Spatial Data Infrastructures in *Denmark*: State of play Spring 2005

Country report on SDI elaborated in the context of a study commissioned by the EC (EUROSTAT & DGENV) in the framework of the INSPIRE initiative

August 2005
# Report meta-information

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<td>9.2</td>
<td>2005-08-05</td>
<td>Danny Vandenbroucke</td>
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Change matrix 2005 versus 2004

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<td>1.2</td>
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<td>2.2.5</td>
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<td>2.4.2</td>
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</tr>
<tr>
<td>2.4.4</td>
<td>Correction</td>
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<td>New information</td>
</tr>
<tr>
<td>3.1</td>
<td>Updated coordinates</td>
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Executive summary

In the 1990s, the development of spatial data, metadata and data discovery services in Denmark was considerable but relatively uncoordinated. Although presently there is no official policy on the development of an NSDI in Denmark, for the last few years a number of initiatives in the public sector and the positive outlook for the geo-data market have lead to a situation where a de facto, consensus-based NSDI is gradually being developed based on voluntary co-operation, partnerships, involvement in development of nationwide spatial products of various public actors at national, regional and local level and of the private sector.

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. Presently, KMS can be considered to be the technical nucleus of the non-formalised NSDI in Denmark.

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 Infostucturbase. 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 modeling 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”.

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<th>Description</th>
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<td>AIS</td>
<td>Area Information System</td>
</tr>
<tr>
<td>BBR</td>
<td>Building and Dwelling Register</td>
</tr>
<tr>
<td>CT</td>
<td>Core Thematic Data</td>
</tr>
<tr>
<td>DAiSI</td>
<td>Danish Academy for Spatial Information</td>
</tr>
<tr>
<td>DAV</td>
<td>Danish Address Road Register</td>
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<tr>
<td>DMI</td>
<td>Danish Meteorological Institute</td>
</tr>
<tr>
<td>DS</td>
<td>Statistics Denmark</td>
</tr>
<tr>
<td>ESR</td>
<td>Municipal Property Register</td>
</tr>
<tr>
<td>FIR</td>
<td>Further Investigation Required</td>
</tr>
<tr>
<td>FOT</td>
<td>Common feature definition</td>
</tr>
<tr>
<td>GEUS</td>
<td>Geological Survey of Denmark and Greenland</td>
</tr>
<tr>
<td>GI</td>
<td>Geographical Information</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographical Information System</td>
</tr>
<tr>
<td>GSDI</td>
<td>Global Spatial Data Infrastructure</td>
</tr>
<tr>
<td>INSPIRE</td>
<td>INfrastructure for SPatial InfoRmation in Europe</td>
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<tr>
<td>KMS</td>
<td>National Survey and Cadastre</td>
</tr>
<tr>
<td>NERI</td>
<td>National Environmental Research Institute</td>
</tr>
<tr>
<td>NIA</td>
<td>No Information Available</td>
</tr>
<tr>
<td>NSDI</td>
<td>National Spatial Data Infrastructures</td>
</tr>
<tr>
<td>OIS</td>
<td>Public Information Server</td>
</tr>
<tr>
<td>PSI</td>
<td>Policy and legislation on access to public sector information</td>
</tr>
<tr>
<td>REF</td>
<td>Reference data</td>
</tr>
<tr>
<td>SDI</td>
<td>Spatial Data Infrastructures</td>
</tr>
<tr>
<td>VIS</td>
<td>Information system of the road sector</td>
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<tr>
<td>VMS</td>
<td>WEB Map Services</td>
</tr>
<tr>
<td>WFS</td>
<td>Web Feature Services</td>
</tr>
<tr>
<td>WMS</td>
<td>Web Map Specifications</td>
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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 report is 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 last version of the report (version 9). Some additional information on legal issues were integrated as well.

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.

---

\(^1\) 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; Coordination - 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.
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 schemaes)
- XML-committee (public committee who approve XML definitions and schemas)
- FOT specifikation (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

<table>
<thead>
<tr>
<th>Levels of SDI:</th>
<th>NUTS region name(s)</th>
<th>NUTS codes</th>
<th>Status</th>
<th>Spatial coverage: National</th>
<th>Spatial coverage: Region</th>
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<tr>
<td>National</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>KMS</td>
<td>Denmark</td>
<td>DK</td>
<td>Operational¹¹</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Regional</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Various County GIS</td>
<td>County level</td>
<td>DK</td>
<td>Operational²²</td>
<td>-</td>
<td>100%</td>
</tr>
<tr>
<td>Local</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Municipalities and</td>
<td>Municipal level</td>
<td>DK</td>
<td>Operational</td>
<td>Almost 100%</td>
<td></td>
</tr>
<tr>
<td>utilities</td>
<td></td>
<td></td>
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<td></td>
</tr>
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</table>

¹¹ 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.

