Spatially Enabled Government in Europe as an basic ingredient for Spatially Enabled Societies

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1. INTRODUCTION

In the definition of Spatial Enabled Society (Wallace, 2007), Spatial Enabled Society is "a scenario for the future as we are in an increasingly complex and rapidly changing world, societies can be regarded as spatial enabled where location and information are regarded as common goods made available to citizens and businesses to encourage creativity and product development." The authors in the article explain that the vast majority of the public are users of spatial information. One of the statements in this article is to make existing spatial data infrastructures (SDI's) more appropriate for spatially enabling government and society. Four strategic challenges are formulated as an important milestone for the successful realization of SDI implementation towards spatial enabling societies and governments. These strategic challenges can be summarized as follows: SDI governance for broad stakeholder involvement, promotion of data sharing, creation of enabling platforms and capacity building. This chapter illustrates with examples that SDI governance and the use of spatially enabled platforms are fundamental conditions for successful partnership building in national EU Member States e-government programs. The entire issue of spatially enabled societies cannot be covered in one article due to the complexity of its theme. In the authors' vision, societies can also be spatially enabled without successful SDI's, because of the fast growing technological developments and the huge availability of spatial information from various media, mobiles, etc. National governments can, however, play an important role in providing successful SDI tools for the realization of efficient government performances as well as for business development and citizens' e-democracy issues. For that reason this article focuses on Spatially Enabled Government, as a crucial part towards optimizing the creation of a genuine spatially enabled society. More effort is needed hos the SDI-community can contribute to other communities to optimize the use of each others' spatial data, such as the space community and the data collected by voluntary communities. Convergence between these communities at the strategic and operational level is a basic condition for optimized Spatial Enabled Communities. (The spatial data community in a broad sense).

A government can be regarded as spatially enabled when location and spatial information are considered to be common goods made available to citizens and businesses to encourage creativity and product development (Wallace, 2007; Masser *et al*., 2008). Spatially Enabled Government is also defined as an innovator and enabler across society and a promoter of e-democracy. The Global Spatial Data Infrastructure (GSDI Association) works closely with the Permanent Committee on GIS Infrastructure for Asia & the Pacific (PCGIAP) in promoting the Spatial Enabled Government issue in the Asia Pacific Region. A common workshop was organized during the 13th PCGIAP meeting in Seoul, South Korea in June 2007. The heart of the workshop was the commencing dialogue in and a better understanding

of the concept of spatially enabled government, and to better comprehend and describe the legal and economic issues and policies involved (Kok *et al*, 2007; 2008)
Examples in Europe show that leadership, legal foundation, cooperation and commitment building platforms, communication visions and involvement in e-government programs are essential ingredients for successful SDI governance. These conditions will make current spatially enabled societies more aware of the use of reliable spatial information in a broader sense and context, at a time of huge information overload in our society.

2. SPATIALLY ENABLED GOVERNMENT IN EUROPE

Current practices in Europe show that National Mapping, Land Administration and Cadastral Agencies (NMCA's) are important actors responsible for the creation, coordination and implementation of SDIs at (sub)national and international levels.

One of the key elements for the strategic role of NMCA's in SDI development and implementation is the fact that they provide well-maintained and up-to-date data and services, which feeds a nation's economic development. NMCAs are subsequently catalysts for the development of SDIs. They stimulate the exchange of core data with other organizations in the public domain, as well as data sharing and data integration. These activities can only take place when they align with government authorities for organizational and institutional arrangements. NMCAs play a vital role in helping to embed these arrangements in (sub-)national e government plans. These activities lead to spatially enabled governments and the creation of an enabled geospatial society by arranging partnerships with the geospatial technology sector. In particular in Spain, The Netherlands and the Nordic countries, NMCA's play a central role in the establishment of spatially enabled platforms. In this way they fulfil a key link between the geospatial community and responsible ministers. This matchmaking role is important for the provision of SDI-tools to national e-government policies and decision making processes.

At the EU level, high progress has been made during the last ten years. The successful INSPIRE Directive is an excellent example of dialogue between networks of policy makers and various European and Member State geospatial communities. In July 2004, the INSPIRE Directive was adopted by the European Commission (EC). On 17 March 2007, the Directive 2007/2/EC of the European Parliament and of the European Council of 14 March 2007 establishing the Infrastructure for Spatial Information in the European Community (INSPIRE) was published in the official Journal (European Commission, 2007). The INSPIRE Directive entered into force on May 15th 2007. It was developed over a relatively short time span. The legal impact of this Directive on the EU member states is that they are obligated to transpose the INSPIRE Directive principles into their national legislations. It contains a legal framework for implementation in the EU member states. It defines specific data themes which need to be used, contains implementing rules for data specifications, metadata, network services, data and service sharing, and monitoring and reporting. This legislation also requires that each EU country sets up a national geo-portal to provide access to geospatial data, and services.
The principles of INSPIRE are similar to the ones used in national SDI-processes. This means that data should be collected once, be combined with data from different sources and be available on conditions that are not restricting its effective use. The SDI-processes are smoothly proceeding thanks to INSPIRE's general rules on establishing a European infrastructure for geospatial information for environmental policies purposes. These general rules are based on existing national SDIs and operated by the member states. In a broader context our impression is that the interaction between the development of the INSPIRE

legislation and the development of the implementing rules are proceeding well. It is a sophisticated and interactive approach between EU officials, professionals of the geospatial community, and NGO's throughout the European Union.

In the current stage of the implementation process, communication and interaction between the European Commission and EU member states is guaranteed by the INSPIRE Committee (IC), the National Contact Points (NCP) and the Initial Operating Capability Task Force (IOC TF). Their roles are respectively advising the European Commission in the adoption process of the Implementing Rules (IC), information provision in their EU countries related to the Directive and monitoring/reporting to the Commission on the implementation and use of their SDIs (NCP), and on the implementation of the INSPIRE Discovery and View Services (IOC TF).

