnostic Services
FIR	Further Investigation Required
FOI	Freedom of information
FPX	Future Position X
GI	Geographical Information
GINIE	Geographic Information Network in Europe
GIS	Geographical Information System
GML	Geography Markup Language
GPS	Global Positioning System
GSD	Geographical Sweden Data
GSDI	Global Spatial Data Infrastructure
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
ISO	International Organization for Standardization
LDBS	Land Database
LIS	Land Information System
MEGI	Metadata for Geographic Information
NAP	National Amsterdam Peil
NKG	Nordic Geodetic Commission
NLS	National Land Survey
NSDI	National Spatial Data Infrastructures
PRTR	Pollutant Release and Transfer Register
PSI	Policy and legislation on access to public sector information
REF	Reference data
SCB	Sweden's Statistical Databases
SDI	Spatial Data Infrastructures
SEK	Swedish Crown
SEPA	Swedish Environmental Protection Agency
SGU	Geological Survey of Sweden
SIS	Swedish Standards Institute
SMHI	Swedish Meteorological and Hydrological Institute
SNRD	Swedish National Road Database
SPAR	Swedish Population and Address Register

SS	Swedish Standards
STANLI	Swedish programme on geographical information standardisation
SWEPOS	Swedish geodetic network of GPS receivers
SWEREF	Swedish Reference Frame
TM	Transverse Mercator
TR	Technical Report
UELN	United European Levelling Network
ULI	Utvecklingsradet for landskapsinformation (Swedish Development Council for Land Information)
VAR's	value added resellers
VERVA	Swedish Administrative Development Agency
WGS	World Geodetic System
WISE	Water Information System for Europe
WISS	Water Information System for Sweden
WMS	Web Map Service

1   GENERAL INFORMATION

1.1   Method

This report is summarizing the review of SDI in Sweden, and reflects the degree to which the SDI situation in Sweden is similar to the ideas set out in the INSPIRE position papers[1] and in the more recent INSPIRE scoping documents.

The 2002 report was based mainly on the analysis of web sites and other documents readily accessible[2] including:

- http://www.lantmateriet.se/index_eng.htm

- http://www.sis.se/stanli

- http://www.stadskartan.se/start/

and has been completed by integration and consolidation of comments received in spring 2003 and summer 2004 from representatives of the NSDI initiatives. The update of 2005 was based on input from Swedish experts and integrated in the report. The update of 2006 was based on input from Swedish experts and the country visit that was performed on 27-28 November 2006. For the 2007 update information was received on data sets and services, the use of the infrastructure and data sharing practices.

For the 2009 update information was received from the survey report, a number of publications and presentations from conferences and workshops and information extracted from the geoportal and relevant websites. In this version obsolete information was removed, while a conclusion paragraph regarding the status of each indicator was added for each component.

1.2   Background of the Swedish NSDI

The Swedish NSDI consists of a network of supporting actions and services aiming to facilitate an efficient production and use of spatial information. This includes increased co-operation between authorities, municipalities and private sector companies in development and implementation of GI standards, in establishment of efficient updating processes and to set up metadata services and Internet based services for easy access and distribution of geographic data.

The Swedish approach regarding the capture, storage and use of data (and especially geographic data) is based on a common understanding of the need for cooperation

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[1] INSPIRE position papers, final versions: RDM, ETC, DPLI, ASF, IST, IAS (latest version).

[2] Including the analysis of various documents, project references and web sites readily accessible. Most resources were gathered from the Internet. Throughout the report a distinction is made between actual SDI initiatives and GI and GIS based projects. Key elements that should be in place for an SDI to exist are: Status - strategy (or mandate) for SDI to be developed and not a one-off effort; Co-ordination - who will administer and organise the SDI; Scope - broad based interest and stakeholder involvement; Promoting - awareness, documentation, access; Funding - dedicated resources, a clear plan to pay for it; Partnerships - getting players on-board.

between responsible agencies, including creation of efficient links between national, regional and local levels. Geographic information in Sweden is collected mainly at the national level and the Municipal level, although the 21 Counties are becoming increasingly involved in spatial data collection and use. New GIS activities have also been initiated as a result of the implementation of the Water Framework Directive. Five of the County Administrative Boards have been designated as competent water authorities of the five Swedish river basin districts. The 290 Municipalities are the responsible authorities for the large scale mapping as well as the maintenance of key databases through their administrative processes.

Geo-portals that offer this spatial/geographic data and services are pertinently available. However, not until recently, a national portal that offers access to all available data on both national and local level is available. Today SDI activity at the national level is very complete and up-to-date regarding the combination of data, applications and technology, and the approach to the provision of services. Other SDI activities in the country are either not evident or they have been integrated into the existing NSDI framework.

The information offered by the Swedish NSDI is mainly developed out of the Land Data Bank System (LDBS), the Land Use Map and the Topographic Map, and all are based on the National Geodetic Network. The NSDI forms an essential part of the Country's Public Sector Information, or PSI. Besides the reference GI, the basic components of the Swedish SDI are:

- Metadata ;

- Legislative and institutional framework;

- Human resources, technical systems and processes;

- Strategies and action plans, especially for interoperability and information dissemination.

The NSDI is hosted by the National Land Survey (NLS) of Sweden. The NLS is a governmental agency and the first Swedish authority to have a commercial presence on the Internet with the MapStore service. Other Internet-based services and applications available include Property search, SwedeImages and MapSearch.

Although many building blocks were in place, there was not an actual NSDI in place in Sweden until the mid 1990's. It required the coordination of organisations, information, systems and technology. Key to this process and specific to the Swedish model was the merging of the Central Board of Real Estate Data and the National Land Survey (old) into the new National Land Survey. A key driver or objective behind this change was to bring a geographical dimension to the Land Data Bank System (Wiberg, 2002).

2 Details of the Swedish NSDI (NLS)

2.1 General Information

Lantmäteriet (www.lantmateriet.se) -the Swedish National Land Survey (NLS) is a governmental agency (i.e. part of the state and thus not a separate legal person). It is the dominant player in the GI market. The Ministry of Environment is the responsible governmental body for Lantmäteriet. Lantmäteriet is organised in four divisions each of which has its special area of responsibility:

- The Cadastral Services Division, which is responsible for real property formation and sub-division

- The Land Registration Division, which is responsible for land registration and land title issues

- The Land and Geographic Information Division, which is responsible for the creation of geographic and real property information databases and for making the data available

- Metria, which is Lantmäteriet´s Commercial Division and works on a competitive basis

 The NLS has the responsibility to co-ordinate the development of the NSDI. In the field of geo-spatial data this task includes inter alia work with standardisation, establishment of metadata services, co-ordination with other producer's production plans (e.g. the municipalities that create and maintain GI databases) and the establishment of new forms for co-operation.

Lantmäteriet is supported by the Geodata-Advisory Board (Geodatarad). The Board has an advisory role towards Lantmäteriet on matters of national SDI, and on European and international matters.

ULI (*Utvecklingsradet for landskapsinformation*) (http://www.uli.se/) is a National Association for geodata and geographic information technology with almost 200 members among government authorities, municipalities, county councils, companies, colleges and other organizations. ULI is working to raise awareness of geographic information technology in both industry and the public, and to facilitate dialogue between users and producers.

Within *SIS (the Swedish Standards Institute)* a project called *Stanli* (http://www.sis.se/DesktopDefault.aspx?tabName=%40projekt&PROJID=2528&menuItemID=3728) was set up already in 1990 to promote standardization within geographic information. The work is financed by approximately 30 different organizations. Through Stanli Sweden has taken an active part in the ISO/TC 211 and CEN/TC 287 developments of framework standards. Based on results from this work a Swedish framework has been set up. Besides a number of profiles for different application areas

have been developed, for example for road and railway networks, utility networks, addresses, cadastral parcels, and hydrology.

The 21 counties are increasingly involved in spatial data collection and use, but it is the 290 municipalities in Sweden which are responsible for large-scale mapping and the maintenance of key databases through administrative processes. The Swedish Environmental Protection Agency (SEPA) produces and processes a lot of data in areas of its responsibility. Other government agencies, such as the National Road Administration, the Swedish Post and others are involved with and co-operate in data production and/or have responsibilities in different user sectors for spatial information.

## 2.2 Component 1: Coordination and organizational issues

The Lantmäteriet is coordinating the Swedish SDI. In addition an advisory Council – the GI Advisory Board (Geodatarad) – was introduced, which advises Lantmäteriet about the Swedish SDI and European and international matters. The Swedish Government has appointed the Geodata Advisory Board to support Lantmäteriet´s coordination responsibility for production, cooperation and development in the geodata (geographic and real property information) field. The advisory board should:

- Participate in the formulation of a national geodata strategy for the coordinated provision of information in the geodata field,

- Carry out the preparatory work and process questions of both basic and common national interest in the geodata field,

- Contribute to the development of a national and international infrastructure in the field by, for example, supporting the implementation of standards, and

- Contribute to increased coordination of the activities of involved authorities and agencies concerning the development and provision of information.

The Geodata Advisory Board has ten members besides the General Director of Lantmäteriet, who is the chairman. The other members are from the Geological Survey of Sweden (SGU), The Västra Götaland County Administrative Board, City of Stockholm, Swedish Association of Local Authorities and Regions, the Swedish National Road Administration, Swedish Development Council for Geographic Information (ULI), Swedish Meteorological and Hydrological Institute (SMHI), National Maritime Administration and Swedish Military Authorities.

At the same time Lantmäteriet is appointed to take the lead on the INSPIRE implementation. Lantmäteriet has identified a new internal structure for the coordination of the implementation of the INSPIRE directive. An INSPIRE working group has also been formed that meets each second month to co-ordinate activities and issues related to INSPIRE (the working group is made up of representatives from about 20 Swedish authorities that have responsibility for the provision of metadata, datasets and services in accordance with the INSPIRE-directive).

