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

Report meta-information

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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. Merely it represents our findings/changes per section on our preparation of the desktop analysis

Executive summary

Denmark has a well developed NSDI. The Infrastructure for Spatial Information Act was adopted by the Parliament in December 2008 and entered into force on 15 May 2009. The Act sets the framework for the further development of the Danish SDI.

The guiding principles of the SDI development are well summarized in the geo-data report of 2002: *On one hand Denmark is in a strong position in the geo-data field and has good bases of using geo-data offensively in digital management. This is among other things due to the fact that a number of basic registers are in place and that there has been invested strongly in the digitizing of map products. On the other hand it must be stated that the existing co-operation structures in the field are too uncommitted to obtain the most expedient geo-data utilization and production across authorities and that it has not been possible to a sufficient extent to prioritize between different wishes and needs in the field*. Geo-data are seen as the backbone of e-Government. Another important idea of the Danish SDI is to try reaching consensus.

It is the National Survey and Cadastre Agency (KMS) that has formally put forward a first vision for an NSDI for Denmark. The principles described include: consistency of data, having a nation-wide collection of data with attention on form and quality, research and development for SDI, national and international cooperation.

A number of other actors and initiatives are important to the functioning of the emerging NSDI environment in Denmark:

- GeoForum is the national GI interest group and encourages cooperation amongst the main players in the GI market in Denmark;

- **Project E-government** which has been initiated by the central government and the regional and local administrations in order to promote and coordinate the transition to e-government in the public sector. One outcome of Project e-government is the "Spatial Data Service Community". Others are the XML committee, the Infostructurbase. e-day 1 and 2, and electronic invoices in the public sector.

- **Spatial Data Service Community** was established in 2002. Some of the objects of the Service Community are to:

    1. Develop and formulate a vision and a strategic framework for development of geodata in Denmark;

    2. Secure co-operation on data, access to data modelling etc;

    3. Promote development of coherent geodata services.

    Some of the outcomes are a "WMS cook-book", a "WFS cookbook", a report on basic data and an agreement on shared object types in "topographic mapping".

The 2007 structural reform, in which 13 counties were merged into 5 regions and 270 municipalities were consolidated into 98 new, larger units, required the development of new cross-boundary solutions. The new authorities met an immediate need to share and merge their geographic information, in order to fulfil their administrative responsibilities.

In January 2009, the National Geodata Agreement came into effect, and all ministries gained access to the National Survey and Cadastre's geodata and web services. A similar Municipal Geodata Agreement was reached with Local Government Denmark in 2009, and will come into effect in 2010.

The most recent efforts within the Danish SDI are related to the application of standards and the further development of services.

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Abbreviations and acronyms

AIS	Area Information System
AWS	Address Web Services
BBR	Building and Dwelling Register
CEN	European Committee for Standardization
CT	Core Thematic Data
DAiSI	Danish Academy for Spatial Information
DAV	Danish Address Road Register
DMI	Danish Meteorological Institute
DMP	Danish Nature and Environmental Portal
DS	Statistics Denmark
EBST	Ministry of Economic and Business Affairs
ESR	Municipal Property Register
EU	European Union
EUROGI	European Umbrella Organisation for Geographic Information
FIR	Further Investigation Required
FOT	Common feature definition
GEUS	Geological Survey of Denmark and Greenland
GI	Geographical Information
GINIE	Geographic Information Network In Europe
GIS	Geographical Information System
GML	Geography Markup Language
GSDI	Global Spatial Data Infrastructure
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
ISO	International Organization for Standardization
KMS	National Survey and Cadastre
LMOs	Legally Mandated Organisation
NERI	National Environmental Research Institute
NGO	Non-governmental Organizations
NIA	No Information Available
NOST	National Operative Staff
NSDI	National Spatial Data Infrastructures
OGC	Open Geospatial Consortium
OIO	Public Information Online
OIS	Public Information Server
PPP	Public-private partnerships
PSI	Policy and legislation on access to public sector information
REF	Reference data

SDI	Spatial Data Infrastructures
SOA	Service-oriented architecture
UTM	Universal Transverse Mercator
VIS	Information system of the road sector
VMS	WEB Map Services
WFS	Web Feature Services
WMS	Web Map Specifications

1 GENERAL INFORMATION

1.1 Method

This report is summarizing the review of SDI in Denmark, and reflects the degree to which the SDI situation is similar to the ideas set out in the INSPIRE position papers[1] and 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:

- www.kms.dk
- www.geoforum.dk
- www.geodata-info.dk
- http://www.dmu.dk/1_Viden/2_Miljoe-tilstand/3_samfund/AIS/index_en.htm
- http://www.inspire-danmark.dk/
- http://www.xyz-geodata.dk/English/introduction.htm

and has been completed by integration and consolidation of comments on Version 5 of this report, received from representatives of the NSDI initiatives. For the final update of 2005 input was received from the Danish Authorities and integrated in the version 9 of the report. Some additional information on legal issues was integrated as well. The update 2006 was based on information received from Mr. Jes Ryttersgaard, on the screening of other sources and the presentations given during the EC GI&GIS workshop in Innsbruck in June 2006.

For the update of 2007, written input was received on the organizational set-up of INSPIRE, on data sets and services (although the templates were not used because *"too complex and too time consuming, especially when dealing with data at local level"*), and on data sharing practices (answers on questions). All the information was integrated as much as possible in this country report. However, the information on data sets and service could not be integrated in the assessment at European level (see summary report).

For the 2009 update the survey questionnaire was used, along with various web sources, publications and the geoportals. In this version obsolete information was removed, while a conclusion paragraph regarding the status of each indicator was added for each component.

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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.

1.2 Overview of NSDI-related actors and initiatives

The development of geographic or spatial information in Denmark seems to be considerable. The Danish market for geo-data is expected to expand and will consequently be an important driving force in the future – enough so that the framework of the NSDI is being considered as giving a new direction to business and market research. Several Danish universities have launched research projects on the SDI topic (ETeMII, Daugbjerg).

The NSDI situation in Denmark is on the one hand a patchwork or collection of initiatives and on the other hand a focused, step-by-step move towards establishing an official NSDI. Innovation and voluntary cooperation amongst various institutions and organizations has been essential for the ongoing development of a national spatial data infrastructure based on consensus. And in 2002 the "Spatial Data Service Community" became a reality.

The building stones of the Danish SDI (DAISI) can be looked at as in the following figure including Government initiatives, Digital Maps and Registers as well as Data models.
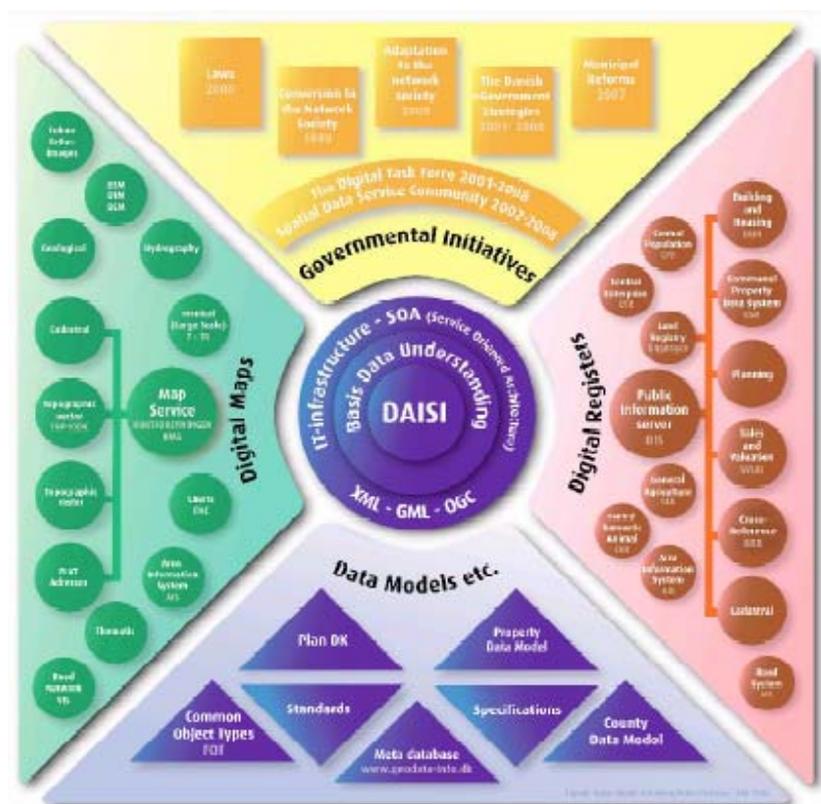

Figure 1 Danish SDI structure

Presently what is termed a "de facto" SDI seems possible for the national scale, as information and data is available in one form or another for the following:

- Geodetic reference system;

- The "core" set of spatial information with the cadastre, land registry, Building and Dwelling Register (BBR) and the Municipal Property Register (ESR) comprising information on all properties, land ownership, buildings, addresses, restrictions, assessed values;

- A cross reference register containing the administrative keys in the various register has existed since the early 1990s;

- Image information;

- Topographic datasets;

- Municipal Large Scale Maps (TK-standard);

- A simple data model for regional (county) data;

- A metadata-service launched in the mid 1990s;

- The National Square Grid - Denmark

In addition a number of projects and initiatives have resulted in:

- "VMS cookbook" (Vejledning i anvendelse af WEB Map Services) 2003

- "WFS cookbook" (Vejledning i anvendelse af Web Feature Services) 2004

- GML basis geometrier, 2004

- OIOXML (public standard for naming and design of public XML schemas)

- Infostrukturbasen (public repository for xml schemas)

- XML-committee (public committee who approve XML definitions and schemas)

- FOT specification (approved specification of shared object types), 2004

- Basisdata (guidelines and analysis model for categorizing of basic data) 2004

- E-day 1 (2003)

- E-day 2 (Febr. 2005)

- Metadata (Geodata-info.dk is going to follow ISO 19115 in 2005)

KMS is the key-player for this merging NSDI. At lower level, counties and municipalities take relatively independent SDI-like initiatives which rely however to a large extent on KMS-data.