At this moment, the European Commission has adopted INSPIRE's Meta Data Regulation, Network Services Regulation monitoring/reporting, and Regulation on Data and Service Sharing. Regulations regarding interoperability of geospatial data sets, and download / transformation services are currently in development.

The Spatial Application Division Leuven (2010) conducted a survey concerning the coordination, funding and sharing measures related to INSPIRE in EU member states, EU Candidates and EFTA countries. A detailed questionnaire was distributed in November 2009 related to the transposition of the INSPIRE Directive, its coordinating structures, strategies, funding measures and data/service sharing. The headlines of the survey's outcomes show that:

- About half of the EU member states have transposed INSPIRE in their legislations.
- Most of the problems during the transposition are related to institutional issues and coordination, the composition of platforms, the identification of the datasets in accordance with the INSPIRE legislation principles, INSPIRE data theme coverage, funding mechanisms and the lack of involvement of local governments.
- the variety of approaches dealing with legal, pricing, geospatial data policy issues across Europe is very high.
- the key successes of INSPIRE are manifold, such as the increase of geospatial/SDI-awareness, stronger drive for cooperation, legal basis, enhanced SDI capacity building and stronger support for e government.
- The NMCAs play a very active role in the INSPIRE implementation process.

Some European countries have contributed to INSPIRE's success through their excellent national SDI-initiatives. In many of these countries the availability of accurate and well-maintained land administration data, cadastral data, small scale and large scale topographic data sets provided by the NMCAs is the reason for the excellent SDI development and implementation processes. These registrations are essential for sustainable economic development at (sub-)national level and the stimulation of better governments. Active contribution from NMCAs forms a key factor for INSPIRE-success as they provide the core datasets of the Directive, the so-called Annex 1 data themes (e.g. coordinate reference systems, and cadastral parcels).

3. INTRODUCTION TO COUNTRIES

This section illustrates some successful SDI developments in EU countries and how NCMA's play a central role in the SDI implementation process. NMCAs have a leading coordinating role in these processes. Examples will show how the SDI became a vital part of their national e- government programs.

DENMARK

Denmark has a well-developed national SDI due to the fact that their national mapping agency plays a central strategic role in the creation of e government strategies and plans. The Danish E-Government Strategy 2007-2010 is described in the document "Towards better digital service, increased efficiency and stronger collaboration" and published by the Danish Government, the Local Government Denmark (LGDK) and the Danish Regions (2007). The key essential issue of this strategy plan is coordination and creation of digitalization of improvements in services to citizens and businesses, as well as coordination and prioritization of digitalization in the public sector through cross-governmental collaboration. An important interdisciplinary priority area in this Danish e-government strategic plan is the creation of a community service responsible for the development of a digital framework for Geodata in Denmark at decentralized and national level. The Danish Minister of Environment Troels Lund Poulsen launched his policy plan "Redegørelse om infrastrukturen for geografisk information" in 2008 as a part of this e-government strategy. It contains a geographic basic framework as part of the e-government strategy plan. It is also to be used as a basis framework for the Danish environment policy development, implementation and monitoring processes for the Government and Danish Society (Miljøministeriet, Kort & Matrikelstyrelsen / Danish Ministry of the Environment, National Survey and Cadastre, 2008). The Spatial Data Service Community chaired by the National Survey and Cadastre is the platform for linking the geospatial dimensions with the infrastructure for Denmark's e-government (Spatial Data Community Service, 2010). This group stimulates that the Digital Framework for Geodata will be used effectively by all stakeholders in the public domain, the business community and citizens. The National Survey and Cadastre is the central public source for geographic data. They are coordinator for the registration of geospatial information and the National Authority for the NSDI, which is identical to INSPIRE's definition. Article 19(2) of Denmark's Infrastructure for Spatial Information Act lays down that the National Survey and Cadastre is also responsible for the implementation of INSPIRE in Denmark and is designated as their contact point with European Commission. The Infrastructure for Spatial Information Act creates a connection to e-government. It was passed by the Danish Parliament in December 19th 2008 and came into force on May 15th 2009 (Danish Government, 2008; 2009).

NORWAY

The approach in Norway is very strategic. For more than twenty years the Norwegian Mapping Authority has been playing a leading role in the international standardization and innovation network. Partly based on this position, they developed a national SDI step by step in strong cooperation with other GI producers and regional and local authorities. The Norwegian Mapping Authority developed the virtual platform Digital Norway in cooperation with local and regional partners (almost 600 in total!) and introduced the Geodata portal Geonorge before the INSPIRE development started (Digital Norway, 2010). The participating institutions of Norway Digital bring their own data into the infrastructure. This information will be made available to all public producers, administrators and major national users of geographic information. The Norwegian Mapping Authority coordinates these activities. The Norwegian SDI policy plan and their implementation approach are laid down in the White Paper from the Norwegian Government approved by the Norwegian Parliament in 2003 (Norwegian Government, 2002). Digital Norway became a part of the Norway e-government. One of the objectives of the Digital Norway is the execution of their national Arealis Program. This is a Ministry of Environment Program focused on making environmental and land use information available at national, regional and local levels. The Norwegian Government's Policy Document for the Information Society Digital Norway (Norwegian

Ministry of Modernisation, 2005) became one of the 21 initiatives for the period between 2005 and 2007 to be coordinated with relevant ICT initiatives as part of Government's Action Plan for Modernisation. This means that the geographic maps and data need to be made available to all in an administrative partnership through a common gateway. This service will also be commercially available and as a free information source for the general public.