²² All Counties have GIS datasets and Internet mapping services available [http://www.miljoportalen.dk/](http://www.miljoportalen.dk/) 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.

**For the time being the project runs until 2006.** 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.

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 eg 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.

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;
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 download 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.

Spatial data and GIS applications and services are well represented at the County level. The Counties base their administration and registrations on the products from the KMS (see Ryttersgaard, 2000) and commercial orthophotos.

All counties have web based GIS applications public available with identical services. Because the individual counties have dedicated solutions they are developing a shared service providing unified access to selected data. The counties will on January 1. 2007 bee replaced by new state driven centres and activities in the new municipalities.

Examples of the Counties with geo-information available to the public and using Web Mapping applications are given below.

**Nordjyllands Amt** The link ([http://arealinfo.nja.dk:8080/index.html](http://arealinfo.nja.dk:8080/index.html) in Danish) in section *Kort of luftfoto* of [http://www.nja.dk/Forside.htm](http://www.nja.dk/Forside.htm) brings the visitor to a series of web maps (presented using ESRI Map café) that offer various themes that have been overlaid onto a topographic map background. The themes can be turned on/off from the legend box, other features include zoom, pan, scale, coordinates, etc. Links are available for tips and advice to understand and use the map and also copyright information.
Other County examples include:

**Viborg Amt** (in Danish) offers information on the nature and environment, and has dedicated GIS server ([http://gis.vibamt.dk](http://gis.vibamt.dk)) with dynamic maps about regulations and plans ([http://gis.vibamt.dk/arealinfo/ai_map.asp](http://gis.vibamt.dk/arealinfo/ai_map.asp)), with download ([http://gis.vibamt.dk/arealinfo/ai_download.asp](http://gis.vibamt.dk/arealinfo/ai_download.asp)) with direct access to the environmental database ([http://gis.vibamt.dk/arealinfo/AI_Map.asp?Page=DAM](http://gis.vibamt.dk/arealinfo/AI_Map.asp?Page=DAM)) and with an experimental WMS ([http://gis.vibamt.dk/wms.htm](http://gis.vibamt.dk/wms.htm)).

**Ringkjøbing Amt**, offers both a Web based mapping application and data download. [http://tm.ringamt.dk/arealinformation/](http://tm.ringamt.dk/arealinformation/)
Ribe Amt offers the visitor Web based mapping and specifically has on-line metadata (in Danish) for the available GIS data used in the Web based mapping application.

http://www.gis.ribeamt.dk/
2 DETAILS OF THE DANISH NSDI

2.1 General information

There is no official policy on the development of an NSDI in Denmark. A number of initiatives however lead to a situation where the framework for a de facto NSDI exists. The Danish NSDI activities are therefore mainly based on cooperation, partnerships, voluntary involvement and development of spatial products.

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 fulfills 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.

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 has more than 100 organisational members and about 600 personal members. GeoForum Denmark’s mission is to encourage the wider use of spatial information in the Danish society.

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 Meterological Institute -DMI,
2.2 Component 1: Legal framework and funding

2.2.1 Legal framework and organisational issues

Since there is no official policy on the development an NSDI in Denmark, no SDI specific legal framework or strategy is in place. On behalf of the Ministry of the Environment KMS has established an INSPIRE DK-following group. Participants are representatives from the state, counties and municipalities.

2.2.2 Public-private partnerships

The KMS policy on the production of geodata is to seek the task solved in the most efficient way. Sub-contractors (e.g. private surveyors, mapping companies) are often used. In 2002/2003 the degree of sub-contracting is a ¼ of the total expenses.

The digital national topographic database TOP10DK, for example, was created in collaboration with private producers. It was nationwide by the end of 2000. All the intensive geodata and map users have bought TOP10DK.

The process of transforming the Danish cadastre into a digital form was also in close cooperation with the private sector. The digital cadastral maps were produced in cooperation with private firms. In fact, 80% of the map production was sub-contracted to 50 Danish firms. The conversion project was finalized in 1997.

The Spatial Data Service Community cooperates with the Geoforum on development of guidelines etc.

2.2.3 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.

The counties have made an agreement to distribute their datasets free of charge and nearly all has Web based download.

Directive 2003/4 has not been transposed into Danish law yet. Directive 2003/98 on the re-use of PSI has been implemented by Law no. 596 of 24 June 2005.
2.2.4 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.

2.2.5 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 not implemented Directive 2002/58 on privacy and electronic communications yet.

2.2.6 Licensing framework

Only the right to use data, not the data as such can be bought from KMS.