The following table presents a summary of the SDI situation in Denmark. The organizations identified in the left most column are those who host or are otherwise responsible to manage the SDI (or GIS) site on the Internet.

Table: country-wide overview of SDI					
Levels of SDI:	NUTS region name(s)	NUTS codes	Status	Spatial coverage: National	Spatial coverage: Region
National					
KMS	Denmark	DK	Operational[*1]	100%	
Regional					
Various County GIS projects	County level	DK	Operational[*2]	-	100%
Local					
Municipalities and utilities	Municipal level	DK	Operational		Almost 100%

[*1] The organization is not an SDI, but it is considered as a building block for the Danish NSDI, because of its responsibility for coordinating activities.

[2] All Counties have GIS datasets and Internet mapping services available http://www.miljoeportal.dk/English/ and are distributing their data for free. Some are described in this report to illustrate.

Other players are:

All the agencies within the Ministry of Environment (including National Environmental Research Institute – NERI, and Geological Survey of Denmark and Greenland – GEUS), National Agency for Enterprise and Construction, Ministry of Food, Agriculture and Fisheries, Ministry of Transport, The Ministry of Science, Technology and Innovation, Danish Meteorological Institute -DMI, Statistics Denmark – DS, Local Government Denmark and the Association of County Councils in Denmark

The **KMS** (the National Survey and Cadastre Agency) has put forward a first vision for a possible NSDI for Denmark. The principles described include: consistency of data, having a nation-wide collection of data with attention on form and quality, research and development for SDI, international cooperation (Ryttersgaard, 2000).

[KMS] According to existing law the KMS has a coordination obligation, which to a great extent is put into practise through development of the spatial data infrastructure. Over the years a coordinating committee (SAMBO) has formulated the basis for cooperation between the different involved bodies. This coordinating committee has been replaced by the Spatial Data Service Community.

Traditionally the municipalities have had their own large scale maps (technical maps). Since 1990 the production has been digital. Today all municipalities have access to "technical map" databases, owned by the municipalities or the utilities.

Over the last 10-12 years a number of Municipal "digital map co-operations" has been created. Each of them typically comprises the municipalities in a county. In addition to its responsibility for development, updating and production of cadastre, topography, geodetic reference-systems and charts the KMS as infrastructure enterprise initiates and improves cooperation between the different players in the GI sector. From the 1.January 2007 the number of municipalities is reduced from 271 to 99. At the same time the

counties disappears. Their spatial data related activities will be transferred to the Minister of environment and the new municipalities. *Examples of cooperation projects on-going include:*

- Pilot project on coordinated updating of municipal large scale spatial databases and the national topographic databases;

- Shared Object types (FOT). The aim is to integrate data from the KMS and the Municipalities, and other key players, ex. the road sector;

- Denmark's roads. Aim is to integrate information from TOP10DK with data from the National Road Authority.

The former Ministry of Buildings and Housing has established the new Public Information Server (OIS). This e-government server gives users free access to property information, environmental data, land, business, and person-related data.

*As recently as 2001, **GeoForum** began acting as the national GI interest group (organization). GeoForum encourages cooperation and collaboration amongst the main players in the GI market in Denmark (i.e. education, industry, government). Geoforum organizes yearly conferences and cooperates with the Spatial Data Service Community on development of the national SDI.*

Project E-government

Project E-government has been initiated by the central government and the regional and local administrations in order to promote and coordinate the transition to e-government in the public sector in 2001. The Project is led by a joint board *made up of the permanent secretaries from five ministries, the managing directors of [Local Government Denmark](#) and [The Association of County Councils in Denmark](#) which represent the municipal and regional authorities, respectively, and finally a representative from the municipalities of Copenhagen and Frederiksberg.*

The board is served by the [IT-Technical Centre](#) in the Ministry of Science, Technology and Innovation and the [Digital Task Force](#) which is based in the Ministry of Finance. The Digital Task Force also serves as the secretariat of the board.

The guiding idea behind Project E-government is that the responsibility for the implementation of e-government lies at the decentral level, but that in several cases, there can be a need for common guidelines and solutions to general problems of legal, technical, and organizational nature in order to support the transition process. The need for a cross-level effort was stressed in a [whitepaper on e-government](#) published in May 2001 (Danish only), and the project was agreed on in the annual negotiations with the regional and municipal authorities in June 2001. Implementation in the public sector of the recommendations from the joint board does not require legislation. Examples are e-day1 and e-day 2 and electronic invoices.

Geodata and INSPIRE are mentioned in the e-government strategy for 2007-2010. The strategy highlights the importance of geodata and INSPIRE: "The service community for Geodata is devising a framework for the development of geodata in Denmark, ensuring coordination and a cohesive geographical administrative basis cutting across disciplines and administrative levels. In 2007 the EU adopted a directive (the INSPIRE Directive) containing a framework for constructing a joint European geographical infrastructure. This directive will also be the standard setter for essential public data collections in Denmark" (http://www.gsdi.org/GSDI10/papers/TS16.1paper.pdf).

One outcome of Project e-government is the "Spatial Data Service Community". This service community, established in 2002, is led by a steering group with representatives from the Ministry of Environment, [Local Government Denmark](), [The Association of County Councils in Denmark]() and, the National Agency for Enterprise and Housing, the Directorate for Food, Fisheries and Agricultural Business and the National Survey and Cadastre (KMS).

The purpose of the Service Community are to:

- To develop and formulate a vision and strategic framework for the spatial data development in Denmark;

- To secure the overall and concrete cooperation on data, access to data, modelling, prioritization and infrastructure in order to secure coherence between spatial data across subject areas and administrative levels;

- To promote development of coherent spatial data services and strengthen usefulness of spatial data to benefit citizens, companies and public authorities;

- To attend to cooperation between the spatial data sector and individuals and companies about joint public data projects e.g. concerning the XML based exchange of data;

- To prepare strategic decisions about investments in the spatial data sector including a prioritization of development projects;

- To make decisions about pricing principles and scales, when relevant, for the distribution of costs in joint projects.

The strategic aims are concentrated on:

- Responsibility, competence and division of roles;

- Pricing structure;

- Basic data;

- Data descriptions;

- Distribution and Presentation;

- Dissemination and Deployment;

- International Coordination.

In 2009, the Ministry of Climate and Energy also joined the Spatial Data Service Community. Since 2002, the Community has contributed to major new initiatives, including the establishment of FOT danmark and plansystem.dk. In 2009, it sustained these efforts and invited the newly established domain management committees (covering social work, health, and buildings, homes and resources) to introduce geodata to the management of their respective domains. FOT danmark is a membership association of central and municipal authorities that aims to establish unified topographic mapping of Denmark to be used throughout public administration. The association's work is carried out partly through municipal initiatives in which the National Survey and Cadastre is directly involved, and partly through the association itself. There has been broad support for this type of collaboration. By the end of 2009, 90 out of 98 municipalities have joined the National Survey and Cadastre as members of FOT danmark. As of October 2009, FOT data had been established in 27 of these municipalities. Coverage of the entire country is expected to be complete by the end of 2012.

FOTdanmark is an association established in October 2007 between the Danish state (Danish National Survey and Cadastre) and six of the municipalities in Denmark. Today (July 2009) more than 88 of the 98 municipalities within Denmark are members.

FOTdanmark works for the establishment of a unified public topographic mapping of Denmark with the aim to become one of the main elements in the national strategy for eGovernment in Denmark.

The purpose of FOTdanmark is to create a coherent mapping so that all Danish authorities – state as well as local – have a common understanding and a solid base for cooperation on a local and national scale.

The FOT-specification forms the basis for the creation of a geographic database containing a seamless and uniform set of geodata that covers all Danish territories except the Faroe Islands and Greenland. These are available at: http://www.fotdanmark.dk/Materiale/Files/FOTspecifikation/Specifikation+4.0+p%C3% A5+engelsk.

As an example of these new initiatives is that, a digital mapping application was launched in 2008 on the citizen portal Borger.dk and the commercial portal Virk.dk.

Borger.dk is run by the Ministry of Science, Technology and Innovation at the National IT and Telecom Agency and is also available in other languages such as English, French, Spanish, German and Arabic.

Virk.dk is run by the Danish Commerce and Companies Agency. Virk.dk is a business internet portal monitored by the public sector in Denmark. The overall objective of Virk.dk is to relieve Danish companies from administrative burdens and to provide a single entrance to the public sector. It also provides a link for registration of foreign

companies that perform services in Denmark (from Infrastructure for spatial data in Denmark 2008 report).

In January, the National Geodata Agreement came into effect, and all ministries gained access to the National Survey and Cadastre's geodata and web services. A similar Municipal Geodata Agreement was reached with Local Government Denmark in 2009, and will come into effect in 2010. The National Survey and Cadastre and the Armed Forces have an existing agreement on geodata and web services access; the country's five regions have also inherited the geodata access agreements that were held by the former counties. This agreement supported an increased interest in the application of spatial data to new areas including health, environment, defence and emergency management. Meanwhile, municipalities continue joining a number of collaborative efforts. These include the development of unified nationwide topographic data through FOT danmark and the acquisition of the Danish Digital Elevation Model, which was produced and quality-controlled in accordance with official requirements.