Figure 1: Overview of players, activities/roles and results
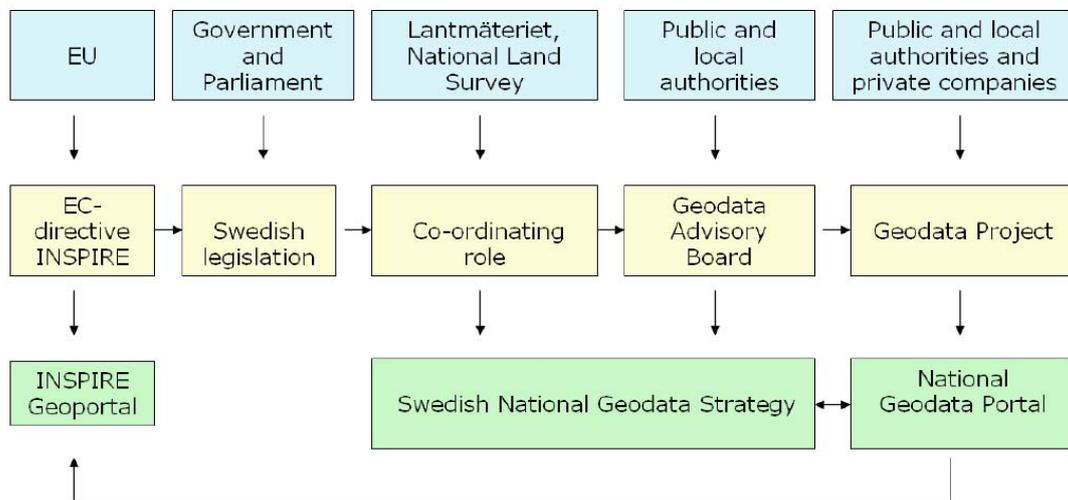
Lantmäteriet, together with the Geodata Advisory Board, a number of Swedish public sector authorities and the Swedish Association of Local Authorities and Regions, has created a National Geodata Strategy for the integrated provision of information within the geodata sector.

The aim of the Geodata Strategy is to provide guidance to the producers and users of geodata. The Geodata Strategy is the plan for how to build a national infrastructure for geodata, which is, at the same time a part of the European infrastructure. The National Geodata Strategy provides prerequisites and dictates the route.

. The strategy identifies 8 action areas:

1. Co-operation in networks as a basis for the infrastructure, with priority given to the development of models for activities and agreements. The identification of areas of application that have a significant potential.

2. The structuring of information, including the development of a basic framework containing descriptions of rules and methods for a service-oriented exchange of information and which describes geodata, defines the geodata sector and takes into account the requirements of the Inspire directive.

3. The technical infrastructure, including the establishment of a geodata portal for a development environment, standardised interfaces and a national service catalogue.

4. A national metadata catalogue, including a national programme for the creation of metadata.

5. Geodetic reference systems and an accelerated transition to the new national reference system, Sweref 99.

6. Research and development (R&D) and education including the formulation of a national R&D and education programme.

7. Legislation, including an investigation of the possible need for changes and adaptation to Inspire.

8. Financing and price-setting, including the development of financing and flexible pricing models and the implementation of cost-benefit analyses.

(http://www.geodata.se/upload/Strategi%20-%20infrastruktur/Dokument/Eng/Geodata_Strategy_2009.pdf).

The cooperation should be based on voluntary agreements and satisfy the needs of local, regional and national applications. The networks should stimulate the development of services that meet the requirements of individual citizens in both private and public sphere of activity. (http://www.geodata.se/en/Infrastructure-for-geodata/A-National-Geodata-Strategy/)

The vision for the national geodata strategy, in a 10-year perspective, is that organisations that manage geodata should:
- Generate *increased benefits for society* through the use of geodata based on co-operation across organisational boundaries at the lowest possible price.
- Link *information resources in a network* and make them available via homogenous services and uniform descriptions of the information.
- *Serve* the public and private sectors and citizens and *satisfy demands* at local, regional, national, European and global levels.

The Geodata Strategy was first published in March 2007, and has been updated every year since then. A status report had to be presented to the government by the end of March 2010 (Rannestig and Sandgren, 2009; Geodata Strategy 2009).

One important action described in the strategy was to start the common project "Geodata project". The objectives for the Geodata Project are to:
1. increase the value for customers of the provision of geodata
2. increase co-operation within and between public and private sector
3. create flexible business processes
4. decrease the costs for the provision of geodata
5. increase growth and competitiveness for private sector which provide geodata products and services.

The project focuses on two issues:

- the technical infrastructure: develop a portal to make it easier to share data through services

- the business model: processes, responsibilities, agreements, finances, etc.

The project is divided into three main phases. The first phase, which was completed during the autumn of 2008, has, concerning the business model, focused on the geodata state of play in Sweden in terms of provision, demands and needs. A number of cost benefit analyses, research projects, as well as standardisation activities were carried out. Concerning the technical infrastructure, work during the first phase has been concentrated on designing a prototype for the Geodata Portal, formulating a preliminary standard for metadata, designing a tool for the creation of metadata and preparing guidelines for creating and providing metadata and geodata services.

Phase 2, which was completed during the first half of 2009, involved the designing of an architecture for the future business model as well as formulating what is required for the implementation of the model. While the Geodata Portal continued to be developed.

Finally, in phase 3, the management organisation for the Geodata Portal will be established and set up. The completed portal, with a technical solution that functions together with the business model and administrative routines, will be in operation by the end of June 2010 (http://www.geodata.se/upload/Strategi%20-%20infrastruktur/Dokument/Eng/Geodata_Strategy_2009.pdf).

The Swedish government is investing 50 Mkr/year (~ 4.65 M€/year) for the coming three years on the implementation of INSPIRE.
30 Mkr/year (~ 2.79 M€/year) is earmarked for coordination activities.
20 Mkr/year (~ 1.86 M€/year) will be designated for public sector authorities that have a responsibility for providing metadata, datasets and services that are covered by the directive (from survey response).

2.2.1 Conclusions of Component 1

The Swedish SDI approach is truly national. SDI building blocks have reached a significant level of operationality. With INSPIRE, Lantmäteriet – the Swedish mapping, cadastre and land registration authority is confirmed to be the leading organisation. At the same time, the Geodata Advisory Board who is the coordinating structure consists of data producers, as well as mixed data users/producers (but mainly they are the different data custodians). Also the Swedish Development Council for Geographic Information (ULI) is involved in this Board. Not only data custodians who are the driving force, but also users are participating actively according to the survey, at least to a certain degree.

Based on these conclusions we score the indicators as follows:

- The approach and territorial coverage of the SDI is truly national

- One or more components of the SDI have reached a significant level of operationality (5)

- The officially recognised or de facto coordinating body of the SDI is a NDP, i.e. a NMA or a comparable organisation (Not so clear)

- The officially recognised or de facto coordinating body for the SDI is an organisation controlled by data users

- An organisation of the type 'national GI-association' is involved in the coordination of the SDI (No)

- Producers and users of spatial data are participating in the SDI (Not so clear)

- Only public sector actors are participating in the SDI

2.3 Component 2: Legal framework and funding

2.3.1 Legal framework

In 2006, the Swedish Parliament approved legislation that officially appointed Lantmäteriet as the coordinator for the Swedish NSDI and setup the Geodata Advisory Board.

On the national level, the responsibilities for GI are divided among several ministries. For instance, the ministry of Justice is responsible for the Land Registry, which has been transferred to Lantmäteriet by a parliamentary decision of 2005, taking effect from 2007 onwards. The ministry for Environment is responsible for Lantmäteriet, the National Board of Housing, Building and Planning, the Environmental Protection Agency and the Meteorological and Hydrological Institute. The Ministry of Enterprise, Energy and Communications is responsible for the Geological Survey, the Maritime Administration, and the Road Administration. Lantmäteriet has agreements with other ministries for the use of its data, such as the Ministry of Finance, the Ministry of Education, and the Ministry of Agriculture.

Lantmäteriet has a strong tradition of cooperation, with other national agencies and with the local authorities. One of the most important cooperation agreements deals with the National Road Database. The database is built in cooperation between the Road Administration, Lantmäteriet, the forest authorities and the municipalities. Another joint effort database is the Address Register. This is built in cooperation between Lantmäteriet, the municipalities, the Post and the National Tax Board. Lantmäteriet also cooperates with the Statistics Office, the National Railway, etc. These agreements usually do not take the form of formal contracts.

Lantmäteriet, the Swedish Environmental Protection Agency (SEPA) and the County Administrative Boards have made an agreement including two parts. On the one hand, they have the purpose to make the collaboration within the field of environment protection more efficient, by building a stable infrastructure, and on the other hand, it

includes GIS support from Lantmäteriet to SEPA. There are plans to make the information in this agreement (VIC Nature) available to the public via the Internet.

Lantmäteriet also cooperates with the municipalities. Swedish municipalities have a high level of independence, and they are not obliged to provide any spatial data to the government, except in a few cases, such as maps for planning. 38 municipalities also function as a cadastral authority, under supervision of Lantmäteriet. The cooperation with the municipalities is traditionally based on an incentive model. The municipalities are paid for providing their data, by a division of revenues from Lantmäteriet, depending on the level of data the municipalities provide, and of their population numbers. If the municipalities want to use Lantmäteriet's data, they have to pay for it.

The common vision for the cooperation between Lantmäteriet and the municipalities is laid down in a general agreement, which lays down the principles for cooperation and the financial model. The Association for Local Authorities has made a framework agreement with Lantmäteriet in 2000, and a new one in 2003. Standard agreements are negotiated with the Association for Local Authorities and are then used for concluding individual agreements with the local authorities. In addition, an object catalogue is made and the use of standards is included in the agreements.

The local authorities also have many cooperation agreements amongst each other, to build common databases, sell them together and divide the revenues. These agreements usually include the right to show the data on the Internet.

Lantmäteriet also cooperates with the Swedish Standards Institute, under a letter of intent signed by both parties. The aim of the agreement on standardization within the framework of a Swedish geodata strategy was to clarify the respective roles of the organizations and to avoid duplication of efforts (Swedish Geodatastrategy 2009).

In April 2006, the Swedish Parliament organized the EU Interparliamentary Conference on the INSPIRE directive. At that time, the chairperson of the Housing Committee of the Parliament had raised considerable political interest in the issue of geographic information and the role and tasks of Lantmäteriet, and the political climate was very good for organizing the conference and raising political awareness.

