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

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Change matrix 2010 versus 2007

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

Executive summary

Within the context of promoting the Information Society and e-Government, the vision and approach of the Greek NMA to develop a public National Geographic Information Infrastructure is being promoted by the Greek government. Whereas the vision is fully INSPIRE-inspired and compatible, a pilot phase of the development is just about to start and no concrete results are available. Although there is no implementation strategy yet, there is an implementation plan described in the common proposal for the establishment of the NSDI submitted by the Hellenic Mapping and Cadastral Organization (HEMCO) and CADASTRE S.A. for Funding through the Fourth Community Support Framework and accompanied by Technical Specifications and Bidding Documents. The Project includes three sub projects:

a) Information System of the NSDI, including metadata service
b) Data interoperability
c) Data policy-organizational structure

Furthermore a national repository of spatial environmental data has been developed in the framework of the National Environmental Information Network. The system is planned to be updated under the INSPIRE and Water Framework Directive requirements. HEMCO has compiled an inventory of the public agencies and bodies throughout the public sector that are involved in the implementation of INSPIRE Directive, including spatial data sets and services. It maintains a web page for providing information and receiving feedback concerning the Directive and its implementing rules.

A major building block and test case for the NSDI is the development, from scratch since no cadastral system previously existed in Greece, of the digital national cadastral system.

Parallel to the efforts of the public sector, private companies are developing data products which may be of relevance for the NSDI.

Currently (2010) a fundamental reform of the Greek public sector is taking place, which not only entails the restructuring of ministry departments but also the voting of the “Kallikratis” law, which removes Prefectures and reduces the number of Municipalities from 1034 to 343. At the same time “Kallikratis” enables the decentralization of governance, devolving powers and responsibilities to the regions and municipalities. Within this reform, the ownership and responsibility for spatial data, its collection, sharing and updating, as well as the ownership of spatial data services is in turmoil. Moreover, the administrative boundaries themselves are being revised, thus posing technical barriers regarding the spatial dataset coverage and completeness.

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Abbreviations and acronyms

CSFIII	3rd Community Support Framework
CT	Core Thematic Data
DSM	Digital Surface Model
DTM	Digital Terrain Model
EUROGI	European Umbrella Organisation for Geographic Information
FIR	Further Investigation Required
GI	Geographical Information
GINIE	Geographic Information Network in Europe
GPS	Global Positioning System
HC	Hellenic Cadastre
HellasGIS	Hellenic Geographic Information Society
HellaSDI	Hellenic Spatial Data Infrastructures
HEMCO	HEllenic Mapping and Cadastral Organization
HEPOS	Hellenic POsitioning System
HMGS	Hellenic Military Geographical Service
HTRS07	Hellenic Terrestrial Reference System 2007
IMIS	Institute for Management and Information Systems
INSPIRE	INfrastructure for SPatial InfoRmation in Europe
IS	Information System
ISO	International Organization for Standardization
MEECC	Ministry of Environment, Energy and Climate Change
MRDF	Ministry of Rural Development and Food
NaGii	National Geographic Information Infrastructure
NIA	No Information Available
NMA	National Mapping Agency
NSDI	National Spatial Data Infrastructures
OGC	Open Geospatial Consortium
OPIS	Operational Program – Information Society
PPP	Public-Private Partnerships
PSI	Policy and legislation on access to public sector information
REF	Reference data
SDI	Spatial Data Infrastructures
WFD	Water Framework Directive
WFS	Web Feature Service
WMS	Web Map Service

1. GENERAL INFORMATION

1.1 Method

This report is summarizing the SDI review for Greece, and aims at reflecting the degree to which the SDI situation in Greece is similar to the ideas set out in the INSPIRE position papers[1] and to the more recent INSPIRE scoping documents.

The 2002 report provided some general information. Due to lack of published or on-line information, the technical issues however have not been elaborated. The GINIE final report has been consulted. Some completing comments were received from Mr. **Marinos Kavouras,** Coordinator of the Greek geoinfo-soc committee. Relevant information from the recent paper on 'Comparative Analysis of NSDI policies in Greece and Cyprus: Two different systems within the EU' by Dimopoulou et al. (2003) had been integrated. For the 2005 update input was received from the Greece Authorities and integrated in that version of the report. For the 2006 update, no feedback was received from Greece INSPIRE stakeholders. Some additional information on legal aspects obtained through other channels and later integrated in the report. For the 2007 update, input was received from the Hellenic Mapping and Cadastral Organization. No templates were filled, nor were the questions regarding data sharing answered. Hellenic authorities have foreseen in the project a survey to systematically collect all the information needed for monitoring and reporting the GR status.

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

1.2 NSDI-related actors and initiatives in Greece

In 1994, the EU co-funded project to establish a fully digital cadastral system was started in a collaborative effort of the NMA and other public institutions and the private sector. The project wanted to establish a parcel-based land information system and can be regarded as a major test case and effort in creating an NSDI.

In 2000, HEMCO was the first to concretely propose the development of the Hellenic SDI (see executive summary http://ontogeo.ntua.gr/nagii/executive_summary.pdf), called **Nagii or NaGi[2]: National Geographic Information Infrastructure**. Now there is an increasing level of awareness and move towards launching a formal HellaSDI initiative with wide participation and linkages to the e-government activities, and other relevant European initiatives such as INSPIRE.