FINLAND

In Finland the uniform national topographic map 1:20,000 was launched in the 1950's (Artimo, 1992) and their first portal was launched in the 1990's (National Land Survey of Finland, 2010a). Based on their long experience, it was obvious that the National Land Survey of Finland (NLS) took the lead in the development of the national Finnish SDI. The National Geo Portal pilot was launched by the NLS in July 2009 (Leskinen *et al*., 2009). It can be considered the main access point for national - local geospatial datasets. A new version was launched in June 2010 (National Land Survey of Finland, 2010b). It is an important feature of the national basic information pool for e-government offering taxation, persons and corporate information. Because of their strong strategic network position and relationships with other agencies and regional authorities, the NLS fulfils the task of being secretariat for the National Council for Geographic Information according to the Law Geo-Information (Finnish Ministry of Justice, 2009). Members of the National Council for Geographic Information include 7 ministries, public agencies, cities, research institutes and private sector companies (Finnish Ministry of Agriculture and Forestry, 2010). The INSPIRE legislation has been transposed into Finnish legislation. The Government Bill for their SDI legislation was passed in June 2009 (Finnish Government, 2009a). The Act of January 2010 shows the SDI authorities (Finland's INSPIRE network) that need to be involved in the process (Finnish Government, 2009b). A broad range of state authorities are involved such as the Environmental Institute, National Land Survey, Meteorological Institute, Transport Agency, Geological Survey, Statistics Finland, Population Registry Centre, Agency for Rural Affairs, Natural History Museum, Game and Fisheries Research, Forest Research Institute, the National Forest Agency, the Food Safety Authority, Agriculture-Food Research, Agriculture and Forestry Information Centre, the Board of Antiquities, Defence Forces, Transport Safety Agency, the Institute for Health and Welfare, the Energy Market Authority and the Ministry of Employment and the Economy. As regional authorities 15 economy, transport and environment centres, 19 regional councils, 13 forestry centres and 22 search and rescue agencies are involved as well as the 326 municipalities. In the annual cycle for SDI strategy development (Finnish National Council for Geographic Information, 2004) and implementation of the Finnish SDI, the National Council for Geographic Information, ministries, public agencies, enterprises, the National INSPIRE secretariat and the National INSPIRE network work together on the development of roadmaps and annual action plans, communication strategies, and support for better decision making processes (Spatial Applications Division Leuven, 2005; 2007, Maa- ja metsätalousministeriö/Ministry of Agriculture and Forestry, 2010).

SWEDEN

In 2006 the Swedish Government commissioned the National Land Survey of Sweden (Landmäteriet) with the responsibility to formulate the Swedish Geodata Strategy (Landmäteriet, 2009) for the integrated information provision to the geodata sector, and the coordination and support concerning Sweden's INSPIRE-implementation. In fulfilling this task, the Geodata Advisory Board was installed by the government to support the Landmäteriet. Board members are the Landmäteriet, Swedish Environment Protection

Agency, Geological Survey of Sweden, Vastra Gotaland County Administrative Board, City of Stockholm, Swedish Association of Local Authorities and Regions, Swedish National Road Administration, Swedish Development Council for Geographic Information, Swedish Meteorological and Hydrological Institute, National Maritime Administration and Swedish Armed Forces. The 10 year action plan of the Swedish Geodata Strategy aims to generate increased benefits for the society through the NSDI linking information resources to a network and providing services to public sector administration, private sector and Swedish citizens. The Swedish Geodata Strategy also deals with the implementation of INSPIRE (Spatial Applications Division Leuven, 2007; Landmäteriet, 2010) Besides the implementation of INSPIRE, Landmäteriet is also responsible for the implementation of Directives and initiatives regarding geo information, such as the EC Directive for the Re-Use of Public Sector Information (PSI), the EC initiative for the creation of a Shared Information System in the Environmental Sector (SEIS), and the Global Monitoring for Environment and Security (GMES). In the Geodata strategy plan a link is made to other policy issues, such as the Maritime Environment, Climate and Vulnerable Locations, such as contaminated areas with a potential threat in disturbing their large eco systems. Moreover, the plan also links to the government's action plan for e governance. Finally, the strategy consists of the following eight work packages: 1) Network cooperation as the infrastructure basis, 2) Information structure, 3) Technical infrastructure, 4) National metadata catalogue, 5) Geodetic reference systems, 6) Research, development and education, 7) Legal framework and 8) Funding and Pricing models. The National Geoportal has been launched and forms an essential feature in the Swedish national e government program.

SPAIN

In the Royal Decree 1545/2007 the strategic goals of the Spanish government for SDIs are written (Ministerio de Fomento/ Ministry of Infrastructure and Transport, 2007). The National High Council for Geography (2010) is responsible for the development of the Spanish SDI. Members of this Council are 7 ministries, 17 regional governments as well as associations of local authorities, The development of Spain's SDI strategy occurs in close cooperation with public agencies, private sector companies, research community and academia. Because of Spain's federal structure, cooperation is essential between the governments at the national level and autonomous levels. The legal basis for the cooperation structure is laid down in the Royal Decree 1999 concerning the establishment of the Spanish National SDI and the National High Council for Geography. The Spanish SDI aims to provide reliable geospatial data from multiple sources. Therefore, geospatial data harmonization is necessary as well as the national geo-portal for data discovery. The Spanish IDEE Geoportal is very successful (IDEE Spanish Spatial Data Infrastructure, 2010). It contains interfaces in seven languages, provides free access to numerous data from the national level to most of the autonomies, and offers a series of geoservices. Moreover, it appears that more than 100 local authorities make their geospatial data accessible via this web facility. Noteworthy is that the development of the Geoportal is strongly based on education, training programs, knowledge exchange and innovation. Another strength of the Spanish SDI is the evolution of participating public agencies by the use of innovative technologies. An example is the Spanish Cadastre's high business performance. The Spanish Cadastre's database includes physical, legal and economy data and it contains 32 million urban properties, 42 million rural parcels, 23.5 million cadastral owners in 7575 municipalities (Permanent Committee on Cadastre in the European Union, 2008). The Spanish Cadastre evolved from initially corporate systems to an integrated Cadastral Virtual Office providing 122 million maps in 2009. Finally, the Spanish SDI is strongly in line with INSPIRE, user-

oriented to public administrations and citizens, and its technology is open for geospatial data producers and their clients (European Commission, 2009a).