However, since April the national elections have changed the composition of the Parliament and the Government. This entails that the interest in INSPIRE and other issues regarding SDI and spatial data will have to be raised again.

Lantmäteriet has started the Elips program for the restructuring of fundamental geo-data. It intends to develop new comprehensive processes for the creation, maintenance, exchange, storage and dissemination of spatial data. Its goal is to define requirements for storage and exchange of basic land data for the overall land information process. The work of Elips includes the establishment of common concepts and definitions between producers and users; the identification of common information needs, definition of objects and relations between objects; the establishment of system independent models

for information exchange and dissemination; and the definition of a common technical interface, i.e. standardized exchange format based on GML.

The program started with an analysis of the processes and roles and the available IT-support. Currently, LM is moving to the implementation phase and is starting with the migration to Oracle Spatial Database. This will replace the internal proprietary systems and programs. The migration should be finished by the end of 2008.

The implementation of the Swedish Geodata Strategy and the implementation of the INSPIRE directive is embedded in other initiatives, such as the government's Action Plan for e-Governance from January 2008, that aims at increasing e-governance; and the National Framework for Interoperability that has been identified as a priority in the Action Plan (The Swedish Geodatastrategy 2009).

2.3.2 Public-private partnerships

There are private companies (e.g. T-kartor, Liber) who are data producers for certain parts of the NSDI and who are service providers for some forms of spatial information. Thus in Sweden private commercial firms are involved in building the NSDI in different ways. They can be contracted for development works or production works, but also as vendors. Normally, private commercial firms are making "value-added" products out of core data.

Lantmäteriet is supporting the establishment of value added resellers (VAR's) and has agreed with a number of new companies to be VAR's during the last year. In this process it has also been important to clearly define the content and extent of core data. Currently, the system of working with resellers is under discussion as possibly inconsistent with Directive 2003/98 on the re-use of public sector information.

2.3.3 Policy and legislation on access to and re-use of public sector information

Further to the Nordic tradition of open access to government files, the citizen's right of access to government documents is seen as a fundamental aspect of Swedish society. It was first introduced in 1766 by a forerunner to the Freedom of the Press Act (FOI legislation) from 1948 and last amended in 2002. The legislation includes provisions for access to computer files. The Freedom of the Press Act provides for access to documents kept by a public authority (e.g. the parliament, the government, state agencies and municipalities), including electronic documents. All documents drawn up or received by an authority are included. Access to documents is free of charge ("access" means that the citizen has the right to read and look at the document within the office of the agency which always is free of charge). The citizen also has a right to get a copy of the document or an extract from an "electronic document". The fee for the copy shall respond to the cost for producing the copy (marginal-cost). There is no obligation to make available records for electronic data processing in any form other than printouts. Access can be

denied only with reference to a specific clause in legislation demanding secrecy (the Secrecy Act of 1980). In principle, this legislation also covers information held in databases and registers of public authorities. Access to information in data systems and registers are in practice limited to such data that can be extracted and delivered with routine procedures. A selection of information may be requested if retrieval thereof does not require significant effort. For state-agencies the government decides the prices for copies. The purpose of request – commercial interests or not – is not relevant. If information is subject to copyright then whoever has obtained it by citing the Freedom of the press act must respect the rights of the copyrights owner. In general private legal entities controlled by the crown with public tasks are not subject to the access regulations contrary to municipal entities, which are under the access regulations. Government and municipal authorities are currently however organizing their information resources so that they can provide more information electronically. These activities are services directed to the society and the citizen by the agencies and they are formally based on a regulation (Art 4) in the Administrative Procedure Act.

A limited number of larger national databases and public registers are by law authorized to be used for commercial information services (addresses to persons and companies, real estate and land information, vehicle information, etc.). Within the business sector, such information can then be used for value added services. Pricing of the public information is normally based on a cost recovery principle.

Directive 2003/4 on access to environmental information and Directive 2003/98 on the re-use of PSI have been transposed into Swedish law. The Swedish authorities believed that no changes to the legislation were necessary to implement Directive 2003/98. The Swedish Administrative Development Agency (VERVA) which closed on December 2008 was working on a guideline regarding the application of the PSI directive within the Swedish public sector. VERVA's main task was to support cooperation between public authorities and with the private sector, with the main focus on e-government. It had the mandate to issue instructions to administrations and agencies regarding information management. Municipalities are not bound by these instructions, but they can follow them voluntarily. Parts of VERVA business was taken over by the State Treasury, and Administrative Services Agency, the National Courts Administration and the new Skills Council for the Development of the State.

After the European Commission had sent a letter of formal notice to the Swedish government for the incorrect transposition of the PSI directive, a proposal was prepared for a new Act on the re-use of PSI in the course of 2009. A consultation procedure was held in the second half of 2009, and a new Act is expected to enter into force in July 2010 (see http://ec.europa.eu/information_society/policy/psi/infringements/index_en.htm).

2.3.4 Legal protection of GI by intellectual property rights

The Crown claims copyright to geographical information produced by and for Lantmäteriet. The Lantmäteriet administers the copyright on behalf of the Crown. The Crown also uses the database protection *sui generis* as supporting protections means on geographical and on real estate registers information in certain cases. The municipalities,

the biggest producer of maps in Sweden, also claim copyright and sui-generis protection to their maps and databases.

The current Swedish Copyright Act dates from 1960 (Law no. 729 of 30 December 1960, as last amended by Law no. 665 of 6 July 2000).

Article 49 of the Copyright Act provides for the protection of catalogues, tables or similar products that contain a large amount of items of information. Article 49 also details the sui generis protection for databases. The protection lasts for ten years after initial publication. The protection exists in addition to copyright.

In addition to photographs being able to attract copyright (if original), all photographs are protected by an exclusive right of reproduction according to article 49a of the Copyright Act. This right subsists until 50 years after production.

Following article 9 of the Copyright Act, laws and other regulations, decisions by public authorities, reports by Swedish public authorities and translations of the aforementioned documents are not subject to copyright.. The law specifically states that among others maps and drawings that form part of the documents listed in the first paragraph of article 9 are protected by copyright (if, of course, they meet the general criteria set for copyright protection). Although works of public authorities other than those mentioned above may be subject to copyright, there is a general right for everybody to access and get a copy of them in accordance with the regulations in the Freedom of the Press Act (art. 26a). The documents can normally be used freely but there are a number of exceptions. Works that pertain to geographical information: maps, computer programmes, technical models, works which are the result of scientific research and works that are commercially exploited by public authorities may not be freely used (art. 26 § 3).

The 1993 Act on the Protection of Land Information contains provisions that limit the free production and distribution of certain types of GI. The purpose of this legislation is to regulate and control the use and dissemination of GI from national security-reasons. The production of aerial photographs is with the exception of smaller parts of the country free. Building databases with land information, dissemination of aerial photographs, certain maps and land-information in digital form is subject to approval of the authorities for reasons of national security.

Sweden has transposed the 2001 directive on copyright in the information society in May 2005.

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

On 24 October 1998 the Personal Data Act (1998:204) came into force and replaced the out-dated Swedish Data Act from 1973. The Personal Data Act is based on Directive 95/46/EC. Section 33 of the Act was amended in 1999 to implement the EU Directive on the transfer of personal data to a third country. Data protection applies to a large amount of government information, including the SPAR population database, certain types of

statistics, certain types of real property information and geographical information (addresses, real estate unit number), vehicle registries and VAT files.

Sweden has transposed the 2002 directive on privacy and electronic communications into national law.

2.3.6 Licensing framework

The pricing model for fundamental geographic data is based on decisions by Parliament and Government. When it concerns data from Lantmäteriet the framework for pricing and licensing is decided by the board based on the overall model and economic targets being decided by Government.

There is no delivery of data directly from Lantmäteriet, but requests for information have to go through a system of resellers. The government's position is that the real users should pay for the data and that the price level and organization should not hinder the availability of the data. An increasing number of services are also directly available on Lantmäteriet's website. The viewing services are free of charge, but downloading data is charged for.

The Swedish Agency for Public Management was given a mission to try to create a common model for license but they came to the conclusion that it was not possible due to different regulations etc.

Under the 2009 Geodatastrategy, priorities with regard to licensing included the development of agreements and licensing and pricing models for geodata.

2.3.7 Funding of SDI and pricing policy

Lantmäteriet is financed for 20% by government grants and for 80% by fees of different kinds. Its turnover is approximately 170 million €. The fees come from three sources: licenses for using data, orders for property information services, and consultancy services.

The work of ULI is mainly financed by membership fees and by a NLS grant and revenues from conferences and from sale of publications. The member fees vary between type and size of organisation.

With regard to the standardisation work, the framework is financed by different organisations, mainly state authorities, but also some private enterprises. The Swedish Standards Institute (SIS) is co-ordinating this work and sets up the agreements with the contributing organisations. In some cases organisations set up agreements directly with SIS. With regard to the applied standards (e.g. standards on road networks, utility networks, addresses etc.), for each of these standardisation activities, a group of interested bodies are set up and it is up to the participating organisations to finance these specific activities.

For some GI projects Sweden receives financial contributions from the EU.

Rather limited funds have specifically been allocated by the government to establish the NSDI activities. Funds have been raised for fostering standardisation and for development of metadata services. The different governmental authorities have however, spent substantial amounts of money on developing datasets, standardisation, establishment of efficient methods for delivering data etc. According to Wiberg, the annual cost for managing the NSDI is around 30 million EURO.

Sweden has a long tradition of value-added publishing among government agencies, many of them being dependent on extra income. The exploitation is decided case by case and is a non-profit activity. No government agency is allowed to sell information from databases or registers unless specifically allowed to do so by government or parliament. Only a limited number of agencies have such permission which is given on a case-by-case basis.

The possibility exists that a state agency, if they do have the formal grounds for it, acts on the market in competition with other market actors. Lantmäteriet has such a division, called Metria.