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

In 2004 the Ministry of Environment (today Ministry of Environment, Energy and Climate Change) has completed the first phase of the National Environmental Information Network, under the European Structural Funds, comprising basic spatial environmental information utilizing the appropriate existing national geographic information.

Today the Ministry (MEECC) is planning the update and expansion of the Network, funded by the Information Society program. One of the main objectives, set by the project, is the contribution to the development of the necessary environmental data sets for INSPIRE, coordinated at national level by HEMCO.

Recently, an important development took place towards this objective. The Hellenic Information Society http://www.infosociety.gr/ recognized the usefulness of this objective and adopted the initiative. For various implementation and funding reasons as well as lack of the necessary legal framework, this initiative was decided to be materialized by the Information Society itself by providing funding to some of the major national GI data producers and distributors in 2003. The funding comes from OPIS: Operational Program – Information Society, Action 2: Citizens and quality of life, Measure 2.4: Regional Geographic Information Systems and Innovative Actions.

Due to the probability of this decentralized approach of leading to the development of non-coordinated, heterogeneous and non-interoperable activities, a special scientific committee, called **geoinfo-soc** was formed to support the **NaGi^2** vision. .

A major task of **geoinfo-soc** was to implement the following four horizontal projects, essential to the success of **NaGi^2**:

- NaGi2 conceptualization and overall design;
- Data, architecture and interoperability specifications;
- Data policy and usability issues;
- Prototype implementation.

The harmonization projects commenced in the summer of 2003 and were expected to be completed by the summer of 2004.

A number of private companies are producing spatial datasets and applications. An example mentioned by Dimopoulou et al., 2003 is www.eranet.gr. This company seems to offer an impressive list of datasets and recently launched a geoportal at: http://62.103.55.233/engine/geodatademo_v3.html.

The Hellenic Geographic Information Society (HellasGIS) is the Greek national GI association, which is a member of Eurogi (http://www.hellasgi.gr). It is a union of professionals from the public, private and academic sector, involved in GI. It is also helping to raise awareness that a major initiative is needed. On its webpage a survey on

users opinion about geographical data and INSPIRE implementation is online (http://freeonlinesurveys.com/rendersurvey.asp?sid=8ezyzjl78tugsoy691378).

A project drafted by Ktimatologio S.A. (the company responsible for the Greek cadastre) and titled "Data and IT Infrastructure for a Modern Cadastre" with an overall budget of about 80 million Euros (without V.A.T.) was included in the 3rd Community Support Framework (CSFIII), under the Operational Programme "Information Society" with 50% co financing by the Greek State and the European Commission. Under that project the development of the Cadastre in Greece was based on aerial photography which is used to identify land parcel boundaries. In this context, for the purpose of extending Cadastre to cover the whole country, 3 contracts were carried out in parallel to produce a national coverage of orthoimagery with a pixel size of 50cm and the corresponding digital elevation model. The projects were completed in 2.5 years. Especially for the large urban centres of the Country covering about 3.500 square kilometres, a separate contract was carried out that produced fully rectified orthoimagery with a pixel size of 20cm and the corresponding digital surface model (DSM) These projects produced the first full national coverage of large scale imagery which is already used not only for the on-going cadastral survey project, but also for a number of other projects by State agencies (i.e. Statistical Service) and utility companies (Rokos et al., 2010).

Furthermore, The Hellenic POsitioning System (HEPOS) was established by KTIMATOLOGIO S.A. in order to improve, homogenize and facilitate the cadastral survey activities in Greece. The system allows for the determination of high precision and homogeneous coordinates throughout the whole country, setting up an infrastructure that, at the same time, reduces the cost and the effectiveness of GPS-surveying. The HEPOS system consists of 98 permanent GPS reference stations, a control centre and communication lines (main and backup) that support data transfer between the reference stations and the control centre (Rokos et al., 2010).

It should be mentioned that currently a fundamental reform of the Greek public sector is taking place, which not only entails the restructuring of ministry departments but also the voting of the "Kallikratis" law, which introduces a radical reform, in a bid to reduce government costs and increase the productivity of the public sector. In particular, "Kallikratis" removes Prefectures and reduces the number of Municipalities from 1034 to 343. At the same time "Kallikratis" enables the decentralization of governance, devolving powers and responsibilities to the regions and municipalities. Within this reform, the ownership and responsibility for spatial data, its collection, sharing and updating, as well as the ownership of spatial data services is in turmoil, and will not be possible to determine prior to the enactment of the "Kallikratis" law. Moreover, the administrative boundaries themselves are being revised, thus posing technical barriers regarding the spatial dataset coverage and completeness.

2 Details of NaGii

2.1 General Information

In 2000, HEMCO was the first to concretely propose the development of the Hellenic SDI (see executive summary http://ontogeo.ntua.gr/nagii/executive_summary.pdf), called **Nagii or NaGi^2: National Geographic Information Infrastructure**. Now there is an increasing level of awareness and move towards launching a formal HellaSDI initiative with wide participation and linkages to the e-government activities, and other relevant European initiatives such as INSPIRE.

The Hellenic Mapping and Cadastral Organization (HEMCO) have been assigned as the National contact point since 2007 by a provisional decision of the Secretary General of the Ministry of Environment. It has compiled an inventory of the public agencies and bodies throughout the public sector that are involved in the implementation of INSPIRE Directive, including spatial data sets and services. It maintains a web page for providing information and receiving feedback concerning the Directive and its implementing rules. It regularly informs the Ministry of Environment, Energy and Climate Change (MEECC) responsible for the transposition of the Directive as well as other public agencies maintaining spatial data through meetings, reports, congresses etc. It has developed a portal for dissemination through the web of its aerial photography and cartographic archive applying the INSPIRE Metadata Regulation.

