Improving the local governance processes through exchange of good practices, pilots and training in geospatial technologies "LOCAL – SATS"

D4.1.1	**Report about the cities sustainability and geotechnologies use in the Mediterranean basin**

LOCALSATS CONSORTIUM

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Patras Municipal Enterprise for Planning and Development S.A. GREECE	Aristotle University of Thessaloniki GREECE
Local Councils' Association MALTA	GEREDIS SPAIN
National Authority for Remote Sensing and Space Sciences (NARSS) EGYPT	Jordan University of Science and Technology JORDAN
Greater Irbid Municipality JORDAN	National Council for Scientific Research LEBANON
Union of municipalities of Hermel – planning and local development agency LEBANON	Applied Research Institute Jerusalem Association PALESTINIAN AUTHORITY

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[2] **PU** = Public, **PP** = Restricted to other programme participants, **RE** = Restricted to a group specified by the consortium, **CO** = Confidential, only for members of the consortium.

Contents

General

The aim of the Deliverable ***D.4.1.1: Report about cities sustainability and geo-technologies use in the Mediterranean basin*** is to review and analyze the current status, the operating procedures, the data providers, the relevant stakeholders and the public institutions in the consortium partner countries.

In order to achieve this goal, a vast amount of information, regarding three major fields (Policies, Data/Applications, and Capacities) was gathered from each participating country in the form of dedicated National Reports. The type of information and data collected are presented in in the table below.

Policies	Data – Applications	Capacities
National policies and implementation	National Spatial Data Infrastructure (NSDI)	National budget allocation to Spatial Information
National Census Data	National Census	Funding initiatives and participation to research programs
Spatial data production distribution centers-sharing policies	Processing capability of Spatial data	Dedicated undergraduate, graduate programs, training centers
Use of spatial information in local decision making processes	Spatial data collection capability	
Relevant national institutes, contact points	GPS data availability and costs	
Beneficiaries of ongoing or completed EU/national/regional projects	Level of conformation with the EU INSIRE Directive	

All the National Reports are lengthy and are included in full detail in the Appendix, to which the reader should refer, when detailed information is sought.

The next chapters are summarizing and present the most important parameters of the current status of the geospatial information and National capacities in the Mediterranean sea basin.

A short introduction to LOCAL-SATS aims

LOCAL-SATS: Improving the local governance processes through exchange of good practices, pilots and training in geospatial technologies

In the participating EU regions, the supra-national scale has permitted European directives such as INSPIRE to emerge, which requires all European States to produce numerous geographic data on the environment and to study the feasibility of a European infrastructure in the urbanism documents.

The key to the development of sustainable geographic information is through the creation of spatial data infrastructures (SDI) mechanisms, which allow those actively involved on the whole territory to have access and to share relevant, harmonized, high quality geographic information in view of formulating, executing, following and assessing their development strategies and actions.

Nevertheless, a common problem that has been detected by a previous SWOT analysis for the development of a national SDI is the lack of data or its bad quality in some of the participating regions. Basic maps although fundamental they often don't exist or are outdated, and this is a common problem in many cities and regions.

Data often exist but is scattered and often obsolete or incomplete and indeed there is not a land registry covering the whole of the territory. Sometimes the municipalities or regional governments have no mechanism for centralizing data. There are not aware of projects which have been or are being done by other administrative bodies within the territory. When data do exist, using them is risky because they generally only correspond to specific studies and are not exhaustive or up-to-date. In fact available data is often incoherent.

Problems are not only to be found when gathering information for the creation of databases. They can equally be found when disseminating acquired data. Here, once again this kind of services accessible by internet is not always available for final users. GIS used as an aid when making decisions is still a rare case, even in large city areas. It is also detected in the participating areas that GIS is used but not necessarily in a homogeneous way within organizations.

LOCAL-SATS responds to the need of improvement of local sustainable processes like the urbanization, which is a new priority for the Union for the Mediterranean (UfM). In the next twenty years the towns and cities on the southern and eastern Mediterranean coasts will become the home of 100 million people. This increase will all take place mainly in the cities. It has thus essential that we react as quickly as possible. In this context, using efficient tools to process geographic information as a means to being aware of the risks and challenges, to managing territories and improve our governance systems should be stressed.

LOCAL-SATS is motivated by a number of developmental, technological, scientific, economic and social factors, against which the project objectives match: Geospatial representation, data analysis, formalization and mapping should be deployed not only for understanding the spatial impact but furthermore assessing the developmental policies.

Geospatial technology and databases offer the advantage of multilevel analysis of spatial phenomena. These tools provide a key-solution for investigating issues that are connected through various, relational parameters. An inter-sector approach and interaction of local administration bodies and technical organizations in various fields of sustainable development and geospatial technologies is proposed, making this exchange of experiences, diffusion and training available to local governments and other targeted actor groups, in order to improve and modernize the governance processes in the Mediterranean basin.

Through the initial SWOT analysis the identified main Strength is the consortium composition, which provides for a broad, cross-border analysis, applicable to the whole Mediterranean Basin. The main Weaknesses identified are the delays in e-governance and adoption of geospatial technologies in everyday policy making. Opportunities are offered for sustainable development programs and good governance in local and regional administrations, in fields like environment, cadastre, risk analysis and infrastructure management.

PART A. CURRENT STATUS OF GEOSPATIAL INFORMATION IN LOCAL MANAGEMENT

1. Policies

1.1 National Policies and implementation

Introduction

The main objectives of a National Policy for the production and management of geospatial information are determined based on the needs assessment of the country.

This policy is implemented by a national Institution, which may have the management of all process, the responsibility to collect data, to produce geospatial data and to publish and disseminate the final geospatial products.

The production may be decentralized, which means more than one agencies have be assigned by the central government to compile the national geospatial information, or the production is done only by a single agency.

The next question is then whether the production is done according to some standards.

Conclusions

In EU countries (Cyprus, Greece, Malta and Spain) in Egypt and Jordan there is a national policy for the production and management of geospatial information that is implemented by a responsible National Agency that is determined (table 1.1). In Lebanon this policy concerns only the production and not the management, while in Tunisia and Palestine there is not a National Policy.

In the majority of countries, the production is done by a single agency. Only in Greece, Spain and Lebanon there are more agencies that produce Geospatial data. Malta does not respond. Likewise in the majority of the countries, the production is done according to some standards. Tunisia, Lebanon and Palestine are excluded. Malta does not respond.

Table 1.1 National Policies and implementation

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
1.1.1 Is there a National Policy for the production and management of geospatial information?	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes: Production No: Management	No
1.1.2 Is there a Responsible National agency?	The Department of Lands and Surveys of Cyprus	Ministry of the National Defense - National Remote Sensing Centre	National Cadastral & Mapping Agency S.A (NCMA S.A)	Malta Information Technology Agency (MITA)	National Geographic Institute	Egyptian General Authority (EGSA)	Royal Jordanian Geographic Centre	Basic maps: Ministry of Defense - Directorate of Geographic Affairs (DGA). Environmental maps: Center for Remote Sensing, CNRS	No
1.1.3 Is the production of geospatial data done only by a single agency?	Yes	Yes	No	N/A	No	Yes	Yes	No	Yes
1.1.4 Is the production done according to some standards?	Yes	No	Yes	N/A	Yes	Yes	Yes	No	No

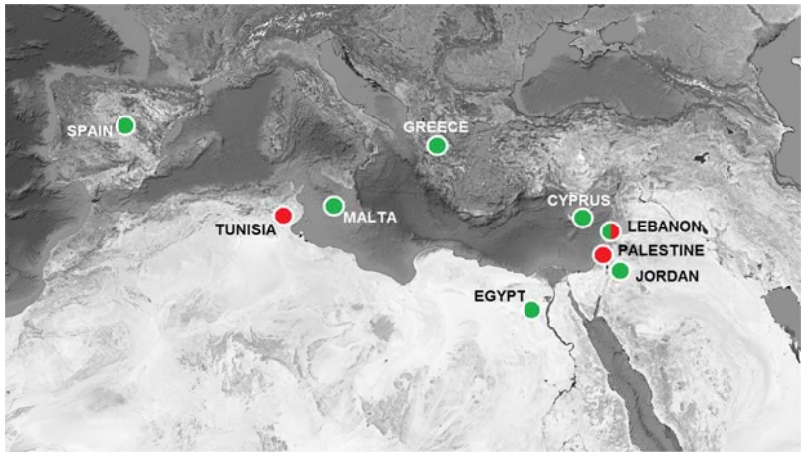


Fig. 1.1.1 Is there a National Policy for the production and management of geospatial information?
●: Yes, ●: No, ●: Yes Production / No: Management.

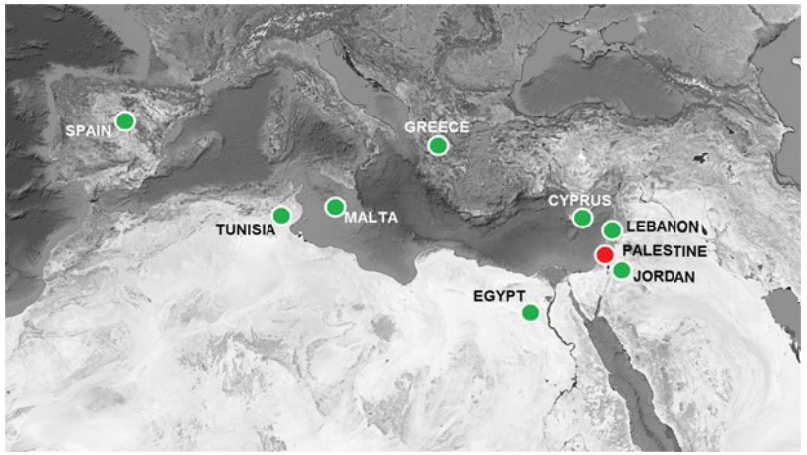


Fig. 1.1.2 Is there a Responsible National agency? ●: Yes, ●: No.

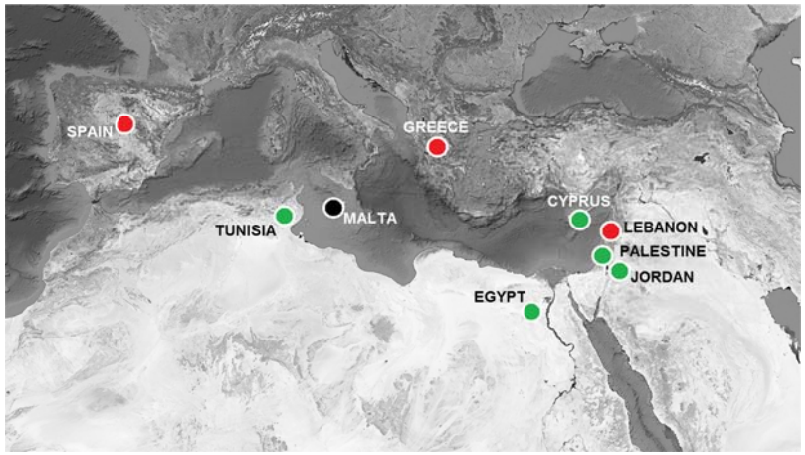


Fig. 1.1.3 Is the production of geospatial data done only by a single agency?
●: Yes, ●: No, ●: N/A.

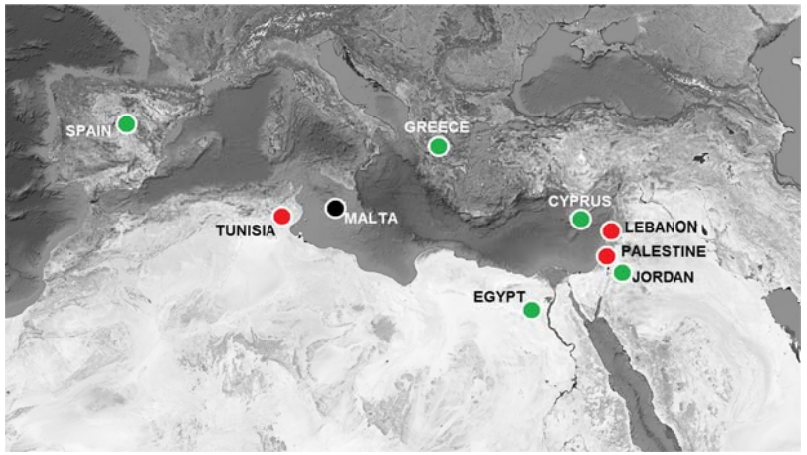


Fig. 1.1.4 Is the production done according to some standards?
●: Yes, ●: No, ●: N/A

1.2 National Census Data

Introduction

The National Policy for the production and management of census data is implemented by a National Statistical Institute, which is responsible for the conduct of statistical operations, aiming at the development, production and dissemination of official National statistics, which are used for decision and policy making at local, regional, national and possibly at European and international levels.

In this context, the mission of this Institution is to:

- obtain, safeguard and produce continuously improved statistics that are useful for public policy, the economy and the life of the people,
- cooperate and represent the country in the services of any other European or International Organization.

Conclusions

In all countries a National Statistical Policy is implemented by a National Agency.

Only in three countries (Tunisia, Jordan and Egypt) the National Statistical Institutes are not in cooperation with European and International organizations (Table 1.2).

Table 1.2 National Census Data

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
1.2.1 Is there a National Policy for the production and management of Census data?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.2.2 Is there a Responsible National agency?	The Statistical Service of Cyprus (CYSTAT)	National Institute of Statistics	Hellenic Statistical Authority (ELSTAT)	National Statistics Office (NSO)	National Statistics Institute of Spain (INE)	Central Agency for Public Mobilization and Statistics (CAPMAS)	Department of statistics (DoS)	Central Administration of Statistics (CNRS)	Palestinian Central Bureau (PCBS)
1.2.3 Is there Cooperation with European and international organizations on info exchange?	Yes	No	Yes	Yes	Yes	No	No	Yes	Yes

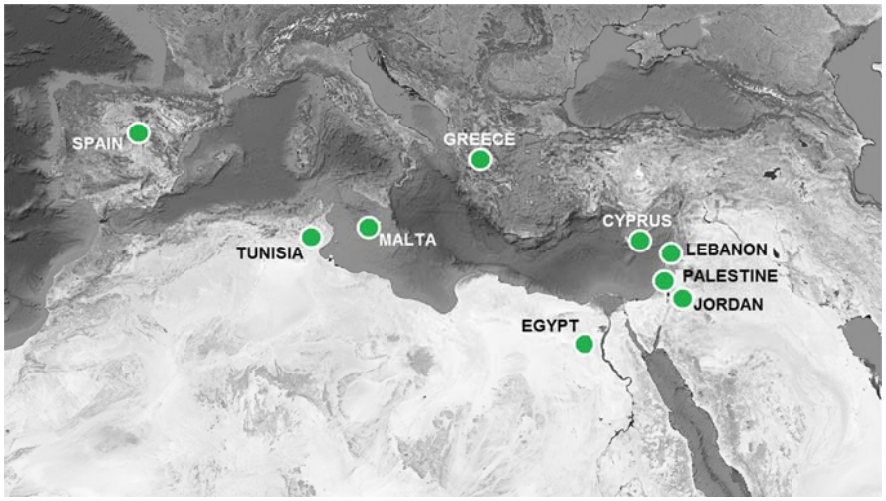


Fig. 1.2.1 Is there a National Policy for the production and management of Census data? ●: Yes.

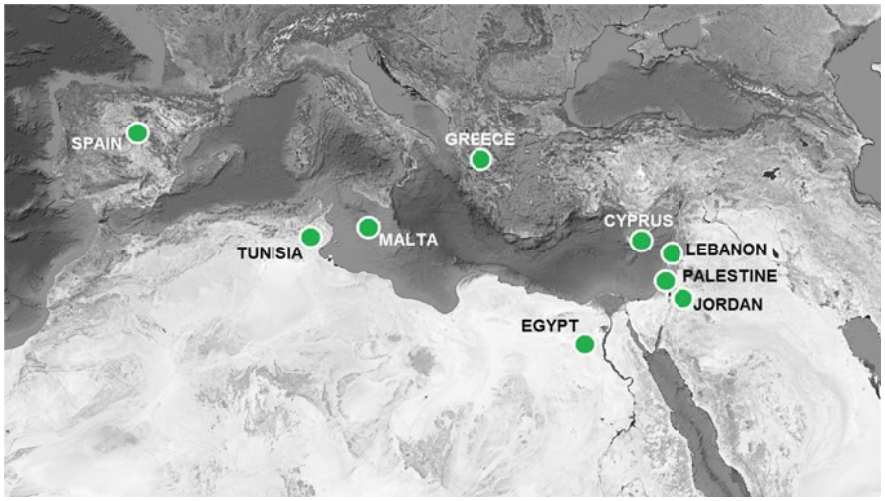


Fig. 1.2.3 Is there a Responsible National agency? ●: Yes.

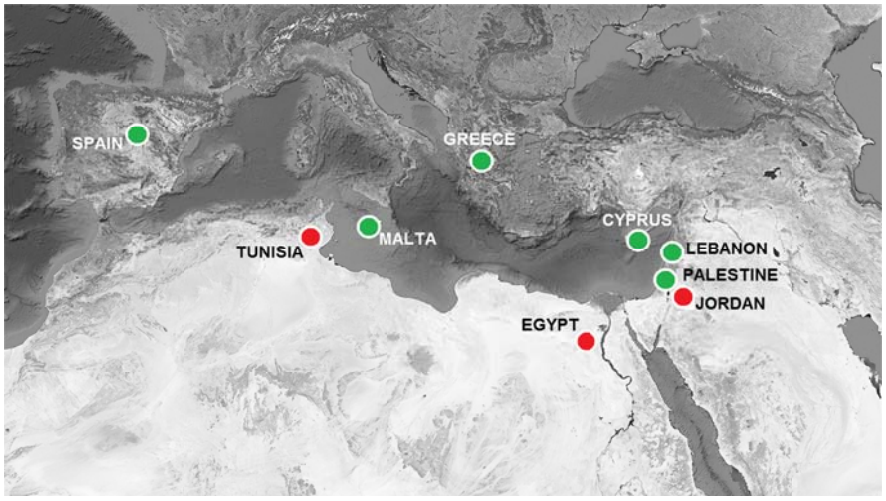


Fig. 1.2.2 Is there Cooperation with European and international organizations on info exchange? ●: Yes, ●: No.

1.3. Spatial data production/distribution centers-Sharing policies

Introduction

In the context of a national policy for the establishment of Geospatial Information there are two distinct stages:

Acquisition of raw data:

The existence of a national policy for the acquisition and sharing of source data is crucial. This Policy is implemented by a single or more national Institutions, which have the responsibility to capture data. The existence and implementation of a Policy in each country, a list of the official military and civil institutions that are responsible for this stage, and the existence of sharing policy for the source data are presented in Table 1.3

Production and sharing policy of spatial data:

The produced geospatial data may be National Cartographic base and National Topographic Maps in different scales, orthophotos in different resolutions, thematic maps in various scales etc. There is a great dissimilarity of the existing national data sets that are presented in the same table.

"The spatial data is produced by one national institution or are there other public organizations producing this type of information" and "is there a sharing policy", are the questions also encountered in the Table 1. 3

Conclusions

According to table 1.3, all the EU countries (Cyprus, Greece, Malta, Spain) and Jordan have a national policy for the acquisition of source data and they indicate the responsible National Agency. Only in Greece there are two Agencies, a civil and a military one. Egypt, Lebanon and Tunisia while indicate one or more responsible National Agencies, they declare that there does not exist a national policy. Finally Palestine does not respond. For the source data only in two EU countries (Greece, Spain) there is a sharing policy. Cyprus declares that there is not a relevant policy and Malta does not respond. For the non EU countries, in Egypt, Jordan and Lebanon the source data is shared according to a policy. In Palestine exists a limited sharing, while in Tunisia there is not.

As is mentioned in the introduction there is a great dissimilarity of the spatial products. More specifically:

All countries produce orthophotos (from aerial and/or satellite images) in different resolutions, except Tunisia and Jordan. Malta not responds.

All countries describe in details the different topographic maps and National maps that dispose. The scales vary from 1:1000 to 1:250000.

The same applies for the thematic maps that each country disposes. Archaeological, tourist, hydrological, geological, climate, crop, risk maps are some of all maps referred.

The scales of this type of information vary, depending on the reference level, which means local, regional or National level.

For the Natura 2000 and Ramsar convention areas, only two (Greece, Spain, Malta) of the EU countries, give a positive answer, while Cyprus answers negatively. For the rest of countries, except Lebanon that is consistent with Ramsar convention, no country produces the aforementioned thematic maps.

Organizations providing various spatial data sets: Apart from the National Institutions implementing the National policies, in the majority of countries there are additional public organizations that produce spatial data (in table 1.5 the precise number of the relevant national institutions is given for each country). Only in Cyprus and Palestine the spatial data are produced by a single organization.

Finally in the question "Is there a sharing policy for the spatial data?" the answer for the majority of EU countries, except Cyprus, is positive. Positive is the answer of Lebanon as well. For Egypt, Jordan and Palestine the answer is negative.

Table 1.3 Spatial data production/distribution center-Sharing policies

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
1.3.1 Is there a National Policy for acquisition of source data?	Yes	No	Yes	Yes	Yes	No	Yes	No	No
1.3.2 Who is the Responsible National agency?	Department of Lands and Surveys	-Ministry of the National Defense - National Remote Sensing Centre, -Office of the Topography and Cadastre, -National Office of Mines, -Ministry of Housing and Land Management, -National Institute of Meteorology, -Coastal	-Hellenic Military Geographical Service (HMGS) -National Cadastre & Mapping Agency S.A (NCMA S.A)	- Malta Environment and Planning Authority (MEPA)	National Plan of Land Observation -PNOT	-The Military Survey Authority -Egyptian General Surveying Authority (EGSA) -National Authority for Remote Sensing and Space Sciences (NARSS)	Royal Jordanian Geographic Centre (RJGC)	-Directorate of Geographic Affairs (Ministry of Defense) - National Council for Scientific Research -Directorate General of Urban Planning, (Ministry of Public Works and Transports) -Ministry of Agriculture -Council for Development and Reconstruction (CNRS)	N/A

		Protection and Planning Agency, -General Commission for Regional Developme nt -National Electricity Holding, -National Water Holding, -Institution de la recherche et de l'Enseignem ent supérieur Agricole, - Observatoir e National de l'Agriculture							
1.3.3 Is there a Sharing policy for the source data?	No	No	Yes	N/A	Yes	Yes	Yes	Yes	Limited sharing (please refer to report)

Spatial products	1.3.4 Orthophotos	Yes	No	HR (50cm) of the entire national territory, VHR (20cm) for 58 urban centers	Colour Orthophotos at 0.15m ground pixel	Orthophotos VHR (25, 50, 10cm) each 3 years of the entire national territory, Periodic coverage (annual, monthly and weekly) of the entire national territory via medium and low resolution satellite images (2.5-100m)	N/A	No	Yes, GeoEye, 2013, (45 cm). Ikonos, 2005 (1m). Russian KVR 1000 (2m).	Yes

Spatial products	1.3.5 National Maps	Yes (scale variable)	National territory: on 1/50 scale. 1/25 and 1/100 scales : not available	National Topographic Maps 1:5.000, and 1:50.000, National Cartographic Base 1:100.000	Large Scale Digital Topographic Mapping (1:2,500, 1:1,000) and Medium Scale Digital Topographic Mapping (1:50,000, 1:25,000)	National Topographic Maps 1:5.000, 1:25.000 and 1:50.000, National Cartographic Base 1:100.000, The Province Map 1:200.000, Spanish map 1:500.000, National map 1:1.250.000	Digital Topographic maps with different Scale, Digitization of published maps scale 1: 50.000, 1: 100.000, 1: 250.000, 1: 500.000, 1: 1.000.000, Digitization of Topographic maps scale 1:50.000, 1:100.000, 1:250.000	Maps for the entire country at a wide range of scales. -A few of the main cities 1:1,250 -the majority of cities and villages at both 1:2,500 and 1:5,000 - the main cities and their surrounding areas at 1:10,000, and the most heavily populated areas of the country have been mapped at the scale of 1:25,000. - National maps 1:50,000 and 1:100,000 -National Atlases	National Topographic maps 1:200000 1:50000 1:20000 1:5000 (Capital), Administrative divisions maps level 3 & A miscellany of thematic maps	-National Topographic Maps 1:50.000, -A few of the main cities 1:1,250

Spatial products	1.3.6 Thematic Maps	Yes	Thematic maps , Regional Priorities, Mapping Regional Agricultural Maps	Thematic maps in various scales concerning: Basins, Monuments of Natural Environment, National Parks, Natura 2000 areas, Areas of the International Treaties for Nature and the Environment, Protected forest areas,	-Statutory protection zones under Planning and Environment Protection Legislation -Habitats and land cover, generally focusing on natural habitats - Archeology and other major cultural assets -Marine Posidonia Habitats -European	Thematic maps (Land cover-land use) 1:25.000	Geologic map of Egypt Scale 1:2.000.000, Tectonic map of Egypt Scale 1:2.000.000, Geologic maps of south Valley Scale 1:250.000, Geologic maps of Sinai Scale 1:100.000, Geologic maps of south Valley Scale 1:100.000, Geomorphologic Maps of Sinai Scale 1:250.000, Geomorpho	Archaeological maps at 1:250,000, showing all the main cites of antiquity, as well as tourist maps at 1:5,000 and 1:1,500.	National Soil maps 1:50000 1:200000 National Land cover maps 1:20000 National Geological maps 1:50000 1:200000 Forests maps 1:200000 Selective Forest maps 1:20000 Selective Crop maps 1:50000 Flood risk maps 1:20000 Hydrgeological map (1:200.000)	Thematic maps, Historic maps, hydrological maps (Wells and springs locations, groundwater, aquifers…), land use land cover maps, geopolitical maps, cities and tourist maps, geological maps, soil maps, climate maps and details maps in locality level in addition to AutoCAD format.

Spatial products					Environment Agency datasets -Planning Data including Development -Planning Data, Planning Constraints Data, Scheduling Data and Listed Natural Heritage - Environmental Data including Environmental Permitting, Environmental		logic Maps South valley Scale 1:250.000, Maps mineral resources of Egypt 1:1.000.000, Flood hazard maps of Sinai Scale 1:250.000, Flood hazard maps of south valley Scale 1:250.000, Geo. Environmental map of Mokattum area Scale 1:5.000, Geologic map of			
Spatial products					Assessments, Marine Data and Terrestrial Data -Base Maps including Survey		south Libia Scale 1:250.000			

					Control Points, Topography, Background Maps and Archive Survey Sheets					
	1.3.7 Natura 2000	No	No	Yes	Yes	Yes	No	No	No	No
	1.3.8 Ramsar convention areas	No	No	Yes	N/A	Yes	No	No	Yes	No
1.3.9 Are there other Public organizations producing spatial data?		No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
1.3.10 Is there a Sharing policy for the spatial data?		No	Yes	Yes	Yes	Yes	No	No	Yes	No

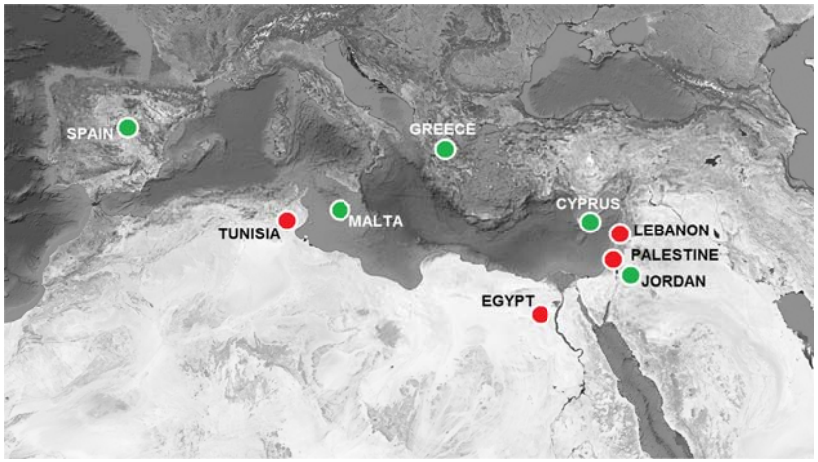


Fig. 1.3.1 Is there a National Policy for the acquisition of source data? ●: Yes, ●: No.

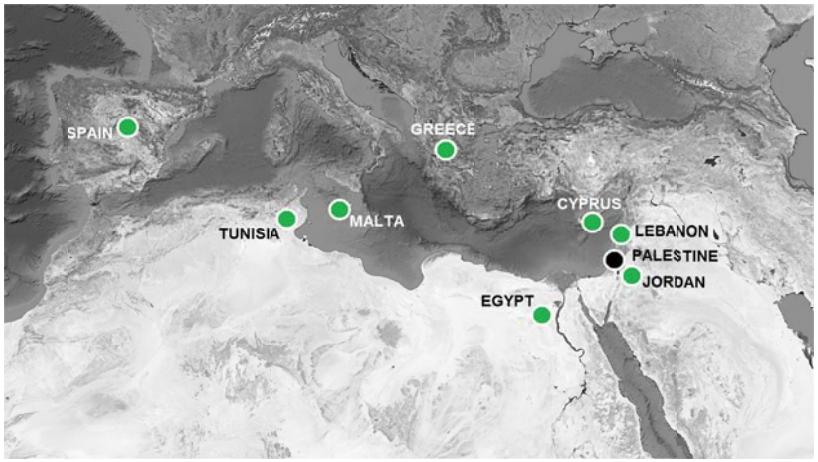


Fig. 1.3.2 Who is the Responsible National agency? ●: Yes, ●: N/A.

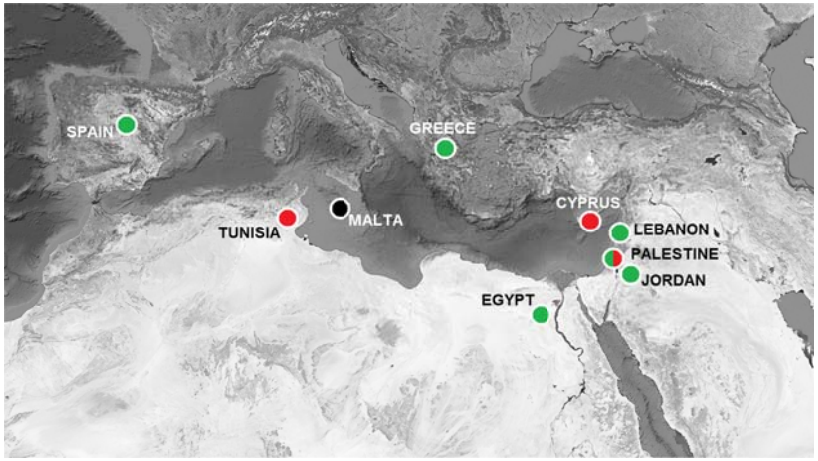


Fig. 1.3.3 Is there a Sharing policy for the source data? ●: Yes, ●: No, ●: Limited sharing, ●: N/A.

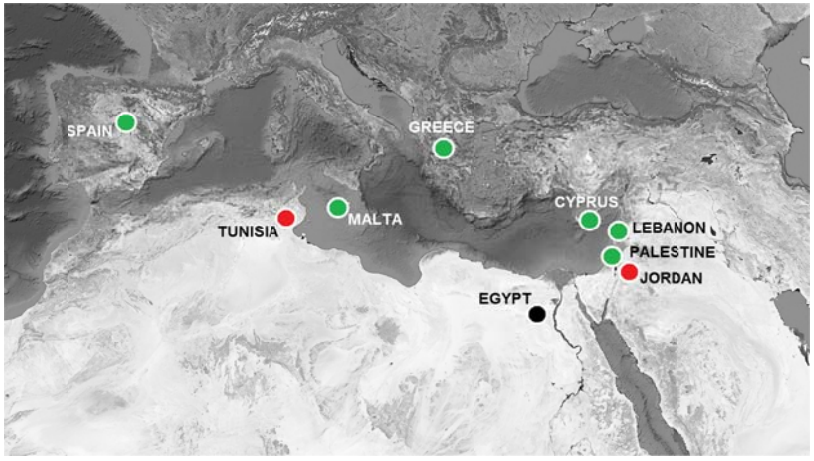


Fig. 1.3.4 Spatial products: Orthophotos. ●: Yes, ●: No, ●: N/A.

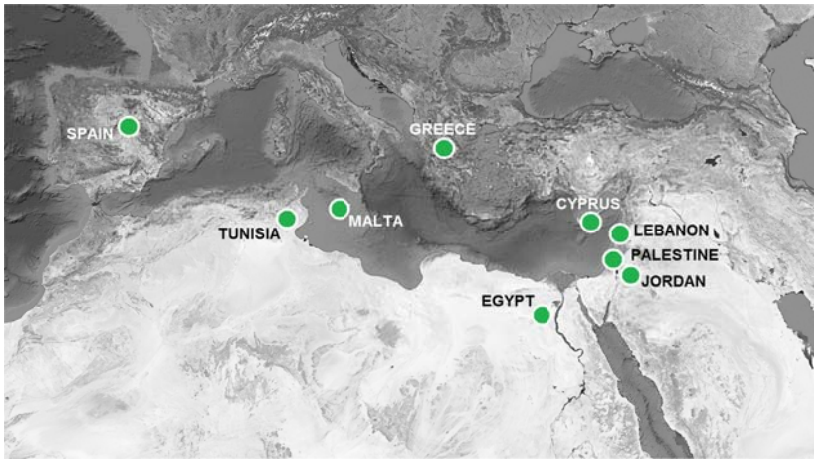


Fig. 1.3.5 Spatial products: National Maps. ●: Yes.

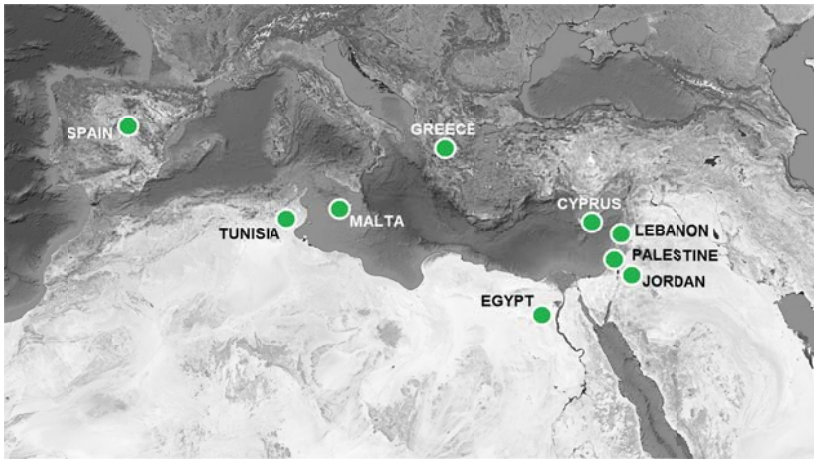


Fig. 1.3.6 Spatial products: Thematic Maps. ●: Yes.

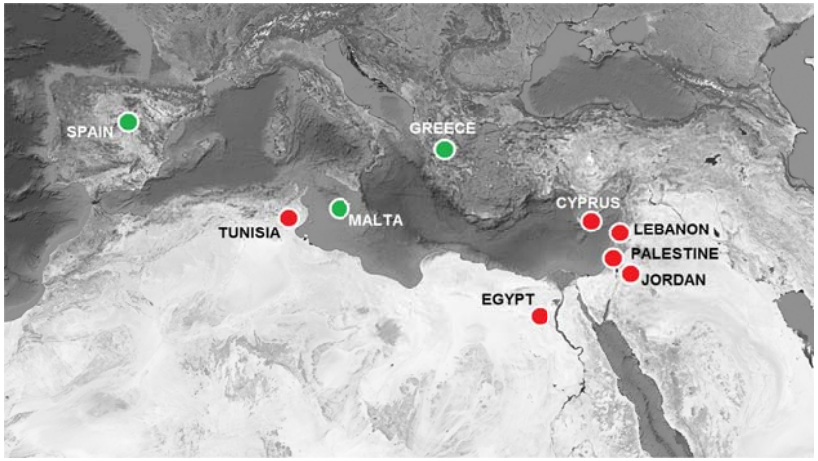


Fig. 1.3.7 Spatial products: Natura 2000. ●: Yes, ●: No.

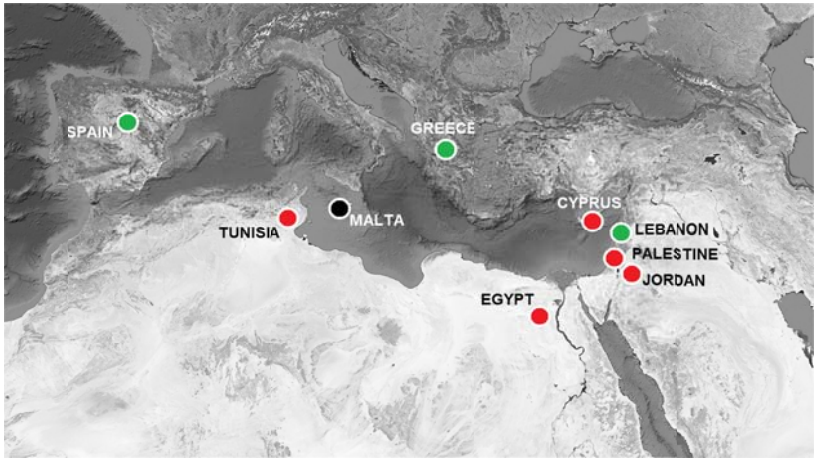


Fig. 1.3.8 Spatial products: Ramsar convention areas. ●: Yes, ●: No, ●: N/A.