For environmental information, **the National Environmental Research Institute** (NERI), situated in the Ministry of Environment, is using GIS and Remotely Sensed data. Current projects include:

- Environmental data coordination activities. This is a cross-disciplinary activity and covers NERI's participation in the data and GIS coordination activities of the Ministry of Environment and Energy. The work is carried out in a number of working groups and seeks to provide an improved overall use, comparability and availability of the Ministry's data collections and GIS, both internally within the Ministry as well as in relation to external collaborators;

- GIS implementation and coordination. The aim is to establish and maintain basic GIS facilities within NERI including training and support. National coordination activities within the Ministry of Environment as well as GI coordination within the European Union are also addressed in this project;

Land Information System is the first attempt to integrate geographic data related to natural and environment in Denmark, which will provide unprecedented opportunities for the use of GIS data within the Ministry of Environment resort. All data have been **rescheduled for EUREF89.**

WWW-AIS. The project made the first generation of AIS (Area Information System) data available on the Internet (2003). The first step was to establish a down-load site where GIS professionals can view AIS data using a PC and an Internet browser. GIS functionalities include: zoom, pan, layer, obtain attribute information, etc. AIS partners include many players at the national and the county levels.

An overview of the key milestones achieved in 2008 and 2009 are:

Key milestones reached in 2008:

- The Spatial Data Infrastructure Act was passed.

- FOT danmark's membership increased from 50 to 82.

- V is Stedet ("Show the location") was developed and implemented on the public portals Borger.dk (for citizens) and Virk.dk (for companies).

- All central government authorities have full access to the National Survey and Cadastre's geodata and services from the beginning of 2009.

- Denmark's Digital Elevation Model has become available to all central government bodies and 85 of 98 municipal authorities.

Key milestones reached in 2009:

- The public gained free and open access via the internet to the historical information that is contained in 45,000 historical maps.

- Infrastructure for Spatial Information Act came into force on May 15, 2009.

- The Ministry of Climate and Energy joined the Spatial Data Service Community.

- The National Geodata Agreement came into effect, creating a foundation for the use of the National Survey and Cadastre's data among central government authorities.

- The Municipal Geodata Agreement was reached between the central and Local authorities, clearing the way for access to the geodata and web services of the National Survey and Cadastre.

- The membership in FOTdanmark, which seeks to establish a basis for unified access to nationwide topographic data, increased from 82 to 90 (of a possible 98) municipalities.

- Quality control of the Danish Digital Elevation Model was completed, and the number of municipalities that procured the same elevation model as the central government rose from 85 to 87 (of a possible 98).

- A new Digital Land Register was introduced on September 8, 2009. In the future, the spatial location of easements and buildings on rented land will be registered in the Land Register on the basis of the cadastral data.

- The Building and Dwelling Register (BBR) was modernized and a new IT system was launched on December 1, 2009.

- The Danish Address Web Services (AWS) was launched in the spring of 2009.

The first phase of work on the Danish INS PIRE geoportal started in 2009 with the development of a new version of geodata-info.dk. When launched in 2010, the website will make it easier to find, add and edit metadata while providing information on the licence conditions and limitations that may affect access to the geodata themselves. The site will be open to all data responsible parties, including those not specifically included

in Infrastructure for Spatial Information Act, and all will be encouraged to take advantage of geodata-info.dk as a central resource for metadata publication (from Infrastructure for spatial data in Denmark 2008 and 2009 reports).

2   DETAILS OF THE DANISH NSDI

2.1   General information

KMS (*Kort & Matrikelstyrelsen*) is the Danish governmental organisation for national survey and cadastre (www.kms.dk). It was formed in 1989 by the merger of the Geodetic Institute, the Hydrographic Department and the Danish Cadastral Department. It belongs to the Ministry of Environment. KMS fulfils several functions: it is the government authority responsible for mapping, charting, geodata, cadastral registrations and the authorization of licensed surveyors, a state enterprise carrying out tasks on market terms and a government research institute for mapping and geodata. By law it has the obligation to coordinate the public use and creation of geodata.

Since 2002 the KMS has had the status as the National Infrastructure agency for Spatial Data and Information.

There is an official Action plan, which is signed by the Ministry of Environment, The Ministry of Agriculture, The Farmers association, the "green" NGOs and the County Association. The Action Plan (Handlingsplan for information om arealreguleringer I det åbne land, maj 1998) makes it a county obligation to make web access to a minimum number of map based regulations and plans. The result has been web mapping solutions for all counties since late 1999.

KMS is responsible for establishing national standards for the generation, storage and sharing of geodata. As Denmark's responsible authority for the implementation of the European directive INSPIRE, KMS has acquired new international obligations. This has required KMS to address the standardization of geodata as both a national and European activity. KMS' activities include the establishment and maintenance of the following geodata types:

1. National Geodetic Reference Systems and Networks
2. Digital Terrain Models
3. Place Names and Points of Interest
4. The Digital Map Supply - web service
5. Common/Shared Object Types - large and small scale map databases
6. Cadastre
7. Cadastral Archives
8. Nautical Charts
9. Administrative Boundaries

Recent developments in Denmark's public sector have placed new demands on KMS. The 2007 structural reform, in which 13 counties were merged into 5 regions and 270

municipalities were consolidated into 98 new, larger units, required the development of new cross-boundary solutions (Dael et al., 2008).

Currently, there are three cadastres in Denmark:

- The central Cadastre, which covers all of Denmark beyond the municipalities of Copenhagen and Frederiksberg
- A cadastre for the Municipality of Copenhagen
- A cadastre for the Municipality of Frederiksberg

On December 18, 2009, the Danish parliament passed an amendment to the Law on Subdivisions. On October 1, 2010, the amendment transferred the cadastral authority from the Municipalities of Copenhagen and Frederiksberg to the National Survey and Cadastre, resulting in one, single nationwide Cadastre.

Geoforum Denmark is the Danish Society for GI (www.geoforum.dk). On 1 January 2001 DAiSI (Danish Academy for Spatial Information) merged with the Danish Society for Photogrammetry and Surveying and the Danish Cartographic Association into GeoForum Denmark, which is now the Danish member of EUROGI. GeoForum Denmark's mission is to encourage the wider use of spatial information in the Danish society. *Geoforum* has today approximately 250 company members and 350 personal members

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                         │     Geoforum Board      │
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                         │       President         │
                         │    Michael Israelson    │
                         └─────────────────────────┘

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     │       Secretariat       │         │  Executive committee:   │
     │                         │         │                         │
     │    Head of secretariat  │         │   Pres. Michael Israelson│
     │     Jesper Skovdal      │         │  Vice pres. Inge Flensted│
     │                         │         │  Treasurer Kirsten Elbo  │
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 │ Technical committees:│  │  Arrangement com's:  │  │ Political committees: │
 │ •Standardisation com.│  │ •Arrangement com. West│  │ •International com.   │
 │ •GML com.            │  │ •Arrangement com. East│  │ •Science com.        │
 │ •Orthophoto com.     │  │ •Conference com.     │  │ •Political com.      │
 │ •3D com.             │  │ •Competencies com.   │  │                      │
 └──────────────────────┘  └──────────────────────┘  └──────────────────────┘
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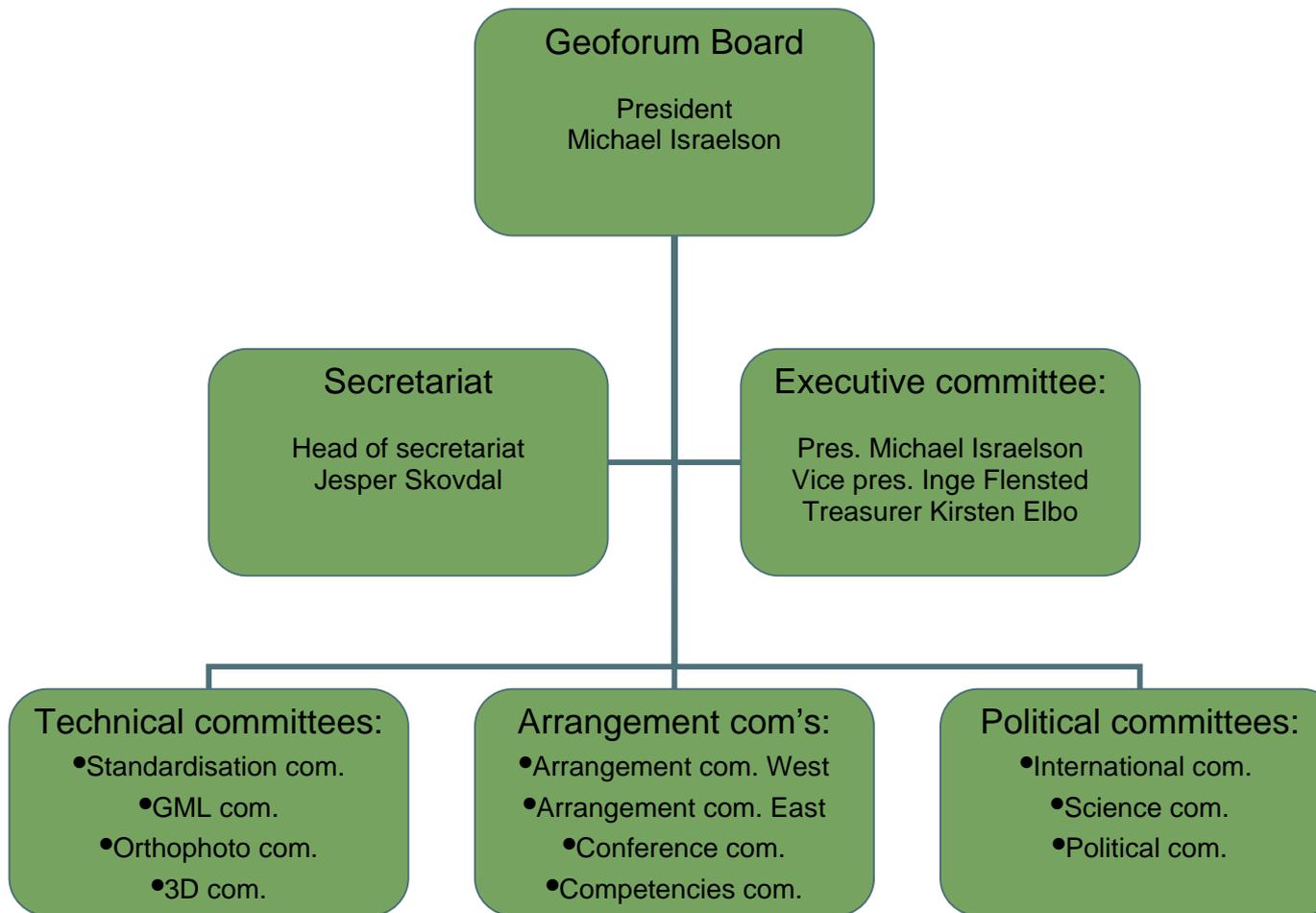
Figure 2 Organisation of Geoforum

In 2002 the partners behind the e-government initiative formed the Spatial Data Service Community (see chapter 1).