THE NETHERLANDS

In 1984 the RAVI was founded as an Advisory Council (Eerste Kamer der Staten-Generaal, 1998) for the Dutch Minister of Housing Building, Spatial Planning and Environment (VROM), as coordinating minister for geo-information in The Netherlands (Van Loenen and Kok, 2004). In 1990 the Minister of Interior was appointed in the Decree IVR 1990 for the coordination of the information supply and responsible for the coordination of the government information provision in general (Netherlands Ministry of Interior Affairs, 1990). The Minister of VROM asked RAVI to investigate a desirable organization for land information supply in the context of an effective and efficient use of geo information in the Dutch public domain. They developed the Structure Plan for Geo Information in 1992 in cooperation with and with commitment from all stakeholders (RAVI, 1992). This plan was approved by the Council of Ministers in that same year. In 1993 RAVI became the National Council for Geo Information responsible for the implementation of the Dutch SDI, in particular activities related to increasing the compatibility and the exchange of data between the main core data sets such as defined in the Structure Plan for Geo-information. (population-, enterprises-, cadastre and title-, buildings- registrations, the 1:10,000 topographic data set, the 1:1000/2000 topographic data set and the register of addresses) (Tweede Kamer der Staten-Generaal, 1993).

In 1998 the Minister of Interior introduced an E-Government Action Program. The program was approved by the Parliament for implementation government-wide. The main parts of this Action Program were the Public Counter 2000 and the Authentic Registers (Tweede Kamer der Staten-Generaal, 1998).

The geo-information sector and the RAVI worked very closely together with the Ministry of Interior to include the Dutch SDI registrations in the e-government program. They developed an action plan together for the conversion of SDI registrations into Authentic Registers (AR) in their so-called streamlining core data set program (Tweede Kamer der Staten-Generaal, 1998).

AR status means that every government agency is obliged to use the data in this register. Special legislation for every authentic register is required. Their data need to be certificated as accurate and current, and the producer assumes all liability for its use by others. Each Register is assigned to a responsible ministry for maintenance and improvement. In the international domain the Dutch SDI approach is used as a good example for the creation of an INSPIRE infrastructure. The streamlining core data set program was realised on January 1st 2003. The Ministers of Interior, VROM and Economic Affairs announced in their letter to the Dutch Parliament to assign responsible Ministers for the further development of authentic registers (Tweede Kamer der Staten-Generaal, 2003; Rijksoverheid (2003). The legislation of the AR of Persons and Enterprises should be developed by respectively the Minister of Interior and the Minister of Economic Affairs. The legislation of the AR's of Cadastre, Buildings, Addresses and the 1: 10.000 topographic data set should be developed by the Minister of VROM. The minister recommended in his letter that investigation was needed to qualify the 1:1000/ 2000 topographic core data set (GBKN) as a future AR. Government stated that there was a growing interest in using the GBKN for their spatial planning processes and public safety and security objectives. The digital production of the large scale base map of The Netherlands was completed by a public-private partnership consortium

consisting of the Dutch Cadastre, Dutch municipalities, utility companies and Dutch Telecom in 2002. The production cost amounted around 250 million Euros, and financed by the partners. Negotiations were needed on how these responsibilities should be transmitted to the Ministry of VROM and how the maintenance costs of the GBKN should be financed in the future.
In 2004 the Dutch Council of Minister assigned to the Dutch Geo Information Sector 20 million Euros for the Geo-innovations programme "Space for Geo Information" to work on innovations and knowledge provision based on SDI achievements (RAVI, 2003; Kok, 2003; Den Boer, 2004).

The initiative role in the GI coordination process was changing, because of the importance of the implementation of the AR's. Leadership in this implementation process by the government was needed. For that reason another administrative organisation model for GI-policy making and GI implementation needed to created. The GI-Council was established in 2006 (Netherlands Ministry of Housing Building, Spatial Planning and Environment *(VROM), 2006)*. The GI-Council became responsible for the strategic GI agenda and further GI-implementation in the public domain. High level representatives of Ministries and agencies became members of the GI-Council. The activities of RAVI were handed over to Geonovum (Tweede Kamer der Staten-Generaal, 2006). The activities of Geonovum were more focussed on the development of standards, access to geo data, and the implementation process of INSPIRE. The Geonovum platform currently works on the implementation of the VROM GI program "GIDEON" under the leadership of the Dutch GI-Council. The GIDEON program focuses on standardization and technological aspects in the AR's implementation process (Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM), 2008). The second role is the implementation of the INSPIRE Directive into national technical infrastructures. The third role is to encourage the use of geo-information in numerous government policy and implementation chains, such as safety, sustainable living environment, mobility and area development. The fifth role is to encourage collaboration in knowledge, innovation and education related to SDI issues such as the continuation of the 40 million Euro innovation programme "Space for Geo Information" that was realized between 2004 and 2009.

The AR Cadastre and Topography came into force on January 1st 2008 (Staatsblad voor het Koninkrijk der Nederlanden, 2007). The impact is that these data needs to be obligatory used by all administrative bodies in the Netherlands
The AR Buildings and Addresses came into force on July 1st 2009 (Staatsblad voor het Koninkrijk der Nederlanden, 2009a). The Dutch NMCA plays an important role in the current implementation process of the Dutch SDI. The Dutch Cadastre currently maintains the key register for cadastre, and topography, and is distributor of buildings and address information.
A strategy group chaired by the Secretary General of the Ministry focuses on the transformation process of GBKN to a framework for legislation and implementation of an AR register (BGT). This transformation process is to be realised by the end of 2012 and the implementation is expected to take place in 2014.
On December 12th 2008 the Council of Ministers decided to make preparations for the development of an AR for sub soil information. Legislation will be developed and finalized in 2012.