Pricing

The framework for public fees is found in several laws. For the government and the state agencies the central regulation is found in the Instrument of Government (constitutional law), which is a part of the Constitution and in the Ordinance on Fees. For the municipalities, the Municipality law regulates the rights to decide fees.

In general two types of fees can be determined. Fees for a service which the citizen is forced to use are similar to a tax. The power to decide such a fee is constitutionally given to the parliament and the municipal council. The power can be transferred to the government or even to a state agency. The fee shall only cover the cost for the service. Another type is the fee for services which the citizen is free to use. The power to decide on such fees within the state administration is placed on the government, which can transfer this power to an agency. Such a fee should only cover the costs for the service. If a fee should allow a profit, the parliament should decide this.

Lantmäteriet and the Environmental Protection Agency are ruled under traditional conditions for agencies. That means among others, that the pricing of the agency services and products shall give no profit and only mirrors the costs. The general principle is that a state agency is not allowed to decide prices for its product/services unless the parliament or the government has decided that it can do so.

The government has given *Lantmäteriet* the right to set fees for services from the real property register and set principles for license fees for use of GI. Such a fee shall cover the cost for producing the document, the costs of dissemination plus a contribution for support and maintenance of the system used, which thus constitutes a modified marginal cost principle. The pricing involved is intended to generate no profit, but some users are thought to see it as expensive. Before the new budget year the government prescribes in a

special decision after the budget has passed the parliament, what, how, etc, the agency shall fulfil their objectives. In the decision, the government gives instructions and power to the agency for decisions on the fees. Since 1995 Lantmäteriet shall calculate its fees on information from the Real Property Register and for geographical information with the modified marginal cost principle described above. The fee for products, which contain the said data, shall cover the cost for dissemination but also a contribution from the user, which shall be used for maintenance and support of the technical milieu in which the information is processed and distributed from. The principles for pricing rests on a statement made by the Parliament. Following those principles government decides for each year to what extent the users of the basic geographic and land information shall contribute to the costs for maintaining the databases. In 1998 the users' maximum-contribution was 100 million SEK, which is approximately 20 percent of the annual costs for the production and maintenance of the basic datasets. The users also have to pay for the actual costs for delivering the information.

The Geodata project contains work on financing and pricing models for geodata, with a priority for models for the data handled via the Geoportal. An important task is to harmonise the different licensing and charging principles (Costs should be kept as low as possible and should reflect the principles of the legislation implementing INSPIRE (Swedish Geodatastrategy 2009).

2.3.8 Conclusions of Component 2

Although at the time of the survey, only a draft legislation was in place to transpose INSPIRE, there is an overall strategic and implementation plan available. A national Geodata portal and the technical framework supporting the portal, and in particular a business model for data sharing (under referral) has been developed. The Crown claims copyright to geographical information produced by and for Lantmäteriet. Sweden has transposed the 2002 directive on privacy and electronic communications into national law. The principles for pricing rests on a statement made by the Parliament. Following those principles government decides for each year to what extent the users of the basic geographic and land information shall contribute to the costs for maintaining the databases. The Swedish government is investing 50 Mkr/year (~ 4,65 M€/year) for the coming three years on the implementation of INSPIRE.

Based on these conclusions we score the indicators as follows:

- There is a legal instrument or framework determining the SDI-strategy or – development

- There are true PPP's or other co-financing mechanisms between public and private sector bodies with respect to the development and operation of the SDI-related projects

- There is a freedom of information (FOI) act which contains specific FOI legislation for the GI-sector (No Information found)

- GI can specifically be protected by copyright

- Privacy laws are actively being taken into account by the holders of GI

- There is a framework or policy for sharing GI between public institutions

- There are simplified and standardised licences for personal use (In Preparation)

- The long-term financial security of the SDI-initiative is secured

- There is a pricing framework for trading, using and/or commercialising GI (In Preparation)

2.4 Component 3: Data for themes of the INSPIRE annexes

2.4.1 Scale and resolution: European, National, Regional, Local, Other

The data in the NSDI includes what is termed core reference and thematic data. Digital data at the national level is in most cases provided at the scale of 1:10.000 and stored in the national land-use and topographic database. Generalised and larger scale data products are available.

2.4.2 Data by resolution or scale range for the INSPIRE themes

The Geographical Sweden Data (GSD) offers access to maps in different scales. The following is an overview of some of the product descriptions available on-line. Visitors view the description information (presented in PDF format) and can order the product (either vector or raster maps) from the specified contact person. (http://www.lantmateriet.se/templates/LMV_Entrance.aspx?id=73)

Scale	Description
1:10 000	The Property Map series (Fastighetskartan)
	The main elements are:
	- Orthophoto
	- Boundaries, including property boundaries
	- Names and register numbers of property units
	- Place names
	- Line enhanced planimetric details
	- Arable land
	- Contours with a 5-m interval
	- The national grid

1:50 000	Topographic Map (Topografiska kartan) The Topeographic map series give detailed information about land use (forest clear-cuts, boulder-stewn areas and rock outcrops, etc) and about all kinds of roads and foot-paths.
1:100 000	Road Map (Vägkartan) The Road map is based on the Topographic Map series and is designed to be used as a detailed and up-to-date road map.
1:50 000 and 1:100 000	The Mountain Area Map (Fjällkartan) The maps have been adapted to cater for mountain hikers with more detailed information about trails, shelters, etc.
1:250 000	General map + general description; General road networks; General administrative boundaries
Other	Maps of Sweden; 1:1 000 000 Generalised versions of Sweden including administrative boundaries 1:5 – 1:20 mil. Terrain Elevation database + general description Contours at 5m, 10m, and 25m vertical intervals Digital orthophotos Land Cover Data (Corine Land Cover + Swedish more detailed land cover database) The National Road Database (which is established in close co-operation between the Swedish Road Administration – as co-ordinator – Lantmäteriet, the municipalities and the forestry companies.

Numerous other datasets exist, specifically the ones which are held by various government agencies who maintain data for environmental, agricultural, geological, transportation, statistical, etc. purposes.

The principle sources of reference data in the Swedish NSDI (NLS) are elaborated as: (Wiberg, ETeMII):

- The **geodetic reference system** (ETRS89 adjustment) is well established and used. Permanent GPS beacons provided differential GPS service. The system is adjusted to the common European and Global Reference System;

- **Administration units** are well established in the Real Property Register and in the system with basic geographic information. From here it is possible to generate most kinds of administrative units out of the system;

- **Property rights units** provide the strongest part in the NSDI when taken together with the Real Property Register and the Cadastral Index Map;

- **Addresses** (held by the post office and municipalities) are handled in a way that all known requirements of the NSDI can be satisfied;

- Selected **topographic themes** include elevation models established for the entire country, transportation networks which are well established with the Swedish National Road Database (SNRD); Hydrography is established in the system for basic geographic information, and is planned for further expansion and elaboration of the data set; Orthoimagery is well established and the Orthophotos cover the whole country (being updated each year for 25% of the Country surface area).

The LDBS is comprised of the Real Property Register together with the Land Register. On its own, the LDBS is "text only" information but in combination with the cadastral index map the database becomes geographically referenced.

The current version of the Real Property Register was introduced to Sweden in 2000 gives the following detailed information (Wiberg, 2002):

1. Real Property:

   - Property unit[3]

   - Joint property unit

   - Coordinates

   - Plans, regulations and rights

   - Precincts

   - Joint facility

   - Cadastral index map

2. Land Register:

   - Title

   - Leasehold

   - Mortgage

   - Rights

   - Notifications

3. Building:

   - Building unit

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[3] Each **property unit** in Sweden is described with the following information: Administrative area where the property unit is located; Address; Location on the cadastral index map; Centroid coordinates from the property unit and the buildings on it; Area of the real property unit, and tax assessment values; Name, address and civic registration number of the owner; Date for purchase, changes and price information; Building plans and regulations affecting the unit. (ETeMII, also Wiberg).

- Address

- Coordinate

4. Address:

   - Address unit

   - Property unit

5. Property Tax Assessment:

   - Total assessed value

   - Assessed value for land

   - Assessed value for buildings

   - Basis for valuation

   - Owner

Regarding the three INSPIRE annexes addressing the 34 spatial data themes, Sweden is providing discovery and view services for most of them while a number of them can be also downloaded. Metadata are available for some of the data themes. Lantmäteriet, SGU, SMHI, SEPA are among the main providers. A complete list will be presented in the updated report including the information provided by the country in 2010.

2.4.3 Geodetic reference systems and projections

SWEREF 99 is a Swedish realization of ETRS 89. SWEREF 99 coincides with WGS 84[G873]. Coordinates can be transformed from SWEREF 99 to the Swedish coordinate system RT90 (and vice versa) via a seven parameter transformation formula: http://www.lantmateriet.se/templates/LMV_Koordinattransformation.aspx?id=1149 .

Lantmäteriet includes RT 90 and SWEREF 99 as well as geoid to get more accurate information on elevation for surveying purposes.

The ellipsoid used with SWEREF 99 is GRS 80.

The national map coordinate system is RT90. It is a local geodetic datum. The Swedish national map series are based on a Transverse Mercator (Gauss-Kruger) grid of this datum, and is denoted: RT 90 2.5 gon V 0:-15

Older maps are based on RT 38 which differs from RT 90 with 0-5 metres.

The ellipsoid used with RT 90 is Bessel 1841.

The processing of GPS data is performed according to EUREF guidelines and based on observations made on permanent reference stations in Sweden (SWEPOS), Denmark, Finland (FinRef), and Norway (SATREF).

The national height system in Sweden is RH 70, the National Height System 1970. The system is connected to the NAP (National Amsterdam Peil) via UELN 55 (United European Levelling Network 1955).

Projection zones: for larger scale maps >1:10 000, there are 6 different zones of Transvers Mercator projections used in Sweden. Six are used to reduce the map projection errors. The boundaries of the projection zones are adjusted to follow administrative borders if possible.

The SWEN 01L is the national geoid model provided by the NLS and replaces the previous SWEN98L model. SWEN01L is based on a Nordic geoid model called NKG 96, which is in turn based on the global geoid model EGM98.