Recently the Ministry of Treasury, The Ministry of Environment, The Ministry of Custom and Tax, The County Association and The Municipality Association have entered into an agreement on the use and financing of digital addresses, cadastral maps, the cadastral register, the property databases and the taxation/valuation databases.
The agreement includes access to the updates of the cadastral maps free of charge for those authorities who have acquired a right to use the cadastral maps. The rest of the mentioned data is available for the authorities free of charge. The different users have to pay the distribution costs.

### 2.2.7 Funding model for SDI and pricing policy

The Danish funding model is a combined model that encompasses government funding and cost recovery. The total expenditure of KMS in 2005 is around 27 million Euro, of which about 1/2 will be covered by income from the market and 1/2 by the government.

KMS is inter alia 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 1999 KMS entered into the third “contract of results” with the Minister of Housing and Urban Affairs for the period 2000-2003. This means that KMS is obliged to reach certain goals within an agreed financial framework. The year 2000 was altogether a good year for KMS, which worked actively to realise the perspectives and the development and operational objectives of the contract of results. Out of eleven strategic objectives, nine have been reached while two were delayed. No information for the period later than 2000 was available.

KMS was created as a market oriented state enterprise and prepared for a life under conditions that are close to that of the private industry. User payments are therefore an important source of financing. Other public authorities also pay fees for the use of maps and other geodata obtained from KMS.

The pricing model of KMS is based on two elements. Firstly, you do not buy the data but you buy a right to use the data. The price is set according to the use by the demands of the customer. A municipality, for example, normally wants a user right so that they can use the data all over in the municipality for their normal obligations. Secondly, you pay the expenses for the delivery (e.g. extraction from the database).

Nationwide web-based access to the cadastre and the geodetic reference database has been possible for five years for registered users.

### 2.3 Component 2: Reference data and core thematic data

#### 2.3.1 Scale and resolution: European, National, Regional, Local, Other

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). Since the 1980s digital maps with accuracy of 1 meter have been produced. But these maps have been created for specific reasons and thus vary from region to region. Likewise the copyrights for
these various maps are owned by different organizations. Finally, these maps may contain some topological features but they are not topological maps in the true sense.

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 most recent product is TOP10DK (available since 2000) which 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.

2.3.2 Reference data and core thematic data by resolution or scale range

The geographical reference data presently available in the KMS:

- 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.

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

An important dimension for all of these registers is that they were not planned to provide data for purposes other than those which were laid down at the establishment of the register, and this can present certain limitations in how they will be used in an e-government setting (Brande-Lavridsen, 2002).

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 a 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;
- “FLAT” is a product offered by the KMS, it is an address based theme based on the digital cadastre map;
- DD0 a private produced color orthophoto map,
- KMS project is underway to establish geo-referenced building ids.

### 2.3.3 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).
2.3.4 Quality of the reference data & core thematic 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.

No other information regarding quality was discovered.

2.3.5 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 primarily 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 cookbokk” (Vejledning i anvendelse af Web Feature Services), 2004;
- GML basis geometrier (GML basic geometries), 2004;
- FOT specifikation (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)

2.3.6 Language and culture

Metadata was provided as an Internet accessible service. The old site (http://www.geodata-info.dk/index2.asp) 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.

2.3.7 Data Content

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

2.3.9 Character sets
Danish uses some special characters (æøåÆØÅ) which can cause problems.
2.4 Component 3: Metadata for reference data and core thematic data

2.4.1 Availability

Metadata is available for most reference geodatasets. But overall the situation for metadata appears to be not very well developed or maintained at this time. There is an ongoing project about updating the Geoinfo database with more datasets and to convert it from CEN to ISO.

2.4.2 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) gives a CEN/TC 287 based overview of each dataset, and where to get further information about the dataset. Over 40 organisations have provided descriptions of more than 1100 datasets. KMS has the responsibility for running the service.

2.4.3 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.

2.4.4 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 Component 4: Access and other services for reference data, core thematic data and their metadata

2.5.1 On-line access service for metadata of reference data & core thematic data

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/](http://www.geodata-info.dk/). The metadata is offered in Danish and partly in English.

2.5.2 On-line access service for reference data & core thematic data

Apart from the topographic data sets, much of the reference data and core thematic data is not available on-line (directly), but can be ordered on-line. The data will be sent out on CD-Rom for example.

2.5.3 Inter-linkages of on-line access services for metadata and reference data resp. core thematic 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.

2.5.4 OpenSource 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).

2.5.5 Availability of web mapping service(s) and of a WebMap server interface

It was not specified if ISO 19123 is used in all or even a few of the components that make up the so-called de facto NSDI situation in Denmark.

The KMS has the web based services MapService (Kortforsyningen) 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.

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.
2.6 Component 5: Standards

Included in other components.

2.7 Component 6: Thematic environmental data

This section provides information about the extent to which the (N)SDI-components which were identified for reference and core thematic data are applicable to thematic environmental data.