The concept of the SDI, the introduction of AR's and the general GI standardization system was realized before the INSPIRE process started. That was one of the reasons that the

INSPIRE Directive transposition process in Dutch Legislation and further technical implementation was a relatively easy process. The National Legislation implementation INSPIRE came into force on September 1st 2009 (Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM), 2009a; 2009b; Staatsblad voor het Koninkrijk der Nederlanden, 2009b).

4. OBSERVATIONS AND FINDINGS

On the basis of the information presented so far, it appears that the developments concerning SDI-implementations are proceeding rapidly. One of the key reasons for these dynamic developments is the availability of a legal system for the implementation of the INSPIRE Directive in the 27 EU member states. It appears that the adoption of INSPIRE has stimulated awareness of the strengths of using geospatial data and spatial data infrastructures for policy making processes and service delivery in the EU member states, candidate and EFTA countries.

There are large variances in SDI developments among the EU Member States. In some countries, it was the active role of some NMCAs that made the difference (as we have seen in most of the Nordic countries, Spain and The Netherlands). In some cases, they were already active before the INSPIRE process even started.

In the case of The Netherlands, the SDI-vision was already laid down in the structure plan for geo information (1992), and the authentic registers approach (1998). The "Space for Geo Information" program results were used to optimize the Dutch spatially enabling society ambitions, such as disaster and security management and educational programs. These visions and concepts for core data management and standardisation were a partial starting-point for the INSPIRE preparatory plans. The Dutch NMCA was one of the key drivers in these developments.

In the case of Spain, the National Geographic Institute (IGN) was one of the key drivers behind the Spanish SDI development. This NMCA made excellent arrangements with agencies at the central level, played a leading role in the cooperation with the autonomous regions, research community and private sector, and succeeded in integrating SDI-components in geospatial technologies. These results worked as a catalyst for the INSPIRE development in Spain, and SDI-implementations at public authorities on different administrative levels.

The experience in Norway teaches that a strong international position of a NMCA on standardization (such as ISO and IHO) is essential to the establishment of a successful virtual technology network. Digital Norway became an essential part of the Norwegian White Paper of Public Information. Some of "Norwegian" standardization principles were used in the preparatory phase of INSPIRE.

Finally, some interesting examples of NMCA initiatives have recently happened since INSPIRE's early beginnings in 2001. In Denmark, through INSPIRE, the Danish NMCA became the coordinator for GI-implementation and partner in the Danish e government program. In Finland, again through INSPIRE, the Finnish NMCA NLS became Secretary of the National GI-Council. On the basis of NLS's large network, this NMCA played an important role in the communication and commitment building with all parties nominated in the SDI Act launched on January 1st 2010. The parties included are 21 state authorities, 69 regional authorities and numerous numbers of local authorities. In Sweden, the Swedish

government commissioned Landmateriet with the task of formulating the National Geodata Strategy. It contains the INSPIRE implementation strategy, but moreover the establishment of a framework dealing with other EU directives and initiatives, and a strategic link with Swedish government's action plan for e government.

5. TOWARDS SPATIAL ENABLED SOCIETIES IN EUROPE

The described examples in Europe show that their SDI results and national e-government progress are strongly interrelated and in some cases completely integrated, not only in a technical way, but also on the organisational and institutional level. These results are useful for the creation of more spatially enabled societies.

In Europe a lot of work needs to be done in the process for more optimized spatially enabled societies. On the other hand there are many opportunities. The program for the Spanish Presidency of the Council of the European Union "Innovating Europe" of 1 January- 30 June 2010 promotes the new 2010-2015 Strategy to Information Society, 2010 follow up, in the so called Internet of the Future program (Ministerio de Asuntos Exteriores y Cooperación / Ministry of Foreign Affaires and Cooperation (2009).

In the Strategy Document 2010 of the European Commission one of the priorities is the Global Monitoring for Environment and Security (GMES) Program as an important monitoring instrument for analysing the impact of the world's climate change and a sustainable Europe (European Commission, 2009b).

Another important pillar is the 7th Framework Programme and especially their ICT Policy Support Programme ICT PSP) under the Competitiveness and Innovation Program established by Decision no. 1639/2006 of the European Parliament and the Council in 2006 (European Commission, 2010a). This Programme runs in 2009-2013 with a total budget of 730 Million Euros. The main objective of this program is to stimulate the innovation and competiveness by more intensive use of ICT facilities for citizens, private companies and public sector agencies. The program consists of six themes, ICT for a low carbon economy and smart mobility, digital libraries, ICT for health and inclusion, open innovation for future internet enabled services in smart cities, ICT for improved public services for citizens and businesses and multilingual web.

For the geospatial community there are many opportunities for participation, especially for the themes low carbon economy and smart mobility, and internet enabled services in smart cities. The spatial component is important for the realisation of these objectives.
In the ICT work program of the European Commission 2011-2013 "Internet in the Future" (28 October 2009, IP/DG/1596) 300 million Euros are available for research related to promote the use of internet for the future (European Commission, 2009c). The main cornerstone of this program is the focus on stimulating competition, transparency and standardization. A second cornerstone is a stimulus program for more citizen participation. A third issue is related to safeguarding the security and safety.

On November 18th 2009 the Ministerial Declaration on E-Government (Malmö Declaration) was adopted during the Ministerial Conference (Swedish government, 2009). One of the conclusions included stimulating a central role for citizens and businesses in e- government processes and the growing need in stimulating data interoperability among the EU Member States.

The authors' observation is that in these above mentioned documents no reference is made to the INSPIRE legislation and its implementation results. Research needs to be made on what the ideal institutional and organizational conditions are for a complementary approach in the use of the INSPIRE infrastructure and the involvement of the SDI community in the development and execution of the Digital Agenda program, as a part of Europe 2020 Strategic Document EU 2020 (European Commission, 2010b).