A homogeneous reference system facilitates the production, processing and use of geodata; it also makes compilation of data from different sources easier. For these reasons, a rapid transition to the national geodetic reference system, SWEREF 99 and the height system, RH 2000 should take place, which are well adapted to corresponding European systems (Rannestig and Sandgren, 2009). At the end of 2009/10, 167 municipalities were shifted to SWEREF 99 and 29 municipalities to RH 2000. Ten authorities have implemented transition to SWEREF 1999 and four agencies have implemented transition to RH 2000 (Geodata Strategy 2010).

2.4.4 Quality of the data

It is recognized that the most essential objective for the NSDI is to deliver information that can fulfil the demands from users in the whole society. An evaluation of SDI users and their use of the information is carried out in an annual survey. The results of the survey are used as the base for programs and for improving activities.

During the last years, much effort has been spent on establishing efficient routines for updating (NLS) information directly from the source. Examples include (1) the National Road Administration, delivering information on new or changed public roads, (2) the municipalities delivering information on local streets and (3) the National Environmental Protection Boards, delivering information on national parks.

The Geodata Advisory Board and the Swedish Standards Institute's (SIS) signed a letter of intent concerning standardisation within the framework of a Swedish geodata strategy. Within the framework of the co-operation an action plan has been formulated. Future Position X (FPX), the University of Gävle and Lantmäteriet have, together, established a test environment. Within the framework of this work, quality assured methods have been developed for testing specification, datasets and services (Wasström, 2009).

A research paper (Östman et al., 2009) has been published addressing a number of questions such as to what extent NLS's data can be mapped to the INSPIRE schema. Thirteen INSPIRE schemas have been investigated during schema matching and mapping, and when doing the real transformation it was found that data for ten schemas might be delivered according to the implementation rules. Also the result from metadata survey answered to the question of the availability and characteristics of the dataset-level metadata as specified by INSPIRE. It was also found that for each theme, feature types specified by INSPIRE is either:
a) covered by the NLS database (transformable),
b) covered by the NLS database (but it need special transformation rules (problematic transformation) and
c) not covered by the NLS database

During transformation from Shape format to GML, the file size has been increased and the data types have been converted to text format to conform to XML encoding. However, consistency checking has shown that the actual values of the data kept without change. Current XML editors are limited in their capabilities to handle normal size GML file and perform simple operation on such file. More efforts in the future should be dedicated to address these problems.

2.4.5 Interoperability

The NSDI is based on cooperation between the different bodies and a commitment to use standards (see section 2.6) particularly in Sweden where the Municipalities are strong and have an independent status, voluntary cooperation is essential (Wiberg, 2002).

2.4.6 Language and culture

Metadata is provided in Swedish and in some cases, but not all, English. Accompanying documents for the data and maps are provided. Several of the existing standards, e.g. on road and railway network and hydrology, as well as existing database specifications are today also available in English.

2.4.7 Data Content

No information has been found.

2.4.8 Geographical names

The GSD PlaceNames dataset has approximately 450.000 place names. It remains to be determined the number of languages that the names are provided in.

2.4.9 Conclusions of Component 3

Already from the previous SE's SoP report Geodatasets existed which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components while the geodetic reference system and projection systems are standardised, documented and interconvertable. Although data quality is considered important n documented data quality control procedure was found. On the other hand, interoperability is highly established. The INSPIRE 2010 MR confirms the statement. 173 data sets have been reported. 33, 24 and 116 data sets under the three respective annexes while all themes are covered. The main language used is Swedish while English translation is extensively used.

Based on these conclusions we score the indicators as follows:

- Geodatasets exist which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components

- The geodetic reference system and projection systems are standardised, documented and interconvertable

- There is a documented data quality control procedure applied at the level of the SDI (Partially)

- Concern for interoperability goes beyond conversion between different data formats

- The national language is the operational language of the SDI

- English is used as secondary language

2.5 Component 4: Metadata

2.5.1 Availability

In the Swedish SDI, metadata exist but they are not all structured according to standards yet. However, LM is working on standardization. The Elips program aims at standardizing descriptions, and a working group on metadata was installed by the GI Advisory Board in the process towards the first version of the National GI strategy. So far, the working group has looked at discovery level metadata only, at the level of datasets. The object level will be addressed later on. The implementation of metadata standards will begin at the internal level of LM. Afterwards, the national level will be shaped accordingly. The Elips program progress in stages over several years. In 2009 it included work on the details of buildings, addresses and apartments. Real estate information, registration details and place names will follow (http://www.lantmateriet.se/templates/LMV_Page.aspx?id=14545). The actual focus of the Elips program is to provide IT support for storage of basic data and information as needed by the future information management process in Sweden.

The focus lies on ISO 19115. The working group has selected 22 elements to use as core metadata and will add a limited number of other elements. A Swedish translation of the ISO standards is being made by technical committee 489 of the Swedish Standards Institute. The committee has members of LM, the Road Administration, the Association of Municipalities, the Geological Survey, the Housing Board, private companies and the municipality of Stockholm. The intention is to produce Swedish translations for all 400 elements, which can be used by all authorities.

Moreover, a national geo-portal (www.geodata.se) has been set up (1st version) as an entry point for data and services that will serve both INSPIRE and have a broader NSDI perspective.

Geodata.se contains metadata that makes it possible to search, locate, view and download geodata from different sources that are physically stored in different environments. Geodata.se is also the main node for the Swedish cooperation in Europe in accordance with the INSPIRE directive.

Geodata.se can be used to:

- find geodata sources

- view details of found data sources and information on how to gain access to them

- directly view the data and map resources you have found

create, upload and administer metadata for geodata and services produced by its organisation.

2.5.2 Metadata catalogues availability + standard

All authorities are responsible for information on geo-information within INSPIRE Directive imposes obligations to provide metadata and that make this information available through various online services. With the creation of the national geodata portal (www.geodata.se) metadata published by a number of producers have become available.

In connection with the development of the Geodata Portal a proposal for a Swedish profile for the metadata standard, SS-ISO 19115, has been prepared. In simplistic terms, a profile is a customised standard that has a special aim. The profile describes the metadata elements that should be included (mandatory as well as a number of voluntary) in the Swedish Geodata Portal and how these metadata should be described. The profile is based on the requirements that are given in the INSPIRE directive and the draft set of implementation rules. In addition, a number of metadata elements, which are considered to be important for Swedish purposes, have been added. During 2008 the Geodata Project has developed an application which makes it possible for respective authorities to create metadata. With the tools — a Swedish profile for metadata, guidelines and an application for creating metadata — it will be possible to build a national metadata catalogue.
To facilitate the implementation of the ISO metadata standard, SIS/ Stanli has translated the English concepts and definitions to Swedish. The results have been published in a technical report (TR 14, *Metadata på svenska*) (Geodata Strategy 2009).

Stanlis vision is that there should be standards that cover all major types of geodata used in Sweden.

Sweden participates through Stanli in the development of ISO 19 100 series standards. SIS is the Swedish representative in the international work of ISO / TC 211 Geographic Information / Geomatics and contribute through Stanli to work with ISO 19 100 series. Detail information on standards of metadata is available in Swedish at: http://www.geodata.se/sv/Infrastruktur-for-geodata/Standarder/

There are different metadata catalogues available on-line either directly on the NLS pages or on the web sites of key players (e.g. http://www.lantmateriet.se/cms/level2index.asp?produktgrupp=104A)

The Nordic countries are cooperating on the development of technical infrastructure. An important part of the collaboration is closest to the joint development of a metadata catalogue and the use of open source. The goal of collaboration is to share knowledge and solutions and to achieve more than cost-effective solutions in the main portal of the work.

Lantmäteriet also take part in the establishment of EuroMapFinder – a service being set up by EuroGeographics.

A service called 'GeoLex' exists (works with internet explorer not firefox) for metadata for Swedish reference data (http://www.geolex.lm.se available only in Swedish).

2.5.3 Dublin core metadata standards for GI-discovery

2.5.4 Metadata implementation

FIR

2.5.5 Conclusions of Component 4

Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes. The 2010 MR reveals that for the reported datasets of INSPIRE (94%, 75% and 68% of the data sets have metadata for the Annexes I, II and III respectively). All authorities are responsible for information on geo-information within INSPIRE Directive imposes obligations to provide metadata and that make this information available through various online services. With the creation of the national geodata portal (www.geodata.se) metadata published by a number of producers have become available.

Based on these conclusions we score the indicators as follows:

- Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes

- One or more standardised metadata catalogues are available covering more than one data producing agency

- There is a coordinating authority for metadata implementation at the level of the SDI (Not so clear)

2.6 Component 5: Network Services

2.6.1 On-line access service for metadata: discovery services

A national geo-portal (www.geodata.se) has been set up (1ˢᵗ version) as an entry point for data and services that will serve both INSPIRE and have a broader NSDI perspective. Services and data will successively be made available via the portal. In stages, the portal will be accessible for a larger circle of users. The portal includes WMS services and metadata published by a number of producers.

Currently data and services from at least 16 public authorities are published (135 discovered, 35 download and 46 viewed). The metadata production (according to IR) and access to several services (based on data sharing agreement) is currently ongoing and data and services are constantly produced for the portal.

The available services include services from the Lantmäteriet, the Swedish road administration, Swedish Meteorological and Hydrological Institute, the Geological Survey of Sweden, the National Heritage Board, etc.

Currently the geoportal is only in Swedish and requires a registration that is authorized manually from geodata.se. To facilitate the development of metadata has developed a tool to create and publish metadata to the portal.

All of the technical solution is based on a distributed approach, i.e. geodata and services accessible through the portal are stored in each of the producer. In the portal, users see the geo-information and services available and the opportunity to evaluate the geo-information and services. It allows in a easy and comprehensive way to reach many organizations and geodata services. Geodata Strategy 2010.

There are also discovery services for reference data (e.g. MapSearch and Geogrpahical Data Sweden) on the Lantmäteriet website.

A comprehensive service for on-line access to metadata on data on the national and local level is part of the National GI strategy (Rannestig and Sandgren, 2009).