Other players are:

- All the agencies within the Ministry of Environment (including National Environmental Research Institute – NERI, and Geological Survey of Denmark and Greenland – GEUS),

- The National Agency for Enterprise and Construction,

- Ministry of Food, Agriculture and Fisheries, Ministry of Transport,

- The Ministry of Science, Technology and Innovation,

- Danish Meteorological Institute -DMI,

- Statistics Denmark – DS,

- Local Government Denmark,
- the Association of County Councils in Denmark.

The LMOs meet in the Danish INSPIRE Committee. In October 2007, a Danish INSPIRE network became a reality. The members come from industry, interest groups etc. To create awareness in the public administration, an INSPIRE conference for high-level administrators was organised in March 2007.

2.2 Component 1: Coordination and organisational issues

Within the e-Government initiative, there is a Spatial Data Service Community. In this Community the key INSPIRE stakeholders are involved: the Ministry of Environment; the Local Government Denmark; the Association of County Councils; the National Agency for Enterprise and Housing; the Directorate for Food, Fisheries and Agricultural Business; the Ministry of Science, Technology and Innovation; the National Survey and Cadastre (KMS). The objective is to replace existing formal and informal co-operation forums. It necessitates also a new way of thinking about basic data, about economy and law in the field of geo-data.

The INSPIRE Committee consists of legally mandated organisation with regard to the SDI: National Survey and Cadastre; Ministry of Environment; National Agency for Enterprise and Construction; Ministry of Food, Agriculture and Fisheries, Ministry of Transport; Ministry of Science; Technology and Innovation; Danish Meteorological Institute; Statistics Denmark; Local Government Denmark and The Association of County Councils in Denmark. Geoforum is an observer (www.inspire-danmark.dk).

The spatial data infrastructure coordinating committee will advise and assist the Ministry of the Environment and the National Survey and Cadastre in developing the transaction- oriented elements of the spatial data infrastructure. The committee aims to sustain the already successful collaboration among the public authorities that maintain or are otherwise responsible for geodata. Furthermore, the Danish INSPIRE coordination group is a forum for authorities that are identified in Infrastructure for Spatial Information Act. The group convenes at regular intervals to address such tasks as the coordination of official responses on the implementation of INS PIRE.

In order to continue harmonised administration the Ministry and the community of municipalities decided to establish a shared system including databases for environmental data. All environmental data from the counties are amalgamated in the shared databases. Information in Danish is available on: www.miljoeforvaltning2007.dk.

Shared Objects

For years the State administration and the Municipalities have discusses and negotiated the possibilities for joint mapping activities.

The result is not joint mapping but an agreement on definition of shared objects, comprising all objects present in topographic and technical maps. The results confirmed by the Spatial Data Service Community is documented in the FOT specification 3.0 Business models has been evaluated, a joint administration will be established, a shared storage and distributions system is under development and there are several joint projects on collection and updating of the shared objects. http://www.fotdanmark.dk/

Reference data committee

In order to common spatial reference data across the different administrative sector the Spatial Data Service Community has set up a reference data committee with representatives from the different administrative levels. First meeting will be in September this year.

www.xyz-geodata.dk and

www.xyz-geodata.dk/22_11_2005/06_01_31_Kommissorium_for_Referencedataudvalget_v3.doc

Further E-government initiatives

The Ministry of Finance and the municipalities have decided to develop a shared public citizen portal with "my page" as a personalized entrance to public registrations. The development starts in 2007 and should be finalised not later than 2012.

http://www.e.gov.dk/nyheder/tema/faellesoffentlig_borgerportal/borgerguiden_information_pa_borgernes_praemisser/index.html

2.2.1 Conclusions of Component 1

The Danish SDI approach is truly national. SDI building blocks have reached a significant level of operationality. KMS is the Danish governmental organisation for national survey and cadastre Within the e-Government initiative, there is a Spatial Data Service Community. In this Community the key INSPIRE stakeholders are involved: the Ministry of Environment; the Local Government Denmark; the Association of County Councils; the National Agency for Enterprise and Housing; the Directorate for Food, Fisheries and Agricultural Business; the Ministry of Science, Technology and Innovation; the National Survey and Cadastre (KMS). GeoForum Denmark's mission is to encourage the wider use of spatial information in the Danish society. *Geoforum* has today approximately 250 company members and 350 personal members.

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

- The officially recognised or de facto coordinating body for the SDI is an organisation controlled by data users (Not so clear)

- An organisation of the type 'national GI-association' is involved in the coordination of the SDI

- Producers and users of spatial data are participating in the SDI

- Only public sector actors are participating in the SDI (No)

2.3 Component 2: Legal framework and funding

2.3.1 Legal framework

Before the implementation of the INSPIRE directive, Denmark had no encompassing legal framework for the NSDI. The Infrastructure for Spatial Information Act was adopted by the Parliament in December 2008 and entered into force on 15 May 2009. The Act sets the framework for the further development of the Danish SDI. KMS is now assigned to manage the infrastructure for spatial information in Denmark (Jesper Jarmbæk, The Danish Way: Development of the Danish Spatial Data Infrastructure through Binding Collaboration, http://www.gsdi.org/gsdi11/papers/pdf/179.pdf). The Act contains two additions to the provisions stemming from the INSPIRE directive. First, the Danish minister for the Environment can extend the scope of the Act to data outside of the Annexes of the INSPIRE directive, after negotiations with the minister responsible for these data. Second, the Minister can also determine, in collaboration with other public sector parties, which data should be used as the foundation and the official sources for mapping and registration (KMS, Infrastructure for spatial data in Denmark 2009, http://www.kms.dk/NR/rdonlyres/   A8EE3B94-19D3-4B27-BC9E-C09C2D6A4BFA/0/KMS_Infrastruktur_2009_UK.pdf).

Also in 2009, agreements for the use of spatial data were concluded with central government (National Geodata Agreement) and with all municipalities (Municipal Geodata Agreement). These agreements took effect from 2010 (cf. infra, KMS, Infrastructure for spatial data in Denmark 2009, http://www.kms.dk/NR/rdonlyres/ A8EE3B94-19D3-4B27-BC9E-C09C2D6A4BFA/0/KMS_Infrastruktur_2009_UK.pdf)

The Danish policy on spatial data infrastructures is closely linked to the eGovernment policy. The rules and guidelines for spatial data should help increase their value for eGovernment policy.

2.3.2 Public-private partnerships (PPPs)

The Danish SDI has a history of successful public-private cooperation. For instance, the digital national topographic database TOP10DK was created as a PPP in 2000; and the digitization of the Cadastre in the 1990s took place in cooperation between the public and the private sector.

Cooperation between the public and the private sector is considered very important for the development of the Danish NSDI. The public bodies specify the data requirements, conduct data quality assurance and distribute the data. The private companies collect the data and contribute technical solutions for accessibility (Jesper Jarmbæk, The Danish Way: Development of the Danish Spatial Data Infrastructure through Binding Collaboration, http://www.gsdi.org/gsdi11/papers/pdf/179.pdf)..

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

The general right of access to government held information is laid down in Act no. 572 of 19 December 1985 on Access to Public Administration Files (*Lov om offentlighed i forvaltningen*). Public administration in the sense of this Act means all public bodies of central and local government, excluding parliament and the courts.

Utility companies are also subject to the Access Act, but other private sector companies with public tasks generally are not. There are various grounds for denying access, for instance confidentiality of the files in question and privacy. More important, access may be limited out of consideration for public financial interests, which includes the interest of public sector bodies that undertake activities of a commercial nature.

Directive 2003/4 and the provisions of the Aarhus Convention have been included in the Access to Environmental Information Act.. Directive 2003/98 on the re-use of PSI has been implemented by Law no. 596 of 24 June 2005. The Law was amended by Act no. 551 of 17 June 2008, which entered into force on 1 July 2008. The amendment widened the law and included Parliamentary and Court information (Chris Corbin, *ePSIplus Denmark National Meeting report*, http://www.epsiplatform.eu/content/download/19412/247563/file/ePSIplusNationalMeeting_Denmark_FV2.pdf).

In June 2008, this analysis prompted the government's economic committee to pass a new agreement on financing central government authorities' access to geodata and services from the National Survey and Cadastre. The new framework took effect at January 1, 2009. This agreement grants all ministries full access to geodata and relevant services from the National Survey and Cadastre. Rather than paying traditional usage fees, each ministry will pay a fixed annual contribution based on its use and needs. The agreement underlines the National Survey and Cadastre's role as the central government's infrastructure organisation for maps and geodata.