Other important topics for research include questions on which institutional and organisational arrangements need to be made for the realization of the convergence process between the SDI and space community. Important questions are how these instruments can be used for the execution of significant European programs, how the results of this convergence process between the SDI community and the space community can be used for the benefit of spatially enabled societies.

The progress made by the geospatial communities in Europe is outstanding, especially in some EU Member States. On the other hand a lot of (research) and policy work needs to be done on the European scale to keep pace with the agenda and activities of the EU 2020 program for the realization of a spatially enabled society.

REFERENCES

Artimo, J. (1992), The Digital Mapping Process of the Basic Map of Finland, ISPRS Congress Proceedings, IAPRS, Vol. XXIX, Part B4, Commission IV, http://www.isprs.org/proceedings/XXIX/congress/part4/252_XXIX-part4.pdf, [accessed 25 June 2010].

Danish Government, Local Government Denmark (LGDK) and Danish Regions (2007), Towards Better Digital Service, Increased Efficiency and Stronger Collaboration, The Danish E-Government Strategy 2007-2010, The Digital Taskforce, Christiansborg, Denmark, http://modernisering.dk/fileadmin/user_upload/documents/Projekter/digitaliseringsstrategi/Danish_E-government _strategy_2007-2010.pdf, [accessed 20 June 2010].

Danish Government (2008), Official Journal of The Danish Government (9 December 2008), infrastruktur for geografisk information, Law number 1331, Denmark, http://retsinformation.w0.dk/Forms/R0710.aspx?id=122571, [accessed 24 June 2010].

Danish Government (2009), Announcement of The Danish Government (15 May 2009), infrastruktur for geografisk information, number 396, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX: 72007L0002:EN:NOT#FIELD_DK, [accessed 24 June 2010].

Den Boer, AM. (2004), Voor Geo-informatie € 20 miljoen beschikbaar, Tijdschift Geo Info, Geo-Info 1(1), 2004, http://www.geo-info.nl/site/Components/FileCP/Download.aspx, [accessed 29 June 2010].

Digital Norway (2010), Virtual Platform Digital Norway, http://www.statkart.no/Norge_digitalt/Enge lsk/About_Norway_Digital/, [Accessed 25 June 2010].

Eerste Kamer der Staten-Generaal (1998), Kadasterwet, Kamerstukken 1987-1988, 17496, nr 256, Artikel 5, The Netherlands.

European Commission (2007), Directive 2007/2/EC of the European Parliament and of the Council of 14March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE), Official Journal of the European Union L108 Volume 50, http://www.europa-nu.nl/9353000/1/j9vvh6nf08temv0/vi7jgt8o8rw8, [accessed 24 June 2010].

European Commission (2009a), INSPIRE, Implementing rules on data and service, http://inspire.jrc.ec.europa.eu/index.cfm/pageid/62, [accessed 25 June 2010].

European Commission (2009b), Annual Policy Strategy 2010 European Commission (18 February 2009), COM (2009) 73, Brussels, Belgium http://ec.europa.eu/atwork/synthesis/ doc/aps_2010_en.pdf, [accessed 29 June 2010].

European Commission (2009c), ICT Work Programme 2011-2013 (28 October 2009), Internet in the Future, IP/DG/1596, Belgium, http://www.future-internet.eu/http://www.future-internet.eu/fileadmin/initiative_documents/Publications/White_Paper/EFII_White_Paper_2010 _Public.pdf, [accessed 29 June 2010].

European Commission (2010a), Competitiveness and Innovation Framework Programme, ICT Policy Support Program as part of the 7th Framework Programme, Decision no.1639/2006 op the European Parliament and the Council, Belgium http://ec.europa.eu/cip/ict-psp/index_en.htm, [accessed 29 June 2010].

European Commission, (2010b), Europe2020 A European Strategy for Smart, Sustainable and, Inclusive Growth, Belgium, http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20 BARROSO%20%20% 20007%20-%20Europe%202020%20-%20EN%20version.pdf, [accessed 29 June 2010].

Finnish Agriculture and Forestry (2010a), National Council for Geographic Information, Finland, http://www.mmm.fi/en/index/frontpage/land_survey/ paikkatietojenyhteiskaytto/ patinee.html, [accessed 25 June 2010].

Finnish Government (2009a), Hallituksen esitys Eduskunnalle laiksi paikkatietoinfrastruktuurista, Government Bill to Parliament for Spatial Infrastructure, Finland, http://www.finlex.fi/fi/esitykset/he/2009/20090018, [accessed 25 June 2010].

Finnish Government (2009b), Regulation Spatial Data Infrastructure, http://www.finlex.fi/en/, [accessed 24 June 2010].

Finnish Ministry of Justice (2009), Law Spatial Data Infrastructure, Laki paikkatieto infrastruktuurista, Finland, http://www.finlex.fi/fi/laki/alkup/2009/20090421, [accessed 25 June 2010].

Finnish National Council for Geographic Information (2004), National Geographic Information Strategy, http://www.mmm.fi/attachments/maanmittausjapaikkatiedot/5g7g69SqF/Kansallinen_ paikkatietostrategia_Eng_2005_2010%5B1.pdf, [accessed 24 June 2010].

IDEE Spanish Spatial Data Infrastructure (2010), Geo-portal, Spain, http://www.idee.es/show.do?to=pideep_pidee.EN, [accessed 25 June 2010].

Kok, B., Rajabifard, A., Williamson, I.P. (2007), Report on International Workshop On Spatial Enablement of Government and NSDI – Policy Implications, Working Group 3 Permanent Committee on GIS Infrastructure for Asia and the Pacific (PCGIAP) and GSDI Association, http://www.pcgiap.org/wgroup/bbs/72, [accessed 24 June 2010].

Kok, B., Rajabifard, A., Williamson, I.P (2008), Spatial Enablement of Government and NSDI: Policy Implications, GSDI 10 Conference, Trinidad http://www.gsdi.org/gsdiconf/ gsdi10/papers/TS2.3paper.pdf, [accessed 25 June 2010].