The realization of a national Geodata portal and the technical framework supporting the portal, in particular the development of a business model for data sharing, is in place. However, a number of issues (security and secrecy) are still in process along with the adaptation of the retailer model based on the possibilities that are opened through the provision of data via a national node without having a negative impact on functioning solutions that are already available.
The public sector authorities and organizations are responsible for producing metadata and services. These bodies are also responsible for adapting services (alternatively making transformation possible), datasets and for adapting the technical architecture to satisfy the requirements of the INSPIRE-directive.

The Swedish Transport Administration is a new administration that is charged with the task of developing an effective and sustainable transport system including all modes of transport. The services that used to be found at www.banverket.se, www.banportalen.se and www.vv.se are now available at www.trafikverket.se. A number of available services are presented on the following table.

Services						
Service[4]		Organisation responsible	Type of service[5]	Metadata (N/Y/ISO)[6]	Open for Public (Y/N)	Free/Not free[7] (Y/N)
Navigation warnings http://www.sjofartsverket.se/sv/Infrastruktur-amp-Sjotrafik/Sjogeografisk-information/Ufs---Underrattelser-for-sjofarande-/		Swedish Maritime administration	2	N	Y	Y
Ancient monuments http://www.raa.se/cms/fornsok/start.html		National Heritage Board	1	Y	Y	Y
Buildings http://www.bebyggelseregistret.raa.se/cocoon/bbr/welcome.html		National Heritage Board	1	Y	Y	Y
Culture environment http://www.kms.raa.se/kmb		National Heritage Board	1	Y	Y	Y/N
Protected nature www.naturvardsverket.se/sv/Arbete-med-naturvard/Skydd-och-skotsel-av-vardefull-natur/Skyddad-natur/		The Swedish Environmental Protection Agency	2,3	N	Y	Y
Natura 2000 http://w3.vic-metria.nu/n2k/jsp/main.jsp		The Swedish Environmental Protection Agency	1,2,3			

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[4] List the names/IDs and where possible the link (URL) of all the discover, view, download, transformation and invoking services that are part of your infrastructure
[5] Indicate the type (discover, view, download, transformation and invoking services)
[6] Indicate whether the service has no metadata (N), or metadata according to ISO 19119 (ISO).
[7] Whether or not the service is free for use.

Bedrock http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_berggrunden	The Geological Survey of Sweden	2	N	Y	Y
Biochemistry, copper http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_biogeokemi_cu	The Geological Survey of Sweden	2	N	Y	Y
Well archive http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_bark	The Geological Survey of Sweden	2	N	Y	Y
Groundwater (map) http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_grundvatten	The Geological Survey of Sweden	2	N	Y	Y
Groundwater (network) http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_grvnstn	The Geological Survey of Sweden	2	N	Y	Y
Quaternary deposits http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_kark	The Geological Survey of Sweden	2	N	Y	Y
Age determination http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_alder	The Geological Survey of Sweden	2	N	Y	Y
Gravel and moraine http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_grusarkiv	The Geological Survey of Sweden	2	N	Y	Y

Type of soil http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_jordarterna	The Geological Survey of Sweden	2	N	Y	Y
Ground geochemistry, copper http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_markgeokemi_cu	The Geological Survey of Sweden	2	N	Y	Y
Environment monitoring (groundwater) http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_miljoovervakning_gv	The Geological Survey of Sweden	2,3,6	Y	Y	Y
Environment monitoring (sediment) http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_sediment	The Geological Survey of Sweden	1,2,3	Y	Y	Y
Chemical spillagehttp://naturvardsverket.se/en/In-English/Menu/	The Swedish Environmental Protection Agency	No information	No information	Y	Y
Swedish portal for environment reporting https://smp2.naturvardsverket.se/	The Swedish Environmental Protection Agency	1,6	No information		Y
Shore erosion http://www.swedgeo.se/Default.aspx?epslanguage=EN	Swedish Geotechnical Institute	1,3	N	Y	Y
Forest information http://www.svo.se/minskog/templates/svo_se_vanlig.asp?id=10440	Swedish Forest Agency	1,2,3	Y	Y	Y
Forest information http://www.svo.se/episerver4/templates/skogensparlor.aspx	Swedish Forest Agency	1,2	Y	Y	Y

Beast of pray http://www.naturvardsverket.se/sv/Arbete-med-naturvard/De-stora-rovdjuren/Rovdjursforum/	The Swedish Environmental Protection Agency	1,2	No information	N	Y
Ballast and minerals for industry http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_taktprod	The Geological Survey of Sweden	2	N	Y	Y
Ore http://www.sgu.se/sgu/eng/produkter-tjanster/tjanster/index.html	The Geological Survey of Sweden	2,3	N	Y	Y
Minerals and rocks http://maps.sgu.se/wmsconnector/com.esri.wms.Esrimap/wms_mineralresurser	The Geological Survey of Sweden	2	N	Y	Y
Metadata about prospective areas http://maps.sgu.se/sguinternetmaps/markgeofysik/viewer.htm	The Geological Survey of Sweden	2	N	Y	Y
The Environmental Objectives Portal http://www.miljomal.nu/Environmental-Objectives-Portal/	The Swedish Environmental Protection Agency				
Sample of fishing in lakes (NORS) www.fiskeriverket.se	Swedish Board of Fisheries				
Sample of fishing in watercourses (SERS) www.fiskeriverket.se	Swedish Board of Fisheries	1,3	Y	Y	Y
Culverts www.fiskeriverket.se	Swedish Board of Fisheries	1,3	Y	Y	Y
National crayfish database www.fiskeriverket.se	Swedish Board	1,3	ISO (partly)	N	Y

	of Fisheries				
Satellite based monitoring of ships www.fiskeriverket.se	Swedish Board of Fisheries			N	Y
Fishery statistics www.fiskeriverket.se	Swedish Board of Fisheries	3 (reports)		Y	Y
Tuft www.sjv.se/tuva	Swedish Board of Agriculture	1,2,3	N	Y	Y
Multi cube www.sjv.se/tuva	Swedish Board of Agriculture	1,2,3	N	N	Y
SAM internet http://www.jordbruksverket.se/	Swedish Board of Agriculture	2,4	N	N	Y
Digital geodetic archive www.lantmateriet.se	Lantmäteriet	1,3,5,6	Y	Y	Y
Map search and place names www.lantmateriet.se	Lantmäteriet	1,2	Y	Y	Y
Coordinate transformation www.lantmateriet.se	Lantmäteriet	4	Y	Y	Y
Map sheets www.lantmateriet.se	Lantmäteriet	4	Y	Y	Y
GeoLex (metadata application) http://www.geolex.lm.se	Lantmäteriet	1,2	Y	Y	Y
Question to a surveyor www.lantmateriet.se	Lantmäteriet	1,2	Y	Y	Y
Real estate barometer www.lantmateriet.se	Lantmäteriet			Y	
Historical maps www.lantmateriet.se	Lantmäteriet	1,2,3	Y	Y	Y/N
Application of property formation www.lantmateriet.se	Lantmäteriet	1,2	Y	Y	Y
RTK http://swepos.lmv.lm.se/	Lantmäteriet	Real time	Y		N
My property www.lantmateriet.se	Lantmäteriet	1,2		Y	Y
Web-GIS www.gis.lst.se	County Administrative Board	1,2,(3),6	Y (partly)	Y (partly)	Y
WMS WebMapServicehttp://www.gis.lst.se/lstgis/wms.asp	County Administrative	5			Y

	Board				
Ground stabilisation http://www.msb.se/	Swedish rescue service agency		N	Y	
IDA indicators http://ida.msb.se/port61/main/	Swedish rescue service agency	1,3,6	N	Y	Y
Major accidents http://www.msb.se/en/?ResetTargetNavigation=true	Swedish rescue service agency	1,3	Y	Y	Y
Accidences (nature) http://www.msb.se/naturolyckor	Swedish rescue service agency	1,2,3	N	Y	Y
Risk of fire http://brandrisk.smhi.se/	Swedish rescue service agency	1,2	N	N	Y (N for public)
National registration (NAVET)	Swedish Tax Administration	1,2,3	?	N	N
eDeclaration	Swedish Tax Administration	1,2	Y	Y	Y
Taxation unit	Swedish Tax Administration	1,2,3,5	Y	N	?

2.6.2 On-line access service for data: download services

Statistics Sweden is also contributing to the collection of Internet databases freely available for users. The Internet databases have statistical data on the country, county and commune levels. The data can be used in conjunction with the Internet map server "SCB Maps". (SCB, 2000)

Internet is not the only way that data is disseminated, as access and geoprocessing services for reference and thematic data come mainly through CDROM rather than the Internet.

2.6.3 Inter-linkages of on-line access services for metadata and data

No information has been found.

2.6.4 Open Source software

No information has been found.

2.6.5 Availability of viewing services

Web mapping services are commonly available on many web pages in Sweden. An example is the geolex website: http://www.geolex.lm.se/.

2.6.6 Availability of catalogue services that perform payment operations

The services allow the user to order on-line maps. In most cases billing will follow with the map delivery – either via the Internet (e-mail) or in the normal post.

2.6.7 Availability of catalogue services to extract and send data to a user application

No information has been found.

2.6.8 SDI user applications

Customised databases and maps offer a range of products and services via the Lantmateriet ecommerce area (http://www.lantmateriet.se/epidefault.aspx?id=55).

The E-Services include:

Application of property case: In this service users can ask and apply for a real estate action (e.g. land registration, mortgage, etc).

Real Estate Barometer: The Real Estate Barometer shows price changes for one- and two-family dwellings and weekend cottages.

Property Information: where users can have access to property information based on a single address.

Ask the surveyor: where users can ask land surveyors about property issues and request property forms.

Historical Maps: The collection comprises more than a million maps from all parts of Sweden.

Maps, aerial and satellite imagery: In the online shop 'DinKarta' users can view or buy digital (online or in a cd) or printed map from Lantmäteriet's general maps or the National Maritime Administration's nautical charts. Lantmäteriet also offers the same possibility with aerial photos and satellite images.

Map search and Place Names: The service makes it possible to search and view more than 950 000 place-names in Sweden. The place-names in this register will gradually increase in time with the digital mapping of Sweden.