The framework provides all ministries and agencies, universities and elementary- and secondary- schools and with access to the majority of the Cadastre's geodata holdings, as well as access to these geodata over the Internet through the Digital Map Supply.

The main provisions:

- The whole of central government will have access to data from the National Survey and Cadastre, increasing the data's value.

- Whole of central government will help finance the data's maintenance.

- Each ministry's payment is fixed according to its estimated geodata benefit, and the payment encompasses all institutions within the ministry.

- The central government's procurement of geodata will be better coordinated.

Elements covered by the agreement:

- Topographical data collections

- Reference network data

- The Danish Digital Elevation Model

- Property register maps and data

- Nautical chart data

- Web services for retrieving and displaying geodata, including the Digital Map Supply

2.3.4 Legal protection of GI by intellectual property rights

The Copyright Act became effective as of 1 January 1996. This Act consolidated and systematically modernised Danish copyright legislation, replacing the old Copyright Act from 1961. The main Act (Act no. 395 of 14 June 1995) has already been amended several times (Act no. 295 of 24 April 1996 and Act no. 1207 of 27 December 1996). The EU Database Directive was incorporated into the Danish Copyright Act by Act no. 407 of 26 June 1998. The current provisions are now found in Consolidated Act no. 706 of 29 September 1998.

Section 9 of the Copyright Act provides that laws, administrative orders, legal decisions and similar official documents are not subject to copyright. This exemption does not extend to works appearing as independent contributions in the documents (e.g. a copyrighted map that is part of an administrative decision on urban development). Although these works may be copied together with the rest of the document that is not subject to copyright, in further exploitation the rights of the copyright owner must be respected.

There is a special situation about old topographic maps, where KMS has a time unlimited copyright.

Until 1995, photographs were protected by the Photography Act. This Act has been repealed and the protection of photographs has been incorporated into the Copyright Act. A photograph may enjoy protection either as an actual copyrighted work or as a photographic picture. The difference lies both in the material provisions on legal protection and in the timeframe. The right to a photographic picture lasts 50 years from the end of the year in which the picture was taken, whereas a copyrighted work enjoys protection for 70 years after the year of the author's death. All objects made by the aid of the reaction of light-sensitive material shall be considered as a photographic picture.

Denmark has implemented the 2001 Directive on copyright in the information society.

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

Directive 95/46/EC was implemented into Danish legislation by the Act on the Processing of Personal Data (Act no. 429) of 31 May 2000 (*Lov om behandling af personoplysninger*), which entered into force on 1 July 2000. This Act substitutes the Public Authorities' Registers Act and the Private Registers Act, both of which became law on 1 January 1979. The Danish Data Protection Agency exercises surveillance over processing of data to which the Act applies.

Denmark has implemented Directive 2002/58 on privacy and electronic communications with a framework of regulations. For an overview of the Acts implementing this Directive,   see http://europa.eu.int/information_society/policy/ecomm/doc/implementation_enforcement/ country_by_country/denmark_2002_58.pdf.

2.3.6 Licensing framework

Data from KMS is accessible to the public via the Digital Map Supply. For downloading, the KMS website makes a distinction between professional users and other users. For the former, several products are delivered via web-services, online services, CD-ROM, DVD and photocopies. Other users are referred to resellers of paper maps.

In 2009 and 2010, agreements were concluded between KMS and the central government and between KMS and the municipalities. Under the National Geodata Agreement, all ministries, agencies, universities and elementary and secondary schools get access to KMS data, such as topographic data, reference network data, DEM, cadastral data and nautical charts. They get access to the web services and Digital Map Supply. A coordination forum is established to manage the Agreement (Jesper Jarmbæk, The Danish Way: Development of the Danish Spatial Data Infrastructure through Binding Collaboration, http://www.gsdi.org/gsdi11/papers/pdf/179.pdf). Under the Municipal Geodata Agreement, the local authorities obtain access to the data and web services of KMS.

KMS also has agreements with the Armed Forces and the regions.

2.3.7 Funding model for SDI and pricing policy

The Danish funding model is a combined model that encompasses government funding and cost recovery. KMS is a state enterprise carrying out tasks on market terms. By law KMS is required to finance these activities by user payments if at all possible. Because of social considerations, a considerable part of KMS's tasks are nevertheless financed by government appropriations.

In 2009, agreements were concluded between KMS and the central government and between KMS and the municipalities. Under the National Geodata Agreement, each ministry pays a fixed annual contribution based on its use and needs.

2.3.8 Conclusions of Component 2

The Infrastructure for Spatial Information Act was adopted by the Parliament in December 2008 and entered into force on 15 May 2009. The Act sets the framework for the further development of the Danish SDI. KMS is now assigned to manage the infrastructure for spatial information in Denmark. Cooperation between the public and the private sector is considered very important for the development of the Danish NSDI. The public bodies specify the data requirements, conduct data quality assurance and distribute the data. The private companies collect the data and contribute technical solutions for accessibility. In June 2008 the government's economic committee passed a new agreement on financing central government authorities' access to geodata and services from the National Survey and Cadastre. The new framework took effect at January 1, 2009. This agreement grants all ministries full access to geodata and relevant services from the National Survey and Cadastre. In 2009, agreements were concluded between KMS and the central government and between KMS and the municipalities. Under the National Geodata Agreement, each ministry pays a fixed annual contribution based on its use and needs.

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 (No Information found)

- Privacy laws are actively being taken into account by the holders of GI (No Information found)

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

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

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

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

2.4 Component 3: Data for themes of the INSPIRE annexes

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

Denmark topographical databases are covering the whole of Denmark and updated with varying frequency. Data is now seamless, so it is possible to pan across the country without meeting map sheet boundaries. Traditionally in Denmark topographical mapping has been defined with map scales of 1:10.000 – 1:100.000. Larger scale maps were produced on demand and financed by these users (examples were the Utilities and the Municipalities). The KMS produced topographic products (base maps) as paper products until 1994 at the following scales: 1:25 000, 1:50 000, 1:100 000, 1:200 000, 1:250 000, 1:500 000, 1:1 million. Recently the range of products has been redefined and expanded to satisfy users' needs. The following maps of Denmark are also available:

- Map with street names: 1:4000 and 1:10.000
- Road Maps: 1:200.000
- Site Maps: 1:3.200.000
- Maps of Greenland: 1:500.000 and 1:250.000 as well as Map of Faroe Islands: 1:100.000
- Historic maps

TOP10DK (available since 2000) is a complete GIS (topographical) database with 46 themes, covering all of Denmark at a scale of 1:10 000. From the TOP10DK several categories of data collections and maps (scales) are derived. In 2002 the KMS has made available a web-based Map Supply Service to provide a sort of geo-data infrastructure to the user community (note: this service is not offering a SDI solution on its own).

The municipalities have to their disposal "digital maps" with a one meter resolution in rural areas and 0,1- 0,2 meter resolution in urban areas.

The cadastral information is available at: http://kmswww3.kms.dk/kortpaanettet/findmatrikel.htm

Maps for Printing can be found at: http://www.kms.dk/Sepaakort/Kort+til+print/

2.4.2 Data by resolution or scale range for the INSPIRE themes

The geographical reference data presently available in the KMS [3]:

- 2D reference system - as included in the cadastral database and in the topographic databases;

- Elevation - all over Denmark in digital form;

- Units of land rights - digital form as smallest unit of spatial identification;

- Addresses - in digital form;

- Road network   - as included in the topographic database;

- Railway network - as included in the topographic database;

- Hydrography - as included in the topographic database;

- Units of administration - as included in the cadastral database;

- Postal Boundaries - information not available.

Public digital registers in use in Denmark include: Cadastral register (which forms the basis of the Land registry and the Communal property data system); Building and housing register; Communal property data system; Planning register; Central population register; Sales and valuation register; Central enterprise register; General agricultural register; Central domestic animal register; Area information system (AIS); Central forest register; Building Preservation Register; National health register; Information system of the road sector (VIS); etc.

The *cross-reference register* containing the relations between the main identifiers, such as the cadastral number, the property number, the address, secures the connection between the various registers and databases.

Several address themes are presently in use in Denmark:

- DAV, the Danish Address Road Register, which is produced by a private company;

- The "Address Project" which is cooperation project between municipal authorities and the KMS. All municipalities have registered one set of X-Y coordinates for all "front door addresses" in the country;

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[3] Information from the Briefing Notes provided by Mike Clark.

- "FLAT" is a product offered by the KMS, it is an address based theme based on the digital cadastre map;
- DD0 a private produced colour orthophoto map,
- KMS geo-referenced building ids.

Regarding the three INSPIRE annexes addressing the 34 spatial data themes, Denmark is providing discovery and view services for most of them while a number of them can be also downloaded. 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

Spatial referencing of most GI-products in Denmark is done using either UTM or System 34. The System 34 is used for all the cadastral mapping and for most of the technical mapping. It is a 2 dimensional coordinate system of X-Y, and is based on the National Geodetic Reference Network "GI Network". System 34 is divided over two different physical zones: Jutland and Fuen, and Sealand. The Island of Bornholm has its own coordinate system, System 45, which is similar to System 34.

The geodetic datum used can be one of the following:

- System 34,
- WGS84 /ETRS89/ EUREF89,
- ED50.

The KMSTrans is a programme made available (download or web-service) to translate coordinates between a number of global and regional coordinate systems and datum.

For the territory of Denmark (note: not including Greenland or the Faeroer islands) the height references can be either ellipsoidal heights or orthometric heights. Geoid models are made available to manage the conversions. The Ellipsoids used in Denmark are GRS80 and Hayford 1924.

The official Danish datum is UTM/EUREF89 (UTM/ETRS89) and DVR90 (Dansk Vertikal Reference 1990).