Moreover, HEMCO has compiled the technical specifications and bidding documents accompanying the proposal for funding for the establishment of the NSDI. At the same time on the professional sector Surveying Engineers and IT scientists and Engineers are being influential in the INSPIRE implementation preparation.

During the last six years funding has been provided to some of the major GI spatial and thematic data producers and distributors. The implementation of these projects has created innovative procedures within the various public agencies simplifying the every day work through automation and allowing the systematic updating of spatial data optimizing at the same time the decision making processes. Moreover, it has increased the effectiveness of the agencies and bodies improving at the same time the level of services provided to the citizens enhancing and promoting development aspects of the public administration.

A recent survey (2009) by HEMCO and the MEECC identified a number of severe structural problems in what regards spatial data coordination, quality-assurance, sharing and reuse. These problems can be roughly reduced to three fundamental issues:

(1) Lack of a coordinating structure that would dictate spatial data stakeholders roles and obligations,

(2) Lack of a universally-accepted technical framework that would enumerate the data and service specifications that spatial data providers and producers should follow, and

(3) Lack of a coherent and inclusive legal framework that would treat—without omissions—all aspects of spatial data sharing and reuse.

It is envisaged that by the new law all three issues will be addressed by:

(a) Establishing a new coordinating structure with wide participation from all involved stakeholders, where responsibilities and obligations are clearly defined and the procedures followed are open and transparent,

(b) Setting out basic rules for data specifications that the new—to be provided—and the already available—to be transformed—spatial data and services must adhere to, while at the same time, stipulating a reliable quality-assurance mechanism that will secure the compliance and conformance of the data and services with the technical specifications and the IRs and

(c) Stating a core set of basic principles that promote the free, open and transparent sharing and reuse of the data, thus securing public interest and promoting growth and development.

2.2 Component 1: Coordination and organizational issues

In the past the scheduling and coordination of the cartographic and cadastral activities in Greece occurred under the auspices of several ministries and state services. The main cartographic activity in Greece -for a hundred and ten years- had been concentrated and implemented under the responsibility of the Hellenic Military Geographical Service (HMGS).

In order to respond to the prevailing sub-optimal scheduling and coordination of cartography, the HEllenic Mapping and Cadastral Organization (HEMCO) was founded HEMCO (http://www.okxe.gr/engprof.htm) is a state organization, a NMA, under the auspices of the Ministry of Environment, Physical Planning and Public Works. Its purpose is the drawing up and maintenance of a cadastre for Greece, the geodetic coverage and the mapping of the country, the assessment and mapping of the natural resources and the creation of a land and environment data base.

Due to the probability of this decentralized approach of leading to the development of non-coordinated, heterogeneous and non-interoperable activities, a special scientific committee, called **geoinfo-soc** was formed to support the **NaGi^2** vision. All developments about the progress of **NaGi^2** will be reported in a new site called http://www.nagii.gr .

The status of the NSDI and INSPIRE in Greece can be summarized as follows:

1) The transposition status is still on a draft text. A number of issues has to be resolved so as the transposition to proceed. Namely:

(a) The fragmentation of spatial information throughout the public sector. It has been estimated that fourteen Ministries will be involved in the implementation

of INSPIRE Directive in Greece, seven of which are the main players, as far as number of agencies and volume of data are concerned, while the remaining seven Ministries will have a limited involvement.

(b) A National Spatial data Infrastructure does not exist nor there has been yet in place a legal framework for its establishment and operation.

(c) There is a lack of cooperation for planning and implementation of similar data collection and processing projects as well as lack of data sharing agreements among public authorities.

At the end, the transposition will involve the creation of a new Law/Presidential Decree.

2) The mapping and environmental data collection activities are dispersed over various state services which are under the auspices of several Ministries.

3) The main public bodies in Greece that produce and maintain geographical information are:

- Ministry of Environment, Physical Planning and Public Works
- HEMCO and KTIMATOLOGIO S.A.
- Hellenic Military Geographical Service (HMGS)
- Ministry of Rural Development and Food (MRDF)

Each is currently developing its own geoportal with metadata and e-commerce services.

Although there is no implementation strategy yet, there is an implementation plan described in the common proposal for the establishment of the NSDI submitted by the Hellenic Mapping and Cadastral Organization and CADASTRE S.A. for funding through the Fourth Community Support Framework and accompanied by Technical Specifications and Bidding Documents. The Project includes three sub projects:

(a) Information System of the NSDI, including metadata service

(b) Data interoperability

(c) Data policy-organizational structure

However, these are not yet approved.

2.2.1 Conclusions of Component 1

The Greek SDI approach is truly national. Some SDI building blocks have reached a significant level of operationality. In order to respond to the prevailing sub-optimal scheduling and coordination of cartography, the HEllenic Mapping and Cadastral Organization (HEMCO) was founded. HEMCO is a state organization, a NMA, under the auspices of the Ministry of Environment, Physical Planning and Public Works. HEMCO

have been assigned as the National contact point since 2007 by a provisional decision of the Secretary General of the Ministry of Environment.