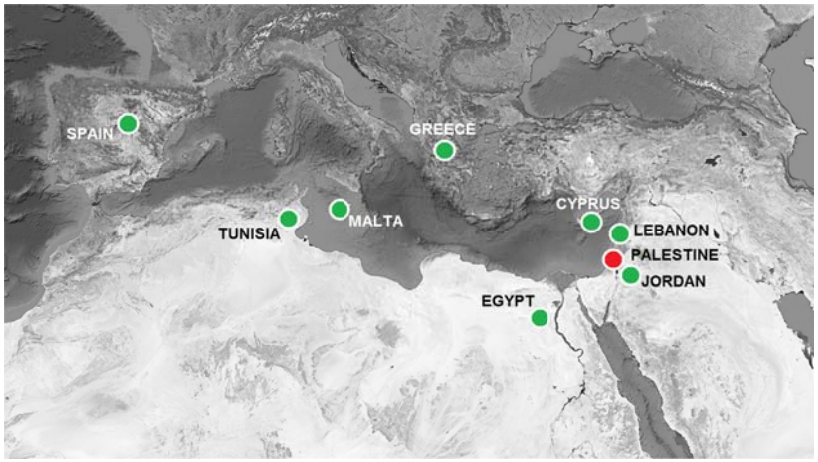


Fig. 1.3.9 Are there other Public organizations producing spatial data? ●: Yes, ●: No.

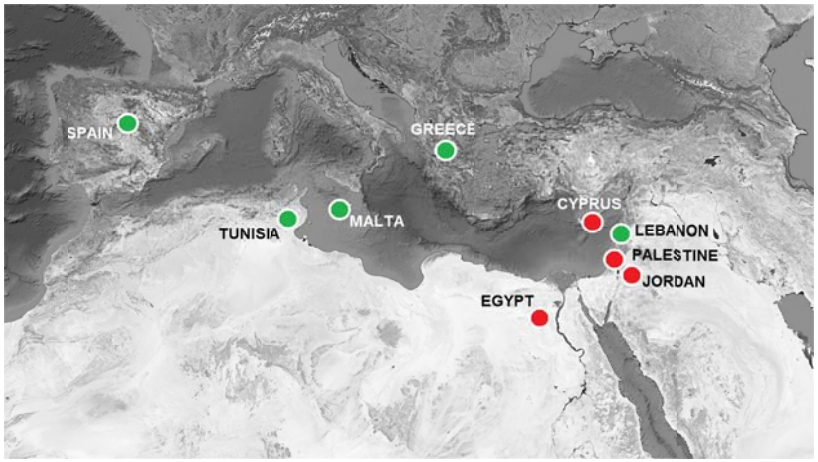


Fig. 1.3.10 Is there a Sharing policy for the spatial data? ●: Yes, ●: No.

1.4 Use of spatial information in local decision making processes

Introduction

In the past years, base maps in different scales was the main type of geoinformation in local decision making processes. Today, orthoimages and DTM, are added in the list of necessary and most used spatial products.

Additionally, thematic maps, usually produced from orthoimages, and census data are the basic type of information used today in local decision making processes.

The scale of the base maps and the resolution of the orthoimages vary, depending from the scale of the project.

Conclusions

The type of data that is used in local decision making processes, according to the table 1.4 it seems to be standardized in all countries.

Thus, the projects in regional and local level are based on Base Maps in scales 1:5.000 (in Lebanon 1:2.000) and 1:50.000 (fig. 1.4.3), orthoimages, (except Egypt), DTM (except Cyprus and Tunisia), thematic Maps and census data.

For the projects in National level, besides the above mentioned data, possibly additional information is required that is specified in each case.

Table 1.4 Use of spatial information in local decision making processes

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
1.4.1 National level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.4.2 Regional and Local level	No	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Yes
1.4.3 Base Maps 1:5000, 1:50000	Yes	N/A	Yes	Yes. Base Maps 1:50.000	Yes	Yes	Yes	Yes. Base Maps 1:20.000, 1:50.000	Yes
1.4.4 Orthoimages	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
1.4.5 DTM	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.4.6 Thematic maps	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.4.7 Census data	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

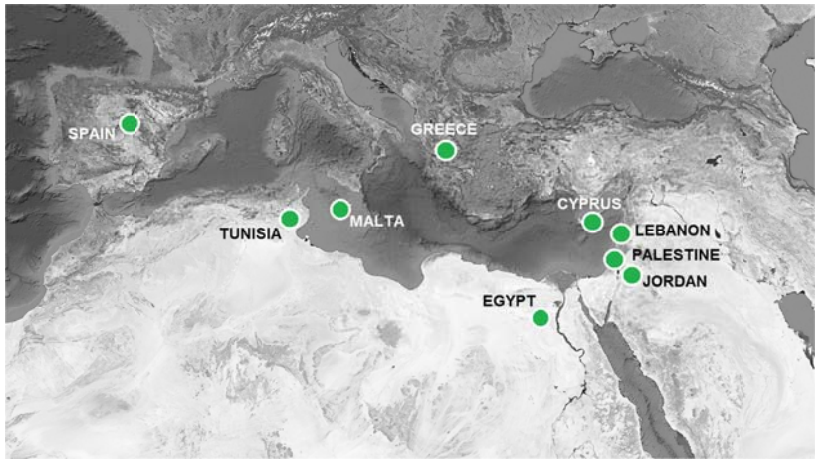


Fig. 1.4.1 National level. : Yes.

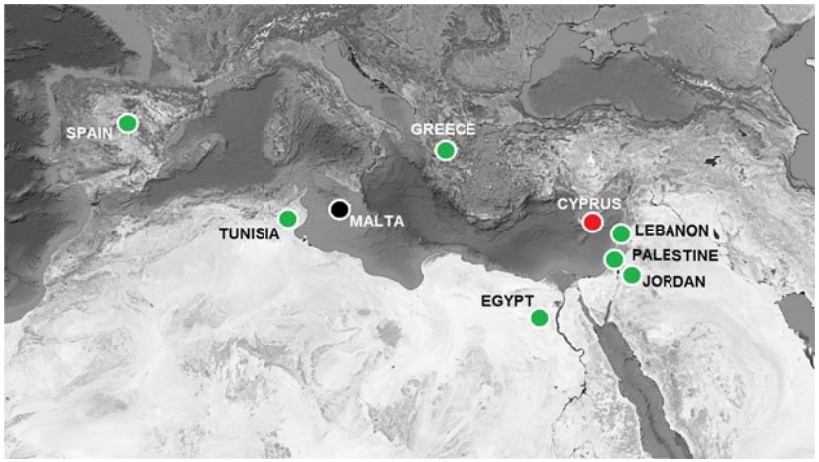


Fig. 1.4.2 Regional and Local level. : Yes, : No, : N/A.

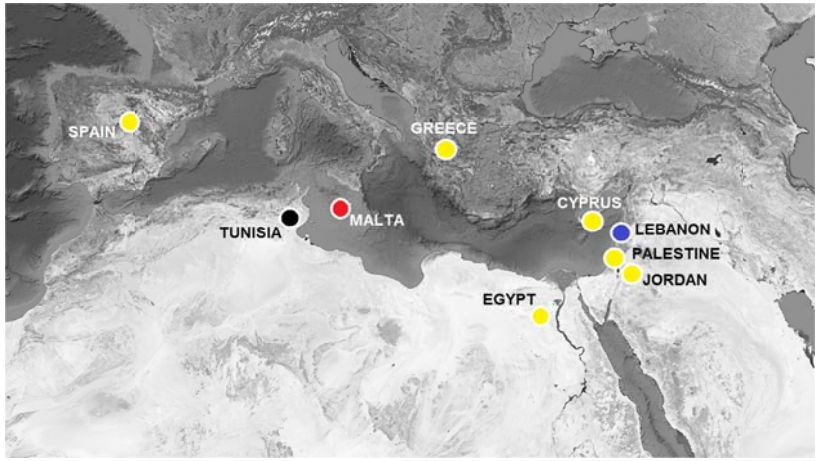


Fig. 1.4.3 Base Maps. : 1:5000, 1:50000, : 1:20000, 1:50000, : 1:50000, : N/A.

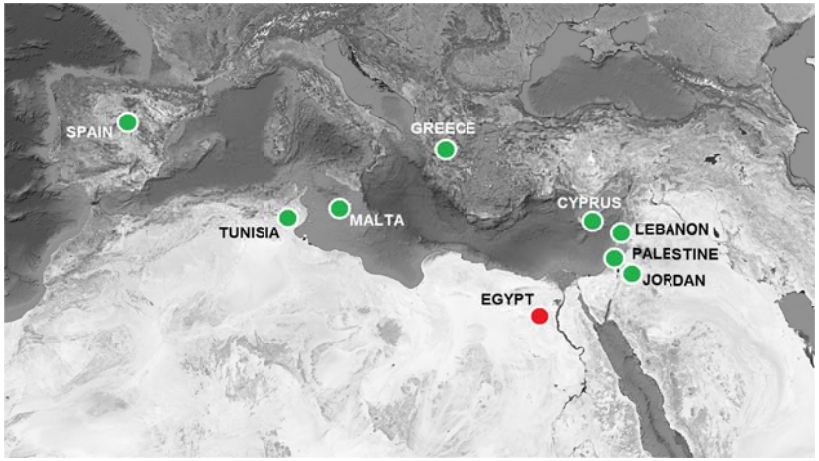


Fig. 1.4.4 Orthoimages. : Yes, : No.

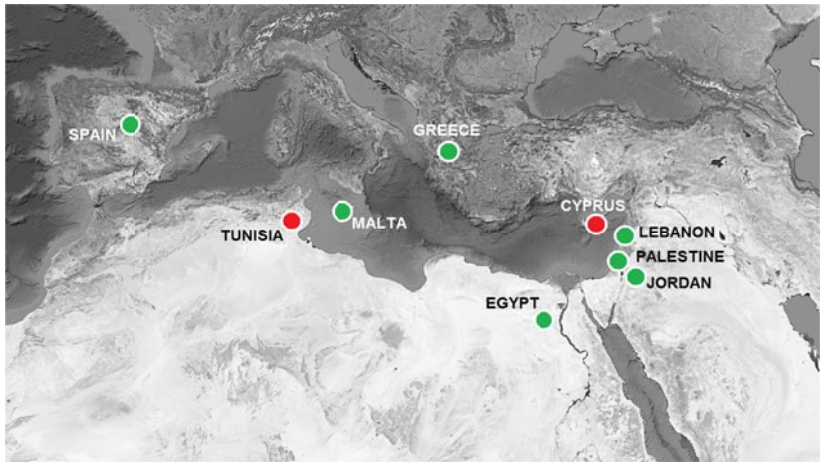


Fig. 1.4.5 DTM. ●: Yes, ●: No.

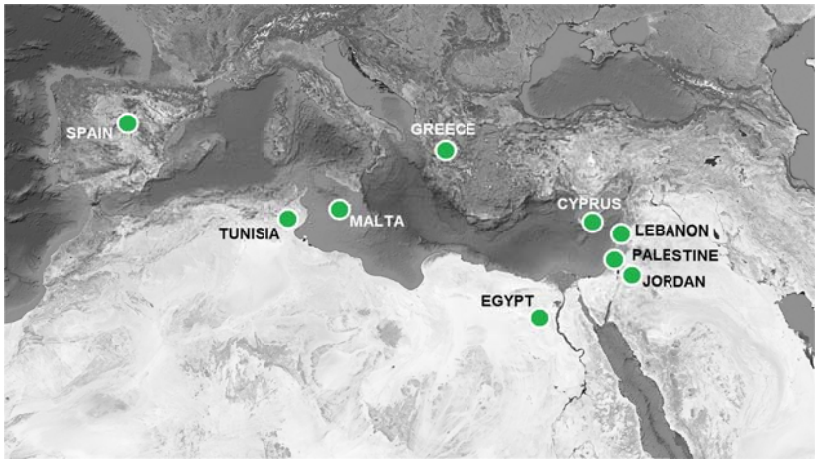


Fig 1.4.6 Thematic maps. ●: Yes.

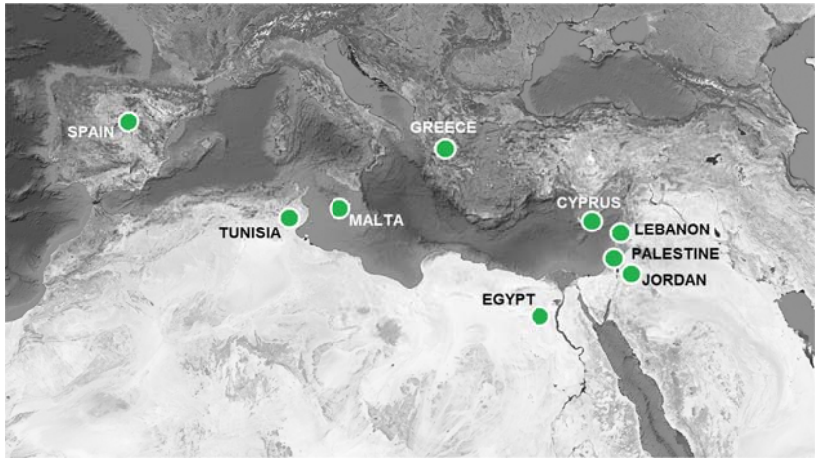


Fig. 1.4.7 Census data. ●: Yes.

1.5 Relevant national institutes

Introduction

Table 1.5 supplements the information that is given in the table 1.3 and more specifically in 1.3.9. Here, the partners give the exact number of relevant institutes that are handling spatial information.

Also, more detailed information is given about the sharing policy: i.e. the number of institutes distributing data on-line, whether there is quoted prices, if there are restrictions in data use and finally whether Metadata are included.

Conclusions

The number of relevant national institutes, that are handling spatial data, varies (table 1.5) from one agency (Cyprus) to 49 (Greece), while the number of relevant national institutes that distribute data on-line varies from one (Cyprus) to 9 (Malta).

In the chart 1.5.1 this combined information for all countries is given. There is readily comprehensible that in Egypt, Jordan and Palestine no one Institute distributes data on-line, although Egypt quotes prices for data. On the contrary, Cyprus distributes data on-line but does not quote prices. Tunisia, Greece, Spain and Lebanon distribute data on-line and at the same time inform about the cost. Although the policy of distributing data on-line is followed by 6 institutes in Malta, there is no answer to the question for the cost of this data.

Due to different reasons, there are restricted data In 6 countries. In this question, Cyprus, Egypt and Palestine respond negatively, that means there are not restricted data.

Finally, for the majority of countries metadata are included, except in the case of Cyprus and Tunisia.

Table 1.5 Relevant national institutes

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
1.5.1 Number of relevant national institutes	1	8	49	11	24	6	21	4	9
1.5.2 Number of institutes distributing data on-line	1	6	3	9	6	0	0	2	0
1.5.3 Are there quoted prices for data?	No	Yes	Yes	N/A	Yes	Yes	N/A	Yes	No
1.5.4 Are there restricted data?	No	Yes	Yes	Yes	Yes	No	Yes	Yes	No
1.5.5 Are metadata included?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

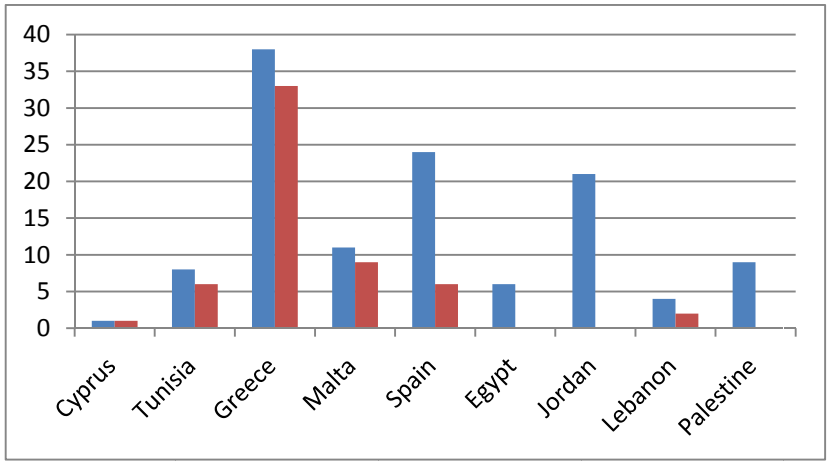


Chart 1.5.1 : Number of relevant national institutes.
: Number of institutes distributing data on-line.

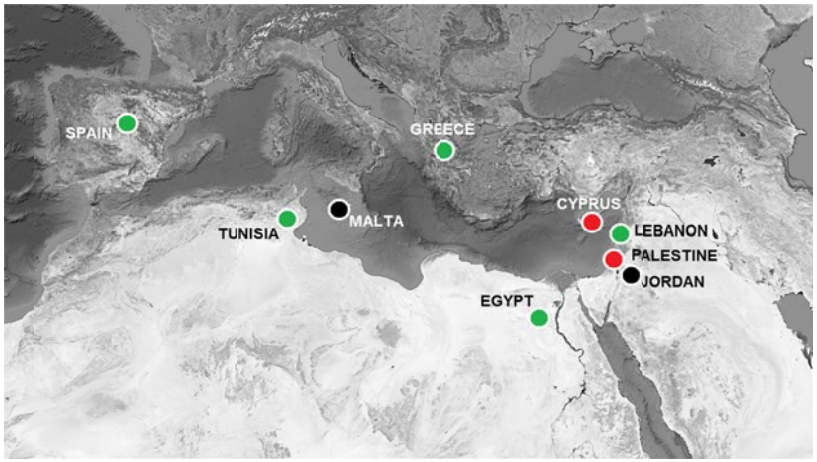


Fig. 1.5.3 Are there quoted prices for data? : Yes, : No, : N/A.

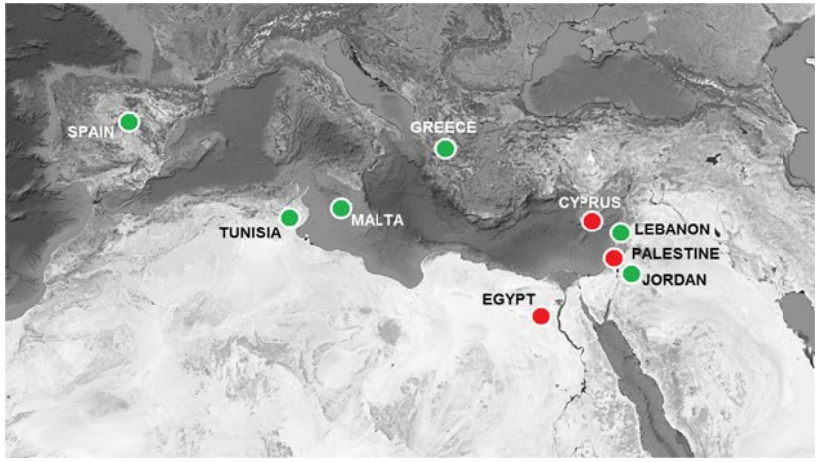


Fig. 1.5.4 Are there restricted data? : Yes, : No.

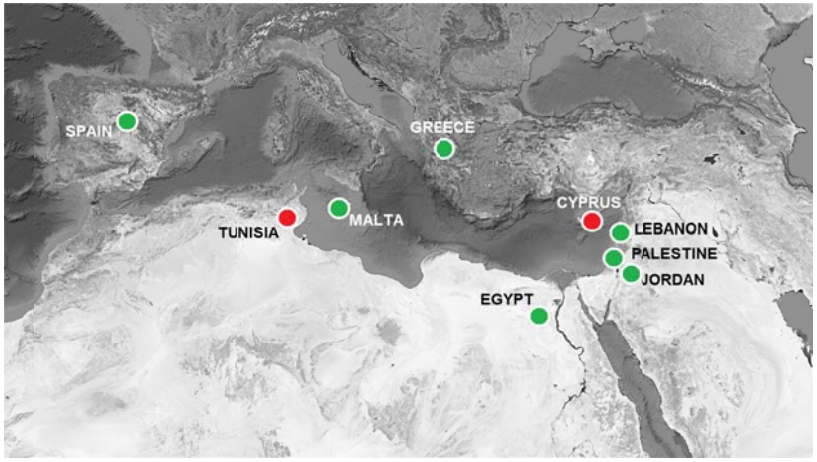


Fig. 1.5.5 Are metadata included? : Yes, : No.

1.6 Beneficiaries of ongoing or completed EU/national/regional projects

Introduction

In the national reports in paragraph 1.6, the last group of questions concerns the National policies. The partner countries are mentioning a few examples of beneficiaries of ongoing or completed EU, national or regional projects. In the relevant table 1.6, the existence or not of beneficiaries are distinguished at the three levels, that means National, Regional and Local level.

Conclusions

According to the table 1.6, all countries respond that in National level, there are beneficiaries.

In regional level, except Jordan that gives negative answer and Malta that does not respond, all the other countries declare that there are beneficiaries.

Finally in local level, except Tunisia, all the countries give a positive reply.

Table 1.6 Beneficiaries of ongoing or completed EU/national/regional projects

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
1.6.1.Beneficiaries are at National level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1.6.2 Regional level	Yes	Yes	Yes	N/A	Yes	Yes	No	Yes	Yes
1.6.3 Local Level	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

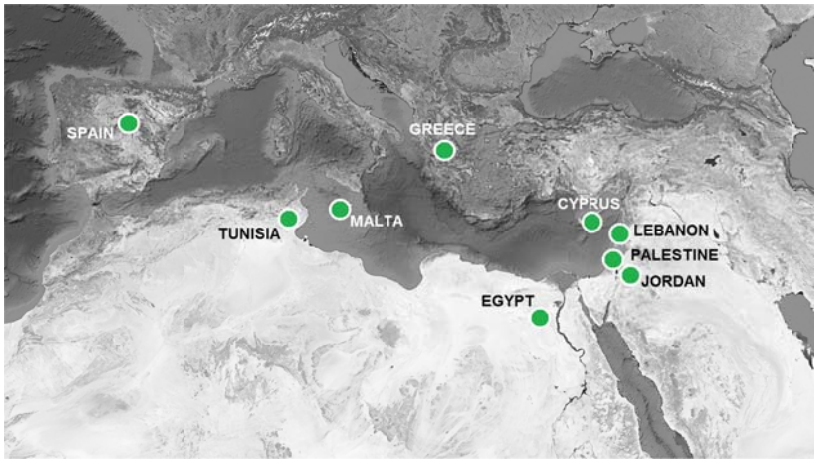


Fig. 1.6.1 Beneficiaries are at National level. ●: Yes.

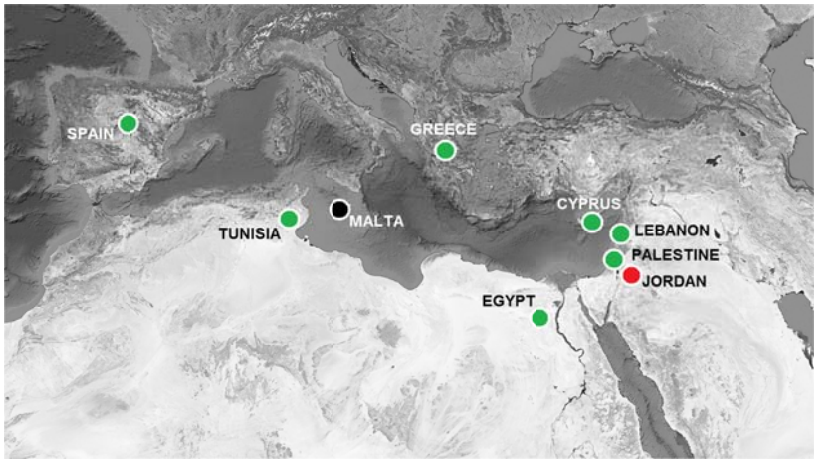


Fig. 1.6.2 Regional level. ●: Yes, ●: No, ●: N/A.

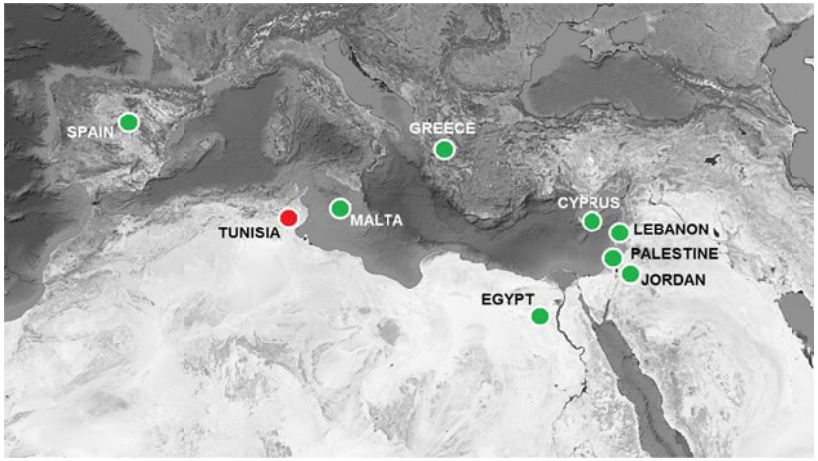


Fig. 1.6.3 Local Level. ●: Yes, ●: No.

2. Data – Applications

2.1. National Spatial Data Infrastructure (NSDI)

Introduction

In Europe, a major recent development has been the entering in force of the INSPIRE Directive in May 2007, establishing an infrastructure for spatial information to support Community environmental policies, and policies or activities which may have an impact on the environment.

INSPIRE is based on the infrastructures for spatial information established and operated by the 27 Member States of the European Union. The Directive addresses 34 spatial data themes needed for environmental applications, with key components specified through technical implementing rules. This makes INSPIRE a unique example of a legislative "regional" approach (http://inspire.ec.europa.eu/)

Spatial data infrastructures (SDI) connect people, policies and technologies into a framework that enables the efficient acquisition, distribution and use of geospatial information (http://www.eurogeoinfo.org/national-spatial-data-infrastructures).

Conclusions

In EU countries (Greece, Malta and Spain) the creation of the National Spatial Data Infrastructure (NSDI) is a key activity for a systematic and effective management of all kinds of resources. The definition of the user´s needs is translated to technical requirements taking in regard the standardization process that is currently taking place in geospatial information at European level according to INSPIRE directive. Thus in these countries an NSDI conforming to Inspire directive is in effect and in the same time is used effectively. Although Cyprus is an EU Member, it does not have developed yet an NSDI. From the other countries only Jordan declares that has in effect an NSDI, that is not in accordance with INSPIRE directive but is not used effectively.

The form of data in all countries having an NSDI is both in Hardcopy and Digital form. For these countries the format of data is Raster, Vector, and DataBases, while in the majority metadata is also included.

Table 2.1 National Spatial Data Infrastructure (NSDI)

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
2.1.1 Is there an NSDI in effect?	No	No	Yes	Yes	Yes	No	Yes	No	No
2.1.2 Is NSDI effectively used?	No	No	Yes	Yes	Yes	No	No	No	No
2.1.3 Does NSDI conform with INSPIRE Directive?	No	No	Yes	Yes	Yes	No	No	No	No
2.1.4 Form of data: Digital (D), Hardcopy (H)	----	----	D/H	D/H	D/H	----	D/H	----	----
2.1.5 Format of data: Vector (V), Raster (R), Database (DB)	----	----	V/R/DB	V/R/DB	V/R/DB	----	V/R/DB	----	----
2.1.6 Metadata	----	----	Yes	Yes partially	Yes	----	No	----	----

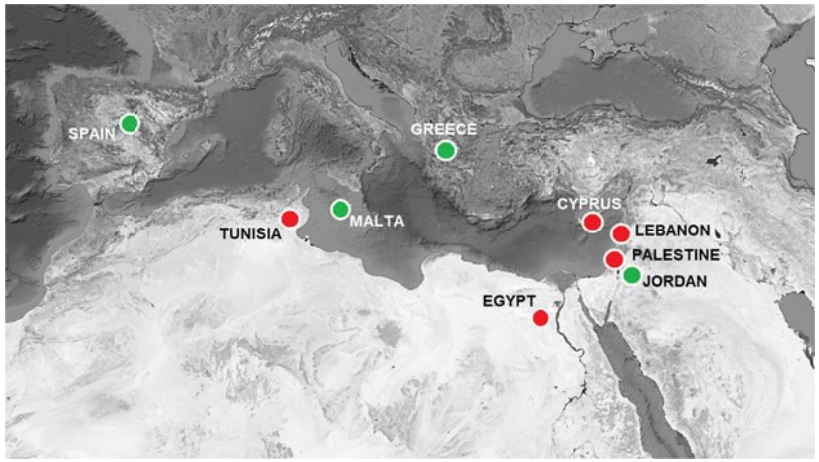


Fig. 2.1.1 Is there an NSDI in effect? ●: Yes, ●: No.

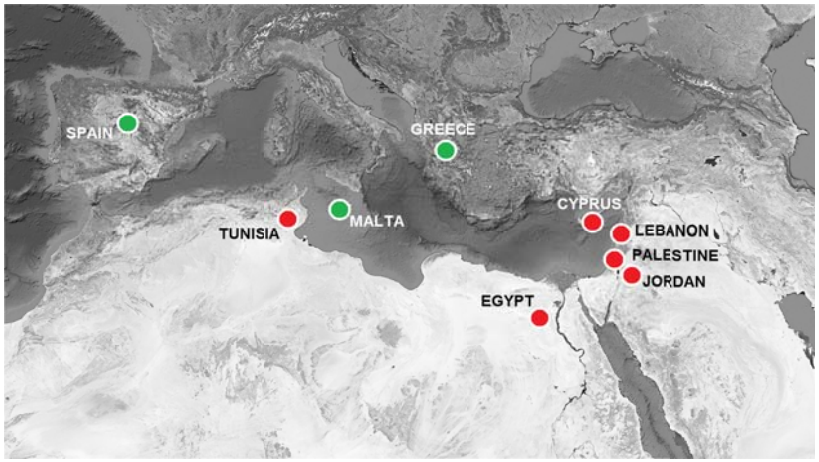


Fig. 2.1.2 Is NSDI effectively used? ●: Yes, ●: No.

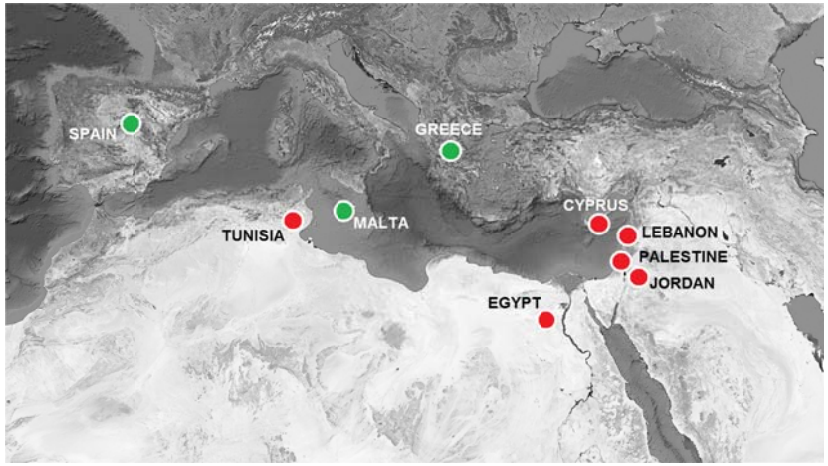


Fig. 2.1.3 Does NSDI conform with INSPIRE Directive? ●: Yes, ●: No.

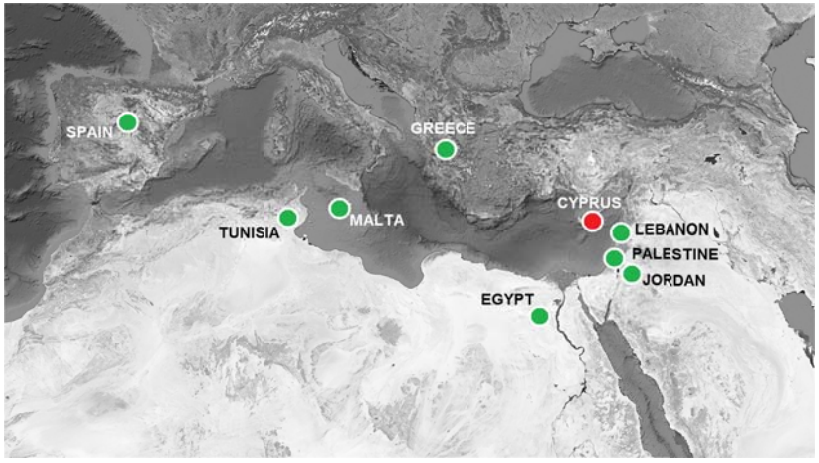


Fig. 2.1.4 Form of data: Digital (D), Hardcopy (H). ●: D/H, ●: No.

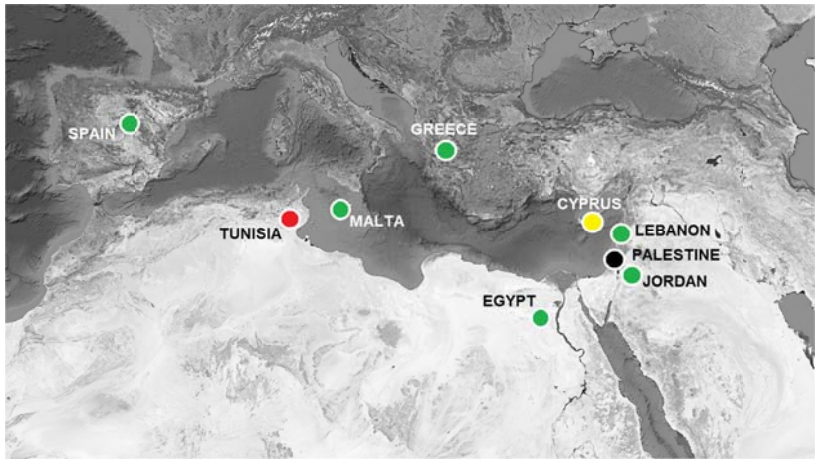


Fig. 2.1.5 Format of data: Vector (V), Raster (R), Database (DB).
●: V/R/DB, ●: V/R, ●: N/A.

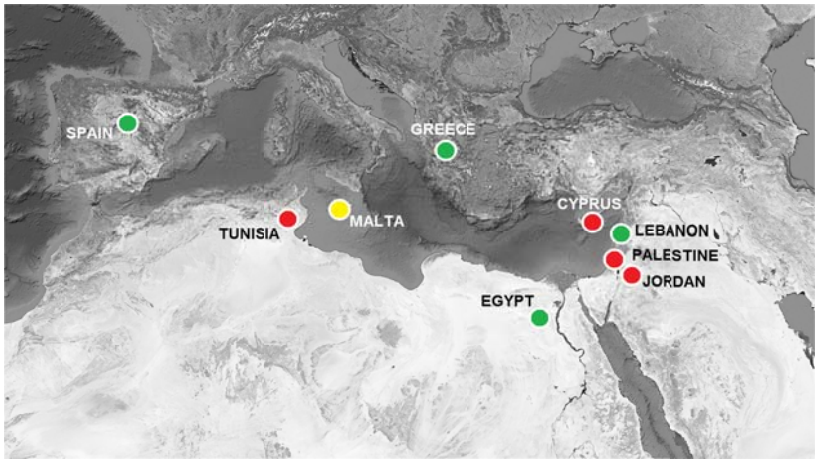


Fig. 2.1.6 Metadata. ●: Yes, ●: No, ●: Not for all.

2.2 National Census

Introduction

According to table 1.2 all countries declare that in their countries a National policy for the production and management of Census Data is implemented.

Also, in the table 1.4 (where the type of spatial information used in local decision-making processes is summarized) all countries respond that census data is included. The question that arises is: What type of national census data is available in each country?

Conclusions

Each country, except Cyprus and Spain that give a general response, quotes in detail all the census data that they collect.

A coarse grouping of the referred type of data is:

- Population
- Residential, Industrial
- Constructions
- Infrastructures, transport
- Environment, Energy
- Technology
- Health, Education, Community services
- Sport, Recreation, Entertainment
- Heritage, Culture, Tourism

Finally, in the majority of the countries, there is free access of data.

Tunisia and Egypt are excluded as they declared that there is not a free access of data.