2.4.4 Quality of the data

The KMS conducted in 2000 a detailed customer survey. The perspectives of the customer included the demands and expectations for Internet services for GI.

Many of the authorities contained in the geographic infrastructure have their own quality assurance procedures. KMS is using quality assurance procedures based on ISO standards for geographical data as well as for their metadata (ISO 19115, 19139).

2.4.5 Interoperability

There is a national exchange format for geographic information known as the DSFL format. The DSFL format has been made available in Denmark since 1983. This is also known as the TK-99. The format is primary used between professional map producers.

Different GIS-software is used in the different organizations and institutions that make up the so called de facto NSDI, including ESRI and MapInfo products.

To support interoperability The Spatial Data Service Community in cooperation with Geoforum has launched:

- "VMS cookbook" (Vejledning i anvendelse af WEB Map Services), 2003;
- "WFS cookbook" (Vejledning i anvendelse af Web Feature Services), 2004;
- GML basis geometrier (GML basic geometries), 2004;
- FOT specification (approved specification of shared object types), 2004;
- Basisdata (guidelines and analysis model for categorizing of basic data), 2004.

Other work is done:

- OIOXML (public standard for naming and design of public XML schemas)
- Infostrukturbasen (public repository for xml schemas)

GMLv30.dk standard

The OIO (Public Information Online)-data standardisation committee has approved the GMLv30.dk exchange format.

http://www.oio.dk/dataudveksling/OIOXML/afsluttede/GML3V0.dk

Sector standardisation

The Ministry for Science, Technology and Innovation, responsible for the standardisation and interoperability, www.videnskabsministeriet.dk/site/frontpage, www.oio.dk, http://www.e.gov.dk/ encourage the different sectors to establish sector standardisation committees. The Ministry of environment and the Ministry of Food, agriculture and Fisheries have followed the recommendations. Information from the last mentioned ministry is available on www.fvm.dk/Default.asp?ID=17208

Open Standards

In June the Danish parliament decided that the government should ensure that the public administration from 2008 based its developments on open standards and that data can be exchanged via well documented standards.

www.folketinget.dk/Samling/20051/beslutningsforslag/B103/index.htm

2.4.6 Language and culture

Metadata was provided as an Internet accessible service. The old site (http://www.geodata-info.dk/index2.asp) now transferred as www.inspire-danmark.dk offered two languages: Danish and English, although not all metadata files are offered in both languages.

In addition the KMS has released Internet service KMS Map Supply. OGC web map specifications (WMS) were used along with supporting HTML and XML-based services for geo-coding and projection transformations.

The regional and local level organizations only distribute their information in Danish and it's unlikely, that they also will distribute information in other languages due to the financial situation.

2.4.7 Data Content

FIR

2.4.8 Geographical names

The KMS has established and maintains a database with official place names.

2.4.9 Character sets

Danish uses some special characters (æøåÆØÅ) which can cause problems.

2.4.10   Conclusions of Component 3

Already from the previous DK'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. The INSPIRE 2010 MR confirms the statement. 48 data sets have been reported most of which belong to Annex I and Annex III (4 belong to Annex III). To support interoperability The Spatial Data Service Community in cooperation with Geoforum has launched a number of cookbooks for various aspects. Many of the authorities contained in the geographic infrastructure have their own quality assurance procedures. KMS is using quality assurance procedures based on ISO standards for geographical data as well as for their metadata (ISO 19115, 19139). The www.inspire-danmark.dk offers two languages: Danish and English.

Based on these conclusions we score the indicators as follows:

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

- 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

Metadata is available for most reference geodatasets. There is metadata on almost 1300 datasets and/or databases in the central Danish metadata service www.geodata-info.dk. A data-set could be data on an object in a limited part in Denmark or a database with nationwide collections of a number of geological information (see separate spreadsheet). The state agencies are responsible for 168 of the metadata entrances. The former counties have created metadata for around 1040 datasets and the municipalities about 40. One result of the 2007 structural reform was the transformation of 14 counties into 5 regions and 271 municipalities into 98. In addition seven regional environmental departments were established. An essential part of the available environmental data was amalgamated in one environmental database. The belonging metadata has not been reconfigured.

The metadata service is a discovery service, without viewing functionality. A majority of the information is ISO-compliant. Users can get an overview of the custodianship to the different themes in the attached document, DK-data-theme stakeholders.

The English version of the metadata service is not in function at the moment.

2.5.2 Metadata catalogues availability + standard

The main example is the old Danish metadata base (Geodata Info) which was based on the CEN/TC 287 standard, and is to comply with the ISO TC211 standard.

In 1994 the KMS published the first version of the Infodatabase on Geodata. The purpose of the Infodatabase was to create an electronic catalogue describing -in a uniform way- digital maps and other collections of geodata from public and private data producers. The metadatabase (www.geodata-info.dk) gave a CEN/TC 287 based overview of each dataset, and where to get further information about the dataset. Over 40 organisations had provided descriptions of more than 1100 datasets. KMS has the responsibility for running the service. However, the www.geodata-info.dk web address is not valid anymore. The new version of geodata will be launched in the summer of 2010 via the www.inspire-danmark.dk website. Moreover, the data that previously could be retrieved from the county land information systems are guaranteed under the Danish Environmental Portal at www.miljoeportal.dk.

The metadata follow the ISO 19115 standard and their incorporation can be done via XML.

2.5.3 Dublin core metadata standards for GI-discovery

Denmark has not implemented the Dublin core because it does not support spatial data in a sufficient way.

2.5.4 Metadata implementation

Metadata sets are made available via the Internet in HTML files and in XML-format.

The KMS is the coordinating authority for metadata implementation.

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 (52% of the data sets have metadata). The new version of geodata will be launched via the www.inspire-danmark.dk website. Moreover, the data that previously could be retrieved from the county land information systems are guaranteed under the Danish Environmental Portal at www.miljoeportal.dk. The KMS is the coordinating authority for metadata implementation.

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

2.6 Component 4: Network Services

The National Survey and Cadastre has developed a new cadastral registration and information system that is based on Service Oriented Architecture.

The new system is based on Service Oriented Architecture. All data to and from the private licensed surveyors including spatial data is transferred digital via XML.

The Ministry of Justice has invited tenders for a new land registry system that make it possible for professionals as well for the citizens to update the system via "self-service".

Three general services could be highlighted:

1. The Ministry of Environment (KMS): the Map Supply (kortforsyningen)

2. A public-public partnership between the Ministry of Environment and the municipalities: the Environmental Portal.

3. The Ministry of Economic and Business Affairs (EBST): the Public Information Online (OIS)

Number 1 and 2 provides access to data via WMS and WFS services.

The Map Supply is widely used by private business as well as public applications. At the moment there are 5.000.000 hits every month (approx. 2. every second). The Map Supply offer access to data (coordinate reference systems, cadastral data, addresses, topographic data including historical versions), as well as functionality (coordinate transformation, key-search). You can get an impression of the functionality on www.kms.dk.

Cadastral and land formation

"Matriculation" is the basis for property registration in Denmark and represents an important part of management foundation in public administration. "Matriculation" consists of the land registry, cadastral map and cadastral archive (

http://kmswww3.kms.dk/kortpaanettet/index.htm?map=mat).

The Environmental Portal has been available for the public as well as professional users since January 2007.

The portal provides access to:

- Area-data: information on the landscape, water catchments, agriculture and planning data
- Water-environment data
- Nature data

The Public Information Online is a homepage that provide access to property data, data on buildings and related data. There were 875.000 logins in 2007 without password and 75.000 with pass word (digital signature).

2.6.1 On-line access service for metadata: discovery services

The most general on-line access service for metadata on reference data and core thematic data is the National metadata service at http://www.geodata-info.dk/. The metadata is offered in Danish and partly in English. The new version of geodata will be launched in the summer of 2010 via the www.inspire-danmark.dk website.

2.6.2 On-line access service for data: download services

From http://www.miljoeportal.dk/Arealinformation/Vejledninger/, users can download data from the Danish Area Information in both MapInfo tab format and ESRI shape format. Users are able to download a rectangular section of the map up to 600 km ^{2} and maximum 5 themes at a time.

Data for download:
- . Antiquities, Protected areas and protected areas proposal.
- Forest Construction Line, Church Construction Line, Protected stone and earth embankments.
- Protected habitats and protected streams.
- Natura2000 areas.
- Natural Data: Inspection, DEVANO and NOVANA.
- Coastal Proximity Zone.
- Drinking of interest, nitrate-sensitive water catchments.
- Pearls, wetlands, agri-environmental areas, sensitive agricultural areas, nitrate classes, phosphorus, ammonia buffer zones and set-aside / fallow land.
- Area Classification (soil).

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

Metadata and reference or core thematic data are not linked to the extent that much of the data are not directly accessible on-line.

2.6.4 Open Source software for access services

There are several installations of UN Mapserver. One is run by the Danish Ministry of Environment with planning data (and a WMS service).

2.6.5 Availability of viewing services

The KMS has the web based services MapService (Kortforsyingen) that gives access to the topographic database TOP10DK and vector based cadastral maps and some raster

based topographic maps and the FLAT addresses. The services are based on the OGC Web Map Service standards.

MiniMAKS, a new cadastral application based on SOA and e-TL, digital and automated Land Registry also based on SOA, are new examples of viewing service developments.

The environmental portal http://www.miljoeportal.dk is another example.

The Kortserver for municipal maps (at the large scale) is based on OGC and GML standards.

There is a draft WMS cookbook (produced by Geoforum on behalf of the Spatial Data Service Community) and several experimental solutions. There is also a few experiments with WFS.