My property: this Service provides free access to detailed information on someone's property and leasing.

Search the diary: Users can search for files and reports in Lantmäteriet's diary recorded from October 2005 onwards. There is also an option to acquire older files.

(http://www.lantmateriet.se/epidefault.aspx?id=55&lang=SV)

2.6.9 Availability of geo-processing services

Geo processing services are well supported at the National level, but are not part of the SDI infrastructure yet.

2.6.10   Conclusions of Component 5

A national geo-portal (www.geodata.se) has been set up as an entry point for data and services that will serve both INSPIRE and have a broader NSDI perspective. Services and data will successively be made available via the portal. The portal includes WMS services and metadata published by a number of producers. Currently data and services from at least 16 public authorities are published (135 discovered, 35 download and 46 viewed). The MR states that 1 discovery, 32 view and 8 download services exist. Furthermore, geo processing services are well supported at the National level, but are not part of the SDI infrastructure yet.

Based on these conclusions we score the indicators as follows:

- There are one or more discovery services making it possible to search for data and services through metadata

- There are one or more view services available for to visualise data from the themes of the INSPIRE annexes

- There are one ore more on-line download services enabling (parts of) copies of datasets

- There are one or more transformation services enabling spatial datasets to be transformed to achieve interoperability (Not so clear)

- There are middleware services allowing data services to be invoked (Not so clear)

2.7 Component 6: Thematic environmental data

2.7.1 Introduction

The Swedish Environmental Protection Agency (SEPA) is one of the authorities responsible for environmental data at national level. At regional level the County Administrative Boards are important SDI drivers.

The Swedish Environmental Protection Agency is a central environmental authority under the Swedish Government. SEPA tasks, according to the instructions laid down by the Government, are to coordinate and drive forward environmental work nationally and internationally.

The Agency's most important tasks are to:

• propose targets, measures and control instruments for environmental policy and environmental protection activities. (Development of environmental work)

• carry out environmental policy decisions on government grants, application of law etc. (Implementation of environmental policy)

• follow up and assess the environmental situation and environmental efforts. (Follow-up and assessment)

Moreover, SEPA is an user organisation in relation to the INSPIRE issues. Experts from the Swedish EPA participate in about a hundred different EU-groups, preparing new environmental policies and legislation as well as analysing the implementation of decisions. The work covers a variety of subject areas, for example, air, water, waste and nature conservation.

To make environmental data more accessible, SEPA has delegated to data custodians the responsibility for storage and distribution of quality-assured environmental monitoring data (basic data). The purchaser (Swedish EPA and county administrations) is guaranteed the copyright for the basic data that is generated by environmental monitoring activities. This is specified in the agreements. A data custodian receives and stores data for different environmental thematic areas (water, air quality etc.) and makes available the results. The data custodians carry out certain feasibility studies and validation. They are also responsible for the distribution of basic data in accordance with an agreed plan. Through repeated, routine compilations of data from different environmental monitoring programs, poor comparability and regional distortion can be quickly corrected. In the future the data custodian agreements will also include the requirement of using metadata standard.

The Swedish Parliament has established 16 environmental quality objectives, such as "Clean air" and "Good-quality groundwater", to guide Sweden towards a sustainable society. The 15 environmental objectives will function as benchmarks for all environment-related development in Sweden, regardless of where it is implemented and by whom. The overriding aim is to solve all the major environmental problems within one generation.

http://www.internat.naturvardsverket.se/

Below you find a description of the organizational structure chosen by SEPA for handling environmental data.

[NLS] SEPA has chosen a model with data custodians responsible for storing environmental data with regard to pressure and state. Most data is not in GIS-format but information about geographical position is available. There is an ongoing development work in making this data and information accessible through GIS applications. The fundamental strategy is that data should be stored close to where it was generated (i.e. close to the producer). Different quality parameters, for example knowledge of how the values have been calculated and what they stand for is available here.

The data custodians are responsible for storage and distribution of quality-assured environmental monitoring data (basic data). A data custodian is to receive and keep data from a specific subject area accessible. The data custodian is also responsible for certain feasibility studies and quality-assurance checks and be responsible for the distribution of basic data in accordance with an agreed plan.

Lantmäteriet will at the request of the SEPA help the Agency to build a stable infrastructure for geographic information (the structure of geographic data at servers, applications to facilitate availability to geographic data and the connection between attribute data and the geographic map layers). Main focus in this project is the process of nature conservation (including Natura 2000) together with the County Administrative Boards. The information will also be available to citizens on the Internet.

At regional level the county administrative boards have made efforts to establish a SDI built on a common network (an intranet called lst-Net). The aim of the GIS service (lst-GIS) in this network is to make access to common databases and also make data and information available to the public on Internet. The Swedish County Administrations GIS-portal (www.gis.lst.se [8]) is maintained by the County Administration West Sweden. It contains:

- Various ESRI ArcIMS-based public (and in some instances password-protected[9]) national and regional **GeoServices.** These are developed, hosted and maintained by the IT-section at County Administration West Sweden on assignment from **21 County Administration** and some other national agencies.

- **Catalogue service - data upload/download, search, metadata display and map preview interface**. Contain some 2500 GIS-related datasets produced by the Swedish County Administrations and uploaded as shape-files metadata inclusive. These datasets are continuously merged to national datasets. Most of these datasets are related to environmental issues and are legislative/protected areas http://www.gis.lst.se/lstgis/.

- Links to a number **ArcIMS MapServices / OGC WMS** (http://gis.lst.se/lstgis/wms.asp)

These datasets are not harmonised according to INSPIRE, but:

- Have the same file-name for each 21 county administration

- Use the same set of attribute fields as specified by the 'standard' from The National Board of Housing, Building and Planning as well as internal County Administration workgroups. Implementation of automatic upload of ArcCatalog (or other) XML-files using ISO 19115 (or similar) is in process.

ArcSDE is used in the GeoServices to store nationwide background data from the National Land Survey (topographic maps 1:1 million down to 1:10.000), Swedish Maritime Administration (sea-charts) and other base data providers.
One can distinguish three variants of SWEREF projections:
　　SWEREF 99 lat long (~ WGS 84).
　　SWEREF 99 TM (Transverse Mercator)
　　SWEREF 99 dd mm projections of the 12 zones designed for large-scale applications at the local level.
The county administrative boards publish WMS in all these SRS / epsg. (SWEREF99TM since Sept 2008, and SWEREF99TM, SWEREF99 dd mm since May 2009).

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[8] Currently only in Swedish

[9] Due to that certain data, such as cadastre and demography, has restrictions set by the data providing agency.

The Swedish Meteorological Hydrological Institute (SMHI) is a government agency under the Ministry of Sustainable Development. SMHI offers products and services that provide various kinds of enterprises and organisations with an important foundation for decision-making. General forecasts and weather warnings, industry-specific services, simulations and analyses, statistics, climate studies and contracted research are some examples of SMHIs range of services (e.g. Agriculture, Aviation, Energy, Real Estate). Furthermore, it participates in a number of marine environmental projects such as the:

SeaDataNet (a co-operation between the European oceanographic data centres, http://www.seadatanet.org/)

BALTEX (The Baltic Sea Experiment, http://www.baltex-research.eu/)

The Swedish IPY Data Centre gives information and makes Swedish data available from the interdisciplinary science within the International Polar Year, IPY (http://ipy.smhi.se/)

SEPRISE (Sustained, Efficient Production of Required information Services) http://www.seprise.eu.

OceanWeb is a tool developed at SMHI for visualising model data (forecasts primarily) and to a certain degree observational data, http://produkter.smhi.se/OceanWeb/.

2.7.2 Application of the legal framework and funding principles to thematic environmental data

[NLS] SEPA and the county administrative boards are the copyright owners for the basic data, with regard to pressure and state, produced by the data custodians. When it comes to charging, these data are free for everyone at marginal costs. Data can be ordered by anyone from the data custodians.

Information about threatened species (nesting areas) can be classified as confidential. In cooperation with the Statistics Sweden, especially in regard to presentation of sources for discharges to and pollution load on waters, it is important to be aware of their special rules concerning secrecy (The Secrecy Act).

SEPA is authorized to develop regulation towards the County Administrative Boards as a step in the implementation of the Water Framework Directive. Harmonizing the treatment of GIS data is one of the areas SEPA has chosen to regulate, e.g. the reporting formats to the European Commission.

2.7.3 Application of metadata issues identified for to thematic environmental data

The Swedish Species Information Centre works with biodiversity, serving as the focal point for information on threatened species and biodiversity in Sweden. Its main tasks are to collect, evaluate and store the most important information about threatened and rare

plant and animal species. A basic part of this work is to assess the types and degrees of threat, and to prepare the national Red List and Red Data Books.

http://www.artdata.slu.se/english/

2.7.4 Application of access services issues to thematic environmental data

2.7.4.1 Environmental objectives

[NLS] Information about the Swedish environmental objectives can be reached at the following Web Portal http://www.miljomal.nu/Environmental-Objectives-Portal/ This Portal includes information about indicators and their underlying datasets. The indicators will be used as tools in assessing progress towards the objectives.