Table 2.2 National Census

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
2.2.1 Are National Census data available?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2.2.2 Type of data	Statistical Databases	Population, agriculture, building and Constructions, culture-Entertainment, education, environment, municipalities, centers of excellence, industry, roads and natural hazards.	Statistics (statistical tables and various indicators): Agriculture, Building and Constructions, Culture-Entertainment, Education, Environment, Fishery, Health-Social Protection, National Accounts, Industry, Inflation, Justice, Labour Market, Livestock,	General Statistics, Economy and Finance, Population and Social Conditions, Industry and Services, Agriculture and Fisheries, External Trade, Transport and Environment and Energy	Statistics for its territorial area	Agriculture, Building and Constructions, Culture-Entertainment, Education, Environment, Health-Social Protection, Industry, Transport, Population, Trade-Services	222 indicators, covering 16 sectors: demographics, economics, construction, telecommunications and information, education, social security, travel, women, health, enterprises and trade unions, nutrition, energy,	Population, agriculture, building and Constructions, culture-Entertainment, education, environment, municipalities, centers of excellence, industry, roads and natural hazards, water resources, energy, urban planning.	Data about the economic, demographic, social and environmental situation: Agriculture, Balance of Payments, Constructions, Environment, Education, Financial Intermediation, Gender, Health, Industry, Jerusalem, Labor force, National Accounts, Prices and Price Indexes, Science and Technology, Tourism, trade,

			Transport, Population, Tourism, Trade-Services, Technology-Information Society				agriculture, housing and households, security and justice, environment.		Water and Waste Water.
2.2.3 Free access of data	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes

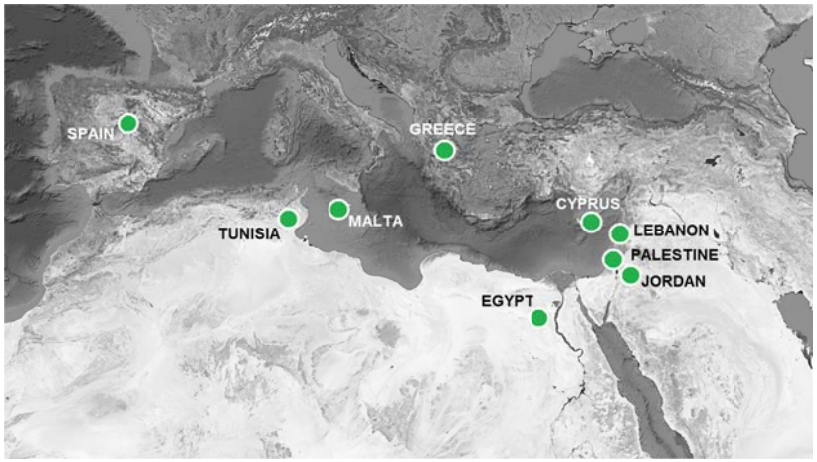


Fig. 2.2.1 Are National Census data available? ●: Yes.

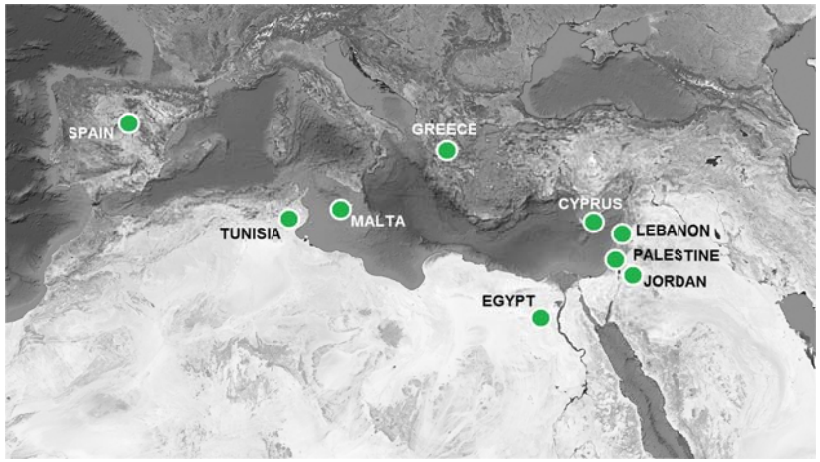


Fig. 2.2.2 Type of data. ●: Yes.

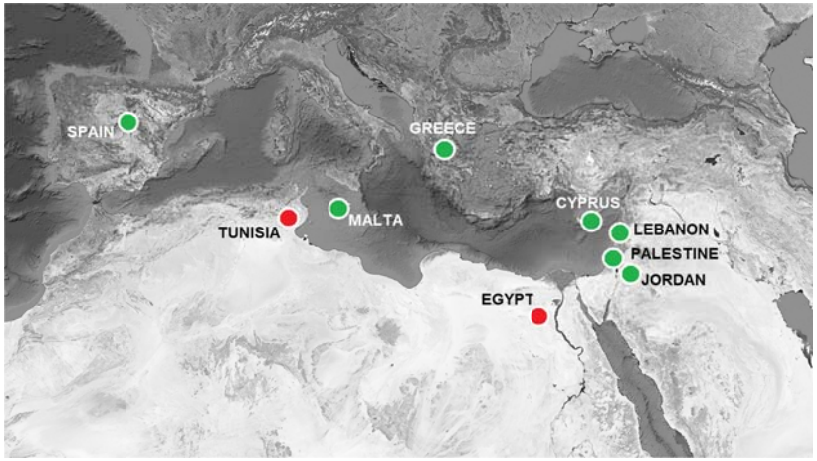


Fig. 2.2.3 Free access of data. ●: Yes, ●: No.

2.3. Spatial data processing capability

Introduction

The production and the maintenance of geodata are vital for each country. This section explores this issue in the partner countries.

Conclusions

In all countries the responsibility of the production and the maintenance of geodata is kept by public organizations, which in many cases are more than one.

Table 2.3 Spatial data processing capability

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
2.3.1 Production and maintenance of geodata	Public	Public	Public	Public	Public	Public	Public	Public	Public
2.3.2 Number of public services and bodies	1	8	38	11	19	6	21	2	9

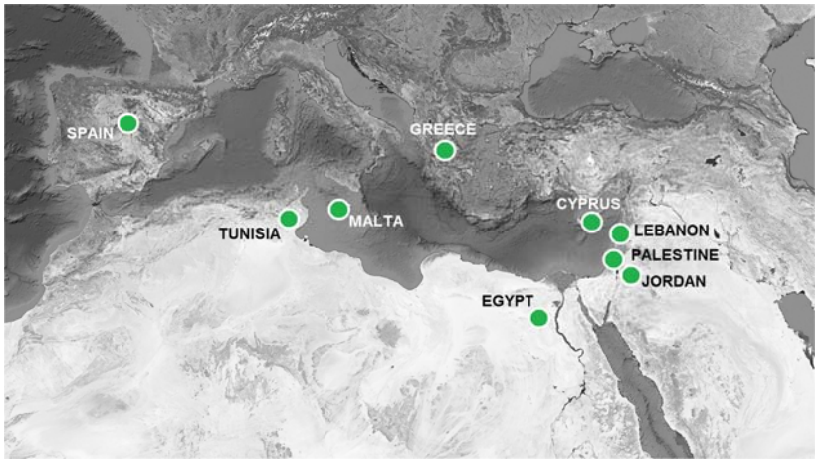


Fig. 2.3.1 Production and maintenance of geodata. ●: Public.

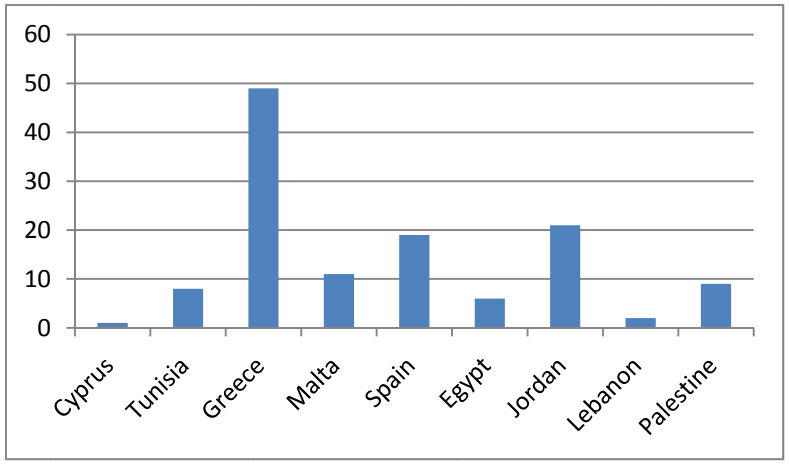


Chart 2.3.2 Number of public services and bodies.

2.4. Spatial data collection capability

Introduction

In table 1.3 the national policy regarding the acquisition of raw data is analyzed.

The capability of each country for the acquisition of different kind of data is examined here in the table 2.3. Aerial and satellite images and Lidar data are of interest.

Also, the question about the existence of a sharing policy for the source data in 1.3.3, becomes more detailed. The information that is given here concerns the free sharing of the data and the existence of royalties. For public organizations that are responsible for the acquisition of source data, the existence of national private industry is examined as well.

Conclusions

Palestine is the only one country where there is not a public organization that collects spatial data while in all others countries, there is a number of relevant Public organizations. The number of public organizations that have the spatial data collection capability ranges from 1 to 19 (chart 2.3.1)

All countries collect Aerial photographs. Malta, Spain and Egypt collect Lidar data as well. These countries and Cyprus and Lebanon declare having the capability to collect also satellite images. Palestine, does not have the capability to collect any of the above type of source data.

Only, in Cyprus, Malta, Spain and Jordan there are free data. Royalties do not exist in Cyprus and Jordan. In all the other countries there exist.

Finally, only in Cyprus, Egypt and Jordan there is no private industry.

Table 2.4 Spatial data collection capability

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
2.4.1 Number of Public Organizations	1	8	2	1	19	1	2	1	0
2.4.2 Aerial photographs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
2.34.3 LIDAR data	No	No	No	Yes	Yes	Yes	No	No	No
2.4.4 Satellite images	Yes	No	No	Yes	Yes	Yes	No	Yes	No
2.4.5 Are there free data?	Yes	No	No	Yes	Yes	No	Yes	No	No
2.4.6 Are there Royalties?	No	Yes	Yes	N/A	Yes	Yes	No	Yes	No
2.4.7 Existence of national private industry	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes

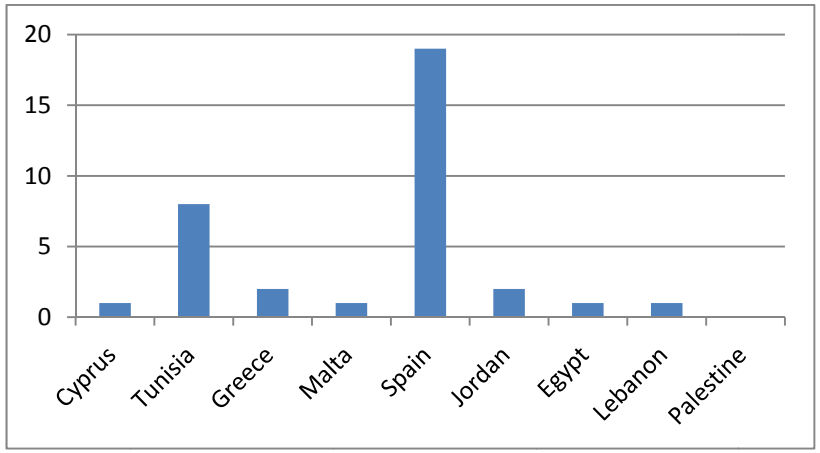


Chart 2.4.1 Number of Public Organizations.

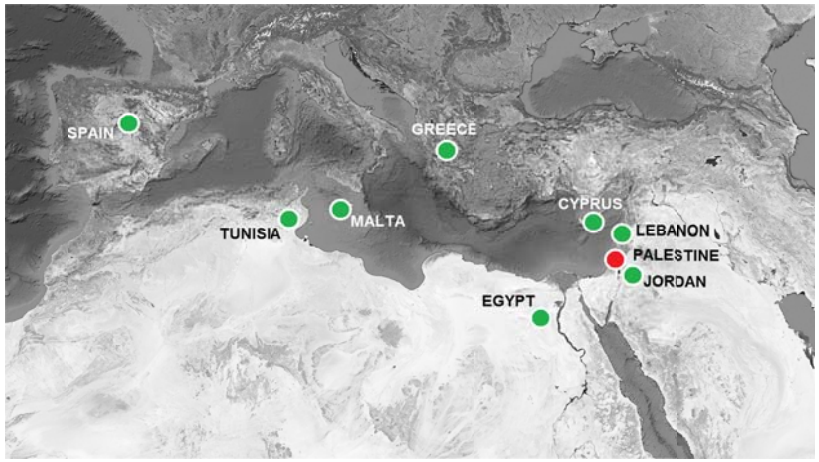


Fig. 2.4.2 Aerial photographs. ●: Yes, ●: No.

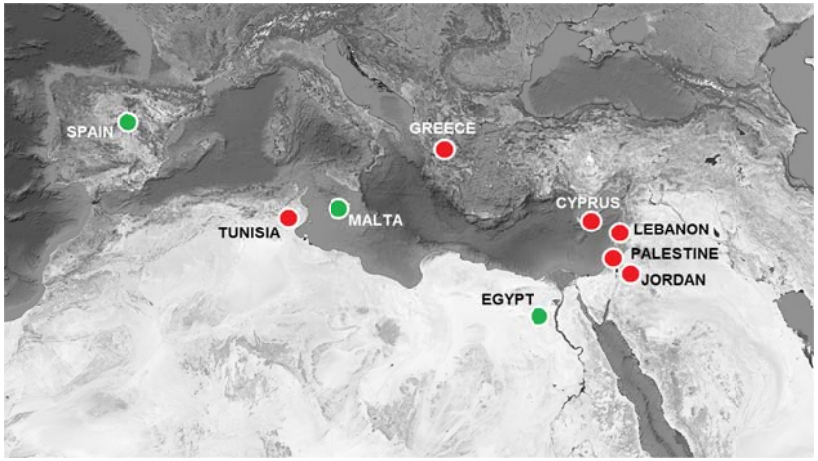


Fig. 2.4.3 LIDAR data. ●: Yes, ●: No.

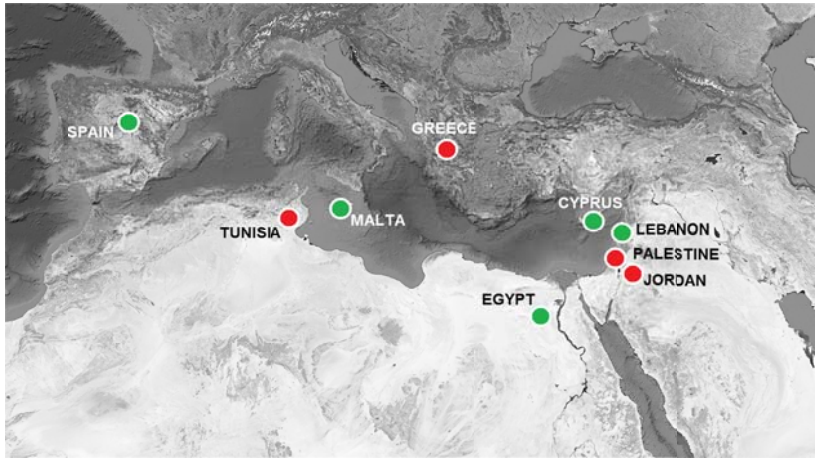


Fig. 2.4.4 Satellite images. ●: Yes, ●: No.

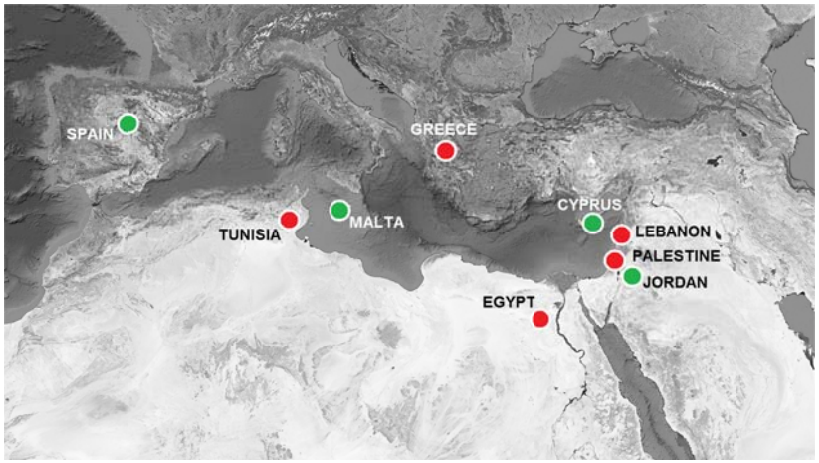


Fig. 2.4.5 Are there data free? ●: Yes, ●: No.

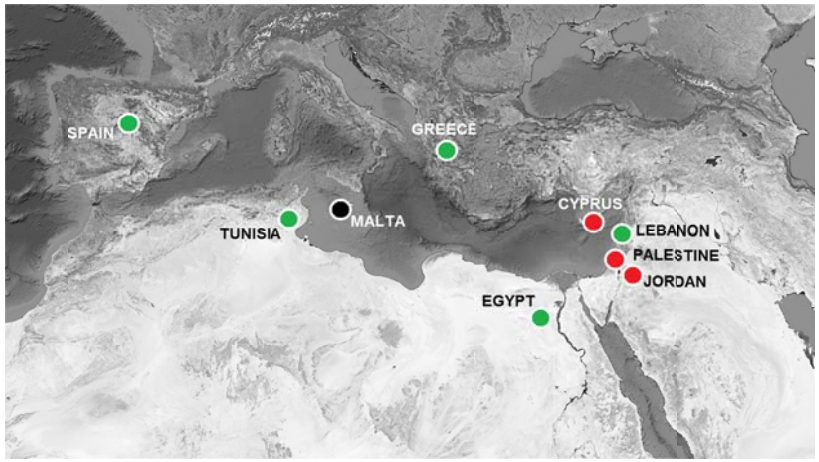


Fig. 2.4.6 Are there Royalties? ●: Yes, ●: No, ●: N/A.

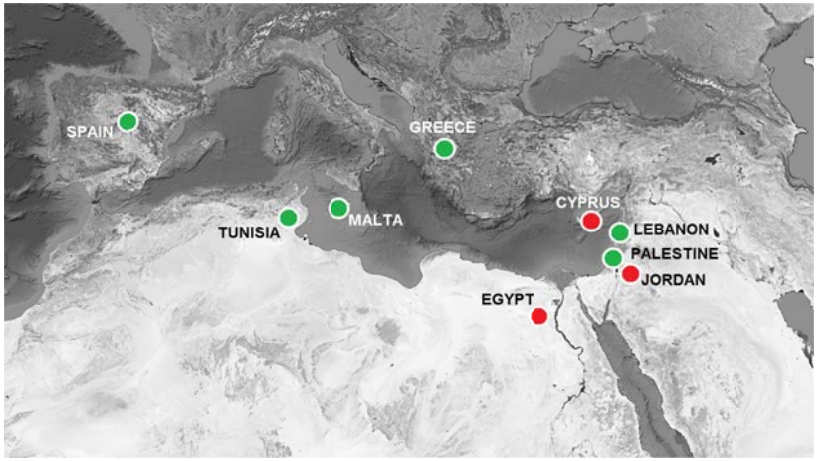


Fig. 2.4.7 Existence of national private industry. ●: Yes, ●: No.

2.5 GPS data availability

Introduction

The existence of one or more public permanent GPS stations network providing real-time or post processing positioning services is the information presented in table 2.5.

Another respond that is requested is about the existence of private systems that are developed for commercial exploitation of geodetic data, for research and scientific purposes etc.

Finally, the sharing policy that is implemented for GPS data is examined.

Conclusions

In all countries, except Cyprus and Egypt, at least one Public National GPS network system has been developed. Only in Spain there are 14 national systems. For Malta there are no data.

Private systems have been developed in only 4 countries as in Greece (1), Malta (1), Spain (2) and Palestine (2).

GPS data is free only in Spain. Cyprus does not give this information.

Table 2.5 GPS data availability

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
2.5.1. Public national systems	0	1	1	N/A	14	0	1	1	1
2.5.2. Private systems	0	0	1	1	2	0	0	0	2
2.5.3. Free data	N/A	No	No	No	Yes	No	No	No	No

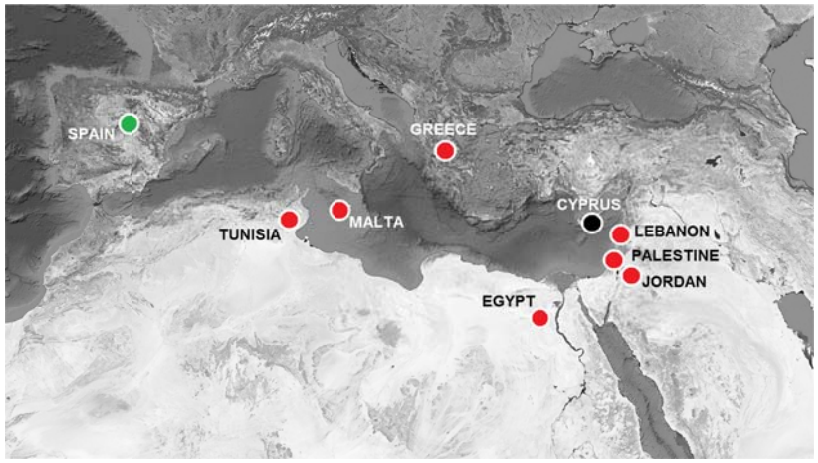


Fig. 2.5.3 Free data. ●: Yes, ●: No, ●: N/A.

3. Capacities

3.1. National budget allocation to Spatial Information

Introduction

Although a national budget plan it is vital for the development and update of National Spatial infrastructure, this information is rarely available for the different countries.

Conclusions

For the majority of the countries there is not information concerning the National budget allocation to spatial information. Greece responds, that for the year 2014, 527 million EUR, has been allocated to the development of Cadastral Maps. Spain, while in his national report gives a lot of information about the financing of various relevant projects, for the year 2014 notes the amount of 8 million EUR. Jordan responds that 2.4 million EUR has been allocated as a total budget to provide maps, sketches and geographical and survey databases. Finally, Lebanon quotes a budget less than 1 million EUR allocated to Spatial Information for the year 2014.

Table 3.1 National budget allocation to Spatial Information

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
3.1.1 Budget, year 2014	N/A	N/A	527 million EUR	N/A	80 million EUR	N/A	2.4 million EUR	<1 million EUR	N/A

3.2 Funding initiatives and participation to research programs

Introduction

At National, European and International level funding initiatives for research and development programs offer to the countries the opportunity for research, collaborations, exchange of knowledge, expertise etc.

Conclusions

All countries respond that they have participated to research programs, but no further information is available.

Table 3.2 Funding initiatives and participation to research programs

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
3.2.1 Funding initiatives and participation to research programs	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes	Limited funding initiatives

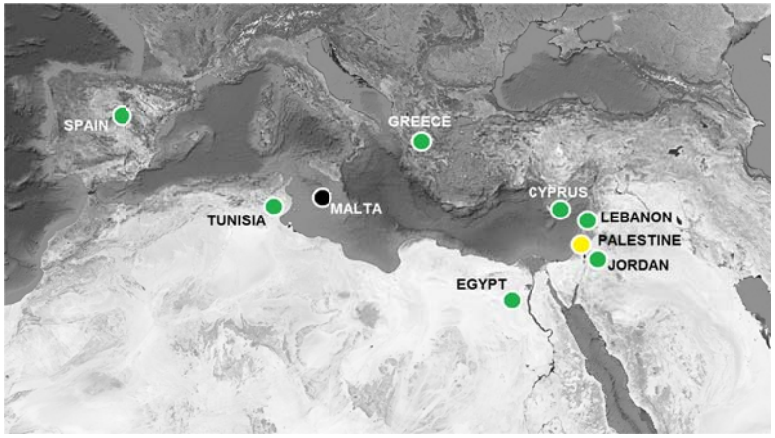


Fig. 3.2.1 Funding initiatives and participation to research programs.
●: Yes, ●: Limited, ●: N/A.

3.3 Dedicated undergraduate, graduate programs, training centers

Introduction

Effective production, distribution and management of geoinformation is based on specialized scientific personnel. Therefore, the existence of dedicated undegraduate and graduate programs in Universities and/or institutes offering training is an indicator of the effectiveness of the country in this sector.

Conclusions

In the table 3.3 the number of the Universities departments and the Institutes that offer relevant educational programs is presented for each country. The same information is given in chart 3.3.1. Cyprus and Tunisia offer 1 program, while Jordan offers 38 programs.

Table 3.3 Dedicated undergraduate, graduate programs, training centers

	Cyprus	Tunisia	Greece	Malta	Spain	Egypt	Jordan	Lebanon	Palestine
3.3.1 Departments (Universities)/Institutes	1	1	5	4	9	4	38	13	10

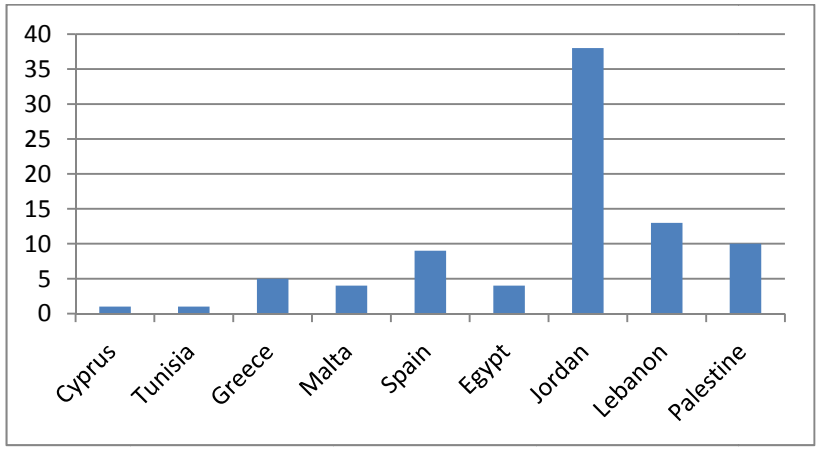


Chart 3.3.1 Departments (Universities)/Institutes

In conclusion

- In the majority of the countries there is a National policy for the production of geospatial information. For the implementation of this Policy a national Institute is responsible. This policy is implemented in a different way in each country.
- In all countries there is a National policy for census data that is implemented by a national institute.
- There is a great dissimilarity of the type of spatial products as:
    - In the majority of the countries, orthophotos are produced from aerial or satellite images in divers resolution
    - All countries produce thematic maps
    - The national base maps are in different scales
- In all countries there are beneficiaries of ongoing or completed EU/National projects at National, Regional and Local level. In local level only Tunisia is excepted.
- An NSDI is in effect in EU countries, except Cyprus, and in Jordan.
- In all countries there is at least one University department or Institute that offer relevant educational program.

Appendix

National Thematic Reports

PART A. CURRENT STATUS OF GEOSPATIAL INFORMATION[1] IN LOCAL MANAGEMENT	
1. Policies	
1.1	*National policies and implementation*

The main infrastructure that deals with this issue is the
Department of Lands and Surveys of the Republic of Cyprus.
The Department of Lands and Surveys of Cyprus of the Ministry of the Interior, is the oldest governmental department of the public sector, and started its operations in the year 1858. The initial and main responsibility of the Department, was the registration of immovable property on the island. However, throughout the years, the Department expanded its services and activities offered to the public, emerging into a dynamic and multifaceted organization.
The Department of Lands and Surveys is highly noted throughout the world for its concrete legal system of land administration, ownership and tenure, as well as for the clear and solid procedures which are in effect throughout it. The function of land registration in Cyprus provides a safe and secure foundation for the acquisition, enjoyment and disposal of rights in land.
Although our system of land registration, ownership, valuation, survey, and cartography has the prime responsibility of ensuring the protection of the interests of individual landowners, it also serves as an instrument of national policy regarding the market of real estate, as well as a mechanism to support the economic development of our country.
The ways in which a proper legal system of ownership in Cyprus serves the purpose of the real estate market, can be seen in the way the Department's of Lands and Surveys land ownership recording systems operates. It contains a legal definition of real property units which accurately reflect the condition on the ground; it facilitates land transfer through a simple and secure system; eliminates the need for extensive searching for a chain of titles like in other countries; it is supported by legislation which requires it to be up to date at all times; all rights are recorded including ownership and restrictions on properties; covers all land including State land, as well as that held by individuals, firms or institutions. All

[1] Geospatial Information:
1. base maps
2. thematic cartographic layers
   - land use, land cover
   - cadastral/legal/ownership
   - infrastructures (roads, railroads, etc)
   - etc
3. aerial photography / satellite imagery
4. permanent GPS stations data

the processes are fully computerized, highly visible, and clearly understood by the public, enabling everybody to have confidence in our system.
Our Land Information System is considered to be nationally uniform and sustainable; a basis for implementing local taxation, land use and building control; a flexible means of administering property rights; a basis for land titling which is accessible, user-friendly; a basis for delivering social justice in relation to land reform and resource allocation.
A multipurpose cadastre would be the first priority for many countries nowadays; along this, the parcel of property will be the fundamental building block of an integrated system of land information. In Cyprus, our Department has managed to implement a fully integrated Land Information System that supports a wide range of decision making elements, including land conveyance, equitable taxation, resource management and environmental planning.
Overall, the general strategic objective of our Department had always been to establish a fixed boundary coordinated cadastral system after a systematic resurvey, the computerization of the land records, cadastral plans, topographical maps, the complete development of our Land Information System (C.I.L.I.S.), to fully support the survey, registration, valuation and management functions of the Department, and the staged development and implementation of a National Land Information System (LIS) where all agencies with land related activities can share available data for the benefit of the economy of the country.

1.2	*National Census data*[2]

Statistical Service of Cyprus

The aim of the Statistical Service of Cyprus (CYSTAT) is to provide reliable and up-to-date statistical information.
The Statistical Service is the competent authority responsible for the compilation and the publication of most of the official statistical data in Cyprus. CYSTAT, until January 2000 under the name Department of Statistics and Research, was set up in 1950 as a small administrative unit while its real function started after Cyprus became independent, in 1960. The Statistical Service, although functions under the Ministry of Finance, maintains its autonomy in technical matters and has exclusive responsibility for the choice of methodology, technique, definitions and procedures for the realization of the programs of statistical activities, as well as for the publication of the statistical data produced. Since the accession of Cyprus in the European Union in May 2004, an important part of the basic activities of CYSTAT include the continuous participation to several committees, working groups and educational programs as well as the collaboration with the Statistical Offices of the European Union (EUROSTAT).
CYSTAT is mainly concerned with the initiation, organization and carrying out of various censuses, surveys and statistical enquiries of an economic, demographic, social or environmental content and the publication of the results· with the

[2] Census data:
1. Residential, Industrial
2. Infrastructures, transport
3. Environment, Energy
4. Health, Education, Community services
5. Sport, Recreation, Entertainment
6. Heritage, Culture, Tourism
7. Landscape

intention both, of assisting the government in policy-making and planning of the activities and the statistical information of the private sector the general public. At the same time, CYSTAT acts as a coordinator in cases where other institutions (such as the Central Bank, other Ministries and Government Departments and semi-Government organisations) pursue work of a statistical nature for the collection of data of direct interest to the area of their activity.
The objectives of CYSTAT are reflected in the role that statistical information is designed to play and for thus the main priority is the wider satisfaction of the user's needs in statistical data.
In order to respond to its role, CYSTAT directs its work towards:
(a) A user orientation, as statistics are not end-products but intermediate products to be used in decision-making and research. In addition, the same set of statistics may have a variety of users and therefore needs to respond to different requirements.
(b) A need for promoting the timely collection and publication of good quality statistical data
(c) A need for maintaining continuity and comparability in the data produced.
(d) The safeguarding of confidentiality of individual returns, impartiality and objectivity as prerequisites for reliable statistics.
(e) The application of the most optimal, both international and European, statistical principles, methods and proceedings.

CYSTAT collaborates with other international organisations, such as the United Nations Statistics Division (UNSD), the International Statistical Institute (ISI), the Economic Committee for Europe (ECE), the International Labour Office (ILO), the Organisation of Foods and Agriculture (FAO) and UNESCO, as well as with Statistical Services and scientific centres of other countries. This collaboration includes frequent correspondence, supply of data and exchange of experiences, attendance in conferences and seminars, technical aid and personnel training.

1.3	*Spatial data production distribution centers - sharing policies*

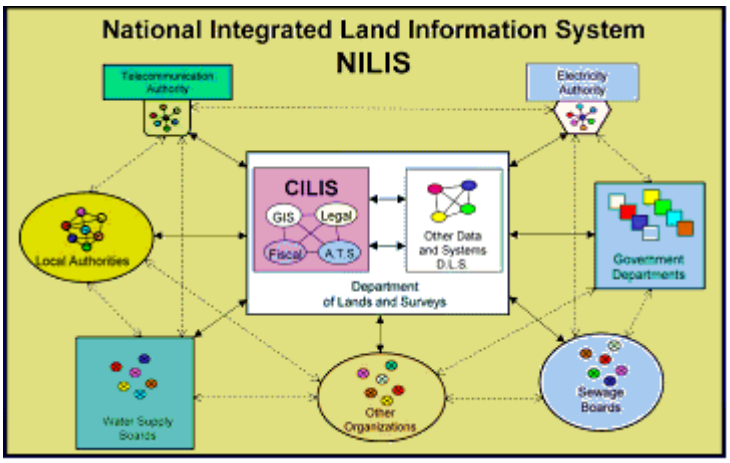
1. LAND INFORMATION SYSTEM

DLS operates, partially on a manual and partially on a computerized basis, a graphical multipurpose cadastre. The Department records a considerable amount of land related data. Cadastral plans are widely used as a fundamental graphic record by a wide range of agencies. Information about development, utilities, land use, water resources, geology, and even statistical data for population, industry, agriculture and planning, are recorded on, or closely related to the cadastral plans.

The Government of Cyprus through the Department of Lands and Surveys (DLS), implemented a system to improve the efficiency and effectiveness of Departmental activities taking advantage of available information technology and modern cost effective survey instrumentation and techniques.

The general strategic objective of the country is the establishment of a fixed boundary coordinated cadastral system after a systematic resurvey, the computerization of the land records, cadastral plans, and topographical maps, the development of a number of computerized systems to support the survey, registration, valuation and management functions of the Department, and the staged development and implementation of a National Land Information System

(LIS), where all agencies with land related activities can share available data for the benefit of the economy of the country.