PlansystemDK provides plans under the Planning Act, i.e. local plans, municipal plans, etc.. (**http://www.plansystemdk.dk/**)

The system is coordinated with the National Environmental Portal and is responsible for the quality of:

1. local plans (and urban planning regulations and other historical plans)
2. municipal plans
3. municipal environment (areas which form the framework for local plans)
4. the municipal
5. commune strategies
6. Zone map - urban and rural areas and cottage areas

The State has responsibility for other level themes that appear in the system, for example:

1. coastal zone (about 3 km wide planning zone along the coast outside the urban zone)
2. shore protection line (300 m protection zone along the coasts)

PlansystemDK contains:

1. Information on the plans (identification and properties)
2. the applicable plan document (pdf format).
3. plans area (geographic extent) shown on map.
4. search options for plans, addresses, land registers etc..
5. opportunity to search for the plans that apply to one address, a plot or a marked area

6. opportunity to get plans (download)

All data from PlansystemDK displayed in the map projection UTM zone 32 EUREF89.

Data provided in WMS version 1.1.0 at the following address: http://kort.plansystem.dk/wms?servicename=wms

The data offered in the "get capabilities" at this address: http://kort.plansystem.dk/wms?servicename=wms&request=getcapabilities&service=wms

Municipalities can now drag FOT data directly from FOT2007 as WMS and WFS via KMS 'new municipality package.

With the user profiles that are distributed to municipalities in the municipality package, is now also opened to access to the three services that retrieves FOT data. These will provide the same data content that FOT-browser solution provides.

The following services are now available:

Service Type	Service Name	Service Title
WMS	fot2007	FOT 2007 (WFS 1.1.0 GML SFP Level 1)
WFS	fot2007	WFS with FOT data
WFS	fot2007_gml212	fot2007_gml212

It is possible to see what services that can be called from a user profile by entering: http://kortforsyningen.dk under "Tools" and then "What services can I access?"

(http://www.fotdanmark.dk/)

The list of municipalities with data in FOT is available at: http://www.fotdanmark.dk/Materiale/Files/20100428_FOT2007oversigt.pdf

2.6.6 Conclusions of Component 5

The most general on-line access service for metadata on reference data and core thematic data is the National metadata service at http://www.geodata-info.dk/. The metadata is offered in Danish and partly in English. The KMS has the web based services MapService (Kortforsyingen) that gives access to the topographic database. From http://www.miljoeportal.dk/Arealinformation/Vejledninger/, users can download data from the Danish Area Information in both MapInfo tab format and ESRI shape format. Users are able to download a rectangular section of the map up to 600 km ^{2} and maximum 5 themes at a time.

Based on these conclusions we score the indicators as follows:

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

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

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

- <u>There are one or more transformation services enabling spatial datasets to be transformed to achieve interoperability (No information found)</u>

- <u>There are middleware services allowing data services to be invoked (No information found)</u>

2.7 Component 6: Thematic environmental data

The Danish Nature and Environment Portal (DMP) is a result of the municipal reform and was established on January 1st 2007, as a partnership between the National Association of Local Authorities in Denmark, Danish Regions and the Ministry of the Environment. The aim is to ensure mutual access to a number of data on the environment, to develop new mutual data areas, as well as enhancing mutual digital administration - benefiting all environmental authorities, as well as the public in general.

Presently, DMP manages mutual data solutions for the authorities on the surface water area, the subsoil water area and the nature area, as well as a mutual public Area Information.

DMP is headed by a board, consisting of two members from each of the partners and an observer from the Digital Task Force under the Ministry of Finance. The annual budget is approximately 40 million DKK of which about 25 million DKK covers the management of DMP (salaries, rent and operation of data solutions) and approximately 15 million DKK is allocated development. DMP is not a statutory office, but a secretariat based on a voluntary collaboration with an appurtenant agreement on responsibility of data after which the parties commit themselves and each other to share specified data on specified parts of the Danish Environment and Nature Portal.

DMP is in the process of implementing service-oriented architecture (SOA), as the main concept (http://www.miljoeportal.dk/English/).

The Environmental portal has established its own standardisation committee including 13 members from all the different organisations (http://www.miljoeportal.dk/Om/Sektorstandardisering/Medlemmer.htm).

2.7.1 Legal framework and funding

see 2.7

2.7.2 Nature of thematic environmental data

The Department of Freshwater Ecology participates in NERI's GIS and Remote Sensing activities and supports NERI projects with the design of spatial databases, and the collection, analysis and presentation of geographic data. The department is developing the Area Information System (AIS) for the Ministry of Environment and Energy in cooperation with the major data collecting institutes in Denmark. The first version of ARI was launched in 2000, and the Internet site is now available.

http://www.dmu.dk/1_Viden/2_Miljoe-tilstand/3_samfund/AIS/index_en.htm

Downloading AIS data free of charge is possible in different formats:

- ▪ ESRI Shape files,

- ▪ MapInfo files.

The complete dataset can be ordered on CD-Rom format (5 CDs) at a price of just over 200€ The order form is available for download on the internet. The form must be filled in and singed by hand and then faxed to the responsible office in Denmark.

The data are subject to copyrights and the data can only be used for non-commercial purposes. The source should always be cited when using the AIS data AIS data sets are provided on an "as is" basis, and the producer and supplier in no way accepts the responsibility for damages or loss arising from the use of the data. The user is also advised that data sets originating from Danish municipalities, counties or agencies may differ from the original data sets as supplied.

The user is cautioned regarding the quality and fitness for use of the data, in that if precise and actual demarcation and administrative status is required for a given area the responsible administrative authority must be contacted. Direct links are available to all the project partners including the different Counties.

The AIS dataset is collected during a long period and represents the situation in the mid 1990'es. There is no agreed plan for updating.

2.7.3 Metadata issues

The Ministry of Environment has made available the Danish Area Information System (AIS) via the Internet. The AIS includes spatial datasets that can be downloaded and metadata descriptions for each data set. The metadata is provided in Danish only and is available in PDF format. (http://www.dmu.dk/1_Viden/2_Miljoe-tilstand/3_samfund/AIS/3_Metadata/metadata_en.htm).

2.7.4 Access services

Internet access includes the following:

- ▪ Land Use Map

- ▪ Land Cover Map:

- ▪ Land Cover Plus:

- ▪ Classification of urban areas:

  - ‐ 100x100m grid

  - ‐ Special theme identical to the preceding except that cells with identical values are merged to one single polygon when they share a border.

- ▪ Depth model for Danish inner waters:

  - ‐ Tin model

- - Depths grid
  - - Depths curves
- Coastal and country borders I
- Coastal and country borders II
- Coastal and country borders III
- Sea around Denmark
- Hydrology
  - - Streams:
  - - Lakes
  - - Small lakes and ponds
  - - Actual wetlands
  - - Catchments demarcations:
  - - Gauging stations
- Planning
  - - Urban Zones
  - - Village demarcations
  - - Landzone local plan
  - - Summer residential areas - Planned
  - - Summer residential areas - Agreed outside planned areas
- Nature- and culture protection
  - - Protected nature types (§3)
  - - Nature- and wildlife reserves
  - - EU-Habitat areas4
  - - EU protected bird areas5
  - - Ramsar areas6
  - - National reserves
  - - Church reserves
  - - Area reserves

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4 If you want to be sure to get the newest version you have to download from Natura2000

5 If you want to be sure to get the newest version you have to download from Natura2000

6 If you want to be sure to get the newest version you have to download from Natura2000

- Area reserves - Proposal

- Line reserves

- Line reserves - Proposal

- Point reserves

■ Resources

- Drinking water sources

- Sea bed raw material areas

■ Polluted areas and major technical installations

- Waste disposals

- Windmill areas

- Windmill areas mentioned in municipality plans

- Windmill areas not mentioned in municipality plans

■ Tourism

- Camping sites

- Youth hotels

- Hotels

2.7.5 Application of standards issues identified for reference data and core thematic data to thematic environmental data

The KMS represent the Danish Standards in CEN and ISO on all Spatial Data related activities. The Spatial Data Service Community has standards in its actual work program.

2.7.6 Update procedures

NIA

2.7.7 Conclusions of Component 6

The Ministry of Environment has made available the Danish Area Information System (AIS) via the Internet. The AIS includes spatial datasets that can be downloaded and metadata descriptions for each data set.

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

See also 2.7.

Local Government Denmark has completed the project "Open standards for spatial data". The study concluded that considerable savings can be achieved among the municipal governments through the further standardization of geodata. The next step will be to establish models for spatial data infrastructure standardisation in order to improve the efficiency of municipal systems and operations.

KMS is using international standards (ISO and OGC)

2.8.1 Conclusions of Component 7

The KMS represent the Danish Standards in CEN and ISO on all Spatial Data related activities. The Spatial Data Service Community has standards in its actual work program. KMS is using international standards (ISO and OGC).

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

The Danish NSDI activities are mainly based on co-operation, partnership, voluntary involvement and development in nationwide spatial products (Brande-Lavridsen, 2002).

In the autumn of 2001 the Digital Task Force[7] carried out an analysis of the geo-data field. The conclusions of the analysis included the following observations. Denmark has a good number of basic registers in place and large investments have been made in digitising of map products. On the other hand, the existing cooperation structures in the field of spatial data are too informal to achieve the most expedient utilization and production of spatial data across authorities; also it has not been possible priorities to the different issues that have arisen.

By the following year the Digital Task Force had established the Geodata Service Community, with the aim to improve the developments in the spatial data field: http://www.e.gov.dk (Brande-Lavridsen, 2002).

Work towards the NSDI in Demark had positive impacts to identify and reduce duplication or wasting of effort.

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[7] The Digital Task Force is financed by the Danish gouvernment and will have a 3 year period (2001-2004) in which to be the catalyst for the development of digital management (e-gouvernment) in Denmark.

Analytically a number of examples are presented below.