Kok, B. (2003), Dutch Geo Information Infrastructure Innovated, Proceedings URISA Conference, Atlanta, Georgia USA, p268-286, http://training.esri.com/campus/library/Bibliography/ RecordDetail.cfm?ID=36052&LibSection=conference%20proceedings&startrow=1&hidpage=1&browseonly=1&year=2003&station=URISA, [accessed 29 June 2010].

Landmäteriet (2009), The Swedish Geodata Strategy 2009, LMV-report 2009:3, 50 pp. http://www.geodata.se/upload/Strategi%20-%20infrastruktur/Dokument/Eng/ Geodata_Strategy_2009.pdf, [accessed 25 June 2010].

Landmäteriet (2010), Sweden is building a national infrastructure for geodata, Geodata, Sweden bit by bit http://www.geodata.se/upload/Strategi%20-

%20infrastruktur/Dokument/Eng/Sweden%20is%
20building%20a%20national%20infrastructure%20for%20geodata%20-
%20brochure%202010.pdf, [accessed 25 June 2010].

Leskinen, T., Pätynen, V., Rainio, A., Ursin, H. (2009), National Report of Finland, 9th UN Regional Cartographic Conference, E/CONF.99/CRP.1, http://unstats.un.org/unsd/ geoinfo/9th-UNRCC-A/CRP/CRP%201%20Finland.pdf, [accessed 25 June 2010].

Maa- ja metsätalousministeriö/ Ministry of Agriculture and Forestry (2010), INSPIRE Directive Member State Report for Finland, Finland, http://www.paikkatietoikkuna.fi/c/document_library/ get_file?uuid=b20cfada-6ade-4af8-82e0-17c264ccc73b &groupId=10128, [accessed 25 June 2010].

Masser, I., Rajabifard, A., Williamson, I.P. (2008), Spatially Enabling Governments through SDI Implementaion, International Journal of Geographical Information Science, Volume 22, Issue 1: 5-20 .

Miljøministeriet, Kort & Matrikelstryrelsen / Danish Ministry of the Environment, National Survey and Cadastre (2009), Infrastrukturen for geografisk information 2008 Redegørelse, Miljøministeriet Frontlinien, Copenhagen, Denmark, http://www.kms.dk/NR/rdonlyres/C674282B-3ECF-45BA-9318-0579D71413E6/0/KMS_Infrastruktur_2009_ DK_ ENDELIG.pdf, [accessed 24 June 2010].

Ministerio de Asuntos Exteriores y Cooperación / Ministry of Foreign Affaires and Cooperation (2009), The Program for the Spanish Presidency of the Council of the European Union from 1 January - 30 June 2010, Innovating Europe, Spain http://www.eu2010.es/export/sites/presidencia/comun/descargas/Spanish_ Presidency_Program.pdf, [accessed 29 June 2010].

Ministerio de Fomento / Ministry of Infrastructure and Transport (2007), Real Decreto 1545/2007 por el que se regula el Sistema Cartográfico Nacional, Royal Decree 1545/2007, Spain http://www.fomento.es/MFOM/LANG_CASTELLANO/DIRECCIONES_GENERALES/ORGANOS_COLEGIADOS/ CSG/Comisiones/RD_1545_2007.htm [accessed 25 June 2010].+

National High Council for Geography (2010), Consejo Superior Geográfico, Spain www.fomento.es/MFOM/LANG_CASTELLANO/DIRECCIONES_GENERALES/ORGANOS_COLEGIADOS/CSG/, [accessed 25 June 2010].

National Land Survey of Finland (2010a), Virtual NLS Map Site, https://www.karttapaikka.fi/ karttapaikka/ default.asp?id=787, [accessed 25 June 2010].

National Land Survey of Finland (2010b) Finnish National Geoportal, Paikkatietoikkuna, http://www.paikkatietoikkuna.fi/web/en, [accessed 25 June 2010].

Netherlands Ministry of Interior Affairs (1990), Besluit Informatievoorziening in de Rijksdienst, (Decree IVR), Stcrt 1991, 20.

Netherlands Ministry of Housing Building, Spatial Planning and Environment (VROM) (2006), Instellingsbesluit GI-Beraad, Staatscourant nr. 112, p 20, The Netherlands.

Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM) (2008), GIDEON - Key geo-information facility for the Netherlands, Approach and implementation strategy 2008-2010, The Hague, The Netherlands http://international.vrom.nl/get.asp?file=docs/publicaties/ 8281.pdf&dn=8281 &b=vrom, [Accessed 29 June 2010].

Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM) (2009a), Besluit van 30 oktober 2009 tot uitvoering van de Implementatiewet EU-richtlijn infrastructuur ruimtelijke informatie (Besluit Inspire), Staatsblad voor het Koninkrijk der Nederlanden, nr 454, Publication date: 10/11/2009, Page: 00001-00008, The Netherlands.

Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM) (2009b), Besluit van 12 augustus 2009 houdende vaststelling van het tijdstip van inwerkingtreding van de wet van 2 juli 2009 tot implementatie van richtlijn nr. 2007/2/EG van het Europees Parlement en de Raad van de Europese Unie van 14 maart 2007 tot oprichting van een infrastructuur voor ruimtelijke informatie in de Gemeenschap (Inspire), Implementatiewet EU-richtlijn infrastructuur ruimtelijke informatie, Stb. 2009, 310, Staatsblad voor het Koninkrijk der Nederlanden, number: 343, Publication date: 25/08/2009, Page: 00001-00002, The Netherlands.

Norwegian Government (2002), Stortingsmelding nr. 30 (2002-2003), Norge digitalt et felles fundament for verdiskaping / Parliament White Paper on Spatial information Infrastructure in Norway – Norway Digital.