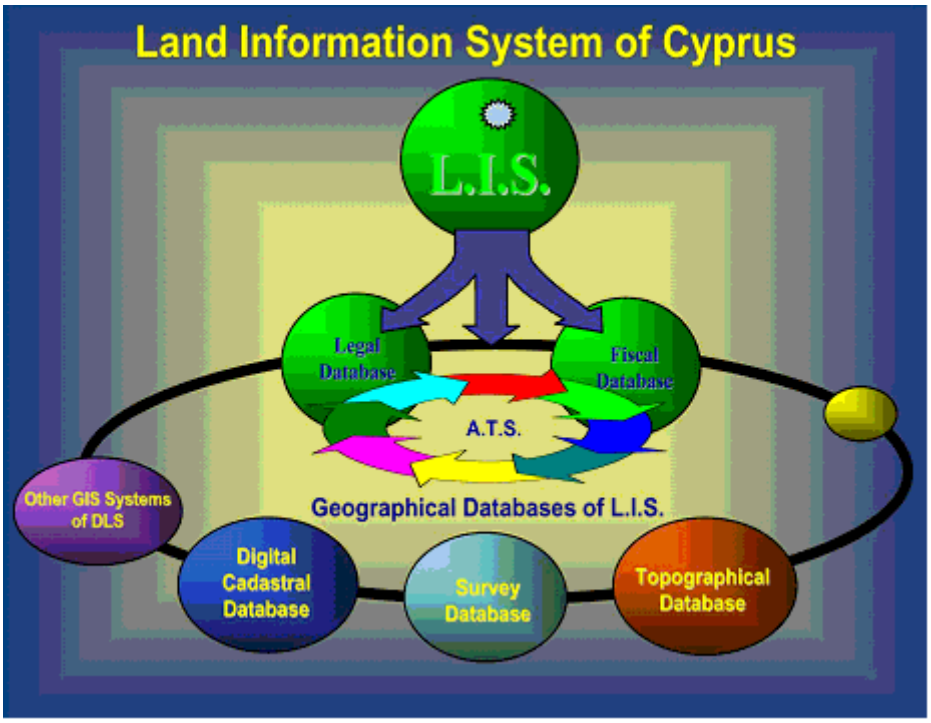


The Cyprus LIS project is a program covering the following groups of activities:

(a) The strengthening and re-computation of the National Grid System and the systematic resurvey, for cadastral purposes, of the entire island. All modern equipment and techniques such as GPS, photogrammetry and EDM tacheometry are being used, in an attempt to reach the most efficient and cost effective method.
(b) The computerization of land transactions, the improvement and acceleration of valuation assessments, the reduction of duplication of land administration work among Government Agencies, and the increase of the ability of the Government to effectively manage state-lands, and expedite acquisition and requisition orders.
(c) The development of a Digital Cadastral Data Base (DCDB), a Survey Data Base (SDB) and a Topographical Data Base (TDB), suitable to support an Integrated Land Information System.
(d) The development of a computerized system, capable of supporting all the registration, valuation and land management functions of the Department, and the development of a Legal/Fiscal Database as a substantial component of the Land Information System.
(e) The introduction of computer-assisted techniques into the Valuation processes, to achieve optimum performance, and to enable a semi-automated general revaluation program at frequent time intervals.
The LIS in the Department of Lands and Surveys has been designed and developed having two major application components:
a. The Survey Related Applications (Geographical Component)
b. The Legal/Fiscal Applications (Legal/Fiscal Component)

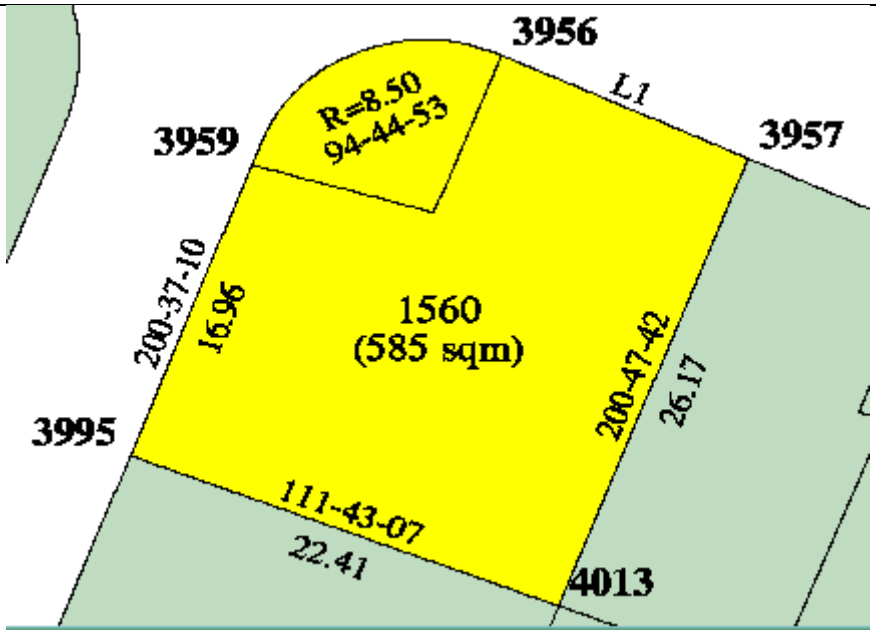
Basically, all Legal/Fiscal application systems have been developed in Cyprus using the case tools of ORACLE Relational Database Management System. The spatial applications are based on Arc/Info, Arc/View and other ESRI GIS products and RDBMS technology, on surveying packages (such as LISCAD) and on CAD packages (eg. AutoCAD and MicroStation).
Four main databases have been developed in the Department:
a. The Survey Database,
b. The Digital Cadastral Database,
c. The Topographical Database, and
d. The Legal/Fiscal Database.

The Survey Database, the Digital Cadastral Database and the Topographical Database constitute the spatial component of the LIS, and the Legal/Fiscal database mainly constitutes the aspatial component. The objective of the Department to operate and maintain an integrated system, where the four databases would operate as one single corporate database, has been achieved. The corporate database contains the survey data-set, the digital cadastral data-set, topographical overlays, the legal/fiscal data-set, sales history data, and other useful information. A number of application systems have been developed around the system. These systems basically include applications for data entry, maintenance, storage, enquiry and output (displaying, reporting, plotting and printing).



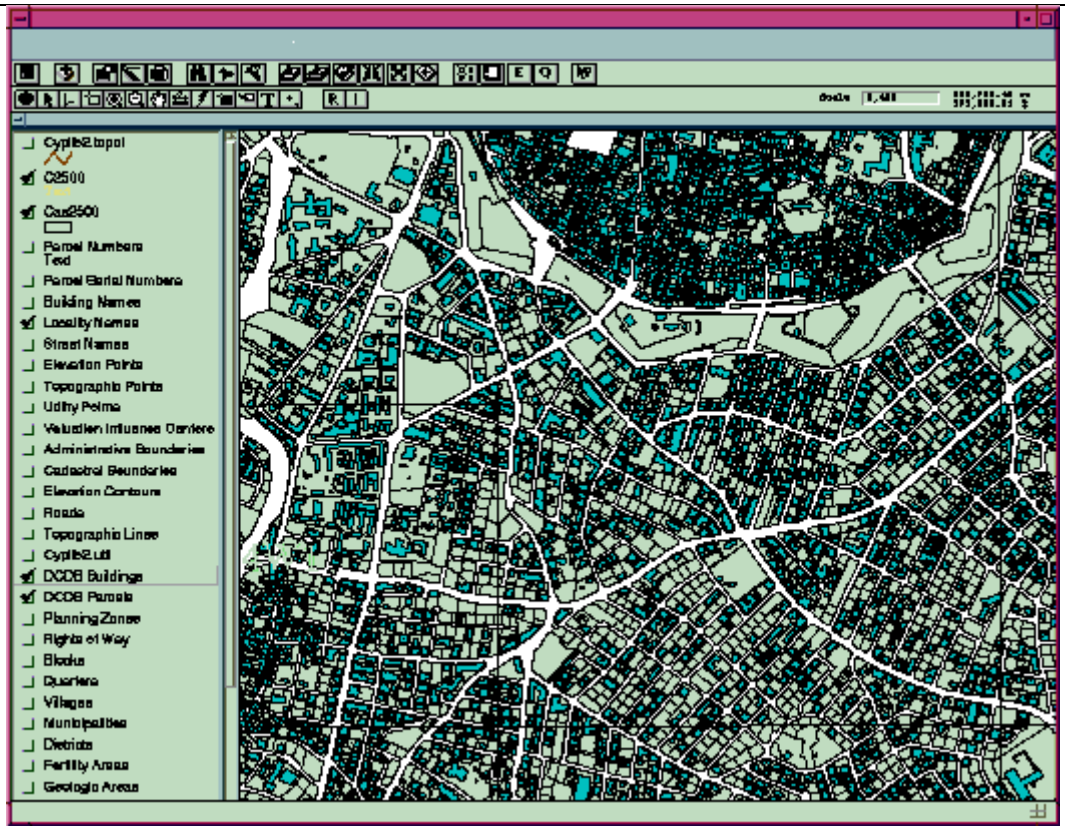
Digital Databases of the Cyprus LIS

1.1 Survey Database



The Survey Database (SDB) stores information related to the geodetic network, current survey data, and historical records of all surveys. The SDB is the repository for detail from the original source records of the surveys that underpin the cadastral framework. It is also the reference system for applications that require dimensions or survey accurate coordinates.
The objective of the SDB is to assure that the country is supported by a system able to efficiently provide timely, accurate and comprehensive survey information. It also contains the underpinning data for the Digital Cadastral Database.

1.2 Digital Cadastral Database



The Digital Cadastral Database (DCDB) has been designed to provide an up-to-date continuous cadastral map base to support cadastral mapping and the LIS functions. The DCDB is the database that stores the current cadastral framework, thematic overlays and topographical data in a seamless form.
The main objectives of the DCDB are:
a. Replace the manual techniques associated with the creation and maintenance of the cadastral plans at various scales.
b. Provide the spatial underlay for an integrated LIS.
c. Ensure that the spatial underlay is correct and up-to-date for all users, both in DLS and in other organizations.

1.3 Legal/Fiscal Database
The basic general objectives of the Legal/Fiscal component of the proposed LIS are:
a. Store and maintain in digital form the land registers and other land records.
b. Facilitate transactions by providing on-line access and maintenance.
c. Provide administrative and statistical support.
d. Provide a document tracking system.
e. Support Computer Aided Valuations.

The Legal/Fiscal activities of the Department are diverse. The functional areas that are supported, and the facilities that are provided, were carefully selected during the users requirements and analysis stages. Consideration was given to the scope of the initial system and from this, the system functionality was determined. The volume of the work involved, the proposed use of the data, the complexity of some functions, and the benefits gained were among the criteria for deciding which functions should be automated.
The system provides on-line support to almost all branches of a District Lands Office, including applications, declarations, mortgages, forced sales, attachments,

local enquiry, registration, checkers, tenure, land consolidation, leases, license, notations and valuations.

2. Land Information System Progress

The Department of Lands and Surveys has already implemented an integrated Land Information System which serves the needs of the Department and the needs of other organizations and departments which use land related data. The implementation phases included a series of projects such as: the strategic planning and system design, the release of tenders for hardware and software, the tender evaluation, followed by an agreement which was signed between DLS and an International Consortium for the system development.

The system development started officially in September 1995, and it was followed by the system design phase. The next phase, which was the system development phase, lasted approximately 2 years. After the delivery of the customised system, a series of testing scenarios followed, which enabled the improvement of the applications.

The system was officially accepted in 1999, and it is currently used in a production environment. At the same time, many projects have been initiated for collecting and preparing the data that populate the LIS databases. These projects include the re-survey of the whole island, the digitization of current cadastral plans, and the data entry of legal and fiscal data.

The progress of the LIS data collection and database population is shown in the following figures:

· Legal data 814.000 registrations (62.6%), out of 1.300.000.
· Fiscal data 190.000 sub-properties (9.0%), out of 2106000
· DCDB 850.000 (78.0%) land parcels digitized, out of 1089480,
696.900 in database (64,0%).
· SDB 50.000 land parcels in database (5,0%).

It is estimated that in 1-2 years the Digital Cadastral Database (DCDB) and the Legal Database data input and processing will be completed for the free areas, whereas the Fiscal database will be completed within the next 2-3 years. The Survey Database (SDB) is scheduled to be fully populated after the completion of the resurvey program.

Further developments have been done on the LIS, during 2005, towards the creation of a planning zones database. The data model has been designed along with the required conversion routines. The digitization of a total of 4500 plans started in January 2005 and it will finish in December 2005. All vector data will be converted and accommodated in the Land Information System. Mass updating will be carried out for the population of all zoning characteristics and attributes of each property.

In addition to the above, extra themes were created in the LIS, providing access to ortho-photo maps and satellite images, which cover Cyprus at large scale. A new server computer has been installed, which accommodates both ortho photos and satellite images. These sets of data along with all the rest GIS/LIS information and datasets can be accessed by all users in an interactive environment.

3. Land Information System Upgrade

In 2004, major upgrades were implemented both for the hardware and the software environment of the Land Information System. Old workstations, servers and peripherals have been replaced by modern technology equipment. The current computer environment consists of the following:

1. Arc/GIS 8.3 and Arc/GIS 9.0 GIS software

2. Oracle 8i RDBMS
3. 17 SUN Servers
4. 485 SUN Workstations
5. 264 PCs
6. 242 printers
7. 28 HP plotters
8. 18 scanners

1.4	*Use of Spatial Information in local decision making processes*

1.5	*Relevant national institutes, contact points*

I. Remote Sensing and Geo-Environment Research Lab, Cyprus University of Technology

http://www.cyprusremotesensing.com/80-research-grants/164-monitoring-air-pollution-in-cyprus-using-satellite-remote-sensing-and-gis-and-micro-sensor-technology.html

Monitoring Air Pollution In Cyprus Using Satellite Remote Sensing And Gis And Micro-Sensor Technology
Summary: This research project aims to support the efforts of local authorities and relevant state agencies to create a comprehensive system for the management, monitoring and measurement of air pollution in Cyprus with the combined use of satellite remote sensing and ground sensors. The main objective is to apply the methods available for determining the atmospheric effects on satellite images and to study their effectiveness for the calculation of air pollution by using satellite remote sensing techniques. The use of satellite images is an essential tool for easy and rapid identification of air pollution. The satellite images used for this application in this study were obtained from the Landsat-5 TM and Landsat-7 ETM + with a resolution of 30x30m, the MODIS Terra with a resolution 1x1km and ASTER with a resolution of 30x30m. These sensors cover a very large percentage of the area of Cyprus.

CONSORTIUM:

CYPRUS UNIVERSITY OF TECHNOLOGY (Coordinator: D.G.Hadjimitsis)
SIGNALGENERIX LTD

II. WideView: The use of telecommunications and GPS technology for the real-time wide-area monitoring and control of power systems

http://www.kios.ucy.ac.cy/research/research-projects/172-the-use-of-telecommunications-and-gps-technology-for-the-real-time-wide-area-monitoring-and-control-of-power-systems-wideview.html

Summary: The WideView project aims to contribute to develop methodologies for real-time monitoring and control of critical infrastructure systems, with particular emphasis on power systems by utilizing the Synchronized Measurement Technology. It is envisioned that with the completion of this project, the

reliability of the power system will be further enhanced, promoting the quality of life and welfare of the citizens. The project will also enable the optimal integration of renewable energy, enabling Cyprus to fulfill its commitments towards the EU for renewable penetration.

Among other objectives the project aims to:
· To perform applied research in the field of GPS synchronized measurement technology (SMT) for real-time monitoring, security, and control of power systems
· The main test bed for this project is the Cyprus power system, thus benefiting Cyprus through the development of tools and processes that ensure the operational integrity of its power system
· The methodologies developed in the proposed project will assist in real-time visualization of the operating states, increasing situational awareness, and ability to take control actions
· To develop methodologies and algorithms for the use of SMT for secure and reliable operation of an isolated power system (e.g., Cyprus), anticipating renewable energy penetration
· To investigate the use of modified SMT with asynchronous sampling to obtain an effectively higher sampling rate than conventional synchrophasor technology allows.

CONSORTIUM:

KIOS Research Center (Coordinator: Dr. Elias Kyriakides)

1.6	*Beneficiaries of ongoing or completed EU/national/regional projects*

Department of Town Planning and Housing
URBANGUARD Project
http://www.moi.gov.cy/moi/urbanguard/urbanguard.nsf/dmlproject_en/dmlproject_en?OpenDocument
The beneficiary was the Department of Town Planning and Housing (DTPH) and the project was implemented in Cyprus. Partners from Greece (EAPAX SA) and Belgium (ADD asbl), as well as local partners from the private sector (Atlantis Consulting Cyprus Ltd; and ALA Planning Partnership) were also involved.

The URBANGUARD project aimed to facilitate the incorporation of urban sustainability indicators into the spatial planning process in Cyprus. These indicators have been mainly used by planners and authorities responsible for preparing and reviewing Development Plans, by local administrators, stakeholder organisations and other special interest groups participating in the plan review process, as well as by the wider public when filing objections against published Development Plans.

2. Data – Applications

2.1	*National Spatial Data Infrastructure (NSDI)*

Cyprus lacks of an integrated record of the geo-information. A catalogue of geoinformation is expected to be delivered by the INSPIRE Management Council (IMC).
The infrastructure is currently provided through the sub-systems and databases of the Land Information System but these data are not yet totally in line with the requirements of the INSPIRE Directive.

2.2	*National Census*

Statistical Databases (Census data) can be obtained from the Statistical Service of Cyprus (CYSTAT)
http://www.cystat.gov.cy/mof/cystat/statistics.nsf/populationcondition_22main_en/populationcondition_22main_en?OpenForm&sub=2&sel=2

2.3	*Processing capability of Spatial data*

The Government of Cyprus through the Department of Lands and Surveys (DLS), implemented a system to improve the efficiency and effectiveness of Departmental activities taking advantage of available information technology and modern cost effective survey instrumentation and techniques (details are given in 1.3).

2.4	*Spatial data collection capability*

The NILIS is responsible for preparing digital geoinformation and maps, all the work associated with land registration, geodesy, topography, mapping, photogrammetry, hydrography, cadastral surveys, land tenure, land consolidation, management of state land, property valuation and the implementation of a National Integrated Land Information System (NILIS).

2.5	*GPS data availability and costs*

The WGS84 spheroid system (geocentric) and a New Local Transverse Mecrator (LTM) Projection have been selected to best suit the present and future mapping needs of Cyprus using the Global Positioning System.

2.6	*Level of conformation with the EU INSPIRE Directive*

The INSPIRE Directive was transposed in the national law of the Republic of Cyprus with the enactment of Law N.43 (I) / 2010 on 14 May 2010 (see Official Gazette No.4241).
The particular feature of Cyprus compared to other EU member states was that by that time a large part of geospatial information infrastructure had already been developed which was stored in the databases of the Land Information System (LIS) of the Department of Lands and Surveys.

3. Capacities

3.1	*National budget allocation to Spatial Information*

Budget allocation data are not available.

3.2	*Funding initiatives and participation to research programs*

The Republic of Cyprus since 1986 has recognized the need for a single infrastructure of geospatial data and thus it entrusted Australian experts with the task of preparing the relevant study. This study was prepared and submitted in

1987. The main recommendations of the study included the digitization of spatial and non-spatial information and the creation of an Integrated Land Information System (LIS). Following the invitation of international tenders, a consortium of companies was awarded the design and development of the LIS which came into operation in 1997.

3.3	*Dedicated undergraduate, graduate programs, training centers*

University of Technology
Department of Civil Engineering and Geomatics Cyprus
https://www.cut.ac.cy/ceg/about/?languageId=2

Undergraduate studies: Surveying Engineering & Geoinformatics Engineering.
Teaching modulus cover state-of-the-art aspects of infrastructure engineering (INFRA), building technology (DOMO) and geomatics-geoinformatics (GEO).

MSc program in Civil Engineering and Sustainable Design, with particular emphasis in Sustainable Development through the use of smart and novel technologies. The program runs over a 13-month period with 5 taught modules per semester and an MSc dissertation over the summer period.

REFERENCES AND USEFUL LINKS

http://www.moi.gov.cy/moi/dls/dls.nsf/dmlinformation_en/dmlinformation_en?OpenDocument
http://inspire.ec.europa.eu/reports/country_reports_mr2012/CY_INSPIRE_Country_Report_2013_v10_Eng.pdf
http://www.moi.gov.cy/moi/DLS/dls.nsf/All/AFFE036C23895C18C225713E001A5CDE/$file/NatRep2005.pdf?OpenElement
file:///C:/Users/KEK210/Documents/LocalSats/NationalReport/m2267_neocleous.pdf
http://www.mof.gov.cy/mof/cystat/statistics.nsf/index_en/index_en?OpenDocument
http://www.moi.gov.cy/moi/urbanguard/urbanguard.nsf/dmlproject_en/dmlproject_en?OpenDocument
http://www.cut.ac.cy/ceg/?languageId=2

PART A. CURRENT STATUS OF GEOSPATIAL INFORMATION IN LOCAL MANAGEMENT	
1. Policies	
1.1	*National policies and implementation*
« GEONAT » (National Geomatic Program, '2000) : www.geonat.gov.tn "National Digital & Cartographic Data Base" ('2000, multi public actors) Resource-Person : Ministry of Housing and Land Management (www.mehat.gov.tn) ITS - Intelligent Transportation Systems in Tunisia (www.itstunisie.tn) NB : No National Geomatic Authority !	
1.2	*National Census data*
National Institute of Statistics (www.ins.nat.tn) National Office of Mines (www.onm.nat.tn)	
1.3	*Spatial data production distribution centers - sharing policies*
Public establishments : Ministry of the National Defense - National Remote Sensing Centre (http://www.cnt.nat.tn) Office of the Topography and Cadastre (www.otc.nat.tn) National Office of Mines (www.onm.nat.tn) Ministry of Housing and Land Management (www.mehat.gov.tn) National Institute of Meteorology (www. meteo.tn) Coastal Protection and Planning Agency (www.apal.nat.tn) General Commission for Regional Development (www. cgdr.nat.tn) : since 1996 National Electricity Holding (www.steg.com.tn) National Water Holding ((www.sonede.com.tn) Institution de la recherche et de l'Enseignement supérieur Agricole (www.iresa.agrinet.tn) Observatoire National de l'Agriculture (www.onagri.nat.tn)	
1.4	*Use of Spatial Information in local decision making processes*
General Commission for Regional Development (www.cgdr.nat.tn) : Regional Development priorities territories (Investment incentives Code, www.tunisianindustry.nat.tn) : Najoua Bel Haj - Med N. Tlijani – Habib B. -R. Zaiem National Electricity Holding (www.steg.com.tn) National Water Holding ((www.sonede.com.tn)	

IRESA (www.iresa.agrinet.tn) : Dr. B. Rayana A
– Climat Change in Tunisia (www.changementsclimatiques.tn)
National Institute of Statistics (www.ins.nat.tn) : Dr. B. Rejeb J.
National Office of Mines (www.onm.nat.tn)

« GEONAT » & National Digital & Cartographic Data Base" : No relevant use…

1.5	*Relevant national institutes, contact points*

National Remote Sensing Centre (http://www.cnt.nat.tn)
Office of the Topography and Cadastre (www.otc.nat.tn)
National Office of Mines (www.onm.nat.tn)
Ministry of Housing and Land Management (www.mehat.gov.tn)
National Institute of Meteorology (www. meteo.tn)
Coastal Protection and Planning Agency (www.apal.nat.tn)
General Commission for Regional Development (www. cgdr.nat.tn)
Observatoire National de l'Agriculture (www.onagri.nat.tn)

1.6	*Beneficiaries of ongoing or completed EU/national/regional projects*

« GEONAT » (not achieved…) : "National Digital & Cartographic Data Base"

Ministry of the National Defense - National Remote Sensing Centre
Office of the Topography and Cadastre
National Office of Mines
Ministry of Housing and Land Management
National Institute of Meteorology
Coastal Protection and Planning Agency
General Commission for Regional Development
National Institute of Statistics
National Electricity Holding
National Water Holding
Observatoire National de l'Agriculture

2. Data – Applications

2.1	*National Spatial Data Infrastructure (NSDI)*

« GEONAT » - "National Digital & Cartographic Data Base"

2.2	*National Census*

National Institute of Statistics (per decade) ; last one is in current (2014)
Ministry of Housing and Land Management (legal Urban planning instruments)

2.3	*Processing capability of Spatial data*

Many public operators. More private operators and improving processing data capacity.

2.4	*Spatial data collection capability*

Many public operators. More private operators and improving processing data capacity : www.st2i.com.tn. – www.3G-Consult.com	
2.5	*GPS data availability and costs*
2.6	*Level of conformation with the EU INSPIRE Directive*
3. Capacities	
3.1	*National budget allocation to Spatial Information*
3.3	*Funding initiatives and participation to research programs*
3.4	*Dedicated undergraduate, graduate programs, training centers*
Specialized Master in Geomatics (Humanities & Arts Faculty of La Manouba – Tunis) « GEONAT »….	
REFERENCES AND USEFUL LINKS	

PART A. CURRENT STATUS OF GEOSPATIAL INFORMATION IN LOCAL MANAGEMENT	
1. Policies	
1.1	*National policies and implementation*

National Cadastre & Mapping Agency S.A. (NCMA S.A.) is handling geospatial data, whilst the Hellenic Statistical Authority (ELSTAT) is handling statistical data. NCMA S.A. is the result of a merger between Hellenic Mapping, Cadastral Organization (HEMCO) and KTIMATOLOGIO S.A.

The National Cadastre & Mapping Agency S.A. (NCMA S.A.), has been assigned by the Greek government to develop the National Spatial Data Infrastructure (NSDI). The effort will incorporate technical implementation of the national geoportal as well as the organizational, data sharing and cost –impact analysis aspects. Also is responsible for the compilation and establishment of the National Cadastre for the country.

Detailed and updated large scale maps of populated areas are under development through the implementation of National Cadastre Project since 1995. Additionally, other activities are under development like the maps' creation of protected (among them and the NATURA 2000 areas).

Moreover, NCMA S.A. has implemented projects for covering the country with Large Scale Orthophotos (1:5.000) and the urban centers with Very Large Scale Orthophotos of the year 2008. All the orthophotos can be browsed and simple manipulation and measurements may be performed free of charge using the company's portal (http://gis.ktimanet.gr/wms/ktbasemap/default.aspx).

NCMA S.A. was also assigned as the contact point for Greece for the implementation of INSPIRE Directive following the Decision No 168237/14-6-2007 of the Secretary General of the Ministry of Environment, Energy & Climate Change and it is representing Greece in the INSPIRE Committee of article 22 of the Directive.

1.2	*National Census data*

The Hellenic Statistical Authority (ELSTAT) is an independent Authority enjoying operational independence, as well as administrative and financial autonomy. It is not subject to the control of governmental bodies or other administrative authority. Its operation is subject to the control of the Hellenic Parliament.
http://www.statistics.gr/portal/page/portal/ESYE

The mission of the Hellenic Statistical Authority is to safeguard and continuously improve the quality of the country's statistics.

The Hellenic Statistical Authority pursues its mission by following in all areas the highest European and international standards of statistical practice, as well as by unswervingly observing the rules and responsibilities it is committed to.

Thus, it strives to

1. Be and remain, beyond any doubt, an independent Statistical Authority, and always function in a way that reflects this very principle

2. Produce statistics that are useful—relevant—for public policy, the economy, and more broadly the life of the people
3. Earn and continuously renew the confidence of users of statistics in their credibility and reliability
4. Obtain and safeguard the confidence of the statistical reporting units—the households, enterprises, and other entities—which provide confidential information for the production of statistical data.
The Hellenic Statistical Authority also strives for full cooperation with Eurostat and the other Services of the European Commission, as well as with the National Statistical Institutes of the other member states of the European Union, aiming to be a full partner in the workings and evolution of the European Statistical System.
These principles serve as the basis on which the Hellenic Statistical Authority coordinates the functions of the other agencies in the Hellenic Statistical System concerning the development, production and dissemination of the official statistics of Greece.
The Hellenic Statistical System (ELSS) comprises agencies that have the responsibility or obligation to collect statistical data. More especially the Hellenic Statistical System is the set of rules, activities and agencies which are responsible for the conduct of statistical operations, aiming at the development, production and dissemination of official Hellenic statistics, which are used for decision and policy making at local, national, European and international levels
http://www.statistics.gr/portal/page/portal/ESYE/PAGE-codepractice
The role of ELSTAT in the ELSS is determining as, according to Law 3832/2010, it coordinates all the activities of the other ELSS agencies that concern the development, production and dissemination of the country's official statistics and forwards these statistics to Eurostat.
More specifically, ELSTAT has, among others, the following responsibilities:
a) produces and publishes as the "National Statistical Institute" the official national and European statistics of Greece,
b) represents Greece as the "National Statistical Institute" in the services of the European Union and in any other competent international Organization,
c) sees to the timely, reliable and effective dissemination of statistical information and to the promotion of statistical issues and economic research in the context of the country's international cooperation,
d) cooperates with public and private agencies in Greece or abroad, such as educational institutions, research centers and non-profit Organizations for the promotion of scientific research for statistical issues and the implementation of the statistical principles of the Hellenic and European Statistical Systems,
e) develops, disseminates and coordinates the implementation of the European Statistics Code of Practice within the framework of ELSS,
f) certifies as "official" statistics those that have been produced by other agencies of ELSS, on the basis of relevant methodology, which is provided in the Regulation on the Operation and Administration of ELSTAT. In this context, the other ELSS agencies are obliged to submit, at least once a year, reports to ELSTAT on the quality of the transmitted data, which fall in the domain of their responsibility.
http://www.statistics.gr/portal/page/portal/ESYE/PAGE-presentation?_piref33_1220869_33_14278_14278.tabstring=Tab

1.3	*Spatial data production distribution centers - sharing policies*

I. Organizations providing various spatial Data Sets

A. Ministry of National Defense

1. Hellenic Military Geographical Service (HMGS)

The Hellenic Military Geographical Service (HMGS) has undertaken the

creation of the 1:50,000 scale maps of the Greek territory since 1889. HMGS conducts aerial photography missions every year and maintains a comprehensive library of Black /White, and colour aerial photographs covering the whole country. At the moment there are approximately 300,000 aerial photos taken from 1961. In addition, there is a historic library of Black/White aerial photos for selective areas of Greece taken in the period 1938-1960.

The most complete and updated map and geospatial collection is available from the Hellenic Military Geographical Service. All kinds of geospatial products in various scales may be found. A detailed pricelist of the mapping data can be found in:

http://web.gys.gr/portal/page?_pageid=33,36592&_dad=portal&_schema=PORTAL

A user friendly tool (GeoIndex) working over the internet is available in order to explore and order the most appropriate products for any application. The tool is able to project the footprint of a map/ortho or even point based information like trigonometric points, on base maps allowing the user to examine the data before the purchase. Orders can be placed using the GeoIndex Tool and payment can be realized using bank transaction. All the rights of the spatial data are reserved from the Hellenic Military Geographical Service.

2. Hellenic Navy Hydrographic Service (HNHS)

The institution of a Hydrographic Office was established in 1905 under the Hellenic Navy General Staff. In 1906 the first hydrographic survey was accomplished and in 1908 the first Hellenic Navy nautical chart was published. HNHS participated on behalf of Greece in the International Hydrographic Organization in 1919. In 1921 the Hydrographic Service becomes an independent service of the Hellenic Navy under the Hellenic Navy General Staff.

The Mission of the Hellenic Navy Hydrographic Service is the collection, elaboration and utilization of the elements and information concerning the Greek and adjacent waters in the fields of Hydrography, Oceanography, Cartography and Navigation with the aim to:

I. Support the operational requirements of the Hellenic Navy and the Hellenic Forces in general.

II. Contribution to the safety of Navigation.

III. Promotion on Hydrography, Oceanography, Cartography and other Marine sciences.

IV. Support, in case of request, of public services and private sector.

A detailed pricelist of the mapping data can be found in:

http://www.hnhs.gr/portal/page/portal/HNHS/Charts

A user friendly tool (GeoIndex) working over the internet is available in order to explore and order the most appropriate products for any application. The tool is able to project the footprint of a naval map allowing the user to examine the data before the purchase. Orders can be placed using the GeoIndex Tool and payment can be realized using bank transaction, courier mail or even using VISA credit cards. There are also 3 Selling Points of Nautical Charts and Publications (in Athens, Pireas and Thessaloniki). There are also available since 2004 digital vector nautical maps which can be monthly updated via the Regional Centers. The maps are generated according to the International Hydrographic Organization specifications. These charts are suitable for using them with ECDIS (Electronic Chart Display Information System), however they can be used by any system which can read data in S57 Ed. 3.1 format.

Additional spatial data are available for environmental use through specific actions of HNHS such as:

I) Oceanographic activities using either special vessels able to perform the collection of oceanographic and hydrographic information or a network of 21 permanent stations used to measure tide gauges in Greek waters. These information can be used accordingly and may provide precise calculation of the Sea level (to be issued in digital form in the near future)

II) Activities of the Hydrography and Operation Division including

1. Plan and Management of Hydrographic Surveys
2. Processing and Presentation of Hydrographic Surveys
3. Hydrographic Equipment Maintenance
4. Hydrographic Data Archive
5. Support of Navy Operations

III) Other consulting services such as:

1. Determination of fore and back shore boundaries and previously delimitated shore boundaries.
2. Determination of terrestrial and sea port zones.
3. Construction on fore and back shore, port works and installations.
4. Installation of aquacultures (sea farms).
5. Location and refloating of wrecks.

3. Hellenic Air Force (HAF)

HAF's mission is the organization, manning, air armament and training of personnel, with the purpose of developing an air power, capable of contributing to the "DISSUASION", to conduct intensive and prolonged air operations for the obtainment and keeping up of air superiority, to secure the air defense of the country, to provide air protection and support for the operations of the other branches of Armed Forces.

Beyond the above mission and during the peacetime, HAF also conducts public service operations with the purpose of supporting the civil sector in the confrontment of special conditions.

The Civil Aviation Service produces aeronautical maps for Greece.

4. Hellenic National Meteorological Service (HNMS)

The Hellenic National Meteorological Service (HNMS) was founded in 1931 under the Ministry of Aviation and its mission was to cover all the meteorological and climatological needs of our country as well as for the physical conditions of the atmosphere. Today, according to the law in force, the HNMS is a National Service under the subordination of Ministry of Defense and the auspices of the Hellenic Air Force General Staff.

The mission of HNMS is to provide meteorological support to:

I) National Defense

II) National Economy

III) Safety of life and property

HNMS participates actively to international organizations that aim to the Meteorology advance with the use of satellites, mainframe computers and mathematic simulations. This participation has always been financially supported by the state.

Current climatologic data are available on a table format to the public through HNMS website:

http://www.hnms.gr/hnms/english/observation/observation_region_html

Additionally, georeferenced weather forecasting and radar images are available in the Services' website providing hourly climatological information.

B. Ministry of Environment, Energy and Climate Change

5. National Cadastre & Mapping Agency S.A. (NCMA S.A)

The NCMA S.A. has been assigned by the Greek government to develop the National Geographic Information Infrastructure. The effort will incorporate technical implementation of the national geoportal as well as the organizational, data sharing and cost –impact analysis aspects. Also, is responsible for the compilation and establishment of the National Cadastre for the country.

NCMA S.A. was also assigned as the contact point for Greece for the implementation of INSPIRE Directive following the Decision No 168237/14-6-2007 of the Secretary General of the Ministry of Environment, Energy & Climate Change and it is representing Greece in the INSPIRE Committee of article 22 of the Directive.

NCMA S.A. maintains a vast set of data:

I) Aerial photographs color and black-white (more than 400.000) in various scales

II) Cartographic maps in various scales

III) Cadastre maps in various scales

IV) GIS data supporting database information including CORINE LAND COVER in 1:100.000 scale and administrative boundaries of regions of the mainland and the islands

Geodetic data and specifically location of trigonometic points and their detailed description on 1:50.000 base maps.

A user friendly tool working over the internet is available in order to explore and order the most appropriate products for any application. The tool is able to project the footprint of a naval map allowing the user to examine the data before the purchase. Orders can be placed using the GeoIndex Tool and payment can be realized using bank transaction, courier mail or even using VISA credit cards.

The Hellenic Cadastre is a unified and constantly updated system of information that records the legal, technical and other additional details about real estate properties and the rights on them; this information is kept under the responsibility and guarantee of the State.

The development of the Hellenic Cadastre aims at the creation of a modern, fully automated real estate property record, whose details are of an evidentiary nature, ensuring the best publicity and security of transactions.

It is a significantly more modern and complete system than the old system of Registrations and Mortgages supported by the Land Registry Offices. Specifically, the Hellenic Cadastre:

- Records all deeds that establish, transfer, change or abolish rights on properties on a real property-centered basis. Thus, everything becomes simpler and more definite.
- Guarantees all legal details it records, since every deed is registered only after its lawfulness has been checked, meaning that no deed is registered if the transferor is not the person that the cadastre shows to be the beneficiary.
- Records the geographical description (shape, location and size) of the property too.
- Unveils and systematically records the State real property for the first time in contemporary Greece.
- Records the rights evoking from occupation, which, especially in the province, may constitute the most usual way of ownership acquisition due to the informal nature of transactions.

A user friendly tool working over the internet is available in order to

explore and view the whole Greek territory in true orthoimages in great accuracy (pixel size 0.2-0.5m). The user can perform basic measurements on the true ortho images, digitize an area and save the vector information in a *.dxf file. The user can also produce a watermarked orthomap ready to be printed in a scale of up to 1:1,000.
The operation can be performed on a typical Web browser or as a plug-in of specialized GIS software and is based on Web Map Service (WMS) protocol.
http://gis.ktimanet.gr/wms/ktbasemap/default.aspx

6. Organization of Planning and Environmental Protection of Athens
The Organization of Athens, according to the law governing its operation (Law 1515/85), is a Legal Entity of Public Sector, with full administrative and economic independence operating under the supervision of the Minister. It is the body which is delegated the overall administrative management of physical planning, urban planning and environmental matters of Athens and its wider area. At the same time, it has the responsibility for associating the economic planning with the various planning levels, for actions and programs regarding the aforementioned area.
The responsibilities of the Organization of Athens mainly concentrate in the following sectors:
   - Ecological reconstruction of Athens, protection of agricultural land, forests, wetlands and other elements of the natural environment.
   - The protection of the coastal landscape and special areas of natural beauty.
   - Protecting historical and cultural heritage.
   - The reduction of pollution from any source, in particular to address air pollution, soil and water and noise pollution.
   - The upgrading particularly deprived areas.

7. Organization of Planning and Environmental Protection of Thessaloniki
The Organization of Thessaloniki, according to the law governing its operation (Law 1561/1985), is a Legal Entity of Public Sector, with full administrative and economic independence operating under the supervision of the Minister. It is the body which is delegated the overall administrative management of physical planning, urban planning and environmental matters of the Thessaloniki and its wider area. At the same time, it has the responsibility for associating the economic planning with the various planning levels, for actions and programs regarding the aforementioned area.
The responsibilities of the Organization of Thessaloniki mainly concentrate in the following sectors:
   - Ecological reconstruction of Thessaloniki, protection of agricultural land, forests, wetlands and other elements of the natural environment.
   - The protection of the coastal landscape and special areas of natural beauty.
   - Protecting historical and cultural heritage.
   - The reduction of pollution from any source, in particular to address air pollution, soil and water and noise pollution.
   - The upgrading particularly deprived areas.