In the Emergency Management area, geodata has become a routine tool for handling crises and emergencies. The National Operative Staff (NOST) makes use of geodata to an increasing degree. Together with other information, geodata contribute to a common operational picture based on which all involved authorities can react. With the establishment of SINE (the Emergency Management's security network), individual emergency management authorities are now also able to access geodata and to use GIS in the execution of their work.

These authorities' control room systems can be equipped with GIS, which enables the continual display of their own data on a map as well as those of other authorities.

SINE (the security network) is the Emergency Management's new shared radio system that ensures a basis for better collaboration and coordination between authorities involved in managing an emergency.

SINE consists of:

- The Radio Net, which is the infrastructure in the new radio system

- Terminals or radios, which are used for the actual communications

- Control room software, which is used for controlling the communication between an emergency management unit's central control room and its staff or units in the field. Extra functionality such as GIS can be utilised as an add-on. GIS integration enables continuous display of resources on a map, as well as integration with other digital data.

Digital Map Supply

The Digital Map Supply is the business and technical framework for the National Survey and Cadastre's distribution of maps and geodata via the Internet. There continues to be a growing demand on the Digital Map Supply, coming partly from a large number of requests from the Danish Nature and Environment Portal, where the Digital Map Supply supplies the maps of environmental data for public administration and the public in general.

Over the course of 2008, the Digital Map Supply has developed towards integration with the new cadastral system (MiniMAKS) and the shared geodata from FOT. There has also been emphasis on how to combine the Digital Map Supply with new services such as "Show the location". In 2009, this focus will continue as relates to the development of a Georeference Database5 and the distribution of digital maps from the archive.

The Public Information Server

The Public Information Server (OIS), administered by the Danish Enterprise and Construction Authority (EBST), maintains a vast amount of information on properties in Denmark. Using OIS, property owners have free online access to their own data, and businesses gain access to digital property data. In 2008, the EBST has worked to incorporate new data sets from energy labelling schemes and the planning system. It has also modified how data are distributed. In addition, it is now possible to retrieve property owners' notices from the Building and Dwelling Register (BBR) through OIS. Preparatory work has been undertaken with the OIS' interfaces to the new BBR as well as the Property Register.

NOST (the National Operative Staff) is the coordinating body between the defence, police and other civil authorities for large incidents, catastrophes, crises and security threats, including incidents of terrorism in Denmark. Led by the National Police, the staff obtains and maintains an overview of a given situation in order to generate a basis for decision-making, coordination and the prioritisation of task execution and resources.

Vis Stedet ("Show the location") and Vis Kort ("Show map")

The web services "Show the location" and "Show the map" were launched in 2009. Both are designed to display maps with a variety of thematic data such as the location of day nurseries, schools, health clinics, etc. Supplementary information can be displayed about each of the institutions shown on the map. "Show the location" and "Show the map" were developed to encourage the re-use of methods and solutions, and to reduce the costs of owning and operating internet portals. They operate in open source environments, making it easier for users to incorporate them into their own projects. Borger.dk and klimaportalen.dk have both integrated "Show the location" and "Show the map" into their websites. Local Government Denmark is also working on a "Show the plan" service, which will draw from the existing web services, while a number of additional authorities and municipalities already feature the "Show the location" and "Show the map" functionalities on their websites.

Moreover, the http://digitaliser.dk/ is a social network for developing sharing and discussion of the digitization of Denmark. www.digitaliser.dk is a social network and tool for development, knowledge sharing and a forum for the digitisation of Denmark. The literal translation is Digitise.dk.

Digitalisér.dk aims to stimulate development and adoption of digital content and business models by utilising Web 2.0 technologies and public data and digital resources. With digitaliser.dk, the Danish government has created a new model of partnership between the tech community and government which paves the way for more direct communication between the public sector, citizens, and businesses.

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3 Annexes

3.1 List of SDI addresses / contacts for Denmark

Table: SDI contact list			
SDI Name (full)	Web address	Organisational mailing address	Over-all contact person: tel./fax/e-mail
National			
Geoforum Danmark - er dannet ved en fusion imellem DSFL, DKS og DAiSI.	http://www.geoforum.dk/Kontakt-os.aspx	Geoforum Danmark Geoforum Danmark Kalvebod Brygge 31-33 1780 København V	Kontakt sekretariatschef Jesper Skovdal Christiansen jes@geoforum.dk general e-mail: geoforum@geoforum.dk Tel.: +45 38 86 10 75 gsm: +45 29 66 70 07 Fax: +45 38 86 02 52
KMS – Kort & Matrikelstyrelsen	http://www.kms.dk/	National Survey and Cadastre Rentemestervej 8 DK-2400 Copenhagen NV	Poul Daugbjerg, Product Development Departmant pd@kms.dk Tel.: +45 35875050 Fax: +45 35875051
NERI	http://www.dmu.dk/1_om_dmu	P.O. Box 358 Frederiksborgvej 399 DK-4000 Roskilde	E-mail: dmu@dmu.dk Tel.: +45 46 30 12 00 Fax: +45 46 30 11 14
AIS – in the Ministry of Environment	http://www.dmu.dk/Udgivelser/Kort_og_Geodata/AIS/	P.O. Box 358, Frederiksborgvej 399, DK-4000 Roskilde	Tel.: +45 46 30 12 00 Fax: +45 46 30 11 14
Spatial Data Service Community	http://www.xyz-geodata.dk/	Rentemestervej 8 2400 København NV	Tel.: +45 72545000
Den offentlige Informationsserver	http://www.ois.dk/	Erhvervs- og Byggestyrelsen Dahlerups Pakhus Langelinie Allé 17 2100 København	

3.2 List of references for Denmark

Table: list of references used to compile the Country Report	
Web sites:	
National Environment Research Institute	http://www.dmu.dk/forside_en.asp [1]
Joint board	http://www.e.gov.dk/sitemod/design/layouts/default/index.asp?pid=1710 [2]
Local Government Denmark	http://www.kl.dk/201842/[3]
The Association of Councils in Denmark	http://www.arf.dk/English/Frontpage.htm[4]
IT Technical Centre	http://www.arf.dk/English/Frontpage.htm [5]
Digital Task Force	http://www.e.gov.dk/sitemod/design/layouts/default/index.asp?pid=1720[6]
Geodata-info – metadata catalogue of spatial data (out of date since 1999)	http://www.geodata-info.dk/ig-about2.htm [7]
Department of freshwater ecology – GIS and remote sensing (AIS)	http://www.dmu.dk/1_om_dmu/2_afdelinger/3_fevo/4_expertise/5_gis/default_en.asp [8]
Geoforum Danmark	http://www.geoforum.dk/ [9]
Areal Information System (AIS)	http://www.dmu.dk/1_Viden/2_Miljoe-tilstand/3_samfund/AIS/index_en.htm [10]
Danish regions	http://www.arf.dk/English/Frontpage.htm [11]
Geodata Danmark (private company)	http://www.gis.dk/index.jsp [12]
Portal to Danish maps on the Internet	http://www.kommunekort.dk/ [13]
NetPortal with geodata for Denmark	http://www.netgis.dk/nyheder.jsp[14]
Geological Survey of Denmark	http://www.geus.dk/geuspage-uk.htm[15]
Glossary of GIS terms in Danish (with English reference)	http://www.geodata-info.dk/greenland/lists/ig-wlist.htm [16]
National Survey and Cadastre	http://www.kms.dk/index_en.html [17]
Nordjyllands AMT	http://www.nja.dk/Forside.htm [19]

Viborg AMT	http://www.viborgamt.dk/Vibamt.nsf/frameset/miljoogveje?opendocument [20]
Ringkjøbing AMT	http://tm.ringamt.dk/arealinformation/[21]
Sonderjyllands AMT	http://www.gis.sja.dk/lodsejerjava/infokort.htm[22]
Ribe Amt	http://www.gis.ribeamt.dk/[23]

Publications:	
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	When de Montalvo, Uta (2001). "Strategies for SDI implementation: A survey of national experiences. Paper presented at the 5th Global Spatial Data Infrastructure Conference, 21-25 May 2001 [33]
	GINIE - GI in the Wider Europe Complete Book, October 2003 http://wwwlmu.jrc.it/ginie/doc/ginie_book.pdf

	[34]
	S.S.Dael, P. Frederiksen & L.T. Jørgensen (2008). THE DANISH WAY TO A NATIONAL SPATIAL DATA INFRASTRUCTURE. The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences. Vol. XXXVII. Part B4. Beijing 2008
	Jes Ryttersgaard (2008).The Danish e-Government Initiative versus INSPIRE Implementation: Synergy or Conflict? GSDI-10 St. Augustine, Trinidad February 25-29, 2008
	Ulla Kronborg Mazzoli (2009). Creating Synergy Between INSPIRE and eGovernment inDenmark. The Third INSPIRE Conference will take place in Rotterdam, the Netherlands, 15-19 June 2009
	Olav Eggers (2009). Implementation of Inspire in Denmark -Howwegetit flying! The Third INSPIRE Conference will take place in Rotterdam, the Netherlands, 15-19 June 2009,
	Infrastructure for spatial data in Denmark Review. Available at: http://www.kms.dk/NR/rdonlyres/F9FAF5C3-743E-4D74-9DB8-B0B4D1D8D04F/0/KMS_Infrastruktur_2008_UK2low.pdf
	Infrastructure for spatial data in Denmark Review. Available at http://www.kms.dk/NR/rdonlyres/A8EE3B94-19D3-4B27-BC9E-C09C2D6A4BFA/0/KMS_Infrastruktur_2009_UK.pdf
	Location - a gateway to e-government. Strategic objectives 2007 – 2010.. Available at: http://www.kms.dk/NR/rdonlyres/D34ED37B-D759-46EB-BECF-EFF447823A91/0/Strategicobjectives20072010low.pdf