2.7.1 Legal framework and funding

NIA

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 AIS 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 signed 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_Miljøtilstand/3_samfund/AIS/3_Metadata/metadata_en.htm](http://www.dmu.dk/1_Viden/2_Miljøtilstand/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 areas 4
  - EU protected bird areas 5
  - Ramsar areas 6
  - National reserves
  - Church reserves
  - Area reserves
  - 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

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
- Youth hotels
- Hotels

2.7.5 Standards
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

2.8 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 Force7 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 Denmark will have positive impacts to identify and reduce duplication or wasting of effort. For example the NSDI may help to reduce the duplication of registration which is seen within certain areas, and is a result of organizational problems, e.g. (Daugbjerg, Brande-Lavridsen):

- Building features are found in a topographic map and in technical maps and in the register of buildings and dwellings;
- Some organizations may be unwilling to share or to coordinate data production;
- Data collected at the local level is not available on regional or national level or vice versa;
- Public authorities are acting as competitors.

Duplication is seen as an inconvenience to users as well as a potential waste of money.

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7 The Digital Task Force is financed by the Danish government 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.
### 3 Annexes

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

<table>
<thead>
<tr>
<th>SDI Name (full)</th>
<th>Web address</th>
<th>Organisational mailing address</th>
<th>Over-all contact person: tel./fax/e-mail</th>
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<tr>
<td>National Geoforum Danmark - er dannet ved en fusion imellem DSFL, DKS og DAiSI.</td>
<td><a href="http://www.geoforum.dk/geo/georam.htm">http://www.geoforum.dk/geo/georam.htm</a></td>
<td>Geoforum Danmark Postboks 218 Lindevangs Allé 4 DK-2000 Frederiksberg GIRO 1 23 06 62</td>
<td>Kontakt sekretariatschef Vagn W. Laursen. <a href="mailto:vwl@geoforum.dk">vwl@geoforum.dk</a> general e-mail: <a href="mailto:geoforum@geoforum.dk">geoforum@geoforum.dk</a> Tel.: +45 38 86 10 75 gsm: +45 29 66 70 07 Fax: +45 38 86 02 52</td>
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<td>KMS – Kort &amp; Matrikelstyrelsen</td>
<td><a href="http://www.kms.dk/index_en.html">http://www.kms.dk/index_en.html</a></td>
<td>National Survey and Cadastre Rentemestervej 8 DK-2400 Copenhagen NV</td>
<td>Poul Daugbjerg, Product Development Department <a href="mailto:pd@kms.dk">pd@kms.dk</a> Tel.: +45 35875050 Fax: +45 35875051</td>
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<td>NERI</td>
<td><a href="http://www.dmu.dk/1_om_dmu">http://www.dmu.dk/1_om_dmu</a></td>
<td>P.O. Box 358 Frederikborgvej 399 DK-4000 Roskilde</td>
<td>Tel.: +45 46 30 12 00 Fax: +45 46 30 11 14</td>
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<td>AIS – in the Ministry of Environment</td>
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<td>Spatial Data Service Community</td>
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<td>Kort &amp; Matrikelstyrelsen, the Ministry of the Environment</td>
<td>Tel.: +45 35875050 Fax: +45 35875051</td>
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<tr>
<td>Den offentlige Informationsserver</td>
<td><a href="http://www.ois.dk/">http://www.ois.dk/</a></td>
<td>Erhvervs- og Byggestyrelsen Dahlerups Pakhus Langelinie Allé 17 2100 København</td>
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## 3.2 List of references for Denmark

Table: list of references used to compile the Country Report

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<td>Geodata-info – metadata catalogue of spatial data (out of date since 1999)</td>
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<td>Portal to Danish maps on the Internet</td>
<td><a href="http://www.kommunekort.dk/">http://www.kommunekort.dk/</a> [13]</td>
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<td>NetPortal with geodata for Denmark</td>
<td><a href="http://www.netgis.dk/nyheder.jsp">http://www.netgis.dk/nyheder.jsp</a> [14]</td>
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<td>Glossary of GIS terms in Danish (with English reference)</td>
<td><a href="http://www.geodata-info.dk/greenland/lists/ig-wlist.htm">http://www.geodata-info.dk/greenland/lists/ig-wlist.htm</a> [16]</td>
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<td>National Survey and Cadastre</td>
<td><a href="http://www.kms.dk/index_en.html">http://www.kms.dk/index_en.html</a> [17]</td>
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<td>Nordjylland's AMT</td>
<td><a href="http://www.nja.dk/Forside.htm">http://www.nja.dk/Forside.htm</a> [19]</td>
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Viborg AMT  

Ringkjøbing AMT  
http://tm.ringamt.dk/arealinformation/[21]

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<td>Clark, Mike (2002). Briefing notes to the INSPIRE DPLI Working Group, Appendix A – EU Member States (brief1.doc). [27]</td>
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