8. General Secretariat for Regional Planning and Urban Development
The General Secretariat For Regional Planning And Urban Development retains maps in various scales concerning:
   - Basins
   - Monuments of Natural Environment

- National Parks
- Natura 2000 areas
- Areas of the International Treaties for Nature and the Environment
- Protected forest areas
- Ramsar convention areas

http://www.ypeka.gr/Default.aspx?tabid=571

The General Secretariat for Regional Planning and Urban Development retains spatial data in the general categories: Geographical names, Transport networks, Protected sites, Production and industrial facilities, Area management / restriction / regulation zone sand reporting units, Habitats and biotopes, Energy resources, Mineral resource.

9. Special secretariat for Water

   The Special Secretariat for Water is responsible for the development and implementation of all programs related to the protection and management of the water resources of Greece and the coordination of all competent authorities dealing with the aquatic environment. The implementation of the Water Framework and the Marine Strategy Directives as well of the related daughter Directives fall within the scope of the activities of the Secretariat.

   The Secretariat, in collaboration with the Regional Water Authorities, formulates and, upon approval by the National Council for Water, implements the River Basin Management Plans and the national monitoring program. The Secretariat is composed of four Directorates and is headed by a Special Secretary, appointed by the Ministry of Environment, Energy and Climate Change and the Government.

   It retains spatial data in the general categories: Hydrography, Geology, Environmental monitoring facilities, such as the hydrographic network and physiographic data (1:100,000), hydrological data (WFD), groundwater monitoring stations, monitoring stations surface water.

10. General Secretariat for Development and Protection of Forests and Natural Environment

    The Special Secretariat for Forests was established by a Common Ministerial Decision (Greek Government Gazette Issue 855/B/18-06-2010) as an Integrated Administrative Sector of Ministry for the Environment, Energy and Climate Change and it is the administrative body for the development, protection and management of the country's public forests as well as the superintendence of private forests on policy and technical issues.

    In particular, the Secretariat' s main aims include the shaping of forest policy, the compilation of long-term forest development programs, tracking the scientific and technological advances on forest management, monitoring and support of research projects and the promotion of the country's cooperation with the E.U., third countries and International Organizations.

    Furthermore, under the Special Secretariat for Forests operate -as corporate bodies- Special Councils such as the Council of Forest Ownership Revision, the Technical Council for Forests and the Regional Councils for Forest Ownership.

    The competent authorities for the enforcement and implementation of the directions and guidance and generally the forest policy implementation - drawn up by the Special Secretariat for Forests- as well as the implementation of the regional programs and studies are the Regional Forest Services that administratively belong to the respective Regions (of the Country).

The Special Secretariat comprises the following directorates:

- Directorate of Forest Resources Development
- Directorate of Forest and Forest Environment Management
- Directorate of Forest and Forest Environment Protection
- Directorate of Aesthetic Forests, National Parks and Game Management
- Directorate of Reforestations and Watershed Management
- Directorate of Forest Maps

11. Directorate General of Mines - DEI S.A.

The Public Power Corporation (DEI S.A) retains maps depicted the location of the power plants and the high voltage and low voltage power distribution centers in the Greek Territory.
http://www.dei.gr/ecpage.aspx?id=761&nt=110&lang=1

12. Institute of Geology and Mineral Exploration (IGME)

The IGME, in its present form was founded in 1976 and main purpose is the research and study of the geological structure of the country, the identification and assessment of mineral and energy raw materials (except hydrocarbons), research and exploitation of groundwater resources, the risk from natural disasters, always aiming to improve the quality of life and environmental protection. It is a Legal Entity of Private Law, supervised by the Ministry and is the official adviser of the State on geo-science, minerals and energy raw materials.

IGME started its activity as IGSR in 1952, continued as ETHIGME (1972-1976) and then as IGME (1976 to date). In its long career in the field of geosciences has focused its activities to contribute to the economic development of the country and improving the quality of life through the exploitation of minerals and energy raw materials, water resources and natural resources in general, with care for the environment.

After an activity of more than 50 years, IGME, responding to the needs of society, has entered a new phase of creative reconstruction, aiming at the effective implementation of the research project and optimization of the services offered.

To this end and under the Founding Act, the IGME :

1. Acts as the National Geological Service, whose aim is identification - recording and eventually knowledge of the basic geological structure of the country, by mapping, geochemistry, geophysics, remote sensing, geoscientific databases etc.

2. Offers advice regarding control and operation of mines, management of geothermal fields and mineral natural resources such as Authorization of bottled water.

3. Identifies and assesses the mineral resources (deposits - rocks) of the country.

4. Contributes to the identification and rational management of water resources of the country through implementation of hydrogeological studies and projects.

5. Investigates, identifies, examines, evaluates and assists in the exploitation of domestic geothermal fields and more generally of energy raw materials.

6. Conducts studies to solve geotechnical problems and cope with natural hazards (eg landslides, earthquakes), and the proper management of the environment to ensure sustainable development.

7. Active in the ore processing technology sector and the techno-economic assessment of rocks and minerals.

IGME is an official representative organization of Greece in

EuroGeoSurveys. EuroGeoSurveys is an organisation of 32 European Geological Surveys. Its aims are to address the European issues, to promote contribution of geosciences to EU affairs, to assist EU to obtain technical advice and to provide a network between the geological surveys.
Also at the Institute fully equipped laboratories operate for:

- ore processing
- chemical analysis of rocks-ores-water and quality control of bottled water
- mineralogical-petrological determinations
- paleontologic determinations
- Soil-mechanic and rock-mechanic tests
- quality control of marble and decorative stones.
- Determination of radon and radium in water
- Tracing of common water and geothermal fluids

All the publications and maps produced for the above mentioned research purposes of IGME are available for purchase in person. A electronic store is under development. Detailed list of IGME maps can be downloaded directly from the link.

13. Centre for Renewable Energy Sources (CRES)
The Centre for Renewable Energy Sources and Energy Saving (CRES) is the national agency for Renewable Energy Sources (RES), the rational use of energy (ES) and energy saving policies (ESP). It is appointed as the National Coordinating Centre for its areas of activity and was founded in September 1987. It is a Legal Entity of Private Sector and has financial and administrative independence supervised by the Ministry of Environment, Energy and Climate Change.
The main purpose is the promotion of RES / ES / ESP in a national and international level, as well as the support of activities (technological, research, advisory and investment) in these areas, following the reduction of environmental burden in the chain of production / transportation / energy use.
CRES has a scientific staff of over 120 scientists, experienced and specialized fields of activity.
The organizational structure of CRES includes the following key points:
- Address Renewable Energy
- Directorate of Development Programmes
- Department of Administrative and Financial Services
- Address Energy Efficiency
- Directorate of Energy Policy and Planning
- Bureau of Quality Assurance
- Legal Service

14. Secretariat For The Environment And Energy Inspectorate
The Special Secretariat for the Environment and Energy Inspectorate (SSEEI) has been established under Law 3818/2010 “on the protection of forests and forest areas in Attica Prefecture”. The Secretariat is responsible for monitoring and coordinating the involved central, regional and local services in order to secure law enforcement in the areas of environment and energy and secure compliance with the relevant provisions.
The Special Secretariat for the Environment and Energy Inspectorate consists of:
The Hellenic Environmental Inspectorate (HEI). Its main responsibility is to undertake inspections in order to monitor compliance with the environmental permits for projects of the private and public sectors.

The Office for Demolition of Illegal Constructions, reporting to the General Inspector of the Hellenic Environmental Inspectorate. This Office, with the technical assistance of NCMA S.A. (National Cadastre & Mapping Agency S.A.), is responsible for locating illegal constructions in specific areas in the Attica Prefecture (areas destroyed by the fires in August 2009, as defined under article 1 – par. 1 of Law 3818) and implementing the relevant demolition acts for any illegal building.

The Independent Coordination Office for the Implementation of Environmental Liability, established through Presidential Decree 148/2009 on environmental liability (harmonization to the Directive 2004/35/CE of the European Parliament and the EU Council on environmental liability with regard to the prevention and remedying of environmental damage).

The Hellenic Energy Inspectorate. Its mission is to monitor the achievement of the objectives of the national energy policy on energy saving and energy efficiency and to implement articles 1 to 12 of Law 3661/2008 on "Measures for the reduction of energy consumption in buildings" (harmonization to the Directive 2002/91/EC of the European Parliament and EU Council on the energy performance of buildings)

15. General Secretariat of Energy and Climate Change

    The General Secretariat for Energy and Climate Change carries out the following:

    - Policy making in the energy sector and the development of mineral resources; Undertakes the necessary measures for the implementation of the respective policies; exercises supervision over the institutions and bodies with competence for the development of domestic energy and mineral resources.
    - Coordinates the activities of individual organizational units, which work under its auspices, in order to design, promote and implement energy, oil and mining policies.
    - Exercises market surveillance, establishes the legal framework, the technical and quality standards, validates and checks the inputs and outputs, as well as the implementation of regulations concerning production, installation, storage, transfer, delivery, supply, security of energy and mineral resources, products and services.
    - Supervises the implementation of the regulations which concern the power plant licensing process, energy transfer and delivery; Responsible for the introduction of the appropriate national regulatory framework for the electricity market.
    - Responsible for the representation of the Ministry at national, european and international bodies, institutions and organizations regarding issues which concern its competences.

16. Regulatory Authority for Energy (RAE)

    The Regulatory Authority for Energy (RAE) is an independent administrative authority, which enjoys, by the provisions of the law establishing it, financial and administrative independence. RAE was established on the basis of the provisions of L. 2773/1999, which was issued within the framework of the harmonization of the Hellenic Law to the provisions of Directive 96/92/EC for the liberalization of the electricity market.

    The financial independence of RAE, which is an essential condition in order to preserve the Authority's independence, was effectively ensured by the provisions of L. 2837/2000, through which it is anticipated that the Authority possesses its own resources, i.e. revenue bonds from the regulated industry, participation to research projects etc. These resources are managed in accordance with the Presidential Decree 139/2001

"Regulation for the Internal Operation and Administration of RAE", while financial management is subject to ex-post auditing by Independent Auditors and the Court of Auditors.

The website of RAE embeds a WEBGIS service that is giving the opportunity to the user to view and examine the location of energy power plants and also the location of future establishment of renewable energy power plants (under application). The underlying orthomaps of the WEBGIS come either from google, openmaps or the NCMA S.A. web map service (WMS) and the whole attempt is conforming the EU INSPIRE directive.

http://www.rae.gr/geo/

It retains spatial data in the general categories: Protected sites, Production and industrial facilities, Atmospheric conditions, Meteorological geographical features, Habitats and biotopes, Energy resources. In more details protected areas (1:50,000), small hydropower stations (1:50,000), equipotential curves wind speed (1:50,000), wind power stations (1:50,000), wind turbine stations (1:50,000), wind hybrid plants (1: 50,000), photovoltaic stations (1:50,000), solar thermal (1:50,000), hybrid plants (1:50,000).

17. General department of Natural Resources
    It retains spatial data in the general category: Energy resources, such as geothermal fields.
18. Department of Environmental Planning
    It retains spatial data in the general categories: Addresses, Transport networks, Orthoimaginery, Population distribution-demography, Hydrography, Protected sites, Production and industrial facilities, Agricultural and aquaculture facilities, Area management / restriction / regulation zone sand reporting units, Habitats and biotopes, Land use, Habitats and biotopes. In more details map of: roads (1:5,000), orthophoto maps (1 m), city blocks (1:5,000), watersheds, geotopes and geoparks, mining plants, aquaculture, eco-development areas, farms of various fauna, controlled hunting areas , industries Seveso (1:50,000), national parks (1:100,000), nuclei national parks (1:100,000), areas NATURA 2000 (1:100,000), nature monuments (1:100,000), national parks (1:100,000), power ranges international treaties on nature and the environment (1:100,000), protective forests (1:100,000), statutes zoning of protected areas (1:50,000), wetlands RAMSAR (1:100,000).
19. Directorate of Air and Noise Pollution
    It retains spatial data in the general categories: Environmental monitoring facilities, Human health and safety. In more detail, the national network station positions monitor atmospheric pollution (1:2,000), concentration measurements of NO, NO2, O3, SO3, CO, C6H6 from the national network monitoring atmospheric pollution, noise maps, and locations of noise barriers.
20. Department of Topographic Applications
    It retains spatial data in the general categories: Hydrography, Buildings, Area management / restriction / regulation zone sand reporting units. In more details map of: beach zones (1:1,000), streams (1:1,000), Buildings (1:1,000).
21. Management Agency Lake Kerkini
    It retains spatial data in the general category: Orthoimaginery, such as color digital orthophoto maps (1 m), satellite imagery IKONOS (Pan Sharpened) (1 m), satellite images ALOS (Pan Sharpened) (2.5 m).

C. Ministry of Rural Development and Food

The Ministry's aims are to promote the Development of agriculture, the Competitiveness of the Greek agricultural products and the Restructuring of the countryside.

22. Directorate of Records Management
    Retains the records and implements payments of compensation money to farmers whose cultivated areas were destroyed by natural disasters.
23. Directorate of Technical Studies and Construction
    The Directorate of Technical Studies and Construction retains maps of dams reservoirs of the Greek territory and agricultural parcels (LPIS) 2006 (1:10,000).
24. Directorate Surveying
    The Directorate Surveying has orthophoto maps that cover the whole territory and were produced from 1:40,000 scale aerial photographs, fotolipsias of the years 1996 to 2001 (disposal aerial photographs). The Directorate Surveying retains digital elevation model maps of Greece in a 20-40m grid size.
    The Directorate Surveying holds a colonization file (Distributions), and the Land Consolidations of the Ministry relating to agricultural rehabilitation of landless farmers and indigenous refugees within national borders. Distributions initiated after 1917, when the Topographical Service of the Ministry, was founded. The Land Consolidations began in 1953. In this form, the preparation of land consolidation continues until today. The Topographical Service of the Ministry of Rural Development and Food is the Service that performed and performs all distribution operations and redistribution of the Country and is the only responsible and accountable for the management of land registry/cadastral data and topographical diagrams produced as part of this work.
    Each parcel of land belongs to a farm of land consolidation or of distribution.
    The implementation work of digitization of analog data are the following:
    a) Scanning topographical / land registry/ cadastral diagrams of settlers file and of Land Consolidation file, at each Topographical Service of all Prefectures of the country.
    b) Georeferencing of topographical diagrams into the system EGSA87.
    The Directorate Surveying has a basis with the boundaries of the referenced modules (grouped sets of land parcels), on which, takes place the identification of land parcels. Produced in 1999 by photointerpretation methods, with orthophoto maps, as a background, with pixel size 1m and precision scale 1:10,000. Updates, additions and corrections have been made up to 2008. Polygons are in EGSA '87.
    From the service are administered the following data of the Network of the Ministry of Rural Development and Food:
    a) Triangulation points (horizontal X, Y, Elevation and description of trigonometric).
    b) Landmarks and attitudes of polygonal paths (horizontal X, Y and Elevation).
    c) Other Technical Data (resolving triangulation issues, paths issues etc.)
    The Directorate Surveying has contributed substantially to the development of the rural economy of Greece, both with the implementation of the above, as well as with the creation of the Land Parcel Identification System (LPIS) and the geodatabase of characteristic features of ground cover GAEC (http://gaec.topographiki.gr/).
    Also has a polygonal and point data file with the locations, as they have been reported by the growers in LPIS.

The archive of toponyms (place names) is not available to citizens for the time being.
http://geoportal.topographiki.gr/portal/page/portal/Topo

25. Greek Payment Agency
The Greek Payment Agency (O.P.E.K.E.P.E.) became operational and started its activity in 2001 and it is responsible for the three funds E.A.G.F., E.A.F.R.D. and E.F.F.according to the Greek Law No 3508. O.P.E.K.E.P.E. is a private legal entity operating for the public interest, supervised by the Minister of Rural Development and Food and has its siege in Athens. The agency pays every year approximately 3 billion of community subsidies to almost 900.000 beneficiaries, including farmers, farmer associations, export companies.
It retains spatial data in the general categories: Land cover, Cadastral parcels, Land cover, Orthoimaginery. In more details agricultural consolidations (1 m), parcels LPIS 2009-2012 (1:5,000), digitized polygons property, orthophoto maps 2009-2012 (1 m), orthophoto maps 2008 IKONOS (1 m), orthophoto maps 2008 QUICKBIRD (0,6 m).
26. Planning and Land Reclamation Project Development Soil / Water Resources
The programs of quality control of irrigation water applied and monitored by the Planning and Land Reclamation Project Development Soil / Water Resources.
They started out in 1976 and 1980 were adjusted to the requirements of European Union directives.
The programs are divided into annual, seasonal, and cover the whole Greece. Samples taken from 91 locations of rivers, 32 lakes, 30 streams, irrigation networks 106 and 326 boreholes. The collection of samples are obtained from the Regional Land Reclamation Services.
27. Forestry Directorate
It retains spatial data in the general category: Protected sites, such as environmentally sensitive areas (1:50,000).
28. Soil Science Institute of Athens, Institute of Soil Mapping and Classification-Larissa, Soil Science Institute of Thessaloniki, Land Reclamation Institute-Sindos (Thessaloniki)
It retains spatial data in the general category: Soil, such as soil studies vector format (1:50,000).

D. Ministry of Infrastructure, Transport and Networks
The mission of the Ministry of Infrastructure, Transport and Networks is:
- to plan and implement national policy and create the appropriate institutional framework at European and international level for the development of top quality transport, mass-transit, telecom and postal services under conditions of healthy competition;
- to ensure the safety of transport, mass-transit and telecommunications;
- to promote the Information Society;
- to contribute to the country's economic development and to the improvement of its citizens' quality of life in the areas falling under the Ministry's responsibility.

29. Greek Post Office
The Greek post office retains maps of all residential areas of the Greek territory in maps of 1:5,000 scales for needs of the service.
30. Attico Metro S.A.
The Attico Metro S.A. retains maps (1:5,000) providing the location of all

the stations and the routes of the Athens Metro network and the respective Metro Network of Thessaloniki (under construction) .
http://www.ametro.gr/page/default.asp?id=15

31. Egnatia Odos S.A.
The Egnatia Odos S.A. is the company that has undertaken the construction of Egnatia Highway in North Greece and retains maps in various scales of the whole route including the crossing highways.
http://www.egnatia.eu/files/images/Project_Status.jpg
It retains spatial data in the general categories: Geographical names, Transport networks. In more details map of: the Egnatia Odos (1:5,000), sites of special interest points in the zone of influence of the Egnatia Odos (1:2,000), vertical lines (one 5,000), contractions as tunnels, interchanges Egnatia Odos (1:5,000), tolls (1:10,000), service stations motorists (1:10,000) and the partings (1:10,000).
32. Directorate of Road Works Studies - General Secretariat of Public Works
The Directorate retains the maps (1:50,000) of the national road transportation network (primary, secondary, tertiary) and the provincial road transportation network (primary, secondary).
33. GEOSE S.A.
The GEOSE S.A. retains the maps (1:1,000) of the national railway transportation network.
34. National Committee of Telecommunications and Post
The National Committee of Telecommunications and Post retains maps of all Wifi access points and the ADSL coverage maps around telecommunication centers in 1:5,000 scale.
35. THEMIS CONSTRUCTION S.A.
It retains spatial data in the general categories: Land use, Utility and governmental services, Buildings. In more details approvals local street plans, charting geography general prisons (1:50,000), Infrastructure judiciary.
36. Organization of School Buildings
It retains spatial data in the general categories: Buildings, Utility and governmental services. In more details the building of schools in operation (1:5,000), projects in progress for schools (1:5,000), etc.

E. Ministry of Education and Religions
The aim of the ministry is to plan and implement national policy and create the appropriate institutional framework at European and international level for the development of top quality educational system, to promote Long Life Learning and regulate religion issues of Greece.
Certain institutes and organizations have developed mapping enterprises and retain maps in various scales.

37. Hellenic Center for Marine Research (HCMR)
The Hellenic Centre for Marine Research aims to carry out scientific and technological research, and experimental development, dissemination and implementation of produced results, especially in the fields of study and protection of the hydrosphere, its organisms, its interface with the atmosphere, the coast and the sea bottom, the physical, chemical, biological and geological conditions that prevail and regulate the above mentioned systems with:
    - the production of products and supply of services
    - the support of decision-making concerning the general public, the economy and culture
    - their economical exploitation either by the HCMR and/or by its

employees or by third parties.

Most of the map products of HCMR are deliverables generated from international and national funded Research Programmes.

It retains spatial data in the general categories: Meteorological geographical features, Sea regions, Habitats and biotopes, Transport networks, Statistical units, Oceanographic geographical features, Mineral resources, Protected sites. In more details meteorological geographical features, fisheries data, habitats and biotopes, ports excursion vessels and ports landings, bathymetric data, seas, gulfs, bays, fishing areas, ecological status of coastal waters, mining permits (1:5,000), etc.

38. Foundation of Research and Technology Hellas (FORTH)- Institute of Applied and Computational Mathematics (IACM)

    The Institute of Applied and Computational Mathematics (IACM) of the Foundation of Research and Technology Hellas (FORTH) is located in Heraklion, Crete, Greece and was founded in 1985. It is one of the founding institutes of FORTH.

    The objectives of IACM are:

    - To conduct research of high quality in selected areas of Applied and Computational Mathematics.
    - To participate in interdisciplinary research projects, mainly by developing and applying mathematical methods and tools for modeling and solving complex problems in the sciences and technology.
    - To develop tools and methodologies based on Applied Mathematics that can be used in the public and private sectors.
    - To provide training for graduate students and postdoctoral researchers in Applied and Computational Mathematics and related areas.

    Retains Land Coverage maps of Attica, Crete, Cyprus, Lesbos and Rhodes regions of 15m spatial resolution.

39. Greek Atomic Energy Commission (GAEC)

    The Greek Atomic Energy Commission is the national authority for the secure implementation of radiation in our country. The regulatory and inspectional responsibilities of the Commission are dealing with nuclear energy and nuclear technology issues, as well as with the radiation protection of the public, the workers and the environment against the dangers resulting from the use of ionizing and artificially produced non-ionizing radiation.

    Furthermore, the Commission participates in the National Emergency Plan, in case of a radiological or nuclear event. Moreover, strong relations have been created with several European and International Organizations, where it represents the country in issues relevant to its responsibilities.

    The majority of the services provided, like the control of non-ionizing radiation, the individual monitoring, the environmental radioactivity control and the calibration of radiation instruments, has been accredited by the Hellenic Accreditation Council. Its work related to education issues in the field of the radiation protection has been acknowledged internationally and the Commission is recognized as the Regional European Training Centre of the International Atomic Energy Agency.

    The scientific staff of the Greek Atomic Energy Commission assigns the highest attention to issues related to radiation protection and nuclear technology. Main goal and concern is to guarantee the protection of the public health through the optimization of the services provided.

    It retains thematic maps concerning the radiation measurements on products surface waters and air in the Greek territory.

40. National Observatory of Athens

The original part of the Observatory was designed by the famous Dane Architect Theophilus Hansen and was the first research Institution built in Greece (1842) after its deliberation from the Ottoman Empire. The Hill of the Nymphs was selected as the place to built the Observatory, a Hill famous from antiquity, where the Nymphs were worshipped and next to one of the famous Observatories of the 5th century, where Meto's Heliotropion was placed. The Hill of the Nymphs is aligned with one of the most celebrated and best preserved meteorological / astronomical Observatories, the Tower of the Winds, which is also the emblem of the Royal Meteorological Society and a rough copy of which was built at the University of Oxford. The new Observatory on top of the Hill of the Nymphs is a landmark in Athens, facing the Parthenon and has long been used by Greek and foreign Astronomers as the basis for astronomical, meteorological, geoastrophysical measurements and observations in its 160 years history. Today the buildings include an Astrogeophysics Museum and it also houses clocks, telescopes and other instrument of the 19th century and an extensive 19 century astrogeophysics library. The National Observatory, Athens is operating today five Research Institutes and provides the facilities for graduate student training in collaboration with Greek and foreign Universities. It hosts the UNESCO Chair for Natural Disasters and operates the National Seismological Network and it is participating in the OPTICON and other international research networks, hosting the Greek Focal Point on the Global Earth Observing System of Systems (GEOSS).

It retains thematic maps of seismic risk in the Greek territory, and Web application display on a map of the positions and information of earthquakes recorded (http://www.gein.noa.gr/el/seismikotita/xartes).

41. Institute for Environmental Research and Sustainable Development

    It retains spatial data in the general category: Environmental monitoring facilities, such as data from climate simulations of the territory, etc.

42. Institute of Sustainable Mobility and Transport Networks

    It retains spatial data in the general categories: Transport net works, Human health and safety, Atmospheric conditions, Meteorological geographical features. In more details transport networks, pollution and greenhouse gases data, climate data, meteorological data, etc.

F. Ministry of Health

The aims of the Ministry of Health is:

- The promotion, protection, preservation and restoration of physical, mental and social welfare of individuals and the society.
- Equality in the provision of the highest quality services and health products and social solidarity in society according to the needs of each individual.
- Protection of civil and social rights in the provision of health services and social solidarity.
- Protecting the natural environment, control of products and services affecting the health of persons and measures to promote better quality of life.
- Setting, training, testing and promotion of health professions and social solidarity, and defining and controlling production, distribution and consumption of goods health to meet the needs of society.
- Informing the society about the protection and promotion of health and healthy lifestyles, and prevention and treatment of diseases and disabilities and procedures for reintegrating people into society.

Retains maps in various scales concerning health issues such as epidemiological records, health indices, disease prevention indices, environmental pollution maps etc.
Especially the Organization Against Drugs retains maps of the centers against drug adiction.

G. Ministry of Public Order and Citizen Protection

43. General Secretariat for Civil Protection (GSCP)

The aims of the General Secretariat for Civil Protection are:

- Processing, policy planning for civil protection
- Contribution to the Interior Ministry planning measures and implementation of civil protection
- Drafting regulations, establishing standards for disaster prevention in cooperation with ministries and other bodies
- Scientific documentation / support programs, plans, actions
- Approval of Prefectural and Local Plans
- Establishment of an annual procurement program media / materials protection policy under the National Civil Protection Planning in cooperation with other bodies
- Contribution to the Interior Ministry allocations policy of protection to local government first and second degree
- Elaboration and implementation of education / training staff protection policy at central and regional level in cooperation with relevant bodies
- Keeping Records of Voluntary Organizations and Volunteers
- Special education / training members of voluntary organizations
- Educational programs in primary and secondary educational institutes
- Undergraduate and graduate university courses
- Approval and funding of applied research programs / studies
- Develop documentation center for civil protection

Within the above mentioned aims the Secretariat retains risk maps for forest fires and other natural disasters (http://www.civilprotection.gr/el/xartes).

44. Hellenic Police

It retains spatial data in the general categories: Addresses, Buildings, such as the locations of police stations, etc.

45. Hellenic Fire Service

It retains spatial data in the general categories: Buildings, Utility and governmental services, such as the locations of fire departments (1:5,000), etc.

H. Ministry of Administrative Reform and e-Governance

46. Directorate of Organization and Operation of Citizen Service Center - General Secretariat for Public Administration and e-Government

The ministry has created and retains maps of all citizens' service offices in Greece.
The geodata.gov.gr is the first effort to free geospatial data available to the wider Civil Service to all its citizens.
The website is continually updated with data from more and more operators of Public Administration, while enriched with functionality. The goal to offer all the geospatial data available to the public administration in order to:

• monitor the civil service

- actively participate in environmental protection
- develop new, smart applications and services

Site link: http://geodata.gov.gr/geodata/

I. Ministry of Interior

47. Greek Agency for Local Development and Local Government

It retains spatial data in the general categories: Geographical names, Administrative units, such as the seats of municipalities for the whole country (1:50,000), the limits of municipalities for the whole country, etc.

J. Ministry of Culture and Sports

The aim of the ministry is to plan and implement national policy and create the appropriate institutional framework at European and international level for the promotion of cultural heritage and sports development in Greece by implementing activities such as: Excavations, reconstructions, conservations, infrastructure projects, programs, educational programs, publications, exhibitions and important events.

The ministry supports mapping activities of Archaeological sites, Museums, and other areas (touristic settlements). It retains a WebGIS (http://odysseus.culture.gr/index_en.html) that is providing information on the whole country of the most important cultural sites of the ancient, medieval and modern times.

Today, the Archaeological Cadastre is being prepared, for the systematic collection, comprehensive investigation, coding, import and recording data and metadata, spatial localization and imaging, storage and management in a database management system, data recovery, processing and analyzing data of all land parcels and properties that have been acquired by the Ministry of Culture, mainly for archaeological purposes with any administrative act, which belong to public or private property of the State. Also, of all institutionalized archaeological sites, places and other protected areas of the cultural environment, as well as of all monuments from antiquity until today, throughout the territory and competence of the Ministry of Culture, aiming at the integrated quantitative and qualitative performance of physical, legal and socio-cultural reality of this cultural heritage (http://archaeocadastre.culture.gr/el/).

48. Archaeological Institute for Thessalian Studies

It retains spatial data in the general categories: Geographical names and Protected sites, such as the archaeological atlas of Thessaly, etc.

49. Directorate Expropriation and Real Property

It retains spatial data in the general category: Geographical names, as geographical names (1:2,000), polygons of buildings of real estate property of Ministry (1:2,000), etc.

50. Office for National Spatial Sport Facilities

The Office for National Spatial Sport Facilities owned by the General Secretariat of Sports. Retains spatial data in the general categories: Utility and governmental services, such as local sports facilities (1:5,000), etc.

51. Directorates Prehistoric and Classical Antiquities

Retains spatial data in the general category: Protected sites, such as archaeological sites (1:1,000), etc.

52. Archaeological Resources Fund

Retains spatial data in the general categories: Protected sites, Orthoimaginery, such as cadastral maps, topographic surveying of castles, etc.

K. Hellenic Statistical Authority

ELSTAT retains since 1950, historical maps (Atlas of Greece) in scales 1:2.000.000, 1:200.000 and 1:100.000, for divers thematic areas as Industry, Economy, Administrative division etc.

ELSTAT retains since 2001 electronic maps (GIS) of building constructions of Greece for more than 600 settlements. Recently (1-28, Feb. 2011) there was implemented a detailed recording of all the buildings in Greece for the update of the 2001 records and for collection of recent data on the buildings' wealth in the country, namely the counting of all buildings in the country with reference to their main use in their ownership and other characteristics.

L. OTE S.A.

Hellenic Telecommunications Organization (OTE S.A.) is the largest telecommunications provider in Greece, and together with its subsidiaries forms one of the leading telecom groups in Southeastern Europe.

OTE is among the five largest listed companies, with respect to capitalization, in the Athens Stock Exchange and is also listed in the London (LSE) Stock Exchange.

Following an agreement between the Greek Government and Deutsche Telekom, since 5th November 2008, each held 25% plus one share in OTE' s share capital.

Since 31st July 2009, following the sale of a further 5% of OTE share capital by the Greek State to Deutsche Telekom, the Greek State holds 20% and Deutsche Telekom 30%.

The OTE Group offers a full range of products and services, from broadband services, fixed and mobile telephony, to high-speed data communications and leased lines services. In addition, the Group in Greece is involved in a range of activities, notably satellite communications, real-estate and professional training. At present, OTE companies employ over 30,000 people in four countries.

OTE S.A. retains a digital WEBGIS providing precise street numbering information on all the settlements of the Greek territory. The site is able to direct a user to follow the shortest route (avoiding heavy traffic) to a specific destination or a Point of Interest (POI).

M. Ministry of Marine and Aegean

53. Directorate of Port Infrastructure

The Directorate of port infrastructure belongs to the General Secretariat of Ports and Port Policy of the Ministry. Retains spatial data in the general category: Elevation, such as bathymetry mapping (1:500)

N. Ministry of Finance

54. Public Real Estate Corporation

Retains spatial data in the general categories: Cadastral parcels, Orthoimaginery, Buildings. In more details the real estate services - cadastre (1:1,000), public real estate records - Geocache, real estate of topographic charts, etc.

O. Ministry of Labour and Social Security and Welfare

55. Workers' Housing Organization

Retains spatial data in the general categories: Cadastral parcels, Transport net works, Buildings, Land use, such as parcels boundaries, settlements network, topographical diagrams, buildings in settlements, settlement

boundaries, city blocks and communal areas in digital form (vector data), epidemiological and demographic indicators, etc

The link gives the detail list of data produced or maintained at the aforementioned public institutions

II. Type of data

Orthophotos, Maps (topographic and thematic) in various scales, Aerial images (scanned copies), Geodetic data (Geodetic control points and leveling control points - Reperes), Geophysical data (Gravimetric, magnetic and anomalies and variations), Thematic maps, Historic maps, etc. The most complete Spatial data collection is maintained by the Hellenic Military Geographical Service and the National Cadastre & Mapping Agency S.A. Detailed information has been given above. A detailed list of the available data providers and types of information can be found in the NCMA S.A. information site about the INSPIRE directive. The link is giving in detail the list of spatial data providers, the types of information and the level of conformation.

III. Royalties - Usage Restrictions

The project of compiling an inventory of public services and bodies, in all levels of government, to be involved in the implementation of INSPIRE Directive carried out by NCMA S.A., showed that the restrictions to the access to spatial information lying under the scope of the Directive are due to the following.

1. Intellectual Property Rights

Most of the agencies and bodies call on the protection of intellectual property rights for the spatial data they produce and maintain themselves like the Hellenic Military Geographical Service, the National Cadastre & Mapping Agency S.A, the Regional Directories of Forests etc.

The protection of intellectual property rights of third parties constitute a restriction to the access to spatial data sets and services held by public authorities. Examples are satellite images held by the Hellenic Military Geographical Service, the National Cadastre & Mapping Agency S.A, the National Statistical Service of Greece, AGROGI S.A etc or digital spatial data that were compiled by private companies as the ones held by the Directory of Road Works of the Region of Attica.

2. Protection of Privacy

Restrictions to the access to spatial data sets and services due to protection of personal data are set, for example, by the Organization for Payments and Control of the Community Aid and Indemnity of the Ministry of Rural Development and Food and the Center for Control and Prevention of Diseases.

3. Public Security

Restrictions to the access to spatial data sets and services due to Public Security are set, for example, the Public Power Corporation S.A, Hellenic Petroleum, General Secretariat of Civil Protection, the State Company for Water Supply and Sewage of Athens (for water supply networks) , Regional Authorities for the Antiquities of the Ministry of Civilization etc., the state company International Airport of Athens S.A, the Directory of Environment and Physical Planning of the Region of Epirus, the Directory of Forests of the Prefecture of Ioannina, the Directory of Civil Protection of the Region of Northern Aegean etc.

4. National Defence

Restrictions to the access to spatial data sets and services due to National Defense are set, for example, by the Hellenic Military Geographical Service for the

classified areas, the Hydrographic Service of the Hellenic Navy for bathymetry data while the Service is using an encryption system for access to the Electronic Nautical Charts (ENCs).
More specifically, Law 3257/2004 "Regulation of the Armed Forces Staff Affairs" and especially article 11, which amended article 13 of the Legislative Decree 1013/1971, refers to the protection of intellectual property rights of the Hellenic Military Geographical Service in cases of use by the public or private sector of the geographical data produced and maintained by this Service while an approval by the same Service is required before any production, dissemination or circulation of high resolution (higher than 1 meter) geographical data or imagery acquired from any source .

5. Confidentiality of Statistical Information
The National Statistical Service of Greece sets restrictions to the access of its spatial and other data, as for example the statistical units, due to the confidentiality of statistical information.
The legislation protecting the confidentiality of statistical data includes:

- Law 2392/1996 : "Access by the National Statistical Service of Greece to administrative sources and archives , Committee for Statistical Confidentiality, Regulation of other Affairs of the National Statistical Service of Greece"
- European Regulation 322/1997 of the Council of 17-2-1997 concerning European statistics.

6. Competition
Various agencies or state companies are restricting the access to their spatial data sets and services due to competition as for example Public Power Corporation S.A, Public Power Corporation – Renewable Sources, the Hellenic Post etc.

7. Official Approval
Many public agencies and bodies require prior official approval, on a case by case basis, for access and use of their spatial data sets and services , as for example the Hellenic Center for Marine Research, the Public Power Corporation, ERGOSE S.A, the National Agricultural Research Foundation etc.

8. Unspecified Digital Spatial Data Policy
Many public agencies and bodies have not yet specified or officially approved their digital spatial data policy as, for example, the Institute of Geology and Mineral Exploration, the Organization of Telecommunications of Greece, NCMA S.A., the Regional Directories for Waters and the ones of Environment and Physical Planning etc.