Based on these conclusions we score the indicators as follows:

- The approach and territorial coverage of the SDI is truly national
- One or more components of the SDI have reached a significant level of operationality (Partially, 2)
- The officially recognised or de facto coordinating body of the SDI is a NDP, i.e. a NMA or a comparable organisation
- The officially recognised or de facto coordinating body for the SDI is an organisation controlled by data users (No)
- An organisation of the type 'national GI-association' is involved in the coordination of the SDI
- Producers and users of spatial data are participating in the SDI (No)
- Only public sector actors are participating in the SDI

2.3 Component 2: Legal framework and funding

2.3.1 Legal framework

The NSDI initiative is in the project phase. The project which is at the initial stage of implementation includes:

- Information System (IS) of the NSDI, including metadata service
- Procurement of equipment for the establishment of the IS
- Data specifications (interoperability)
- Study on the Policy for data dissemination and reuse
- Design of the organizational and administrative structure of NSDI
- Development of a ready to use GIS infrastructure (prototype implementation) for the public sector

No specific legal framework is in place nor are organizational issues clearly defined. However, the founding law of the Hellenic Mapping and Cadastral Organization (HEMCO) (law no. 1647/1986) deals with the use, dissemination of personal data and general national security issues.

2.3.2 Public-private partnerships (PPPs)

The most visible SDI-related activity that HEMCO undertook began in July 1994, when the big project for the establishment of the Hellenic Cadastre (HC) was ratified by the Hellenic State and the European Union. Responsible for the compilation of the HC project is Ktimatologio SA, a private company, which has links with the Ministry of Environment, Physical Planning and Public Works.

2.3.3 Policy and legislation on access to public sector information (PSI)

Article 5 of the Greek Code of Administrative Procedure (Law no. 2690/1999) is a new freedom of information act that gives citizens the right to access administrative documents created by government agencies. It replaces Law 1599/1986. There is a lack of documentation and catalogue services. A pilot project to establish data on the web has been set in place by the Ministry of Environment and Planning.

Directive 2003/98 on the re-use of PSI has been implemented by a new law of March 2006. The transposition of Directive 2003/4/EC on public access to environmental information was done by Joint Ministerial Decision 11764/653 of 17 March 2006.

2.3.4 Legal protection of GI by intellectual property rights

In the past decade Greece has rapidly caught up with the rest of Europe by introducing modernized laws in the area of intellectual property. The Greek Copyright Act (Law no. 2121/1993) was a landmark in the legal history of copyright in Greece. However, the copyright legislation is still considered to be inadequate for the development of an NSDI. This is partly covered by the transposition of the 2001 directive on copyright in the information society.

Directive 96/9 on the legal protection of databases was implemented in Greece by specific legal provisions (art. 7 of Law 2819/2000).

Article 2 of the Copyright Act stipulates that the protection afforded under this Law shall not apply to official texts expressive of the authority of the State, notably to legislative, administrative or judicial texts.

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

Greek Parliament passed Law 2472/1997 on the Protection of Individuals with regard to the Processing of Personal Data (http://www.dpa.gr/legal_eng.htm) in April 1997 to guarantee a basic level of privacy protection. This Law follows the provisions of the EU Data Protection Directive 95/46/EC. Amendments to this Law were made by Laws 2819/2000 and 2915/2001. Directive 2002/58 on privacy and electronic communications has been implemented into Greek law by the Act for Protection of Personal Data and of

Private Life in the Electronic Communications Sector and Amendments to law 2472/1997 of 28 June 2006.

2.3.6 Licensing framework

No information has been found nor provided.

2.3.7 Funding model for SDI and pricing policy

Funding

The funding for NaGii comes from OPIS: Operational Program – Information Society, Action 2: Citizens and quality of life, Measure 2.4: Regional Geographic Information Systems and Innovative Actions.

Some other funding of the SDI-related activities is provided by EU structural funds and e-Government initiatives.

In 1994 the Hellenic government and the EU ratified the proposal for the major project of the establishment of the Hellenic Cadastre. Funding of this project is partially by the EU and partially by the Greek government. HEMCO has completed the CORINE LAND COVER 2000 also funded partially by EU and Greek government.

The funding comes from the Operational Program Information Society, Measure 2.4 “Regional Geographic Information Systems and Innovative Actions”

Pricing policy

A clear pricing policy on information has not yet emerged. There are wide variations in the pricing schemes among government departments, and also within the private sector. Each agency calculates the pricing in its own way and there is no homogeneous method for determining the price of various forms of spatial data. There is no overall official policy on the commercialisation of public sector information.

2.3.8 Conclusions of Component 2

No specific legal framework is in place nor are organizational issues clearly defined. The transposition status is still on a draft text. A number of issues has to be resolved so as the transposition to proceed. Currently a fundamental reform of the Greek public sector is taking place, which not only entails the restructuring of ministry departments but also the voting of the “Kallikratis” law, which introduces a radical reform. Within this reform, the ownership and responsibility for spatial data, its collection, sharing and updating, as well as the ownership of spatial data services is in turmoil, and will not be possible to determine prior to the enactment of the “Kallikratis” law.