2.7.4.2 Water

The Swedish Surface Water Data Base is managed, maintained and further developed by the Swedish Meteorological and Hydrological Institute (SMHI). The surface water database includes information on watercourses, drainage basins and lakes in Sweden, as well as on the surrounding coastal waters and sea areas. Information and data can be reached via SMHI's website http://www.smhi.se/en.
The Geological Survey of Sweden (SGU) is national data custodian for monitoring data (groundwater). SGU has developed a GIS application for presentation of SOE data: http://maps.sgu.se/sguinternetmaps/miljoovervakning/viewer.htm

2.7.4.3 Pressure

The SEPA has investigated how information about the use and release of chemical substances can be made available to the public. As a result of this study Sweden has developed a Pollutant Release and Transfer Register (PRTR) containing information on emissions and discharges of chemical substances and groups of chemical substances from large point sources. The Swedish Pollutant Release and Transfer Register lists some 1,000 enterprises engaged in environmentally hazardous activities. These enterprises are divided into various activity categories according to the Swedish Environmental Protection Agency's environmental reporting rules (NFS 2006:9). http://utslappisiffror.naturvardsverket.se/en/

Two Internet applications can statue examples of how environmental data and information about state and pressure can be presented and downloaded on Internet:

- *A system for nitrogen (N) and phosphorus (P) gross and net load calculations, retention and source apportionment have been developed and applied for reporting to HELCOM, PLC-4. GIS is part of this model. The data custodian has made the reporting results available on http://www-nrciws.slu.se/TRK/index.html*

- The MATCH model application (view and download deposition data from SMHI, a national data custodian): http://www.smhi.se/en/Research/Research-departments/Air-quality/match-transport-and-chemistry-model-1.6831

2.7.4.4 Threatened species

The Swedish Species Information Centre works with knowledge about biodiversity in Sweden. The main tasks are to collect, evaluate and store the most important information about threatened and rare plant and animal species. A basic part in this work is to assess degrees and types of threat and to prepare the national so called Red Lists and Red Data Books. For more information visit: http://www.artdata.slu.se/english/

An example of an Internet reporting application of species (state of environment data) can be reached from the link below. This application also includes presentation of data in real time.

http://www.artportalen.se/default.asp *(Also in English)*

2.7.4.5 Geology

The Geological Survey of Sweden (SGU) holds multiple datasets such as: geo-register, bedrock and the geology for surface deposits, hydrogeology, geophysics, geochemical, mineral supply, and a bedrock database. SGU is connected to the NSDI. The SGU web site includes database definitions and description (Discovery information). For more information visit http://www.sgu.se/sgu/eng/index.html (You find information about databases and map services under *Services*).

2.7.4.6 Environmental information in real property register and cadastre

In Sweden there is a move to introduce an environmental part in the Real Property Register with information on judicial decisions in the environmental courts and restrictions decided by other public bodies and as a result from different inventories. (SLFb, 2001)

The NLS has presented a proposal on how to include environmental information to the cadastre (NLS, 2001).

2.7.4.7 VIC Natur

NLS and SEPA have made an agreement including two different parts:

- one with the purpose to make the collaboration more efficient within the field of environment area protection between NLS, SEPA and the County Administrative Boards by building a stable infrastructure (the structure of

geographic data at servers, applications to facilitate availability to geographic data and the connection between attribute data and the geographic map layers).

▪ The other part includes GIS support from NLS to SEPA. The support includes for example GIS analysis and a data warehouse for geographic information needed at SEPA. GIS data produced by SEPA is included.

Information of VIC Nature is available via the Geodata Portal.

2.7.4.8 WISS – Water Information System in Sweden

WISS is the Swedish counterpart to WISE (Water Information System for Europe). The purpose is to collect all kinds of information needed about the water bodies and monitoring stations in one place – and make it available to all stakeholders and the general public. All information about classifications, measures, monitoring, trends and more is available in one place based on several different data sources. Where possible all information is currently integrated through links and in the future through web services. The database contains a reference library where you can download documents.

For each monitoring station and water body there is a simple map showing the location and a link to the more comprehensive Water Map (www.gis.lst.se/vattenkartan) which is an Internet Map Server which is also available as a web map service in your desktop GIS program.

The development of the database started in 2005 and is in operation since November 2006. Water bodies are classified according to the Water Framework Directive and are constantly updated.

2.7.5 Application of standards issues to thematic environmental data

Within SIS (the Swedish Standards Institute) a project called Stanli promotes standardization within geographic information. In 2006, a new standard has been adopted, *Geographic information – Surface Water Systems – Conceptual and Application Schema (SS 63 70 08)*. The standard is a result of cooperation between nine authorities and organizations in Sweden representing national, regional and local level. SIS will send this standard as a reference document to the INSPIRE Data Specifications Drafting Team.

The County Administration Boards are in progress of developing a common metadata specification based on ISO 19115. This specification is a mix of metadata of the exploration, exploitation and discovery type.

2.7.6 Conclusions of Component 6

The Swedish Environmental Protection Agency (SEPA) is one of the authorities responsible for environmental data at national level. At regional level the County

Administrative Boards are important SDI drivers. The Swedish Parliament has established 16 environmental quality objectives, such as "Clean air" and "Good-quality groundwater", to guide Sweden towards a sustainable society. The 15 environmental objectives will function as benchmarks for all environment-related development in Sweden, regardless of where it is implemented and by whom. The overriding aim is to solve all the major environmental problems within one generation..

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

- Thematic environmental data are covered by the described SDI-initiative or there is an independent thematic environmental SDI

2.8 Standards

Regarding the implementation of standards, the Swedish Standards Institute (SIS) is responsible for the development of national standards and encourages following global trends, namely ISO/TC 211 and CEN/TC 287. SIS vision is to be the most effective organisation for Swedish companies, authorities and organisations, where the knowledge of and the gaining of access to standards are concerned, along with the possibility to influence and take part in the work on national, European and global standards.

The Swedish Standards (SS) series concerning roads, addresses and other layers of GI are well developed. The standards are established for data produced by cooperation between different organizations (GINIE).

Standards in use in the NSDI include:

- GGD-specification – used for mapping and elevation (height) models;

- Swedish Standard SS 63 70 03 – used for addresses

- Swedish Standard SS 63 70 04 – used for description of road and railroad networks

- Swedish Standards for utility networks

- Swedish Standard for surface water systems networks

Work is also going on concerning standardization of:

a. Hydrology (lakes, rivers, catchments etc), SS 63 70 08

b. Cadastral parcels

c. Building plans

d. Metadata

e. Road feature catalogue

The Geographic Information Standards Initiative in Sweden (Stanli) has the mission to contribute to the establishment and use of a spatial data infrastructure in Sweden. Stanli's objective is to - offer a user driven forum which public and private sector stakeholders can use in co-operation to develop, adopt, publish and maintain standards, guidelines and other relevant material. Stanli is the project area for geographic information within SIS, Swedish   Standards   Institute (http://www.sis.se/DesktopDefault.aspx?tabname=%40Projekt&PROJID=2528).

SIS has its mandate a) from SSR and b) from its 1450 or so members. As from September 2007 there is a letter of understanding between Geodata Advisory Board and the SIS/Stanli Steering Committee on Stanli continued role in establishing a national SDI in Sweden.

2.8.1 Conclusions of Component 7

Regarding the implementation of standards, the Swedish Standards Institute (SIS) is responsible for the development of national standards and encourages following global trends, namely ISO/TC 211 and CEN/TC 287. The Swedish Standards (SS) series concerning roads, addresses and other layers of GI are well developed.

Based on these conclusions we score the indicator as follows:

- The SDI-initiative is devoting significant attention to standardisation issues

2.9 Use and efficiency of SDI

See section 2.6.8 and 2.7.4

3 Annexes

3.1 List of SDI addresses / contacts for Sweden

Table: SDI contact list			
	Web address	Organisational mailing address	Over-all contact person: tel./fax/e-mail
National			
NLS	http://www.lantmateriet.se/epidefault.aspx?id=55&lang=EN www.geodata.se	Lantmäteriet SE-801 82 Gävle Sweden	Director General Stig Jönsson E-mail: stig.jonsson@lm.se Chairman of Swedish Geodata project Anders Lundquist E-mail: Anders.Lundquist@lm.se Tel.:+4626633383 Fax: +4626613277 Head of Geodata secretariat Ewa Rannestig E-mail: Ewa.Rannestig@lm.se Tel.:+4626633549 Fax.:+4626613277
Formas, the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning	http://www.formas.se/	Formas Kungsbron 21 Box 1206 Birger Jarls torg 5 111 82 Stockholm	tel: 08 775 40 00 fax: 08 775 40 10 info@formas.se
ULI, the Swedish Development Council for Land Information	http://www.uli.se/	ULI - Swedish Development Council for Land Information ULI, Box 415, 101 28 ,	Information officer, Lisa Samuelsson Tel.: +46(0)8 613 08 16 E-mail: uli@uli.se http://www.uli.se

		Vasagatan 36 Stockholm	
SIS, Swedish Standards Institute	http://www.sis.se/ http://www.sis.se/DesktopDefault.aspx?tabname=%40Projekt&PROJID=2528	SIS, Stanli SE- 118 80 Stockholm	Torbjörn Cederholm Tel. +46 (0)8 555 520 00 e-mail: info.@sis.se
SEPA, Swedish Environmental Protection Agency	http://www.naturvardsverket.se/en/In-English/	SEPA, SE-106 48 Stockholm Blekholmsterrassen 36	Director General Maria Ågren. Tel. + 46 (0)8 698 10 10 e-mail: maria.agren@naturvardsverket.se

3.2 List of references for Sweden

Table: list of references used to compile the Country Report	
Web sites:	
Lantmäteriet (National Land Survey, NLS)	http://www.lantmateriet.se/
Stads Kartan	http://www.stadskartan.se/start/
GeoLex – web mapping application	http://www.geolex.lm.se/
ULI, the Swedish Development Council for Land Information	http://www.uli.se/
Databases in the Swedish Museum of Natural History	http://www.nrm.se/
UN convention on biological diversity (CBD) here is information about CBD, diversity status in Sweden and the activities of Swedish authorities and organizations	http://www.biodiv.se/eng/

The Geological Survey of Sweden, SGU	http://www.sgu.se/sgu/sv/index.html
Legal and funding references	http://www.spatial.maine.edu/~onsrud/gsdi/Sweden.html http://home.online.no/~wkeim/foil.htm http://www.certh.gr/cordis/t_en/p/se/p_r51_en.asp-adtid=508.htm http://www.publicsectorinfo.com/summary_results/08a.html http://codazzi4.igac.gov.co/gsdi5/documentos/Uta_Wehn_paper.pdf http://www.datainspektionen.se/in_english/default.asp?content=/in_english/legislation/data.shtml http://www.lantmateriet.se
GeoTest	http://www.geotest.se/en/
National Geoportal	http://www.geodata.se/en/
European Commission – PSI portal	http://ec.europa.eu/information_society/policy/psi/infringements/index_en.htm

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Other sources:	
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