1.4 Use of Spatial Information in local decision making processes

The projects on development planning, in regional and local level, are based in standard required data, that is:

DATA	PROVIDER
Terrain contour lines (relief)	NCMA S.A (DTM)
Coastline	NCMA S.A (ortho 1:5000)
Hydrological information	Hellenic Military Geographical Service(base maps 1:50000)
Road network	NCMA S.A and Open-Public data (Geodata.gov.gr)
Administrative boundaries	Open-Public data
Settlement boundaries	Base maps 1:5000, Open-Public data, Ministerial and legislative decisions

Wildlife shelters	Open-Public data
Natura areas	Open-Public data
Reforested areas	Directorate of Forest Maps
Springs	Institute of Geology and Mineral Exploration
Caves	Hellenic Military Geographical Service and NCMA S.A
Mountain peaks	Hellenic Military Geographical Service (base maps 1:5000)
Archaeological Sites-Monuments	NCMA S.A (ortho 1:5000), legislative decisions
Land use, land cover	Hellenic Military Geographical Service(base maps 1:50000), NCMA S.A (ortho 1:5000), OPEKEPE
Maps of Division and Redivision	Directorate of Syrveying
Wind and Solar Parcs	Regulatory Authority for Energy
Mines	NCMA S.A

The projects in National level, besides the above mentioned data, possibly be require additional information to be specified in each case

1.5 Relevant national institutes, contact points

Table 1. Relevant national institutes, contact points

Distribution Center	Data Availability	Sharing policy	Data costs	Metadata
Hellenic Military Geographical Service	Off-line	Sold	link	YES
Hellenic Navy Hydrographic Service	Off-line	Sold	link	YES
Hellenic Air Force	Off-line	-	-	YES
Hellenic National Meteorological Service	Off-line	-	-	YES
National Cadastre & Mapping Agency S.A.	Off-line	Sold	-	YES
Organization of Planning and Environmental Protection of Athens	Off-line	-	-	YES
Organization of Planning and Environmental Protection of Thessaloniki	Off-line	-	-	YES
Central Water Agency	Off-line	-	-	YES
General Secretariat For Regional Planning And Urban Development	Off-line	-	-	YES
General Secretariat for Development and Protection of Forests and Natural Environment	Off-line	-	-	YES
Directorate General of Mines - DEI S.A.	Off-line	-	-	YES
Institute of Geology and Mineral Exploration	Off-line	Sold	link 25€ per sheet	YES
Centre for Renewable Energy Sources	Off-line	-	-	YES
Secretariat For The Environment And Energy Inspectorate	Off-line	-	-	YES
Regulatory Authority for Energy	On-line	-	-	YES
Department of Environmental Planning	Off-line	-	-	YES
Directorate of Air and Noise Pollution	Off-line	-	-	YES
Department of Topographic Applications	Off-line	-	-	YES

Management Agency of the Lake Kerkini	Off-line	-	-	YES
Directorate of Technical Studies and Construction	Off-line	-	-	YES
Directorate Surveying	Off-line	Sold	link	YES
Greek Payment Agency	Off-line	-	-	YES
Forestry Directorate	Off-line	-	-	YES
Soil Science Institute of Athens, Institute of Soil Mapping and Classification-Larissa, Soil Science Institute of Thessaloniki, Land Reclamation Institute-Sindos (Thessaloniki)	Off-line	-	-	YES
Greek Post Office	Off-line	-	-	YES
Attico Metro S.A.	Off-line	-	-	YES
Egnatia Odos S.A.	Off-line	-	-	YES
Directorate of Road Works Studies - General Secretariat of Public Works	Off-line	-	-	YES
GEOSE S.A.	Off-line	-	-	YES
National Committee of Telecommunications and Post	Off-line	-	-	YES
Themis Construction S.A.	Off-line	-	-	YES
Organization of School Buildings	Off-line	-	-	YES
Hellenic Center for Marine Research	Off-line	-	-	YES
Greek Atomic Energy Commission	Off-line	-	-	YES
National Observatory of Athens	Off-line	-	-	YES
General Secretariat for Civil Protection	On-line	Free	-	YES
Hellenic Fire Service	Off-line	-	-	YES
Directorate of Organization and Operation of Citizen Service Center - General Secretariat for Public Administration and e-Government	Off-line	-	-	YES
Greek Agency for Local Development and Local Government	Off-line	-	-	YES
Archaeological Institute for Thessalian Studies	Off-line	-	-	YES
Directorate Expropriation and Real Property	Off-line	-	-	YES
Office for National Spatial Sport Facilities	Off-line	-	-	YES
Directorates Prehistoric and Classical Antiquities	Off-line	-	-	YES
Archaeological Resources Fund	Off-line	-	-	YES
Hellenic Statistical Authority	Off-line	-	-	YES
OTE S.A.	On-line	Free	-	YES
Directorate of Port Infrastructure	Off-line	-	-	YES
Public Real Estate Corporation	Off-line	-	-	YES

Workers' Housing Organization	Off-line	-	-	YES

1.6 *Beneficiaries of ongoing or completed EU/national/regional projects*

National level

NCMA S.A. has implemented a series of supporting actions under the title "Data and I.T. Infrastructure for a modern Cadastre" along the lines of the "Information Society" Operational Plan, part of the 3rd Community Support Framework (CSF). The actions' overall budget comes up to 79.670.000 € (excluding VAT) and was co-financed with 50% by the EU and 50% by the Greek State.

Table 2. Beneficiaries of identified ongoing or completed EU/ natural/ regional projects

Project Title	Beneficiary	Web Site	References
Cadastre's IT Infrastructure	NCMA S.A.	link	link
Development of a Digital Database of the "active" titles coming from the Land Registry Offices in urban centers	NCMA S.A.	link	link
Hellenic Positioning System - HEPOS	NCMA S.A.	link	link
Digitization and conversion of existing maps / registers Digitization of data from land consolidations and re-distributions for the entire State	NCMA S.A.	link	link
Digitization of the Dodecanese Cadastre	NCMA S.A.	link	link
Collection of suggestive / indicative data for the facilitation of the cadastral survey procedure	NCMA S.A.	link	link
Delineation of forests and forest areas for the entire country	NCMA S.A.	link	link
Development of unified national basemaps appropriate for the delineation of coastal zones	NCMA S.A.	link	link
Development of IT infrastructure	NCMA S.A.	link	link

Regional level

The Regional Development Funds has been established (Article 53 of Law 2218/1994) under the elected Regional Government (13 regions in Greece). These public institutions manage EU programs. For example:

Region of Central Macedonia
http://www.rdfcm.gr/index.php?option=com_content&view=section&layout=blog&id=1&Itemid=5&lang=el
Region of Crete
http://www.pta.gr/extensions/european-projects-in-progress

Local Level

Municipalities (http://www.ypes.gr/el/) are responsible for managing the development programs.

For example, in 2013, 231 mature projects for municipalities, with a budget of 452 million euros was ready for implementation. These projects primarily was related to the environment, urban regeneration, culture and roads.
In order to avoid delays has been established a joint committee of the ministries of Interior and Development to monitor the progress of development programs relating to local Government.

2. Data – Applications

2.1 National Spatial Data Infrastructure (NSDI)

The National Spatial Data Infrastructure (NSDI), is a system which allows direct access to all available digital geoinformation across the country, through the internet.
The establishment of NSDI, was institutionalized in September 2010, in aim of ensuring equal access to geospatial data and services for all citizens and Public Administration, saving resources, protecting the environment and encouraging investment initiatives through the creation of the National Spatial Data Infrastructure.
In the National Spatial Data Infrastructure, a full list of all available geodata and services (geoportal) will be maintained. Both Public Administration and citizens will have access to geodata and they will be able to process them, through the portal.
Information for data and services that are not given direct access (eg personal data, public safety, etc.), will be provided, as well as the corresponding terms of disposal.
The National Spatial Data Infrastructure, consists of four main components, the digital geospatial data (eg Natura 2000 zones, hydrographic network, road network, protected areas, etc.), the geospatial data services (ie software which performs various processes on the geodata and metadata in order to utilize them), the technical background (i.e. the technical requirements to meet the above geodata), and the institutional framework which shall consist of a well-defined management structure which specifying the individual roles and responsibilities of those involved in the operation of the infrastructure, and on the other hand, relevant legislation regulating the way of sharing the geodata, both between the Public Administration, and from this to the citizens and the wide public (http://www.ypeka.gr/Default.aspx?tabid=649&language=el-GR).

Table 3. National Spatial Data Infrastructure (link)

Applications/studies	Digital or Hardcopy	Format (if Digital)	Metadata
Agriculture	Digital and hardcopy	Vector, raster	Yes
Biota	Digital	Vector	Yes
Confines	Digital and hardcopy	Vector, raster	Yes
Climatology/Meteorology/Atmosphere	Digital	Vector, raster, database, excel files	Yes
Economy	Digital	Vector	Yes
Altimetry	Digital and hardcopy	Vector, raster	Yes
Environment	Digital and hardcopy	Vector, raster, database, excel files	Yes
Geoscientific information	Digital and hardcopy	Vector, raster	Yes

Health	Digital and hardcopy	Vector	Yes
Orthoimagery/basemap/land cover	Digital and hardcopy	Vector, raster	Yes
Military information	Digital and hardcopy	Vector, raster	Yes
Inland waters	Digital and hardcopy	Vector, raster	Yes
Geographical position	Digital and hardcopy	Vector, raster	Yes
Seas	Digital and hardcopy	Vector, raster, database	Yes
Spatial planning/Cadastre	Digital and hardcopy	Vector, raster, excel files	Yes
Society	Digital	Vector	Yes
Construction	Digital and hardcopy	Vector, raster, excel files	Yes
Transportation	Digital and hardcopy	Vector, raster	Yes
Public services/Communications	Digital and hardcopy	Vector	Yes

2.2 National Census

The statistics (statistical tables and various indicators) compiled by the Hellenic Statistical Authority are monthly, quarterly, yearly, every 5 years and every 10 years, covering the sectors

- Agriculture, Building and Constructions, Culture-Entertainment, Education, Environment, Fishery, Health-Social Protection, National Accounts, Industry, Inflation, Justice, Labour Market, Livestock, Transport, Population, Tourism, Trade-Services, Technology –Information Society

http://www.statistics.gr/portal/page/portal/ESYE/PAGE-contact

ELSTAT through an updated web portal offers to the registered user the following options :

- Find statistics and used methodology by subject matter
- Create tables through the statistical database.
- On line ordering printed publications and statistics.
- On line access to publications.
- On line ordering of analog and digital cartographic data.

Finally it offers to user, via alert services and RSS, the possibility to automatically receive updates whenever new material is published or altered on the EL.STAT. portal.

The raw statistical data is not available on line. The user, in order to have primary data, in accordance with the provisions of Law 2392/96 and Regulation of the European Parliament and of the Council 223/2009, can fill out the request form, through the web portal. The Committee on Statistical Confidentiality decides about the request and the cost of the data.

Since 2004, Eurostat's publications and statistical data extracted from databases are available free of charge on-line. The users have an on-line, free access to the most recent and complete available statistical information, concerning the EU, the member states, the Eurozone and other countries, and a free download of all Eurostat's statistical publications through their website:

http://ec.europa.eu/eurostat

The very same date, the Hellenic Statistical Authority (ELSTAT), in cooperation with Eurostat, established the European Statistical Data Support Centre of Greece. The services provided by the Support Team include:

- Information regarding availability of specific data/publications.
- Verification of data.
- Methodological information.
- Technical assistance

2.3 Processing capability of Spatial data

According to the above mentioned paragraphs there is a large number of public services and bodies at all levels of government, that produce and maintain geodata in national, regional or local geographical coverage.
The most important of them, (ie. the ones producing and maintaining the largest volume of data) at national geographical coverage or with a legal mandate of national geographical coverage are given in 1.3.

2.4 Spatial data collection capability

The HMGS is able to fly aircrafts and capture photographs for mapping purposes. However, LIDAR data can not be captured.
National Cadastre & Mapping Agency S.A. (NCMA S.A.) is the most responsible public institution to organize flights for official mapping and cadastral expeditions and has developed a workflow to generate true ortho images in very large scale (VLSO) in urban areas and large scale (LSO) in rural areas of the entire country that are also available through the internet.

Table 4. Organizations delivering Aerial Photography

Organization	Type Of Organization	Data Type	Delivery Time	Cost	Royalties
HMGS	Public	Aerial photographs	N/A	N/A	Reserved
NCMA S.A.	Public	Aerial photographs	N/A	Free web service	Watermarked WebGIS orthomaps

2.5 GPS data availability and costs

HEPOS (HEllenic POsitioning System) is a system that provides real-time positioning services using GPS (the Global Positioning System). HEPOS has been designed and developed by National Cadastre & Mapping Agency S.A. (NCMA S.A.), which also operates the system. The system consists of 98 permanent GPS reference stations, distributed all over Greece. The observations of these stations are transferred to the system's Control Center, for processing, archiving and generation of the data to be sent to the users for positioning in real-time or for post-processing.
HEPOS provides two kinds of services: Real-time services, where the user's position is determined at the time of measurement (RTK and DGPS techniques) and post processing services, where the user's position is determines by post processing the measuring in the office.
HEPOS , with its 98 reference stations (figure 1) covering the whole Greek Region, simplifies the precise positioning, allowing the user to achieve geodetic accuracy by using inly one geodetic receiver, instead of a pair of receivers. At the same time HEPOS offers, in the major part of the country, network based GPS techniques. The post-processing services of HEPOS can be used not only be user equipped with dual frequency receivers, but also by owners of inexpensive single frequency receivers. HEPOS provides high precision positioning throughout the country. In this way, HEPOS is realizing a highly homogeneous nation-wide geodetic reference frame.

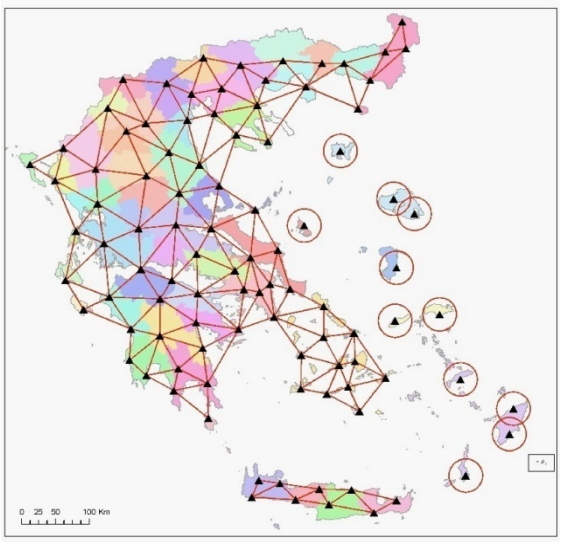


Fig. 1.The location of the 98 permanent GPS stations.

Apart from the public permanent GPS stations network there are developing also private systems, mainly for commercial exploitation of geodetic data or for research and scientific purposes.

EUREF EPN (EUREF Permanent Network)
The EUREF Permanent Network (EPN) is a science-driven network of permanent GNSS tracking stations whose weekly computed positions are used by EUREF to realize the European Terrestrial Reference System. Supported by EuroGeographics, this reference system forms the backbone for all geographic and geodetic projects on the European territory both on a national as on an international level. The EPN is also valuable for scientific applications such as geodynamics, sea level monitoring and weather prediction.
Almost 250 EPN stations, distributed all over Europe, 6 of them are located in the Greek Territory provide in near real-time and real-time high quality GNSS data archived at local and regional data centers (Sch. 7).
EPN analysis centres routinely analyse the data from this network and deliver to the GNSS community precise coordinates for all stations involved in the network.
The EPN tracking stations are integrated in the successive realizations of the International Terrestrial Reference System, which is the basis for the European Reference System.

2.6	*Level of conformation with the EU INSPIRE Directive*

According to the recent study realized by NCMA S.A. the size, type, extend and level of conformation of all the generated geodata provided by public stakeholders in Greece can be found in an excel file published under the link. Furthermore under Public Law 3882/22-09-2010 the national law of Greece conforms with the INSPIRE Directive (L108/1/25-4-2007).

3. Capacities

3.1	*National budget allocation to Spatial Information*

For the year 2014, 527 milions E, has been allocated to development of Cadastre maps, by the NCMA S.A

3.2 Funding initiatives and participation to research programs

NCMA S.A. since 1990 has been active in this field, by installing appropriate equipment, arrange staff training and gradual introduction of data to create the basis of a Geographic Information System, which will be enriched in stages to meet the needs of both government and the market in general to acquire appropriate information.
Some of these data is available to public agencies and individuals.
NCMA S.A. monitors closely many European activities related to GIS and management of digital data, such as GI2000, GISCO, INFO 2000, EUROGI, etc.

3.3 Dedicated undergraduate, graduate programs, training centers

Table 5. Dedicated undergraduate and graduate programs, curricula and personnel – Relevant education and training centers

Institute	Undergraduate program	Graduate program	Training	Personnel	Web site	Curricula
NTUA School of Rural and Surveying Engineering	5 years	Yes	Yes	119	link	link
AUTH School of Rural and Surveying Engineering	5 years	Yes	Yes	55	link	link
AUTH School of Spatial Planning and Development (Eng.)	5 years	No	Yes	19	link	link
TEI of Athens School of Surveying	4 years	No	Yes	26	link	link
TEI of Athens School of Geomatics and Surveying	4 years	No	Yes	15	link	link

REFERENCES AND USEFUL LINKS

Useful links (accessed February 2014)
http://www.ypeka.gr/Default.aspx?tabid=649&language=en-US#
http://www.statistics.gr/portal/page/portal/ESYE
http://www.statistics.gr/portal/page/portal/ESYE/PAGE-codepractice
http://www.statistics.gr/portal/page/portal/ESYE/PAGE-presentation?_piref33_1220869_33_14278_14278.tabstring=Tab
http://www.hnhs.gr/portal/page/portal/HNHS/Charts
http://www.esa.int/esaCP/SEMWYQRMD6E_Benefits_0.html
http://gis.ktimanet.gr/wms/ktbasemap/default.aspx
http://en.wikipedia.org/wiki/Hellenic_Geodetic_Reference_System_1987
http://www.hepos.gr/hepos/HEPOS_flyer_v1_1_eng.pdf
http://www.hepos.gr
http://web.gys.gr/GeoSearch_EN/
http://www.hnhs.gr/portal/page/portal/HNHS/Charts
http://www.hnhs.gr/portal/page/portal/HNHS/GeoSearch
http://www.hnms.gr/hnms/english/observation/observation_region_html
http://www.ypeka.gr/Default.aspx?tabid=571
http://www.dei.gr/ecpage.aspx?id=761&nt=110&lang=1
http://www.eurogeosurveys.org/about-us.html
http://portal.igme.gr/pls/portal/url/ITEM/B28989D912794E5993F04FCC8C6EC2A1

http://www.rae.gr/geo/
http://www.ametro.gr/page/default.asp?id=15
http://www.egnatia.eu/files/images/Project_Status.jpg
http://odysseus.culture.gr/index_en.html
http://www.xo.gr/maps/route_search.aspx?lang=2
http://geodata.gov.gr/geodata/
http://www.inspire.okxe.gr/assets/docs/attachments/MR_indicators_EL_v.2.1.xls
http://www.gscp.gr/ggpp/site/home/ws.csp?loc=el_GR
http://www.ktimatologio.gr/
http://www.ktimatologio.gr/ktima/EN/index.php?ID=Zh91lHBKWwdN1vfW_EN
http://web.gys.gr/portal/page?_pageid=33,36592&_dad=portal&_schema=PORTAL
http://portal.igme.gr/portal/page?_pageid=33,77661&_dad=portal&_schema=PORTAL
http://www.euref.eu/
http://www.metrica.gr/services/gnssnetwork.html
http://www.inspire.okxe.gr/assets/docs/attachments/MR_indicators_EL_v.2.1.xls
http://www.inspire.okxe.gr/assets/docs/attachments/MR_2009_EL_v1.0.pdf
http://www.inspire.okxe.gr/assets/docs/attachments/Metadata_UserGuide_v1.0.pdf
http://www.inspire.okxe.gr/assets/docs/attachments/catalog/geocatalog2.1.0.zip
http://www.inspire.okxe.gr/index.php?option=com_mynews&view=frontpage&Itemid=1
http://www.inspire.okxe.gr/
http://www.ec-gis.org/copygi2000/
http://www.eurogi.org/
http://www.survey.ntua.gr/
http://www.survey.ntua.gr/files/Curriculum_Guide_2009-2010.pdf
http://www.topo.auth.gr/english/main_eng.htm
http://www.plandevel.auth.gr/el
http://www.tg.teiath.gr/topografias
http://www.teiser.gr/geoplir/
http://www.teiser.gr/geoplir/images/stories/link/Odigos_Spoudon_Flash/odigos_geoplir.swf
http://geoportal.topographiki.gr/portal/page/portal/Topo
http://www.gein.noa.gr/el/seismikotita/xartes
http://www.civilprotection.gr/el/xartes

PART A. CURRENT STATUS OF GEOSPATIAL INFORMATION IN LOCAL MANAGEMENT

1. Policies

1.1 National policies and implementation

The main authorities responsible for the handling of geospatial data are the Malta Information Technology Agency (MITA) and the Malta Environment and Planning Authority (MEPA). Statistical data is handled by the National Statistics Office (NSO).
The Malta Environment and Planning Authority (MEPA) is the national body in charge of land-use planning and environmental regulations. It provides a geoportal accessible through its website (http://www.mepa.org.mt/mepa-mapserver) which depicts geographical and environmental data sets.
(https://www.mepa.org.mt/home?l=1)
The Government of Malta has appointed MITA as the responsible body for the implementation of the National Spatial Data Infrastructure (NSDI) programme and putting into effect the INSPIRE Directive. MITA is responsible for the organizational implementation of the Directive.
(https://www.mita.gov.mt/)
Other Government entities which can be considered as data providers are the Malta Resources Authority (MRA), Transport Malta (TM) and the Land Registry Department (LRD).
The table below provides the primary (P) and supporting (S) roles of the various stakeholders with regards to INSPIRE.
(INSPIRE – Member State Monitoring Report: Malta, 2013)

Activity	MITA (Governance Infrastructure)	MEPA (Mapping Function)	Govt. Data providers incl. MEPA	Private Sector
Provides the framework for governing the NSDI across the spectrum of national ICT.	P			
Outlines the business model for financing the NSDI.		P		S
Retains the expertise and main processes for provisioning the underlying datasets (Base Map).		P		S
Provides the infrastructure for deploying NDSI data within Government and the wider user community.	P	S	S	S

Provides the technical EU liaison to assure compliance with the various implementing rules of the INSPIRE directive.	P	S		
Provides the technical input to the execution INSPIRE Directive depending on the specific data or functional theme.	P	P	P	
Contributes datasets to the NSDI.		P	P	S
Identifies and assures synergy and reuse of data across Government.	P	S	P	
Migrates existing datasets to standards set by INSPIRE.	S	P	P	S
Provides added value service based on published data themes and services.				P
Re-engineers business processes to ensure data is collected in the most appropriate manner and re-use facilitated.	P		P	S

1.2 National Census data

The National Statistics Office (NSO) is Malta's national statistical body. It is in charge of the collection, evaluation and publication of statistical knowledge relating to social, economic, demographic, environmental and general matters of Malta.

The NSO is responsible for conducting a decennial Census of Population and Housing across the nation. The Census of Population and Housing 2011 determined social and demographic aspects with regards to persons, families and households in Malta.
http://www.nso.gov.mt/statdoc/document_file.aspx?id=3998

The NSO is responsible for publishing annual general reports relating to Economic Statistics, Business Statistics, Social Statistics and Information Society and Resources and Support Services.
http://www.nso.gov.mt/docs/Annual_report_2013.pdf

1.3 Spatial data production distribution centers - sharing policies

1.3.1 Malta Environment and Planning Authority (MEPA)

The Mapping Unit within MEPA can be considered as the National Mapping Agency of Malta. It is the responsible entity for providing large and small scale topographic mapping of Malta, maintaining an archive of aerial photography and producing the national Ortho photo map.
The Mapping Unit Provides data at the local scale range that is 1:25,000, 1:10,000, 1:2500 and 1:1000. Smaller scales are not available since these are not useful due to the small size of the island.
The main available data sets covering all of Malta area:

1. Vertical and Horizontal Geodetic reference points;
2. Large Scale Digital Topographic Mapping (1:2,500, 1:1,000);
3. Colour Orthophotos at 0.15m ground pixel;
4. Medium Scale Digital Topographic Mapping (1:50,000, 1:25,000).

Thematic datasets include:

1. Statutory protection zones under Planning and Environment Protection Legislation;
2. Habitats and land cover, generally focusing on natural habitats;
3. Archeology and other major cultural assets;
4. Marine Posidonia Habitats;
5. European Environment Agency datasets;

Data sets which are available through the geoportal of MEPA (http://mapserver.mepa.org.mt/frame.php?site=malta_internet&lang=en&group=public&resol=2) are:

1. Planning Data including Development Planning Data, Planning Constraints Data, Scheduling Data and Listed Natural Heritage;
2. Environmental Data including Environmental Permitting, Environmental Assessments, Marine Data and Terrestrial Data;
3. Base Maps including Survey Control Points, Topography, Background Maps and Archive Survey Sheets;

Orders can be placed by using the geoportal via VISA credit cards or by physically going to MEPA and one can pay in cash etc.

1.3.2 Transport Malta (TM)

Transport Malta is the government authority which is responsible for Transport in Malta. It regulates the transport sector and promotes associated services and business on both national and international levels. It provides the Transport Malta Geoportal, which allows users to access geospatial information relating to transport.
(http://gis.transport.gov.mt/)
The themes accessible on the Geoportal are:

1. Core Spatial Data which includes the basic references to all the transport layers containing coast, streets, Local Council boundaries and TenT Network. These are available in both raster and vector.
2. Land Transport Theme displaying bus stops and bus routes.
3. Maritime Theme showing the swimmer zones, anchorage and berth areas, fish farms, lights, wrecks and sea plane landing areas in Valletta and Mgarr (Gozo).
4. Project Theme lists the ongoing large-scale road works projects in Malta, Gozo and the Cirkewwa Ferry Terminal.
5. Residential Road Works Programme Theme which includes the residential

The data is free for viewing for the general public.

1.3.3 Lands Registry Department (LRD)

The Land Registry Department is mainly responsible for collecting applications with regards to the registration of immovable property within registration areas.

The Receiving Office within the LRD is responsible for receiving registration applications, for processing applications regarding searches into the Land register and for handling cash payments for services offered by the receiving office. This office is also responsible for the sale of Land Registry Plans which can be bought in hardcopy form by going physically to this office.

The Drawing office is the entity responsible for processing the applications received by the Receiving office. All information is checked and the plans are then digitized.

The Data Input office then records transaction details from applications into the electronic register.

(https://mhas.gov.mt/en/MHAS-Departments/Land%20Public%20Registry/Pages/Land-Registry.aspx)

1.3.4 Malta Resources Authority (MRA)

The Malta Resources Authority is a government body which is responsible for regulating water, energy and mineral resources in Malta.

(http://mra.org.mt/)

The Malta Resources Authority has the following spatial data accessible through the authority's website:

(http://mra.org.mt/hydrogeology/spatial-data/)

1. Groundwater quality
2. Private Abstraction Sources
3. Petroleum Filling Stations
4. Licensed Quarries
5. Geological maps of Malta, Gozo and Comino

These are available free of charge and can be downloaded as a jpeg image.

1.3.5 Agricultural Paying Agency

The Agricultural Paying Agency makes use of the Land Parcel Identification System (LPIS) which is a key component of the Integrated Admiration and Control System (IACS) with regards to area based subsidies. It is a spatial registers within an IACS environment which identifies agricultural parcels. This system aids farmers to identify their parcels when regards to EU aids.

(https://secure2.gov.mt/MRRA-PA/lpis?l=1)

The Agricultural Paying Agency datasets include:

1. Cultivable Area
2. Permanent Tree Crops
3. Water Reservoirs
4. Non-Agricultural Land
5. Walls
6. Buildings
7. Streets/Pathways
8. Olives
9. Reeds

(http://mars.jrc.ec.europa.eu/mars/News-Events/Workshop-on-LPIS-Application-and-quality-SDIC/Presentations/S2-Slaverio)

1.3.6 Enemalta Corporation

The Enemalta Corporation is the main entity responsible for the provision of

energy generation and distribution to the Maltese Islands. The corporation has a number of data sets on a geoportal however these cannot be accessed by the public.
(http://www.enemalta.com.mt/)

1.3.7 Water Services Corporation

The Water Services Corporation is responsible for the complete water cycle in Malta from the production and distribution of potable water to the disposal of soiled water. It has a geoportal however it cannot be accessed by the general public.
(http://www.wsc.com.mt/content/about-wsc)
(http://www.wsc.com.mt/sites/default/files/mis.pdf)

1.4	*Use of Spatial Information in local decision making processes*

1.5	*Relevant national institutes, contact points*

1.6	*Beneficiaries of ongoing or completed EU/national/regional projects*

'Developing National Environmental Monitoring Infrastructure and Capacity'.
'Developing National Environmental Monitoring Infrastructure and Capacity' is a €4.6 million funded ERDF project which involved the collection of baseline data across multiple themes: air, water, noise, radiation, soil and topographic data. The project was co-financed by the European Regional Development Fund (ERDF) and the Government of Malta. ERDF financed eight five per cent of the funds while the Government of Malta finance the resulting fifteen percent under the Operational Programme 1 – Cohesion Policy 2007 – 2013 – Investing in Competiveness for a Better Quality of Life.
The project was managed by the Information Resources Unit within MEPA and covered the below issues:

1. Air quality
2. Water quality
3. Chemicals in soil
4. Background radiation
5. Traffic-related noise
6. 3D maps for terrestrial and bathymetric zones including high resolution three dimensional terrestrial coverage of the Maltese Islands applying both oblique aerial imagery and Light Detection and Ranging (LIDAR) data. The coastal bathymetric survey within one nautical mile off the coast of Malta was affected by using bathymetric LIDAR date, acoustic scans and physical grab sampling.

Preceding this project, there was a lack of such information in Malta which obstructed land-use planning and environmental monitoring.
All information gathered in this project will be used by the Shared Environmental Information System (SEIS) web-portal which will be free of charge and available to the general public.
(http://www.seismalta.org.mt)
Through this project, Malta is taking part in the Shared Environmental Information System (SEIS), an initiative of the European Commission and the European

Environment Agency (EEA). Together with the Member States it aims to establish a system, which integrates all data which relates to EU environmental policies and legislation across the member states.
The data sets available through the Maltese SEIS portal are:

1. Air
2. Water
3. Radiation
4. Noise
5. Soil

GRISI PLUS
The main goal of the GRISI PLUS project is to improve the effectiveness, modernize and enrich public rural development policies in partners' regions by increasing the use of geographical information and geomatic tools.
The project assembles 14 partners from 11 member states of the North, South, East and West areas, thus covering widely the EU territory. The partnership includes Regions, Provinces, Associations of municipalities and territorial development agencies in order to take into consideration different territorial and policy levels and their competences.
The GRISI PLUS project is co-financed by the European Regional Development Fund and made possible by the INTERREG IVC programme.
Malta is represented in this project by the Local Councils' Association (LCA).
http://www.grisiplus.eu/about-project/objectives/

HOMER
HOMER is the strategic MED project that focuses on the theme of Open Data, a world-wide policy aiming at making available and exploitable Public Sector Information (PSI).
The overall goal of HOMER is to contribute to unlock the full potential of the Public Sector Information in the Mediterranean space, by contributing to make the all area a competitive territory, able to match global competition and to ensure a sustainable growth and employment for the next generations.
In line with the EU Digital Agenda, HOMER will facilitate the wider deployment of PSI in Spain, Italy, France, Malta, Greece, Slovenia, Cyprus and Montenegro, enabling their public governments to better address the legal, cultural and technological challenges linked to PSI policy.
In conjunction with the HOMER project, the website Open Data Malta was launched which contains the following data sets:

1. Malta Heritage Sites
2. Departing Tourist Expenditure JAN-DEC 2010
3. Departing Tourist Expenditure JAN-DEC 2011
4. Departing Tourist Expenditure JAN-DEC 2012
5. Profile of Departing Tourists 2012
6. Malta Hotels
7. Malta Bays
8. Accommodation
9. Bus Routes
10. Cruises
11. Events
12. Gozo Channel
13. Historical Places
14. Hospitals
15. Hotels
16. Pharmacies

17. Postcodes
18. Restaurants
19. Shopping Malls
20. Streets

Malta is represented in this project by the Local Councils' Association (LCA).
(http://www.lca.org.mt/pages/iseSinglePages.asp?m=193)
(http://opendatamalta.com/open-data/datasets/)
(http://opendatamalta.com/wp-content/uploads/2013/09/HOMER_11032014.pdf)

2. Data – Applications

2.1 National Spatial Data Infrastructure (NSDI)

Applications/ Studies	Digital or Hardcopy	Format (if Digital)	Metadata
Agriculture	Digital and hardcopy		
Confines	Digital and hardcopy		
Altimetry	Digital and hardcopy		
Environment	Digital and hardcopy		
Orthoimagery/ Base map/ land cover	Digital and hardcopy		
Geographical position	Digital and hardcopy		
Seas	Digital and hardcopy		
Spatial planning/ Cadastre	Digital and hardcopy		
Construction	Digital and hardcopy		
Transportation	Digital and Hardcopy		
Public services/ Communications	Digital and Hardcopy		

2.2 National Census

1. General Statistics
http://www.nso.gov.mt/statdoc/document_file.aspx?id=3780
2. Economy and Finance
http://www.nso.gov.mt/statdoc/publication_catalogue.aspx
3. Population and Social Conditions
http://www.nso.gov.mt/statdoc/publication_catalogue.aspx
4. Industry and Services
http://www.nso.gov.mt/statdoc/publication_catalogue.aspx
5. Agriculture and Fisheries
http://www.nso.gov.mt/statdoc/document_file.aspx?id=3846
6. External Trade
http://www.nso.gov.mt/statdoc/document_file.aspx?id=1433
7. Transport
http://www.nso.gov.mt/statdoc/document_file.aspx?id=3681
8. Environment and Energy
http://www.nso.gov.mt/statdoc/publication_catalogue.aspx

2.3 Processing capability of Spatial data

2.4 Spatial data collection capability

Custom Aerial Photos is a private company able to take aerial photos. (http://airphotomalta.photoshelter.com)

Terraimaging is a German company responsible for conducting a LIDAR survey of the Maltese Islands as part of the SEIS project. (http://www.terraimaging.de/index.php/nl/)

2.5 GPS data availability and costs

LOQUS is a private company whose network combines a terrestrial (radio) and satellite (GPS) system which operate a tracking system for vehicles, vessels and fixed assets. LOQUS also operates a geographical information system including digital mapping and remote sensing.

MAPPING services:
LOQUS offers the below mapping services:

1. High Resolution Ortho Photos from aerial and satellite images by using Digital Photogrammetric Workstations
2. Creates Digital Terrain Models
3. Vector Mapping (Base Maps)
4. Street Datasets
5. Manual Digitizing of Drawings with Linked Attributes
6. Plan Draughts and Construction of 3D models

Geomatics:
The company also provides services associated with Geographic Information Systems (GIS) technology, focusing on both Cadastral field - Land Information Systems and Utilities Systems and Location Based Systems.

GeoCoding:
Loqus provides a means of geographically identifying physical addresses and linking to any data type involving these addresses through a process known as Geocoding. It also provides the basis for development of analysis tools for data linked to the geocoded addresses. The geocoding of buildings (Address Point Dataset) includes a unique Geocode ID, address details and digital photo for each premise, classification of use (based on NACE standards) and a commercial name. Every address point is mapped, given a unique Geocode ID and forms part of a strategic dataset.
The Address Point dataset defines and locates residential, business and public addresses in Malta and Gozo.

Satellite Remote Sensing
Loqus also offers the service of Satellite Remote Sensing. This process involves using Satellite Imagery as a geographical data source that is:

- Digital
- Synoptic
- Cost-effective
- Up-to-date

- Map-Accurate
- and has Global Coverage

Loqus utilises satellite imagery and image processing for various applications such as:

- Feature Mapping
- Land Coverage Classification
- 3D Terrain Models
- Change Detection
- GPS Mapping
- Base Map for our GIS databases

Loqus is also a value added reseller for a number of renowned suppliers for such services in this field.
(http://www.loqusgroup.com/)

2.6 *Level of conformation with the EU INSPIRE Directive*

The level of conformation of the national geodata provided by the public stakeholders in Malta can be found in the excel file published on the following link: (http://cdr.eionet.europa.eu/mt/eu/inspire/monitoring/envuibdcw/MR_indicators_Template-v_3-4_MT.xls/manage_document)

3. Capacities

3.1 *National budget allocation to Spatial Information*

No specific funds are allocated for data collection. However, MITA has allocated funds in order to maintain to make the data accessible through its own Geoportal. MITA has so far spent €150,000 on the central Geoportal facility and €20,000 per annum on maintenance.