Based on these conclusions we score the indicators as follows:

- There is a legal instrument or framework determining the SDI-strategy or –development (No)
- There are true PPP's or other co-financing mechanisms between public and private sector bodies with respect to the development and operation of the SDI-related projects (No)
- There is a freedom of information (FOI) act which contains specific FOI legislation for the GI-sector (No Information found)
- GI can specifically be protected by copyright (No Information found)
- Privacy laws are actively being taken into account by the holders of GI (No Information found)
- There is a framework or policy for sharing GI between public institutions (No Information found)
- There are simplified and standardised licences for personal use (No Information found)
- The long-term financial security of the SDI-initiative is secured (No)
- There is a pricing framework for trading, using and/or commercialising GI (No)

2.4 Component 3: Data for themes of the INSPIRE annexes

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

- 1:250.000: A/D-converted topographic maps 1:250.000 (DB250K);
- 1:100.000: CORINE Land Cover 1990, Land Cover 2000 (CLC 2005 is in project);
- 1:50.000: A/D converted topographic maps 1:50.000 (DB50K);
- Very large scale: Cadastral map (15% of territory);
- 1 meter resolution: Orthophotographs of 1996-1999 (80% of territory).

Typically, the Hellenic Military Service is the Greek authority that produces and provides topographic maps in Greece. These maps are used as reference base maps by most public authorities.

2.4.2 Data by resolution or scale range for the INSPIRE themes

According to a report on NSDI policy issues among different countries, conducted by the University of Maine in 1998, for Greece the following spatial digital data is available by the different departments of HEMCO (Dimopoulou, 2003):

- CORINE LAND COVER at 1:100.000;
- Digitized maps of Municipality & Community Administrative Boundaries;
- 1:50.000 maps, provided by the Hellenic Military Service, containing coastline, country and regional borders, capital, cities, area, name and codes;
- Coordinates (local system of reference) of the national network of points of reference;
- Digitized maps of Greek Wetlands 1:1.000;
- From the National Cadastre Project, a very important database containing Land Parcels and Buildings, uniquely coded, will be available when ready.
- Soil maps at different scales (1:500 up to 1:100.000) covering most of the agricultural areas of Greece
- Soil Association map (from the Greek National Committee combating desertification) at scale 1:850.000

The Company ERANET advertises at its website www.eranet.gr following nation-wide (inc. the islands) geodatasets:

- Scale 1:200.000: The HELLAS-product as derived from the 1:200.000 maps of the National Statistical Service.

- [HEL01] COASTLINE
- [HEL12] RELIEF MAP as raster (TIFF image) at 200m resolution, without elevation data.
- [HEL22] RIVERS AND LAKES
- [HEL31] BASIC LANDMARKS Names of main geographic elements, like towns, islands, lakes, rivers and mountains, prepared to be inserted easily into your digital map.
- [HEL41] POSTAL CODE BOUNDARIES Boundaries of all postal codes, according to the most recent revision (1999) by the Greek Post.
- [HEL51] REGION BOUNDARIES Administrative boundaries of the 13 regions of the country, representing NUTS2 layer by European Union Standards.
- [HEL52] PREFECTURE BOUNDARIES The official subdivision of the country in prefectures. For each one of them, a number of statistics is provided (real population, number of dwellings and number of households), according to 1991 Census. This layer is the NUTS3 level according to the classification made by EUROSTAT.
- [HEL54] ADMINISTRATIVE BOUNDARIES OF MUNICIPALITIES (1991 CENSUS) Attributes include: municipality name (both in Greek and Latin), prefecture where it belongs, 1991 Census statistics (real population, number of dwellings, number of households), real population according to 1981 Census, and mean elevation. Greek names are also given in small letters for cartographic use. This feature represents NUTS5 layer for European Union statistical nomenclature.
- [HEL55] NEW ADMINISTRATIVE BOUNDARIES OF MUNICIPALITIES (CAPODISTRIAS) Complete coverage of all new municipalities, with their official names (both in Greek and Latin), the names of their capital, as well as demographic data aggregated from the results of 1991 Census. Statistics from the recent 2001 Census are to be included as soon as the National Statistical Service releases demographic data.
- [HEL62] MAIN SETTLEMENTS Locations of about 6.000 settlements (towns and villages) of Greece, with their names and Census codes.
- [HEL72] ROAD NETWORK National and community road network, classified in five categories (primary, secondary, etc.), along with the international and national coding of each segment.
- [HEL82] RAILWAY NETWORK All operating lines, classified according to their gauge.

- HEL04] NEIGHBOURING COUNTRIES Boundaries and coastline of neighbouring countries at the areas near the Greek borders.
- [HEL13] RELIEF MAP as colour raster (TIFF image) at 100 m resolution (without elevation data).
- [HEL32] LANDMARKS Names (as annotation in Greek) of towns, islands, capes, bays, lakes, rivers and mountains ready to be inserted into your digital map.
- [HEL42] POSTAL CODE DEMOGRAPHICS For each area, its real population according to 1991 Census is also available.
- [HEL43] POSTAL CODE GAZETTEER List containing the postal codes that correspond to each municipality or community (according to the New Administrative subdivision).
- [HEL53] PROVINCE BOUNDARIES
- [HEL56] MUNICIPALITY DEMOGRAPHICS Population classification for about 6.000 municipalities and communities, according to the previous administrative subdivision. Attributes include post-processed results of 1991 Census, based on age groups, gender and occupation sector. Updates to 2001 Census data depend on the availability of these data by the National statistical Service.
- [HEL57] LIST OF SETTLEMENTS Table of all settlements, with their 1991 Census code, names (in Greek), 1991 demographics, mean elevation.
- [HEL58] LIST OF MUNICIPALITIES Table containing the correspondence between the previous and the existing administrative subdivision (the modifications after the Capodistrias Plan came into effect)

- 1:50.000: Digital Elevation Model as derived from topographic maps 1:50.000 processed into a 25 meter by 25 meter grid.
- 1:20.000: Road network derived from orthophotographs

Regarding the three INSPIRE annexes addressing the 34 spatial data themes, Greece is providing discovery and view services for some of them while a number of them can be also downloaded. A complete list will be presented in the updated report including the information provided by the country in 2010.