Norwegian Ministry of Modernisation (2005), e Norway 2009 the digital leap, Oslo Norway.

Permanent Committee on Cadastre in the European Union (2008) Cadastral Information System: a resource for the E.U. policies, Overview on the Cadastral Systems of the E.U. Member States, http://www.eurocadastre.org/pdf/Cadastral%20systems_I_2008.pdf, [accessed 29 June 2010].

Rajabifard, A. (2010), Spatially Enabled Government and Society - the Global Perspective, FIG Congress 2010, Sydney Australia, http://www.fig.net/pub/fig2010/papers/ps02/ ps02_rajabifard_ 4644.pdf, [accessed 25 June 2010].

RAVI (1992), Structuurschets Vastgoedinformatievoorziening delen I, II en III, RAVI-rapport 29, Apeldoorn, The Netherlands.

RAVI (2003), Space for Geo-information, BSIK knowledge proposal, Amersfoort, The Netherlands.

Rijksoverheid (2003), Vaststelling van de begrotingsstaat van het Ministerie van Volkshuisvesting Ruimtelijke Ordening en Milieubeheer (XI) voor het jaar 2004, vergaderjaar 2003-2004., XI, nummer 2, Memorie van Toelichting, The Netherlands.

Spatial Applications Division Leuven (2005), Spatial Data Infrastructures in Finland: State of play 2005, Belgium, http://inspire.jrc.ec.europa.eu/reports/ stateofplay2005/ rcr05FIv93.pdf, [accessed 25 June 2010].

Spatial Applications Division Leuven (2007), Spatial Data Infrastructures in Finland: State of play 2007, http://inspire.jrc.ec.europa.eu/reports/stateofplay2007/rcr07FIv112.pdf, [accessed 25 June 2010].

Spatial Applications Division Leuven (January 2008), Spatial Data Infrastructures in Sweden: State of play 2007, http://inspire.jrc.ec.europa.eu/reports/stateofplay2007/rcr07SEv102.pdf, [accessed 25 June 2010].

Spatial Applications Division Leuven (2010) INSPIRE-State-of-Play", Detailed survey concerning coordination, funding and sharing measures.

Spatial Data Community Service (2010), Website Spatial Data Community, http://www2.xyz-geodata.dk/English/introduction.htm, [accessed 24 June 2010].

Staatsblad voor het Koninkrijk der Nederlanden (2007), Besluit van 5 december 2007 tot vaststelling van de tijdstippen inwerkingtreding van de wet Basisregistraties Kadaster en Topografie, Jaargang 2007, nr. 499, The Netherlands.

Staatsblad voor het Koninkrijk der Nederlanden (2009a), Besluit van 15 juni 2009 houdende vaststelling van het tijdstip van inwerkingtreding van een aantal onderdelen van de Wet Basisregistraties Adressen en Gebouwen, een aantal onderdelen van de wet van 14 februari 2009 tot wijziging van de Wet Basisregistraties Adressen en Gebouwen en de Kadasterwet (aanvullingen, verduidelijking en enige technische verbeteringen van de Wet Basisregistraties Adressen en Gebouwen in aanvulling van de kadasterwet in verband met de toedeling van taken aan de dienst voor het kadaster en de openbare registers ten aanzien van de landelijke voorzieningen voor de basisregistraties adressen en gebouwen), Staatsblad 110 en een aantal

onderdelen van het Besluit Basisregistratie Gebouwen, Jaargang 2009, nr. 257, The Netherlands.

Staatsblad voor het Koninkrijk der Nederlanden (2009b), Wet van 2 juli 2009 tot implementatie van richtlijn nr. 2007/2/EG van het Europees Parlement en de Raad van de Europese Unie van 14 maart 2007 tot oprichting van een infrastructuur voor ruimtelijke informatie in de Gemeenschap (Inspire), Staatsblad voor het Koninkrijk der Nederlanden, number: 310, Publication date: 27/07/2009, Page: 00001-00006; The Netherlands

Swedish government (2009), Swedish Ministerial Declaration on E-Government, SE2009, Malmö, Sweden, http://www.se2009.eu/polopoly_fs/1.24306!menu/standard/file/Ministerial%20Declaration%20on%20 eGovernment.pdf, [accessed 29 June 2010].

Tweede Kamer der Staten-Generaal (1993), TK 23400 XI, Vaststelling van de Begroting van de uitgaven en ontvangsten van Hoofdstuk XI, Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer voor het jaar 1994, Vergaderjaar 1993-1994, nr. 6, Verslag van een mondeling overleg, vastgesteld op 29 september 1993, The Netherlands

Tweede Kamer der Staten-Generaal (1998), Actieprogramma Electronische overheid, Tweede Kamer 1998-1999, 26387, nr. 1, The Netherlands.

Tweede Kamer der Staten-Generaal (2003), Actieprogramma Electronische Overheid, Brief van de Ministers van Binnenlandse Zaken en Koninkrijksrelaties en van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer en de Staatssecretaris van Economische Zaken, Kamerstukken II 2003-2004, 26387 Nummer 18, 3 March 2003, The Netherlands.

Tweede Kamer der Staten-Generaal (2006), Oprichting Stichting Geonovum, Brief van de Minister van VROM aan de voorzitters van de Eerste en van de Tweede Kamer der Staten Generaal, vergaderjaar 2006-2007, 30910, A en nr.1, The Netherlands.

Van Loenen, B., Kok, B. (2004), Chapter 6: National spatial data infrastructure in the Netherlands, Legal & economic issues and developments. In B. Van Loenen and B. Kok (Eds.)(2004) Spatial data infrastructure and policy development in Europe and the United States, DUP Science, Delft University of Technology Library, The Netherlands, pp 71-101.

Wallace, J., (2007), Spatially Enabling Mortgage Markets in Australia. In. A. Rajabifard (Ed.)(2007) Towards a Spatially Enabled Society. Melbourne, Autsralia, pp.119-138.