3.3 *Funding initiatives and participation to research programs*

3.4 *Dedicated undergraduate, graduate programs, training centers*

Institute	Undergraduate program	Graduate Program	Postgraduate	Website	Curricula
University of Malta – Faculty for the Built Environment – Department of Spatial Planning And Infrastructure			YES	http://www.um.edu.mt/ben/spatialplan	http://www.um.edu.mt/__data/assets/pdf_file/0005/165191/Master_of_Spatial_Planning_Feb2013_251012_print_A4_Duplexb.pdf http://www.um.edu.mt/ben/overview/PMSCSSIPET2-2012-3-F

University of Malta – Institute of Oceanography			YES	http://www.um.edu.mt/ioi-moc/msc	http://www.um.edu.mt/ioi-moc/overview/PMAPOFTT3-2014-5-O
University of Malta – Institute of Earth Systems		YES	YES	http://www.um.edu.mt/ies	http://www.um.edu.mt/ies/coursesoverview/undergraduate/bachelor_of_science_honours_in_earth_systems

REFERENCES AND USEFUL LINKS

(https://www.mepa.org.mt)
(https://www.mita.gov.mt)
(http://www.nso.gov.mt)
(http://www.transport.gov.mt)
(https://mhas.gov.mt/en/MHAS-Departments/Land%20Public%20Registry/Pages/Land-Registry.aspx)
(http://mra.org.mt/)
(https://secure2.gov.mt/MRRA-PA/lpis?l=1)
(http://mars.jrc.ec.europa.eu/mars/News-Events/Workshop-on-LPIS-Application-and-quality-SDIC/Presentations/S2-Slaverio)
(http://www.enemalta.com.mt/)
(http://www.wsc.com.mt/content/about-wsc)
(http://www.wsc.com.mt/sites/default/files/mis.pdf)
(http://www.seismalta.org.mt)
(https://www.mepa.org.mt/newslet36-article6)
(http://opendatamalta.com/wp-content/uploads/2013/09/HOMER_11032014.pdf)
(http://www.lca.org.mt/pages/iseSinglePages.asp?m=193)
(http://opendatamalta.com/open-data/datasets/)
(http://www.terraimaging.de/index.php/nl/)
(http://airphotomalta.photoshelter.com)
(http://www.loqusgroup.com/)

PART A. CURRENT STATUS OF GEOSPATIAL INFORMATION IN LOCAL MANAGEMENT

1. Policies

1.1 National policies and implementation

In Spain, geospatial information is seen, form management purposes, as a comprehensive system including the complete cycle of the information, from capturing data to publishing and disseminating final geospatial products and services. Inside this whole process National Geographic Institute (IGN) has all the transformation, analysis and cartographic production task that are coordinated with other regional cartography institutions.

This integrated production system includes all the public stakeholders with authority in geographic information in a decentralized and collaborative production model in which take part all levels for administration: local, regional and national. Through a co-funded economic model this cooperative way producing information is a powerful tool for sustainability, even in crisis times, as IGN reach the objective gathering data only once and by the most appropriate agent or group of agents.

The definition of the user´s needs, base of the design of the system, is reached by consensus and translated to technical requirements taking in regard the standardization process that is currently taking place in geospatial information at, both, European and global levels (INSPIRE Directive, ISO TC211). This initial orientation allows to successfully integrating projects at regional, national and international levels and improves the technical sustainability of these projects in time.

The system is based on the use of common shared data sources, mostly digital images obtained through variety of airborne and space sensors, and on working with agreed data models. This contributes to the harmonization of the geospatial information used by all the stakeholders and improves compatibility and interoperability among their projects.

This basis and this approach build up a solid bottom-up national model of producing and managing geospatial information that converges with international top-down approach at the European level, fitting perfectly with current initiatives like the development of INSPIRE Directive, GMES/COPERNICUS (and GEO at global level) in which Spain participates actively.

The Legal Framework to develop the National Spatial Data Infrastructure (NSDI) or IDEE in Spanish is based on:

- Art. 9 Law 7/86 for Cartography in Spain. This Law sets up the legal framework for National Geographical High Council.
- Royal Decree 1792/1999 creates N G H C
- Art. 10.1.g). Royal Legislative Decree 1/96. On Intellectual Property Rights this article establishes maps and spatial data representation are protected by Law.
- Art. 10.1.h). sets up the same for photographs or equivalent documents.
- Art. 6 Law 15/1999. on Personal Data Protection.

1.2	National Census data

National Statistics Institute of Spain (INE) is the organism commander of the general coordination of the statistical services of General Administration of the State and the monitoring, control and supervision of the technical procedures of the same. Between the works that realize, they emphasize statistical on demography, economy, and society Spanish. Through the page official Web all the updates of the different fields from study can be followed.

The INE, under the 12/1989 of 9 May, Law on the Public Statistical Function, is an autonomous body of those contemplated in title III, chapter II of the Ley 6/1997, of 14 April, the Organizational Structure and Functioning of Central Government Act, attached to the Ministry of Economy and Finance through the Secretariat of State for the Economy.

The Ministry of Economy and Finance, through the Secretariat of State for the Economy, is tasked with the strategic management, assessment and oversight of the outcome of the Institute's operations, without prejudice to the powers vested in the Comptroller and Auditor General to assess and monitor the results of public bodies within the central government public sector.

The National Statistics Institute has a distinct public legal personality, its own property and treasury, and independent management and full legal capacity to act, and, within the scope of its concern, is vested in government powers as required to fulfill its purposes, except the power to expropriate. The National Statistics Institute is governed by Law on the Public Statistical Function; the Organizational Structure and Functioning of Central Government Act; the Law 30/1992, of 26 November, on the Administrative Procedure Act; the revised, consolidated text of the Public Procurement Act as approved by Royal Legislative Decree 2/2000 of 16 June 2000; the revised, consolidated text of the General Budget Act, as approved by Royal Legislative Decree 1091/1988 of 23 September 1988; Decree 1022/1964 of 15 April 1964, enacting the State Property Act; and the rest of statutory provisions applicable to the autonomous bodies of central government.

The National Statistics Institute shall exercise the functions of overall coordination of the statistical units of central government, vigilance, monitoring and oversight of the technical duties of central government statistical units, and the rest of duties specified in the Law on the Public Statistical Function.

In order to carry on its technical duties and maintain statistical confidentiality, INE shall be vested in the powers required to ensure its operational impartiality.

- Indicators

The INE monthly makes the Index of Prices of Consumption (IPC) and IPCA. Other economic indicators that the INE makes are index of sales of the commerce retail, the price of Rent and statistics on the transaction and transaction of houses among others. Between the information survey of Wage structure emphasizes each trimester elaborated. From October of 2008 it publishes the Index of Prices of The House (IPV).

- Censuses of population

For the obtaining of real data of population is carried out Census of population. In Spain is realized next to the census of houses with a regularity of ten years, by legal imperative. Between the censuses the population information is obtained from the procedures of management of the municipal registers.

The last Census of Population and Houses was realized in 2001, had a budget of 27 billions of pesetas (a little more 162 million Euros), took part 40,000 people, and crossed 21 million mailing dresses, visiting 13 million homes and taking information from approximately 40 million people.

This census had important innovations:

They were used, for the first time in history, customized questionnaires to facilitate its execution, made thanks to the information of Municipal Register of Inhabitants.
For the data processing computer science techniques were used outposts that, for example, allowed digitizing 120 questionnaires per minute. Accelerating the work and allowing that each municipality has the image of its Municipal Register. It has been the first country of the world in allowing the census questionnaire execution by Internet, via which they used 13,818 homes for execution of his questionnaires.

1.3	*Spatial data production distribution centers - sharing policies*

Starting with the first stages of the process, the acquisition of source data, there is the National Plan of Land Observation (PNOT). Within this plan data is captured using photogrammetry and remote sensing, as well as digital terrain models are produced from aerospace images. In PNOT participates the national administration, via different government departments, and all regional administrations. It is thus a cooperative plan that pools technical, logistical and economic efforts through complex mechanisms of inter-administrative coordination led by the National Geographic Institute (IGN).
In the first phase, the objective of the PNOT is to obtain aerial image coverage and digital elevation models for multidisciplinary applications, with economically optimized resolution and updating periods, as well as to develop applications in which these images are going to be used. This coverage is organized into various levels of spatial resolution and time frequencies, which are materialized into specific plans:
- National Plan of Orthophotography (PNOA), which provides, among other photogrammetric products, periodic coverage (each 3 years) of the entire national territory via very high resolution aerial orthophotography: PNOA25/50 (25/50 cm) and PNOA10 (10 cm).
- National Remote Sensing Plan (PNT), which provides periodic coverage (annual, monthly and weekly) of the entire national territory via medium and low resolution satellite images (2.5 to 100 m).
From the coverage of PNOA and PNT basic and thematic geographic information is produced in a wide range of scales, from local to national level, by all the cartography producer agents of the country. The key point in this second phase of the process is that the main cartographic projects are based on agreed data models, made up in a cooperative frame in which national and regional administrations cooperate, in order to harmonize all the geographic information produced in our decentralized production model. This enhances interoperability among the different datasets and enables the sharing of geographic information, reducing production costs and making the system more sustainable.
- For topographic data bases (basic geographic information dataset) there is the Harmonized Topographic Database (BTA), which is an object oriented geographic Data Model for Reference Data (INSPIRE Annex I thematic groups) with 1:5.000–1:10.000 reference scale. BTA was built and agreed by Regional Cartographic Agencies and the National Geographic Institute and delivered as a recommendation by the Geographic High Council of Spain. BTA allows to share and exchange information between Regional and State Administrations at these scales and so, the subsequent and coherent production of the National Topographic Base 1:25.000 (BTN25), the main national topographic database, by the national authority (IGN).
- In a similar way, there is a common object oriented data model for land cover and land use information: the Information System of Land Cover of Spain (SIOSE). This data model is the reference for land cover information production at 1:25.000

scale and higher. Semantic and geometric generalization of high resolution Land Cover data produced by SIOSE project is an example of a bottom-up approaching for CLC- Global Land cover map production.
All this high resolution information about land cover is the base for preparing the actualization of the coverage and land use CORINE Land Cover data base with reference date 2012 commissioned by the European Commission via the European Environment Agency (EEA) in the frame of the GMES Land service of the European Council and Parliament. Here is included the review, improvement and validation from IGN and CNR of high resolution raster coverage of the GMES Land program (GMES High Resolution Layers – GMES HRL). Globally it is remarkable the participation in international organizations and consortiums through global land cover observation programs:
- GEO SB-02 Global Land Cover (GEO/GEOSS): Contribution to the GEO Task on Global Land Cover, including Data Model, optical and radar images at different resolutions, and surface parameters, as Essential Climate Variables (ECV) datasets, for the understanding of Climate Change.
- ESA global Land Cover map/Global Land Cover Network (GLCN): The Global Cover project is part of ESA's Earth Observation Data User Element (DUE)
- Global Observation of Forest and Land Cover Dynamics (GOFC-GOLD): is a international coordinated effort to provide land cover data (vegetation mainly) for sustainable management of natural resources.
- NASA Land-Cover and Land-Use Change Program (LCLUC) is a scientific interdisciplinary program.
- Global Land Cover Facility (GLCF) is an investigation center for studying the land cover change dynamics and the causes of these changes.
- Global Land Project program for terrestrial ecosystem financed by International Geosphere-Biosphere Programme (IGBP) and International Human Dimensions Programme (IHDP).

These projects (PNOA, BTN25 and SIOSE) make up the reference information set for basic scales products and from them are derived the final cartographic products at 1:25.000 and 1:50.000 scales: National Topographic Map 1:25.000 (MTN25) and National Topographic Map 1:50.000 (MTN50); and geographic information services on the Internet, served by the National Geographic Institute through the Spanish Spatial Data Infrastructure (IDEE).
For every topic of geographic information, both reference and thematic ones, the design of the data model is made taking into account the European technical specifications, coming from the development of INSPIRE Directive, and working with all the agents involved and experts in the topic, coming from different local and regional administrations and also diverse national administration departments. This cooperative procedure ensures sustainability (both technical and economic), integration (both at national level and with international projects) and interoperability (as harmonization and standardization are primary objectives).
On the same way as in basic scales, there is another reference set of projects for smaller scales, starting at 1:100.000. It is formed by the SPOT satellite images (part of PNT), the National Cartographic Base 1:100.000 (BCN100) and the Corine Land Cover database (European Land Cover reference project). From this set of source information there are, as cartographic final products, the Province Map 1:200.000 (MP200), Spanish Map 1:500.000 (ME500) and the National Map 1:1.250.000 (M1000). All this products are also available in the net for download or as web services as part of the National Spatial Data Infrastructure of Spain (IDEE).
Collaboration and coordination between different administrations is sometimes

difficult but continuous as, for instance, in CartoCiudad project. CartoCiudad is the result of merging together and harmonizing information provided by several national public bodies, mainly General Directorate of Cadaster, National Statistics Institute, Post Office and National Geographic Institute, and also regional organizations in some Regions. The outcome of this integration process is a Geographic Information System of a national and seamless streets, ways and roads network, topologically structured and complemented with urban cartography, census-based and postal information, covering all the Spanish municipalities, line with the INSPIRE Directive.
As a point of contact with the European Commission (EC) for the development of the INSPIRE Directive in Spain is the Geographic High Council (CSG). It is the governing body of the National Cartographic System in Spain and is the advisory and planning of geographic information and mapping officer. The CSG has been responsible for creating the Special Commission on Spatial Data Infrastructure, with the aim of producing, among others, the technical specifications necessary to implement a National Spatial Data Infrastructure.

1.4	*Use of Spatial Information in local decision making processes*

The continuous and precise knowledge of the territory is fundamental in order to carry out coordinated decisions about Territorial and Environmental Policy. These decisions requires an integrated Information System, temporal, spatially and semantically with the appropriated exactitude, updated, consistent, adapted to the international geographic standards, shared between all the administrations, accessible for the users and integrated in the Spatial Data Infrastructures (GSDI, INSPIRE, IDEE,…) and in the European and global networks of earth observation (GMES/COPERNICUS, GEO). This Information System helps different institutions to take coordinated decisions based on the same information, avoiding duplicities, sharing costs and applying INSPIRE principles. The Information and observation System implemented by national and regional institutions includes satellite image coverage with different resolutions, orthophotos, and a land cover information system that helps to take coordinated decisions based on the same information.
The National Plan for Land Observation (PNOT) is a model based in the cooperation in the management, quality control and in productions among national and regional administrations and that helps the administrations in the local decision making processes. The information obtained must satisfy the requirements of participant institutions, European Union (Corine Land Cover, COPERNICUS…) and other social agents. The main objectives of the PNOT are to obtain an integrated Information System (spatially, temporarily and semantically) that helps different institutions to take coordinated decisions (based on the same information), to share costs of information and avoid duplicities, so it can be obtained better and more "up to date" information and to apply INSPIRE principles to information on Land Use/Land Cover.
Also, there are other very important objectives derived from these, for example, to improve and optimize the economic resources invested by the participant organisms in the geographic information capture, to take advantage of the potential use of data and products, promoting the greatest diffusion and use by all the social agents or to support and contribute to the implementation of the global and European policies. It is also interesting to take advantage of the convergent interests of the different administration levels (European, national, regional and local) or to promote the cooperative and decentralized production between the different producers instead of competition.
Finally, the PNOT also tries to allow the efficient exploitation of the information by scales and resolutions and promote the expansion of the private sector

companies in the geographic information sector making them contributing with better quality, efficiency and reducing costs.

1.5	*Relevant national institutes, contact points*

CSG provides the organizational framework for data co-ordination and exchange between different government agencies, or Public Administrations. Royal Decree 1545/2007 sets the legal framework for this co-operation with regard to the planning of the production of cartographical material, co-operation in the production and harmonization of data and geographic information, and data exchange between different bodies. The law 14/2010, from 5/7/10, about the infrastructures and geographical information services in Spain (LISIGE), establishes the responsibility of the CSG and makes this role compatible with INSPIRE. Section 1 of Chapter III makes it obligatory for the Public Administrations to put measures in place that ensure that geographic data geographic information services are shared between the different Public Administrations and public sector bodies, by facilitating the access to, and the exchange and use of, the data. These measures must include those which aim to establish geographic information infrastructures and these must be accessible and interoperable by means of the IIGE. The law also establishes the conditions for this access, without placing limitations on the possibility of awarding licenses or demanding fees or setting prices in accordance with current legislation.

Furthermore, it extends the application of these measures to the sharing of geographic data and geographic information services with private enterprises, in accordance with the relevant regulatory conditions for this, with the Public Administrations or public sector bodies of other member states of the European Union and with institutions or bodies of the European Commission in the exercise of their public duties with regard to the environment. Section 3 of Chapter III establishes the geographic information services which must be accessible on the geographic information infrastructures of the Public Administrations, making it mandatory to provide, at least, location, viewing, downloading, and geographic data transformation services, as well as services which provide access to these. It imposes the generalized accessibility of geographic information services, with the condition that the body which manages these services may rightfully deny access when there is a public interest in doing so. It also establishes the fact that certain types of services must be made available free of charge. Moreover, it imposes upon the Public Administrations the obligation to ensure that the geographic information services can connect with each other and are interoperable. Finally, it establishes the limits on public access to geographic data and geographic information services which the Public Administrations may set and the conditions for the access to geographic information services.

Chapter IV of the LISIGE makes reference to the Geographical Information Infrastructure of the General State Administration (GAS), establishing the obligation to set up its geoweb and the responsibilities of the Directorate-General of the IGN in this regard. The IGN is subject to Ministerial Order FOM/956/2008, which approved the policy of public dissemination of the geographic information which the Directorate-General generates. This Order makes all of the information contained in the National Reference Geographic Equipment and other information freely available for non-commercial use, free of charge but subject to the conditions set in the usage license. It also set conditions for its commercial exploitation, encouraging the development of value-added services related to the geographic information, in exchange for a percentage of the profits that those providing these value-added services obtain.

The existence of geowebs set up by data producers and service providers, most of

these being public bodies, can also be considered to be a data-sharing mechanism, both between public authorities and with the general public (see section 5.2, under the heading "Data-producers"). A good example is the Spatial Data Infrastructure (SDI) web of the Ministry of Agriculture, Food and Environment (MAGRAMA), which was launched in November 2011 with the aim of being the national and European hub for geographic information of an environmental nature and for information on agricultural, livestock and fishing resources.
Various data harmonization projects are in existence, some of which have been mentioned previously:
- NGCE, at a scale of 1:1.000.000, and NGBE, at a scale of 1:25.000, developed by the IGN in collaboration with the CCAA which have their own gazetteer and with the Ministerio de Política Territorial (Ministry of Territorial Policy) Registry of Local Organizations.
- CartoCiudad project
- PNOA Project.
- SIOSE Project.
- BTA model created by the CENG of the CSG.
- Co-operation Agreement between Spanish Agricultural Guarantee Fund (FEGA) and the General Directorate for Cadaster for the production of a shared map layer for land plots for the Spanish Farming Land Geographic Information System (SIGPAC) and the Land Registry GIS.

Regarding the Spanish regions (CCAA), are acting as contact points with their different organisms in the coordination of the NSDI (IDEE) projects:
- Andalucía: Instituto de Estadística y Cartografía de Andalucía.
- Aragón: Centro de Información Territorial de Aragón. Dirección General de Ordenación del Territorio. Departamento de Política Territorial e Interior.
- Asturias: Consejería de Fomento, Ordenación del Territorio y Medio Ambiente
- Balearic Islands: Direcció General d'Ordenació del Territori de la Conselleria d'Agricultura, Medi Ambient i Territori del Govern de les Illes Balears (DGOT).
- Cantabria: Consejería de Medio Ambiente, Ordenación del Territorio y Urbanismo. Dirección General de Ordenación del Territorio y Evaluación Ambiental Urbanística.
- Castilla la Mancha: Junta de Comunidades de Castilla-La Mancha. Consejería de Fomento. Centro Cartográfico de Castilla-La Mancha
- Castilla y León: Junta de Castilla y León. Consejería de Fomento y Medio Ambiente. Centro de Información Territorial
- Catalonia: Comissió de Coordinació Cartogràfica de Catalunya (C4). Institut Cartogràfic de Catalunya (ICC)
- Comunidad Valenciana: Conselleria de Infraestructuras, Territorio y Medio Ambiente. Institut Cartogràfic Valencià
- Extremadura: Centro de Información Cartográfica y Territorial de Extremadura. Consejería de Fomento, Vivienda, Ordenación del Territorio y Turismo. Centro de Información Cartográfico y Territorial de Extremadura (CICTEx)
- Galicia: Consellería de Medio Ambiente, Territorio e Infraestruturas. Instituto de Estudios del Territorio
- Comunidad de Madrid: Dirección General de Urbanismo y Estrategia Territorial. Consejería de Medio Ambiente y Ordenación del Territorio. Centro Regional de Información Cartográfica.
- Murcia: Consejería de Obras Públicas y Ordenación del Territorio. Dirección General de Transportes y Puertos.
- Navarra: Comisión de Coordinación del SITNA
- La Rioja: Consejería de Obras Públicas, Política Local y Territorial. Sección de Sistemas de Información Geográfica y Cartografía.

- Gobierno Vasco: Dirección de Planificación Territorial y Urbanismo. Servicio de Cartografía de Gobierno Vasco.

1.6	*Beneficiaries of ongoing or completed EU/national/regional projects*

Some of the projects of the IGN, working in the improvement of the geospatial infrastructures are for example:
- Euradin (European Addresses Infrastructure): It aims at constituting a Best Practice Network to promote the European Addresses harmonization. INSPIRE Directive lays down general rules for the establishment of an infrastructure for spatial information in Europe, based on Spatial Data Infrastructures created by the Member States and that are made compatible and interoperable. Addresses are part of Annex I of INSPIRE, and will therefore be part of the aforementioned European Spatial Data Infrastructures. Over the last decade it has become commonly acknowledged that good address systems constitute a very important part of a society's infrastructure. In everyday life and in an infinite number of applications (Cartography, Cadaster, postal services, health and risk management, rescue services, Navigation tools, Transportation and logistics, emergency situations management, telecommunications, tourism…), addresses are used as a common reference. The number of these IT applications is very big, having as users both the public and private sector.
- EuroGEOSS: Is a large scale integrated project in the Seventh Framework programme of the European Commission. It is part of the thematic area: "ENV.2008.4.1.1.1: European environment Earth observation system supporting INSPIRE and compatible with GEOSS". EuroGEOSS demonstrates the added value to the scientific community and society of making existing systems and applications interoperable and used within the GEOSS and INSPIRE frameworks.
- Euroboundarymap: is a seamless geo-database at the scale 1:100 000 covering 41 countries. It contains geometry, names and codes of administrative and statistical units continuously updated by our members, the national mapping and cadastral authorities (NMCAs) of Europe. It links to the updated statistical LAU- and NUTS-codes for all local administrative units of the 28 member states of the European Union.

2. Data – Applications

2.1	*National Spatial Data Infrastructure (NSDI)*

Since 2012 the NSDI has offered a web discovery service based on the INSPIRE Catalogue profile (CSW ISO AP) which allows access to and consultation of the metadata registers of the data sets and geoservices provided by the public administrations that form part of the NSDI.
Throughout last two years, the CSW service of the NSDI was connected, via collection or exchange of XML files.

National Sphere
SDI River Basin Authority of the Duero
SDI River Basin Authority of the Guadalquivir
SDI Ministry of Agriculture, Food and Environment
Node of the National Geographic Institute
Node of the Directorate General for Cadastre

Regional Sphere
SDI Andalucía
SDI Cantabria

SDI Castile and Leon
SDI Catalonia
SDI Valencian Community
SDI Galicia
SDI Basque Country/Euskadi

At the beginning of last 2013, the SDI of La Rioja and the SDI of the River Basin Authority of the Guadiana, the SDI of Extremadura as well as the rest of the main national and regional SDIs that comprise the NSDI joined the system. To be able to provide access to the NSDI geoservices in the INSPIRE geoweb, it is necessary for the metadata to be accessible via the INSPIRE catalogue client. The NSDI CSW service was included in 2012 in the Registry Service of the INSPIRE geoweb and as a consequence the metadata records contained in NSDI are available for searches via the catalogue client of the INSPIRE geoweb.
The INSPIRE registry system is performing collections every 2 weeks. However, because of the large number of metadata included in the NSDI catalogue, has been taken the decision of carrying out the collections of metadata on a monthly basis. Moreover, the INSPIRE Registry service prepares a report to be sent to the NSDI contact point to communicate, among other things: the number of collected metadata, those corresponding to web services, data sets and services as well as whether the metadata comply with the XML schemas both of INSPIRE and of ISO 19139.
The number of metadata records catalogued in 2012 was over 470,000, of those more than 270 correspond to web services and can be consulted in the INSPIRE geoweb. Regarding the metadata registers, these are available at series, service and individual data set level.

2.2	*National Census*

As was mentioned previously the Statistical System of the State Administration is in charge of the compilation of official statistics of the Spanish State (statistics for state purposes), as well as the official statistics of the European Statistical System (European Statistics).
Indeed, given its administrative organization,in Spain there is a statistical system available for each region. This system creates statistics for its territorial area, which are assigned by the respective legal standards (Autonomy Statutes, statistical laws, statistics plans, etc.).

1. The highest-level legal reference in Spain regarding statistical activity is to be found in the Spanish Constitution of 1978, which, in article 149. 31a establishes that the State has exclusive jurisdiction regarding statistics for state purposes.
2. Law 12/1989, of 9 May, on the Public Statistical Services (LFEP) are the basic legal regulations for carrying out the statistical activity in the General State Administration (GAS). This law sets out the principles governing the statistical activity, regulates the collection of data, its keeping and dissemination of results, institutes the conditions in which response is obligatory, regulates statistical secrecy, introduces statistical production planning and regulates statistical institutions, both executive and advisory.
3. According to the LFEP, the public statistical function in the scope of the GAS is developed by the National Statistics Institute (INE); the ministerial department units and those of any other public institutions dependent on them, to whom that function has been entrusted, and the High Council on Statistics. The following advisory bodies should also be added to these: The Interministerial Statistics Commission and the Interterritorial Statistics Committee.

4. The National Statistics Institute is an Autonomous Body affiliated to the Ministry of Economy and Competitivity, the President of which, ranking as Subsecretary, is appointed and separated by the Government by means of Royal Decree, after nomination by the Minister of Economy and Competitivity. The INE is the central body of the official statistics in Spain, and has important functions and jurisdiction, enshrined in article 26 of the LFEP, summarised below: the general coordination of statistical services of the State Administration and the monitoring and supervision of the technical duties of central government statistical units, the formulation of the draft project of the National Statistical Plan (NSP) and of the annual programmes developed, the proposal of rules regarding concepts, definitions, units, statistics, classifications, nomenclatures and codes for the classification of data and the presentation of results, the application and supervision of the compliance of the statistical secrecy rules regarding the compilation of statistics for state purposes, the compilation of general censuses, of large surveys and of the integrated systems of the economic accounts and of demographic and social statistics, use for statistical statistical services, the creation of directories, the compilation and carrying out of statistical projects entrusted by the NSP, an international relations exercise in statistics and professional perfection of statistics personnel, and the signing of agreements other Public Administrations regarding the statistics entrusted.
5. The statistical services of the ministerial departments, according to the act 33 of the LFEP, have the following functions, among others: the cooperation, within its jurisdiction, with the INE regarding the formulation of the draft project of the National Statistical Plan (NSP) and its annual updating, the implementation and monitoring of the enforcement of the statistical secrecy standards regarding the creation of statistics for state purposes which are entrusted, the use for statistical purposes of administrative data belonging to the department to which they are assigned, the creation and undertaking of statistical projects entrusted by the National Statistical Plan, the publication and dissemination of the results and the methodological characteristics of the statistics carried out and the signing of agreements with other Public Administrations regarding the statistics entrusted.
6. The High Council on Statistics is an advisory body of the statistical services of the GAS, and of the involvement of informants, producers and users of official statistics, where trade union and business organizations and other social, economic and academic groups are represented, together with ministries, the Bank of Spain and the INE. It is presided over by the Minister of Economy and Competitiveness, the President of the INE acts as Vice-president and has approximately forty members. It aims to contribute to harmonizing statistics, improving the use of resources intended for their compilation, and to adapting them to the users' needs for information, as well as to making it easier for respondents to supply primary data. It passes judgment on the draft project of the NSP and on all projects involving implementation of new statistics submitted to it, in addition to formulating recommendations and dealing with queries.
7. The Inter-ministerial Statistics Commission is attached to the Ministry of Economy and Competitiveness, through the INE. It is a participative organ of the statistical services in charge of this activity in the scope of the GAS. It is presided over by the President of the INE, with the general directors of the INE as members, and the general subdirectors of the organic units of each Ministry in which the main statistical production or coordination activity is located, as well as the head of the Statistics Department of the Bank of Spain. Its main objectives are as follows: to horizontally coordinate the activity of statistical services, to integrate the statistical information systems in relation to the different sectors and themes, to encourage the rational use of available data sources and ascertain the implementation, review or record suppression projects and administrative

forms when these are the source of the statistics.
8. The Interterritorial Statistics Committee (CITE) is an official body incorporated in tandem by the representatives of the GAS and of the regions, it is presided over by the President of the INE, and its vice-president is a representative of the regions elected by majority, with representatives of the Statistics Office of each region as Committee members. The Interterritorial Statistics Committee is a permanent official body in charge of overseeing the coordination, cooperation and standardization of statistical matters between the State and the Regions.
9. The Statistical system of the State Administration can establish collaborations with each one of the statistical systems o the regions in order to prevent duplications and to reduce the workload of the informants, in accordance with the respective statistical laws. The LFEP indicates that "the statistical service of the State and the regions will establish the forms of cooperation appropriate in each moment in order to take the most advantage of the information available and to prevent unnecessary duplication of the operations of collection of data or others.

2.3	*Processing capability of Spatial data*

According to the above mentioned paragraphs there are a large number of public services and bodies at all levels of government that produce and maintain geodata in national, regional or local geographical coverage.
The most important of them, (ie. the ones producing and maintaining the largest volume of data) at national geographical coverage or with a legal mandate of national geographical coverage are given in 1.3.

2.4	*Spatial data collection capability*

- The National Cartographic Plan (PCN).
Defined in the LISIGE, the PCN is a planning instrument for official mapping production by the GAS. It should include the technical rules for production, at the proposal of the competent Authorities, and the criteria for standardization, harmonization and coordination of the production of the Administrations that form part of the SCN. To achieve this, mechanisms are to be established for collaboration with the Armed Forces Mapping Plan and with the Plans approved by the regions.
During the year 2012 was complied between the different organizations of the General State Administration with responsibility for producing geographic information, in which questions have been asked regarding both the data and services which they manage and their future plans in this respect.
- Inter-institutional coordination structures
In the case of the ministries or organizations that manage multiple institutions it is necessary to establish an organizational structure to coordinate their production activity with regard to geographic information.
In the case of the Ministry of Agriculture, Food and the Environment (MAGRAMA) a Working Group was set up in 2012 for the Coordination of Geographic Information Services, formed by representatives of the Under-Secretariat, the Secretariat of State for the Environment, the General Secretariat for Agriculture and Food, the General Secretariat of Fishing, and region organizations. One of the first tasks they have performed is the compilation of the spatial data sets that the Ministry must provide in order to comply with INSPIRE.
A similar case is that of the Spanish National Research Council (CSIC) which has different research groups in different Centers and Institutes, with geowebs that publish geospatial information openly on the Internet with SDI specifications and protocols. The Centre for Human and Social Sciences has assumed the role of

coordinator, beginning with the collection of information using INSPIRE as a reference. Training courses have also been given on "Introduction to SDIs" for personnel of the whole CSIC organization.
- Intra-institutional coordination structures
Within each institution it has also been necessary to coordinate adaptation to INSPIRE of the activity performed by their different units. This is the case of the Geological and Mining Institute of Spain (IGME) which during the year 2012 has implemented an internal project which involves experts of the different disciplines covered by the Directive, both technical and thematic, the main objective of which is the implementation of INSPIRE in the Institute. In the implementation process, as well as purely technical and conceptual matters, consideration has been given to aspects of training and dissemination of the Directive among the technicians.
- Coordination structures of the Regions
In the exercise of their competences, the Regions manage a large amount of geographic information divided among multiple institutions, which has made it necessary to coordinate their management, to plan it and to define contact points to coordinate at state level. Furthermore, the Regions assume the role of coordinating their activity with that performed by the Local Administration and they channel all the information compiled. This coordination takes various forms. By way of summary, three main types can be mentioned. The Regions that have created coordination structures for managing their production of geographic information with the regional organisms that were mentioned at point 1.5.

2.5	*GPS data availability and costs*

The Instituto Geográfico Nacional of Spain (IGN), by its Geodesy Department, is carrying out since 1998 the establishment of a GPS Reference Station Network of Spain (ERGPS) delivered all around Spain which allows milimetric coordinate results, as well as velocity fields in a Global Reference System (ITRFxx), serving as support for the other geodetic networks and for technical and scientific works. Most of these stations are being integrated in EUREF Permanent Station Network. The main objectives of ERGPS are:
- High precision coordinate results and velocity field of all points of the network, covering all Spanish territory.
- Global integration of geodetic data.
- To provide GPS users with data for surveying, cartographic, mapping, geodetic and positioning works which require a high precision differential GPS work.
- To contribute to the new Global Reference Systems (ITRFxx).
- To became EUREF permanent network stations and contribution to its reference frame (European Reference Frame) as well as its definition in Spain.
- Generally speaking, to supply with continuous data in geodynamics, atmosphere, ionosphere, troposphere, mean sea level and any other related scientific studies.
ERGPS data obtained (24h files every 30 s.), are stored daily and send to IGN central facilities in Madrid automatically by Internet or, if not possible, by phone line. IGN processes raw data, performs a quality check test and stores them in a data bank and are analyzed, producing daily and weekly solutions for all stations.
IGN is also the center of EUREF Local Analysis (acronym IGE) since September 2001. This network therefore processes a continental network of about 50 stations in Spain , Portugal, Morocco, France , Italy and Britain , providing a solution weekly that is integrated into the overall combined EUREF solution for defining and maintaining the ETRS89 system.
The continuous network processing blocks uses Bernese 5.0 software to obtain a constrained Yebes station ITRF00 (epoch of observation) solution. Various types of

time series (ITRF00, ETRS89, Helmert) for monitoring sites and obtaining velocity vectors and geodynamic applications are also obtained. ZPD (zenith path delays) is also obtained for a special project of EUREF. The calculation process is automated through the tool BPE (Bernese Processing Engine) and scripts on SuSe LINUX environment.
Currently there is a DGPS-RTK differential corrections service for all stations of the National Geographic Institute IGN through differential corrections http://ergnss-ip.ign.es caster with customers via NTRIP protocol address " 193.144.251.13 " for ports 80 and 2101. To have access to customer information, it is needed to fill out the registration form on the FTP server. It is also possible to participate as a supplier of differential corrections from a permanent station, filling out the registration form on the FTP, "Documents" folder and send it to buzon-geodesia@fomento.es. Upon receiving the request then are sent instructions for sending GNSS data to the differential corrections server.
Other DGPS RTK differential corrections public services are delivered by regional governments too as for example:
- CATALONIA: http://catnet-ip.icc.es/
- ARAGÓN – ARAGEA: http://gnss.aragon.es/
- COMUNIDAD VALENCIANA – ERVA: http://www.icv.gva.es
- CASTILLA Y LEÓN – ITACYL: http://gnss.itacyl.es/
- MURCIA – MERISTENUM: http://gps.medioambiente.carm.es/
- ANDALUCÍA – RAP: http://rap.uca.es
- ISLAS CANARIAS – GRAFCAN: http://www.grafcan.es/
- EXTREMADURA – REP: http://www.rep-gnss.es/
- NAVARRA – RGAN: www.navarra.es/appsext/rgan/default.aspx
- LA RIOJA – IDE: http://www.iderioja.larioja.org/
- PAÍS VASCO – GPS2 EUSKADI: http://www.gps2.euskadi.net/
- CANTABRIA – UNICAM: http://www.gnss.unican.es
- ASTURIAS – RGAPA: http://www.rgapa.cartografia.asturias.es

2.6 *Level of conformation with the EU INSPIRE Directive*

The development of SDI projects in Spain has been carried out progressively in recent years, with different but constant rhythms at the three levels at which the country is organized administratively:
• The national level, represented by the organizations of the General State Administration.
• The regional level, represented by the governments of the Regions.
• The local level, represented by Provincial, Inter-Island, Island and City councils.