2.4.3 Geodetic reference systems and projections

Spatial referencing is done by coordinates, but not according to ISO 19111.

Name and nature of the geodetic coordinate system (Greek National System):

GGRS’87 (in generalized use since 1990)

- Ellipsoid: GRS80
- Geodetic Datum: FIR
- Map projection: FIR
- Altitudinal reference system: FIR
- Responsible for maintenance of the geodetic coordinate system: FIR

Algorithms and transformation parameters are available to convert from WGS84 and from systems previously in use in Greece to GGRS'87 and vice versa.

HEPOS supports all common GPS techniques for post-processing and real-time surveying. In particular, for network-based positioning the techniques of VRS, FKP and MAC are supported. For post-processing applications, RINEX and Compact RINEX files are provided for RS and VRS at observation intervals of 1, 2, 5, 10, 15, 20, 30 or 60 sec.

At the same time, HEPOS modernizes the geodetic infrastructure of the country by introducing a new geodetic reference frame as a realization of ETRS89. The new system is named HTRS07 (Hellenic Terrestrial Reference System 2007) and aspires to become the new national reference system. Towards this direction, a two-way transformation model between HTRS07 and HGRS87 has been established. To accomplish this, approximately 2470 trigonometric points, evenly distributed all over Greece, have been measured in a national GPS measuring campaign (Rokos et al., 2010).

2.4.4 Quality of the data

No Information Found

2.4.5 Interoperability

No Information Found

2.4.6 Language and culture

Metadata and accompanying documents are provided in Greek and generally not translated in other languages. However some websites are available in English too.

2.4.7 Data Content

No Information Found

2.4.8 Geographical names

Geographical names are managed in Greek.

2.4.9 Conclusions of Component 3

Already from the previous GR's SoP report Geodatasets existed which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components while the geodetic reference system and projection systems are standardised, documented and interconvertable. The INSPIRE 2010 MR confirms the statement. 306 data sets have been reported most of which belong to Annex III (189) (56 and 61 belong to Annex I and Annex II, respectively). The main language used is Greek while English translation is gaining momentum.

Based on these conclusions we score the indicators as follows:

- Geodatasets exist which provide a basis for contributing to the coverage of pan-Europe for the INSPIRE-selected data themes and components
- The geodetic reference system and projection systems are standardised, documented and interconvertable
- There is a documented data quality control procedure applied at the level of the SDI (No Information found)
- Concern for interoperability goes beyond conversion between different data formats (No Information found)
- The national language is the operational language of the SDI
- English is used as secondary language (Partially)

2.5 Component 4: Metadata

Currently, there has been no effort on a technical level to provide metadata, data and services to the Inspire Geoportal. Metadata will have to be created for a significant proportion of the available datasets. HEMCO has developed a portal for dissemination through the web of its aerial photography and cartographic archive applying the INSPIRE Metadata Regulation. Within the Kallikratis reform, the ownership and responsibility for spatial data and metadata, its collection, sharing and updating, as well as the ownership of spatial data services is in turmoil. It is worthy of highlighting that in the MR the existence of metadata is mentioned for 55% of the datasets, while the percentage of conformant metadata accounts for only 8% of the datasets.

2.5.1 Conclusions of Component 4

Currently, there has been no effort on a technical level to provide metadata, data and services to the Inspire Geoportal. Metadata will have to be created for a significant proportion of the available datasets.

Based on these conclusions we score the indicators as follows:

- Metadata are produced for a significant fraction of geodatasets of the themes of the INSPIRE annexes (Partially)
- One or more standardised metadata catalogues are available covering more than one data producing agency (No Information found)
- There is a coordinating authority for metadata implementation at the level of the SDI (No)

2.6 Component 5: Network Services

The majority of spatial data services and datasets have been created on an ad hoc basis, to fulfil differing needs of the public sector, as well as to comply with different EU Environmental Directive requirements. Information regarding usage does not exist, since the NSDI itself is not in place yet. Similarly no transformation services exist and there is still a lack of data sharing agreement among the different public authorities and each public authority is producing and maintaining spatial data defines its own policy for providing access to data and services. Moreover there are a number of restrictions on data such as intellectual property rights, protection of privacy, public security, national defence, confidentiality of statistical information, competition, official approval of access required and unspecified access policy to mainly digital data. The fragmentary efforts have resulted in heterogeneous view services of different technical specifications and, consequently, of varying degrees of quality. The same holds for download and discovery services, albeit their number is considerably smaller than that of the view services.

No National Geoportal exists. However, there are technical specifications formulated according to INSPIRE Implementing Rules and the pertinent proposal for funding has been submitted since June 2009. HEMCO, as the coordinating organization, will be responsible for the development and maintenance of the National Geoportal, through which it will exercise the quality assurance procedures.

HEMCO provides search on its digital maps, cadastral and aerophotographs and other products via the link: http://88.218.101.129/okxegis/framesetup.asp

KTIMATOLOGIO S.A. has set up state-of-the-art data centres (primary and disaster recovery) with high availability (99, 99%), modern networking, security and backup mechanisms and high storage capacity (120 TB in each), where all its data and applications reside (central storage).

A series of applications have been developed:

Such as:

Services to citizens

Online internet applications have been developed to declare property to the Cadastre during a cadastral survey study. Through this application a user can online:

- declare all the information necessary to register his/her property to the Cadastre,
- identify the location of the declared real property on orthophotomaps,
- pay the cadastral fee using his/her credit card,
- send scanned copies of the deeds that support his/her declaration,
- print a receipt

Services to legal persons

For the legal persons that have a great number of rights to declare, KTIMATOLOGIO S.A. developed a special application to allow them to produce a database with all the information about their real property rights, and submit it electronically to the Cadastre. This application has been used in the cadastral survey projects that were initiated in 2008 by most of the banks operating in Greece.

Services to KT contractors of cadastral surveys

For the contractors carrying out the cadastral survey projects applications developed to receive, register and geo-locate on orthophotomaps all the declarations that were presented in the cadastral survey offices. The application allows, among other things, uniform codification of all the information registered, online checks that prohibit a number of mistakes during data entry, computation of the corresponding cadastral fee for each declaration, real time monitoring of the progress of the work and real time access to all the declaration data from KT's headquarters (Rokos et al., 2010).

As of May 25, 2010, Ktimatologio S.A. offers a free online service that allows anyone to view orthophotographs from the entire country**.** The orthophotographs that are available through this service cover the entire Greek State, excluding only some frontier areas or areas with classified features for which aerial photography is restricted by the official state Authorities. The spatial analysis of these photographs is 20cm for urban areas and 50cm for the other areas of the country. These photographs are the product of photo

shoots that were carried out from 2007 to 2009 and they constitute the most recent and updated mapping material with the best possible analysis.

The access to these services is possible in two ways:

a) Through the webpage

http://gis.ktimanet.gr/wms/ktbasemap/default.aspx

or through the official site of Ktimatologio S.A. www.ktimatologio.gr

b) Through a WMS (Web Mapping Service), version 1.1.0, at the geographic system WGS84. This service is available at the web address: http://gis.ktimanet.gr/wms/wmsopen/wmsserver.aspx

Another governmental geoportal created by the Institute for Management and Information Systems (IMIS) together with HEMCO is the http://www.geodata.gov.gr/geodata/. The service www.geodata.gov.gr enables the public administration to offer publishing, searching and displaying of open geospatial data to citizens. The development of www.geodata.gov.gr was based solely on Open Source Software and open standards. The service was developed by IMIS/RC "Athena", in cooperation with the eGovernment Team of the Prime Minister's Office, the Hellenic Mapping and Cadastral Organization, and the Ministry of Environment, Energy, and Climate Change. On its beta version still the portal aspire to offer geodata of public sector free to all citizens. The portal is using Open Source software (e.g. Joomla, PostGIS, MapServer, OpenLayers, MapFish, GeoNetwork) while the databases are derived from Google Maps, OpenStreetMap and Ktimatologio.gr (orthophotos). It offers (http://www.geodata.gov.gr/maps/) WMS and WFS services in which data are offered as WGS84 (KML, GML) and GGRS'87 in case of shapefiles. Currently it holds 34 data themes, and is constantly updated, such as:

- Train network;
- Corine 2000;
- Hydrographical network;
- Municipality borders;
- Administration boundaries;
- Coastlines;
  (http://www.geodata.gov.gr/geodata/index.php?option=com_sobi2&sobi2Task=search&sobi2Search=alldata).

The National Environmental Information Network and Electronic Environment is an integrated online information system that includes the procedures and tools for collecting, managing and disposing of assets and exchanges of information of the environment. (http://amappl1.e-per.gr/what.html). It provides various view services on several themes and datasets. At the same time shape files can be downloaded as layers (http://amagis1.e-

per.gr/PublicUK_App/mapviewer.jsf?width=1293&height=982&sid=pca7n0jn3aitdcb43mhk7hq976&appl=&rid=)

2.6.1 Conclusions of Component 5

The majority of spatial data services and datasets have been created on an ad hoc basis, to fulfil differing needs of the public sector, as well as to comply with different EU Environmental Directive requirements. Information regarding usage does not exist, since the NSDI itself is not in place yet. Similarly no transformation services exist and there is still a lack of data sharing agreement among the different public authorities and each public authority is producing and maintaining spatial data defines its own policy for providing access to data and services. The fragmentary efforts have resulted in heterogeneous view services of different technical specifications and, consequently, of varying degrees of quality. The same holds for download and discovery services, albeit their number is considerably smaller than that of the view services. The http://www.geodata.gov.gr/maps/ offers view to 34 data themes. Users can download data from the National Environmental Information Network and Electronic Environment at http://amagis1.e-per.gr/PublicUK_App/mapviewer.jsf?width=1293&height=982&sid=pca7n0jn3aitdcb43mhk7hq976&appl=&rid=.

Based on these conclusions we score the indicators as follows:

- There are one or more discovery services making it possible to search for data and services through metadata (No)
- There are one or more view services available for to visualise data from the themes of the INSPIRE annexes
- There are one ore more on-line download services enabling (parts of) copies of datasets
- There are one or more transformation services enabling spatial datasets to be transformed to achieve interoperability (No)
- There are middleware services allowing data services to be invoked (No)

2.7 Component 6: Thematic environmental data

The main environmental area covered by the Ministry of Environment concern Air Quality, Air Emissions, Water Quality, Waste, Nature and Biodiversity, Noise and Industries, hydrological data etc. The National Environmental Information Network includes measurements from monitoring stations for Air and Water quality, sites of NATURA2000, position of main Industries and Installations, position of main

constructions, maps of noise. The system also contains digital geographic background in three scales (1:1.000.000, 1:250.000 and 1:50.000) with information of transport and hydrographic networks, administrative units, DTM, geographical names and land cover for all the country terrain. Environmental data are available on the web site of the Ministry of Environment through the URL www.edpp.gr. Via the website users can access the MoE portal at:

http://amagis1.e-per.gr/PublicGR_App/mapviewer.jsf?width=1093&height=808&sid=4b22apkcapvt26anefbbt4prv6&appl=&rid=

On the map browsers users have access to shape files covering Greece and indicating several environmental fields such as the ones mentioned above with different layers and information contained therein.

There is an option for English version but it appears not to be functioning yet.

Furthermore, the National Hydrological and Meteorological Information bank of Greece (http://www.hydroscope.gr/) provides access to a number of several datasets via its portal. The portal hosts 2613 stations, 10058 instruments and 6303 time series of data. Full usage of the site is available after registration.

Similarly there is a Hydroscope geoportal that contains metadata of the Special Secretariat for Water spatial data under the Water Framework Directive Implementation and INSPIRE. At http://thyamis.itia.ntua.gr:8080/geoportal/catalog/search/search.page 24 datasets can be discovered while a number of GML files can be downloaded.

2.7.1 Conclusions of Component 6

There is an increased effort to depict and provide environmental data and information on the web such as the example of MoE portal. However the extent of this effort is not clear yet.

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

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

2.8 Standards

Greece is complying where available with the common standards of ISO/TC211 and OGG.

2.8.1 Conclusions of Component 7

Based on these conclusions we score the indicator as follows:

- The SDI-initiative is devoting significant attention to standardisation issues (No Information found)

2.9 Use and efficiency of the NSDI

Medisolae-3D (http://www.medisolae-3d.eu/) is a European Consortium of 14 partners, from 7 Member States, representing 100+ islands with expertise ranging from INSPIRE, Spatial Data Infrastructures (SDI), GIS & WebGIS technologies, geo-portal expertise and technologies assisting island authorities to capture geodata and 3D images towards providing geospatial information for the project portal services.

MedIsolae-3D will first deliver partnerships between public data owners and private companies, dissemination and promotion of the island digital content, a 3D flying-over simulation, linkage to geo-based Internet platforms and transfer of knowledge in SDI technology to islands.

In terms of interoperability the Santorini island example is given:

The following interoperability test has been implemented: for the Santorini SDI map services the WMS (Web Mapping Services) capability has been enabled. Any GIS client/viewer supporting the WMS capability (such as Quantum GIS, udig, ArcGIS Explorer and many others, most of them freely available) can access the island SDI spatial datasets at:

http://93.63.59.107:8399/arcgis/services/Santorini/MapServer/WMSServer/

and

http://93.63.59.107/Santorini/SantoriniVE.htm

Annexes

2.10 List of SDI addresses / contacts for Greece

Table: SDI contact list			
	Web address	Organisational mailing address	Over-all contact person: tel./fax/e-mail
National			
Hellenic Mapping and Cadastral Organization	http://www.okxe.gr/ http://www.nls.fi/	Timoleontos Vassou 11-13, ATHENS 11521, Greece	hemcosup@otenet.gr Konstantinos A. Nedas +30 210-6443583 knedas@okxe.gr Konstantinos Stefanakis +30 210-8643783 k.stefanakis@dpers.minenv.gr

2.11 List of references for Greece

Table: list of references used to compile the Country Report	
Web sites:	
	http://www.hellasgi.gr
	http://egeols222.egeo.sai.jrc.it/etemii/reports/d311.pdfhttp://www.survey.ntua.gr/main/labs/photo/research/wg_33/literature.html
	http://www.wipo.org/globalissues/questionnaires/ic-2-7/greece.pdf
	http://mapserver.minenv.gr/website/pilot
	http://www.ktimatologio.gr/ktima/
	http://www.vterrain.org/Locations/gr/
	http://www.ntua.gr/ontogeo/nagii/NAGII.htm
	http://geo-ellanikos.aegean.gr/ideunivers/

Publications:	

	GINIE: Geographic Information Network in Europe. Spatial data infrastructures: Country Reports FINAL D 5.3.2(b). September 2002
	GINIE - GI in the Wider Europe Complete Book, October 2003 http://wwwlmu.jrc.it/ginie/doc/ginie_book.pdf
	Dimopoulou, E., T. Labropoulos, V. Nikolaidou and P. Zentelis, 2003. Comparative Analysis of NSDI policies in Greece and Cyprus: Two different systems within the EU. Paper presented at the 2nd FIG Regional Conference, Marrakech, Morocco, 2-5 december 2003.
	C., Tsadilas, S., Theocharopoulos and F., Gerouki. Brief presentation of the Greek EIONET members Organizations as related to soil data and information in Greece. EIONET workshop on soil Ispra 2009.
	G., Martirano, M., Bonazountas and V., Gagliardi. The Challenge of a Spatial Data Infrastructure for the Mediterranean Islands. NATO Science for Peace and Security Series C: Environmental Security, 377-386, 2009.
	D., Rokos, K., Kyriazis and P., Lolonis. Setting Up the Infrastructure for Improving the Development of Cadastre in Greece. FIG Congress 2010 Sydney, April 2010.