The development of the SDIs has mainly been led by the public sector and, especially, by the mapping agencies that produce geographical information. The period 2010-2013 has seen the continuation of the implementation and improvement of the reference geowebs at each one of those levels. The different INSPIRE monitoring campaigns carried out during this period indicate the existence of a large number of spatial data sets and services made available to the public via the Internet through these geowebs. This is the result of the generalized initiative by all the Public Administrations in Spain to offer free and interoperable geographic information. The meetings held by the Working Group of the Spatial Data Infrastructure of Spain (WG NSDI), supported by the Geographic High Council (CSG), have been instrumental as a driving force.
From the organizational point of view, this period stands out due to the introduction in 2010 of the Law on Geographic Information Infrastructures and Services in Spain (LISIGE). This law transposes the INSPIRE Directive and creates

the legal and institutional framework to further both the implementation of the Directive and the development of the SDIs. This task has been the responsibility of the Executive Board of the Geographic Information Infrastructure of Spain (CODIIGE), which was formed in 2011 and which has been implemented via the creation of the Technical Working Groups (TechWG). The TechWGs are a series of thematic or specialized working groups which have been given the mission of solving the different technical and coordination challenges that face the CODIIGE. The TechWGs have been formed throughout 2012 and their members are formal representatives of the corresponding institutions.

A considerable effort has been made to participate in the Thematic Working Groups (TWG) which have developed the themes of Annex III and an attempt is made to participate at all the events and projects that arise in relationship with the Directive.

From the point of view of the offer of spatial data sets and services, it is worth emphasizing that during the period 2010-2013 all the nodes of reference have evolved positively, although at very different rhythms. The geoweb of the Spanish National Spatial Data Infrastructure (NSDI), known in Spain by its Spanish initials IDEE, has been the driving force for activity, a point of access to the Spanish SDI, a repository of documentation, coordinator of catalogues and a showcase of resources and tools. The NSDI geoweb is the main reference, but each node that forms part of the NSDI is independent and participates in the same conditions as the rest. Moreover, the large-scale harmonization projects developed under the auspices of the CSG have incorporated the data models of INSPIRE (BTA, MNE, NEM, CartoCiudad, etc.). However, to date only a few examples are available of spatial data sets that comply with INSPIRE and a single network service that complies with the implementation rules of the Directive.

During last five years, very much marked by the difficult economic circumstances suffered by Europe and especially Spain, the challenge consists of maintaining the provision of the services implemented in the NSDI, of continuing with the incorporation of new services and of applying the implementation rules of the INSPIRE Directive.

3. Capacities

3.1 *National budget allocation to Spatial Information*

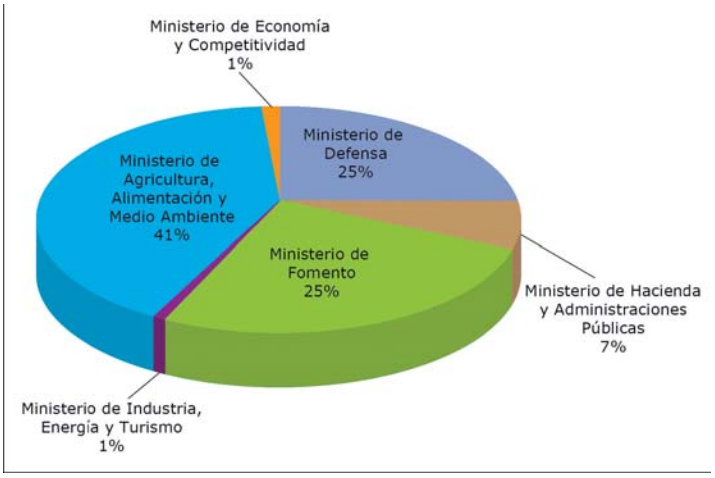
According to the PNC (2013-2016), in general, the largest investments are associated to operations or programs which have greater economic, social competence or transcendence. The project that has the greater investment (26 million euros) is referred to the update information system for agricultural parcels, by the Spanish Agricultural Guarantee Fund (FEGA), essential for the implementation of the Common Agricultural Policy in Spain. More than 4 million euros of this amount are intended for financing the National Plan of Orthophotography.

The Navy Hydrographic Institute (HMI) has the second largest investment (19.7 million euros) considering all of mapping operations of the different types of nautical charts that are required to produce or update.

The next biggest budget in the rank goes to the National Plan of Land Observation (PNOT), with 18 million euros, which includes contributions from IGN, FEGA and the General Directorate of Cadaster. However, this amount does count neither contributions from the regions nor contributions from AGE for LIDAR flights.

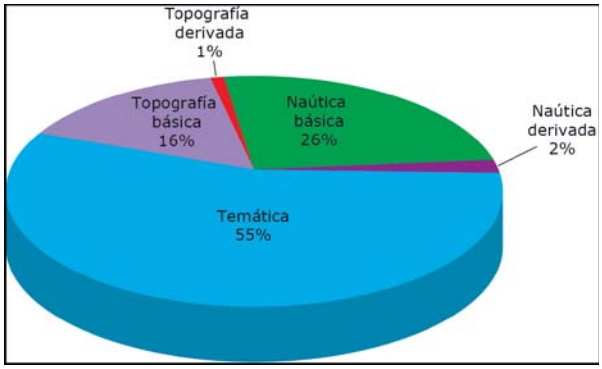
Far from the three already mentioned, the following project according to the national budget is the update of cadastral maps by the Directorate General for Cadaster (5.3 million euros), which includes investments in maintenance and service of the web geoservices. Nearly 2 million euros of this amount are set aside

for financing the National Plan of Orthophotography. The set of geoservices to be maintained by the IGN and CNIG it would require the 59% of the total investment in Geoservices, which is about 3.2 million euros.
Other investment comes from the General Directorate of Water in its diverse mapping operations (2.6 million euros), of which 30% corresponds to water uses (water catchments and locations). The Directorate General of Water also manages a great part of the funding for the National Plan flights LIDAR Observation Territory.
For the production of basic topographic mapping the IGN estimated an investment of 2.5 million euros, of which 65 % would be required to update the National Topographic Database 1:25,000 BTN25 that is part of the Basic State Mapping.
The derivative and thematic mapping of the Ministry of Development would require an investment of 1.9 million euros, highlighting the update of the National Topographic Base scale 1:100,000 and the Official Road Map, both are the 40% of that amount.
The Geological and Mining Institute of Spain (IGME) estimates an investment of 1.8 million euros for their mapping operations, including geoweb services and access for all its geological information.
Cartociudad data base is also an important investment (1.4 million euros), the National Center for Geographic Information provides a public web for virtual navigation through all the road networks in the country.
The National Atlas of Spain, its geographical information system of production and management (SIANE) and its diffusion geoservices would require an investment of 1.15 m. euros.
The Geoweb services from the Ministry of Environment and Agriculture (MAGRAMA) requires an investment of 1.13 million euros. Operations related to forest information would require an investment 0.84 million euros
Geodesy operations from the National Geographic Institute require an investment of 1.11 m. euros, the most important are the High Precision Levelling Network and the GNSS Permanent Stations Network; both are the 67% of the total investment.
Finally, the Ministry of Industry, Energy and Tourism requires an investment of 0.62 m. euros to all its mapping operations, including the Service Stations Database that has the 34% of its budget.
Below we can see a graphic showing the distribution among the different ministries for cartographic products investments:



Below, another graphic showing the % distribution by kind of geospatial

information (Thematic cartography 55%, Basic Topography 16%, Derived Topography 1%, Nautical Cartography 26% and Nautical Derived Cartography 2%):



3.3	*Funding initiatives and participation to research programs*

Some of the research initiatives at European and National level of the IGN are for example:

- EUREF: The IGN is participating in this initiative that is used as the standard precise GPS coordinate system throughout Europe. Supported by EuroGeographics and endorsed by the EU, this reference system forms the backbone for all geographic and geodynamic projects on the European territory both on a national as on an international level. EUREF map The ETRS89 is maintained by the IAG sub-commission EUREF and it is accessed through the EUREF Permanent Network (EPN), a science-driven network of continuously operating GPS reference stations with precisely known coordinates in the ETRS89.
- Intermagnet: The INTERMAGNET programme exists to establish a global network of cooperating digital magnetic observatories, adopting modern standard specifications for measuring and recording equipment, in order to facilitate data exchanges and the production of geomagnetic products in close to real time. Where local support is lacking it is a further goal of INTERMAGNET to aid in the establishment of new observatories or to provide assistance with the upgrade and maintenance of existing facilities. Supplemental to this aim is the promotion of modern standards for measuring and recording the Earth's magnetic field. INTERMAGNET is constituted from existing groups whose primary task is one of geomagnetic measurement.
- E-GVAP: was set up, in April 2005, to provide its EUMETNET members with European GNSS delay and water vapour estimates for operational meteorology in near real-time. The NRT GNSS delay data contain information about the amount of water vapour above the GNSS sites. Water vapour plays a key role in some of the most important weather phenomena: It is obviously related to precipitation, but also provides about half the energy to the atmosphere (via latent heat release), contributing to atmospheric dynamics and it is the dominant greenhouse gas. There is a big lack of humidity observations in the meteorological observing system, usage of ground based GNSS data is one means by which to improve on this.
- IGS: Is a voluntary federation of more than 200 worldwide agencies that pool resources and permanent GPS & GLONASS station data to generate precise GPS & GLONASS products. The IGS is committed to providing the highest quality data and products as the standard for Global Navigation Satellite Systems (GNSS) in support of Earth science research, multidisciplinary applications, and education. Currently the IGS includes two GNSS, GPS and the Russian GLONASS, and intends to

incorporate future GNSS. You can think of the IGS as the highest-precision international civilian GPS community.

3.4 *Dedicated undergraduate, graduate programs, training centers*

The Undergraduate programs that can be find in Spain corresponds to "Technicians in urban developments and survey operations", with 2000 hours class over two courses with theory and practice being trained to everything related to urban planning or and topographic instruments handling. There are 75 public centers in Spain where studying this undergraduate program:
http://www.todofp.es/todofp/formacion/que-y-como-estudiar/oferta-formativa/familias/edificacion-obracivil/proyectos-urbanisticos.html
The Graduate programs in Geomatics consist of four annual courses with a continuation of Master degree of two semesters. Each year about 1200 students start their studies in the following Universities:
- Msc. in Geomatics and Topography Engineering - EPSEB
Escuela Politécnica Superior de Edificación de Barcelona (EPSEB - UPC)
- Msc. in Geomatics and Topography Engineering
Universidad de Salamanca (USAL)
- Msc. in Geomatics and Topography Engineering
EHU - Escuela universitaria de ingeniería de Vitoria-Gasteiz
- Msc. in Geomatics and Topography Engineering
Escuela Politécnica Superior (USC) Campus Lugo
- Msc. in Geomatics and Topography Engineering
Escuela de Ingenierías Industriales y Civiles de la Universidad de Las Palmas de Gran Canaria (ULPGC
- Msc. in Geomatics and Topography Engineering
Escuela Técnica Superior de Ingeniería Geodésica, Cartográfica y Topográfica (UPV)
- Msc. in Geomatics and Topography Engineering
Escuela Técnica Superior de Ingenieros en Topografía, Geodesia y Cartografía. ETSI Topografía (UPM)
- Msc. in Geomatics and Topography Engineering
Centro Universitario de Mérida. (UEX)
- Msc. in Geomatics and Topography Engineering
Escuela Politécnica de Mieres (UNIOVI)

REFERENCES AND USEFUL LINKS

-GoolzOOm, Catastro + Sigpac
http://www.goolzoom.com/
- Sistema de Información Geográfica de Parcelas Agrícolas (SIGPAC)
http://www.mapa.es/es/sig/pags/sigpac/intro.htm
http://sigpac.mapa.es/fega/visor/
- Consejo Superior Geográfico - Infraestructura de Datos Espaciales
http://www.idee.es/show.do?to=pideep_pidee.ES
- Cartografía del Instituto Geográfico Nacional
http://www.ign.es/ign/es/IGN/Map_Ima_ConUltEdi_det_1.jsp
- Directorio Cartográfico de España
http://www.dices.net/
- Corine Land Cover viewer
http://dataservice.eea.europa.eu/clc/eeaclc.asp
- GeoMadrid

http://www.trescantossa.com/geomadrid/Navegar.aspx
- Multimap
http://www.multimap.com/
- SIG Oleícola Español
http://w3.mapya.es/dinatierra_v3/
- Agroguía
http://www.agroguia.es/
- Instituto Geológico y Minero de España
http://www.igme.es/
-Cartoteca digital ICC
http://cartotecadigital.icc.cat/cdm/search/cosuppress/
- Asociación española de teledetección.
http://www.aet.org.es/?q=ini
- MAGRAMA. Biodiversity DDBB
http://www.magrama.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza/informacion-disponible/cartografia_informacion_disp.aspx
- GVA. Biodiversity DDBB
http://cartoweb.cma.gva.es/visor/index.html?modo=web&temas=Web_Biodiversidad
- GVSIG
http://www.gvsig.org/plone/home/gvsig-en/view?set_language=en
- Cartesia
http://www.cartesia.org
- Laboratorio de teledetección de la U.V.
http://www.latuv.uva.es
- Institut de Geomatica
http://www.ideg.es
- Terrasit
http://terrasit.gva.es
- Cadaster
https://www1.sedecatastro.gob.es
-Grafcan
http://www.grafcan.es
- Geographic Center of the Army (CEGET)
http://www.defensa.gob.es/politica/infraestructura/cartografia/politica-cartografica/#sub3
-Instituto Nacional de Técnica Aeroespacial
http://www.inta.es
- GNSS-RTK public network
http://icverva.icv.gva.es:8080

PART A. CURRENT STATUS OF GEOSPATIAL INFORMATION IN LOCAL MANAGEMENT

1. Policies

1.1 National policies and implementation

Egyptian General Survey Authority (EGSA) had been assigned by the Egyptian government to develop the National Spatial Data and Survey. The effort will incorporate technical implementation as well as the organizational, data sharing and cost –impact analysis aspects.
Moreover, Urban Planning has implemented projects for covering the country with Large Scale (1:5.000) and the urban centers with Very Large Scale of the year 2007. Was covered all over the country with maps of high-quality.
National Authority for Remote Sensing and Space Sciences (NARSS) is handling geospatial data, whilst the Central Agency for Public Mobilization and Statistics (CAPMAS) is handling statistical data. National Authority for Remote Sensing and Space Sciences (NARSS) as a unique research entity in Egypt, possesses various resources, laboratories and equipment that enable the organization to pursue and conduct scientific and technical services in the field of remote sensing and geographical information system to the local/national (governmental and non-governmental) and regional agencies. NARSS can provide and participate professionally in the multidiscipline applications of both fields.

1.2 National Census data

Central Agency for Public Mobilization and Statistics (CAPMAS) is an independent Authority enjoying operational independence, as well as administrative and financial autonomy. It is not subject to the control of governmental bodies or other administrative authority. Its operation is subject to the control of the Presidency of the Republic. http://www.Capmas.gov.eg
The CAPMAS Statistical System comprises agencies that have the responsibility or obligation to collect statistical data. More especially theEgyptian Statistical System is the set of rules, activities and agencies which are responsible for the conduct of statistical operations, aiming at

the development, production and dissemination of official Egyptian statistics, which are used for decision and policy making at local, national.
The role of CAPMAS is determining as, according to Law 2915/1964, it coordinates all the activities of the other agencies that concern the development, production and dissemination of the country's official statistics and forwards these statistics.
the following responsibilities:
a) produces and publishes as the "Central Agency for Public Mobilization and Statistics (CAPMAS)" the official national and statistics of Egypt,
b)sees to the timely, reliable and effective dissemination of statistical information and to the promotion of statistical issues and economic research in the context of the country's international cooperation,
d) cooperates with public and private agencies in Egypt or abroad, such as educational institutions, research centers and non-profit Organizations for the promotion of scientific research for statistical issues and the implementation of the statistical principles of the Egyptian Statistical Systems,
e) develops, disseminates and coordinates the implementation of the Egypt
f) sees to the inculcation of its staff and that of other "CAPMAS" Branches, with the principles and methods of production of reliable statistics for the Egyptian Statistical System,
g) defines the ELSS agencies2, which have the responsibility or obligation to collect statistical data,
h) Certifies as "official" statistics those that have been produced by this agency, on the basis of relevant methodology, which is provided in the Regulation on the Operation and Administration of "CAPMAS". In this context, the other Branches in the governorates are obliged to submit, at least once a year, reports to "CAPMAS" on the quality of the transmitted data, which fall in the domain of their responsibility.

1.3	*Spatial data production distribution centers - sharing policies*

1. Organizations providing various spatial Data Sets

1- The Military Survey Authority

The most complete and updated maps are available from the Military Survey Authority. All kinds of map products in various scales may be found and could buy all the maps of the Survey of the military all over Egypt which is available to everyone, but it is not available online.

2- Egyptian General Surveying Authority (EGSA)

Egyptian General Surveying authority (EGSA) has been established under the name of Public surveying authority, and was designed at that time for the coverage of the Egyptian land with topographical maps and the

creation of maps and books of ownership of agricultural lands located within the reins and built real estate's within the city to collect the taxes and to create records that officials responsible for them.
In 1971 turned the public authority related to the Ministry of Irrigation, identified tasks several resolutions of the Republic of the latest presidential decree No. 328 of 1983 also defines supervision system of the surveying business carried out by non-Republican Decree No. 298 of 1984, then switched to economic organization in 2001.
The authority passed through a long service life through several stages, widened during the scope of its work and developed the techniques to keep place with global developments in this area, and has achieved in recent great achievements in the field of automated conversion, which provides IT infrastructure geographical necessary for overall economic activity in particular and development in general in the context of strategy State-building e-government in the global trend in the information age.

Basic services

- building the trigonometrical survey nets with different grades with advanced technical methods in that field aiming to provide the bench marks which join the Egyptian maps with the global maps .
- Measuring and calculate the astronomical and geodetic observations aiming to the accuracy at the trigonometrical survey to reach to the standard accuracy level .
- Measuring and calculating the accurate balance and other kinds of balances aiming to adjusting the elevations and depressions which serve the different engineering projects.
- Measuring, calculating and making maps for the local gravity moreover joining it with the surrounding countries and other world countries to use these measures in oil and minerals excavation and to use them in researches and studies concerning landscape adjusting.
- Calculating the astronomical observation calendar.
- Building the technically advanced topographic maps with small and medium scales photogrammetrically to use them at the military and internal security purposes and construction and people housing projects and agriculture expanding and land reclamation in addition to the great construction projects and planning projects .
- Building the cadastral maps with great scales by the advanced technical methods in both photogrammetric and land survey for rural and urban areas to use them in confirming the properties and collection taxes in addition to help in small projects such as schools or factories building or constructing canals or drains ---- etc. .
- Updating the basic maps with the recent data to be equal as it's in

filed.

•Printing basic maps and gathering them by the most advanced methods to provide the public and private sector.

•Forming geographic maps and different atlases to use them in different studies .

3- National Authority for Remote Sensing and Space Sciences (NARSS)

National Authority for Remote Sensing and Space Sciences (NARSS) is the pioneering Egyptian institution in the field of satellite remote sensing. NARSS is an outgrowth of a Remote Sensing Center, established in 1971 as an American-Egyptian joint project that was affiliated to the Egyptian Academy of Scientific Research and Technology. In 1994 the Authority was established as an organization under the State Ministry of Scientific Research to promote the use of state of the art space technology for the development of the country and introducing High Tech capabilities in regional planning and other applications. NARSS includes two major sectors: Remote Sensing and Space Sciences. The sector of remote sensing works on the use of data provided by earth observation satellites and various airborne sensors to produce maps and spatial data for the evaluation and monitoring of natural resources, natural hazards and management environmental. The sector of space sciences is concerned with the development of sensors for earth observation to be mounted on satellites and with all the problems involved with monitoring communication with satellites and retrieving the information for processing, and ultimately on launching an Egyptian remote sensing satellite.

4- Central Agency for Public Mobilization and Statistics (CAPMAS)

Central Agency for Public Mobilization and Statistics (CAPMAS) is the official statistical agency of Egypt that collects, processes, analyzes, and disseminates all statistical data and the Census.

CAPMAS is considered under presidential decree no. 2915 of 1964 the official provider for data and statistical information collection, preparation, processing, dissemination and giving official nature of the statistical figures in A.R.E.

CAPMAS key aim is to complete unified and comprehensive statistical work to keep up with all developments in various aspects of life and unifying standards, concepts and definitions of statistical terms, development of comprehensive information system as a tool for planning and development in all fields

CAPMAS is also the responsible for Implementation of statistics and data collection of various kinds, specializations, levels and performs many of the general censuses and economic surveys. CAPMAS functions support

state planning, decision making policy assessing. It employs highly trained human resources with outstanding technical expertise, and currently with modern computer equipment.

Central Agency for Public Mobilization and Statistics (CAPMAS) provides aggregated data of the most important Demographic, Social and Economic indicators in Agriculture, Environment & Natural Conditions, Prices, Vital statistics, Investment, Housing, Health, Finance & banking, Tourism, Population, Balance of Payments, Culture & Media, Energy , Foreign Trade, Communications, Industry, National Accounts, Education, Transport, Public Finance , and Labor.

5- Egypt State Information Service (SIS)

Egypt State Information Service (SIS) was established in 1954, Egypt State Information Service is the nation's main informational, awareness and public relations agency. On 6/9/2012 a decree was issued to transfer the affiliation of (SIS) from the Ministry of Information to the Presidency of the Republic.

SIS serves the nation through its headquarters in Cairo and its network of 64 domestic and 32 international press offices. SIS operates in the following fields:

Domestic Informational Services: Including providing access to government information, awareness-raising in areas such as family planning, environmental protection, literacy, political participation…etc. Additionally, SIS media offices provide access, at symbolic rates, to computer and internet facilities, as well as conference and screening rooms.

International Public Relations and Diplomacy: including staffing and managing 32 press offices around the globe which monitor and maintain a dialogue with the global press. SIS facilitates the work of international journalists operating in Egypt through its Foreign Press Center and its recently established Cairo Foreign Press Club.

6- Egyptian Cabinet's Information and Decision Support Center (IDSC)

The Egyptian Cabinet's Information and Decision Support Center (IDSC) stands as one of the distinguished Think Tanks in Egypt, particularly for the Cabinet. Its main task is to support decision makers with regard to economic, social and political issues, while placing emphasis on priority issues to foster the reform efforts that push the development march forward.

Moreover, IDSC strives to enhance relations with different ministries and government authorities, and to open communication channels with the public to measure the society's attitudes towards national issues. IDSC also works on disseminating data and information, focusing on

electronic dissemination.
IDSC has significantly contributed to crystallizing the opinions and concepts that have an impact on the Egyptian government's foreign and national policies through publishing various research, covering diversified themes, as well as books and working papers. Besides, periodicals and public opinion polls are prepared. It also organizes seminars, conferences, workshops and training programs.
IDSC's Information Portal acts as a one stop shop for macro and sector information, analytical reports, economic indicators, and bulletins, as well as links to other information sources in its bid to implement Egypt's strategy for providing free access to information.
The IDSC has been keen to diversify its publications by releasing social and economic studies as well as informational reports seeking to serve both decision-makers and the community at large. These reports provide integrated data and information in a simple manner and within a framework of transparency and objectivity that could be easily perceived by all segments of the society.
A monthly bulletin that includes a group of indicators on macroeconomic, sectoral and social level in Egypt. It introduces some macroeconomic indicators (inflation rates, financial, foreign trade and general Market indicators), and shows the progress in the real economy (information technology, energy, transportation, and construction), it also introduces some social indicators (labor market, population, health and social solidarity), then it compares the economic situation in Egypt with that of similar emerging economies.

7- Egypt's Information Portal (EIP)
Egypt's Information Portal, since its launch in June 2003, by the Information and Decision Support Center, has been one of its knowledge instruments for disseminating and providing information that of interest to the Egyptian citizens and the international community. It turned into a main reference reflecting the developments and reality in Egypt while concurrently serving as a societal communication channel allowing interaction with the society as well as identifying its vision towards crucial issues. For this purpose, the portal offers a constantly updated tool diffusing knowledge in a timely manner.
The Portal has become a main source, which reflects developments in the country, as well as a channel for societal communication, interacting and identifying the society's needs and perception on important issues.
a. General information about Egypt (general information-political system-history and civilization-..).
b. Information and data about different sectors of the State (time

series).
c. Various databases.
d. Studies, reports, working papers, conference papers, abstracts of research studies conducted by IDSC.
e. Periodical bulletins (weekly-monthly-quarterly-annual).
f. Services (IDSC activities-IDSC in the press-information inquiries-weather forecast-metric conversions …).
g. Complete files of the most important enacted laws and legislations.
h. Contact directories of various entities and agencies.
i. Events and conferences agenda.
The Portal offers various sections meeting the visitors' needs as follows:

- Studies and Information Reports:

The portal allows visitors access to studies' abstracts, reports, publications on international experiences, and opinion polls' results issued by the IDSC and other research centers. Such studies approach the most important economic and social issues, besides providing a catalogue for table of contents. EIP's subscribers are allowed to obtain full texts of the contents on the portal.

- Periodicals:

EIP provides various periodicals, on annual, bi-annual, quarterly, monthly or weekly bases. These periodicals are provided in a timely manner along with a feature allowing the user to browse previous issues.

- Statistical Indicators:

EIP provides visitors with diversified indicators on the macro, sectoral and governorates levels at different intervals (daily, weekly, monthly, annually) in addition to indicators' daily update of the Egyptian stock market and international stock markets indices as well as daily currency rates to monitor indicators of measuring development performance, learning about the most important updates of economic and social sectors. EIP is keen on constant data updating from its main sources according to issue dates, ensuring non-contradiction among different data sources. Add to this, EIP allows users to review time series, graphs and charts of selected data and indicators.

- Economic and Social Issues:

EIP presents most important economic and social issues, including studies and reports, classified by topic. Users can also browse other agencies' relevant sites, field research and data series in connection with each part.

Directories:
EIP provides contact directories of agencies in Egypt including (telephones, emails, and websites...) of ministries, governorates, universities and major agencies in the country such as (Council of Ministers –People's Assembly) in addition to provision of search engines of databases and data directories.

- Research Centers' Studies:

EIP is keen on providing the service to students, researchers and decision makers by offering publications of Egyptian research centers in both Arabic and English. It also presents publications' abstracts and storage location classified by the area of interest.

- Media:

For latest news and comments of print-media about IDSC, the EIP allows visitors to follow these pieces of news in addition to a review of national events agenda of most important seminars, conferences and workshops.

- Services:

EIP updates visitors with weather forecast, currency exchange rate, world standard time and enables them to access e-services on Egyptian Government Services Portal according to interest area. EIP also publishes a set of public surveys in the hope to have users' interaction.

- Information Inquiries:

Data relevant inquiries received from the private and government sectors as well as academicians through the EIP are put forward to the Information Services Unit to provide the necessary information in a timely manner, thus datum is given in short time.

8- Egyptian Mineral Resources Authority (EMRA)

Established in the year 1896 as the tasks and duties of the Egyptian Geological Survey (EGS) are similar to those of most geological surveys worldwide, and include mapping, grass-roots mineral exploration, geohazard and geoenvironmental studies, hydro geological studies and services to the community. The Egyptian Mineral Resources Authority maintains support teams of geophysicists, remote sensors, GIS and database specialists, as well as laboratory and publication arms, that will allow it to provide a full range of earth-science information about the Stat

EMRA's Main Objectives &Activities

•Maximize national reserve of minerals
•Ensure optimum exploitation
•Maximize value added.
•Satisfy domestic demand and exports
•Guarantee clean environment
•Regulating the mining activities
•Supervising the implementation of laws governing mining activities
•Create and Promote investment opportunities
In addition to Licensing of Exploration / Exploitation activities,

EMRA offers:
• Surveying and geological mapping
• Geological Exploration and assessment
• Geophysical studies
• Shallow Drilling and well logging
• Rock sample analysis
• Environmental Studies
• Training programs
• Publishing

Geographic Information Systems Lab
GIS Lab consists of units:
1- Image Processing facilities
2- Cartographic facilities

Each unit equipped with up to date hardware and Software "They are operated highly professional staff, 7 for image processing, 10 for digitization, and 7 technical support.
Three nets connect the different units with each other and outside:
1- The ministry of industry and technological development net
2- Internet international net (internet)
3- Internet

The internal net are used to through produce the final layout, printed copies and keep the production on CD"s or floppy disks.

Software:
1- ERDAS imagine
Three license on UNIX
2- ERDAS imagine
(P.C) Three Licenses on pc"s.
3- Digital image processing
4- Micro model

5- Poly map
6- Liquefy
7- Equis geology database
8- Slop stability analysis's
9- Arc Gis (V.8) 3 licenses
10- Arc view (3.1) 2 licenses
11- Arc view (3.2) 4 licenses
12- Auto cad (14) 8 licenses
13- Arc info (P.C) 4 licenses
14- Arc info (Unix) 2 licenses
15- Dak (data automation kit) 5 licenses

These software used for production of different types maps: such as Flood hazards, geologic, lithology, structural, and, Movement and active faults map by using space Images with different resolutions.

Digital mapping

Cartographic experience (digital mapping) Transfer the different / types 6 maps to digital types. The following maps are the main eseaples for this works.

1- Geologic map of Egypt Scale 1:2000.000
2- Tectonic map of Egypt Scale 1:2000.000
3- Geologic maps of south Valley Scale 1:250.000
4- Geologic maps of Sinai Scale 1:100.000
5- Geologic maps of south Valley Scale 1:100.000
6- Digital Topographic maps with different Scale
7- Geomorphologic Maps of Sinai Scale 1:250.000
8- Geomorphologic Maps South valley Scale 1:250.000
9- Maps mineral resources of Egypt 1:000.000
10- Flood hazard maps of Sinai Scale 1:250.000
11- Flood hazard maps of south valley Scale 1:250.000
12- Geo. Environmental map of Mokattum area Scale 1:5000
13- Geologic map of south Libia Scale 1:250.000

Maps

I- Digitization of published maps of EGSMA

Map Scale	Price (L.E.)
1: 50 000	2000
1: 100 000	1800
1: 250 000	1600
1: 500 000	1400

1: 1000 000 1200

II- Digitization of Topographic maps (6 layers)

Map Scale	Price (L.E.)
1: 50 000	800
1: 100 000	900
1: 250 000	950

B-Printed maps

Size	Price (L.E.)
A0	150
A1	150
A2	75
A3	50
A4	15

Price printed map on compact disk by 500 L.E.

C-Scanning for maps and images

Size	Price (L.E.)
A4 colored	20
A0	100
A1	70
A2	50
A3	30
A4Black and white	10

III- Processed Space Image

Price E.P.

scale	Spin2	Spot	TM	Area	Print size (cm)
1:10 000	6500	---	---	5x5	51x51
1: 25 000	9700	5200	---	12.5x12.5	50x50
1: 50 000	---	5200	3250	25x25	50x50
1: 100 000	---	---	4550	50x50	50x50
1: 250 000	---	---	6500	150x100	60x40

If the area of all within more than one scene 15% of the total coast will be added.

IV- Space image printing on normal papers

Printed Size	Price (L.E.)
A1	300
A2	250
A3	200
A4	100
A5	10

- 10% will be add to the product
- 10% discount for students and Egyptian research center

9- Ministry of Planning

The Ministry of Planning takes the task of preparing a plan of economic and social development and follow-up implementation. Through investments, whether domestic or Arab or foreign. Ministry concerned in order to achieve this, include the following:

Receive suggestions from ministries in sectors of production, services and provinces on the preparation of the overall planning for economic and social development.

Propose a number of alternative development strategies capable of achieving long - term national goals to choose from in light of existing and projected conditions.

A medium - term plan under the strategy selected based on drawing clear objectives and defined to include all aspects of economic and social activity and organizing energies in the range of procedure and in its relations with the international community.

The preparation of annual plans, which take into account the conditions of the existing economic structure the time of publication, in the light of the medium - term plan.

Proposed evaluation of investment projects and to provide elements of implementation of physical, human and financial .

Field follow-up and continuing to plan projects to get to know the pros and cons that may face the implementation of projects and find practical solutions and scientific predict problems before they occur and develop appropriate solutions to them.

Study of everything related to the private sector , whether domestic or foreign , and the provision of data and related information to ensure implementation of its role in development in the light of the outcome of the evaluation and international agreements.

Monitor the implementation of the annual plans for investment and production periodically on the dates specified by the Minister of Planning At the end of each financial year and assess what has been achieved and what has happened from deviations and back problems during implementation and propose actions to be taken to meet these problems and to ensure the achievement of the objectives of the plans annual and medium-term .

10-The General Administration of Geodesy

General Administration of Geodesy has diversity of products & services.

General Acts of astronomical calculations:

- Announced the issuance of astronomical calendars .
- Determine the mosques' prayer & worshipers line.
- Account the dates of various events & festival.
- Prepare & send data to explore the moon each Hijri month, Salum, Kharga, Suhag, Qena and Toshka .

Acts of Agricultural statistics :

- The department of agricultural statistics calculates flats strategic crops such as rice, wheat, cotton, & sugar cane.

Business of Budget :

- To identify wastage lines of old Benchmarks.
- Making first class benchmarks networks in all areas of the Republic.
- Carry out the budget to account for the network & covered sewage areas & areas of land reclamation & touristic villages to protect the shore of the Nile River & Delta.
- the budget to account for longitudinal & find levels of real estate, routing power lines, oil pipelines water ways& air points runway axes in addition to the main roads for the completion of sewage works .

Altravrs Business :

- The calculation of civil rights of all parts of the republic .
- Identifying signs of separation boundaries & requests for expropriation .
- The expense of projects of roads, sanitation & agricultural departments of all surveying districts.
- Discovering altravers of cities for the project work area and modern area directorates in the governments.

Others :

- Arbitrating disputes between individual & Authorities to indicate the correct location for each party.
- Expense the extraction of flat pieces expropriated for public utility projects.
- The establishment of gravity networks to all parts of the republic to correct the
- Bring down the coordinates of triangle of various grades on topographic or a kilometric of all scales.
- Meteorological budget & points of triangle.

11-Ministry of Agriculture

In July 1974, a presidential decree was organized by the Ministry of Agriculture and Land Reclamation, and ensure that division to 6 sectors

of integrated services and work are :

1. Sector Minister's Office under the supervision of Ministry Undersecretary, and includes traditional advisory bodies of the office and secretarial and technical affairs.

2. Sector planning and follow circular and financial analysis and cost.

3. Livestock and Veterinary Services consist of interest veterinary medicine and public administration for the veterinary and livestock insurance fund.

4. The land reclamation which consists of two departments; development of plenary and department of resettlement.

5. Directorates services sector nationwide.

6. The general secretariat (separating) includes departments of the financial and administrative affairs, and legal.

In the 1996 Presidential Decree No. 31, issued merging the Ministry of Agriculture and Bureau of Land Reclamation, and it was called "Ministry of Agriculture and Land Reclamation," it was organized by Presidential Decree No. 162 of 1996.

The ministry services are:

• Develop public policy in the areas of agriculture and land reclamation and horizontal expansion nationwide through planning programs to limit the arable land reclamation depending on water sources identified by the Ministry of Public Works and Water Resources in accordance with the reclamation programs.

• Study methods provide the ingredients of Agriculture and Land Reclamation and raise the efficiency of implementation and the potential for exploitation by the economic optimization of the reclaimed land, livestock and water and follow up the implementation of projects and evaluate the development plan in order to achieve the objectives of the State in the field of green wealth .

• the general policy of agricultural cooperation and the disposition of the wasteland and reclaimed desert and in accordance with the provisions of law , supervision and coordination between agencies working in the field of Agriculture and Land Reclamation in order to achieve the performance speed and accuracy of implementation.

• Conduct studies and research on the development of agricultural and livestock production and fisheries and planning policy industrialization of agriculture in the areas of new expansion and utilization of applied from the results of such research, publish and disseminate applied to various means of guidance and holding seminars and local and international conferences related Oalastrak , and provide technical advice to government agencies , institutions , organizations and individuals in Egypt and friendly countries .

• fee settlement policy in the reclaimed land in order to achieve the

distribution of population density stationed in the cities as well as the general policy of agricultural cooperation and the development and dissemination of its services under the agricultural credit system until it reaches the level of the village.

• To develop and install the rural communities and work to raise the standard of living and the promotion of rural agricultural economies through various means including the mechanization of agriculture in order to reach the highest production at the lowest cost .

• Study projects, agricultural and industrial communities and in common areas of Land Reclamation and horizontal expansion and contract agreements for both domestic and international sectors overseeing the implementation of those agreements

12-General Authority for Meteorology

The most important goals of the General Authority for Meteorology monitoring the changes that occur to the atmosphere and to predict their occurrence and to provide all the services and meteorological information to the sectors of various state as well as the exchange of data within the framework of the instructions issued by the World Meteorological Organization WMO and the International Organization of Civil Aviation of ICAO.

The most important services performed by the General Authority for Meteorology for different sectors of the state

1- Civil Aviation :

The General Authority for Meteorology to provide services to the Civil Aviation through the centers of weather forecasts attached to airports, which operate around the clock , where issued reports and weather forecasts for airlines , national and international , and working in the Arab Republic of Egypt or cross- atmosphere Egyptian reports include data half- hourly and hourly weather conditions at airports are also issuing warnings in case of emergency is supplied aircraft before take-off reports of a complete weather route for each trip are used in determining the load of aircraft and flight time and the amount of fuel used and Gbrha elements of the economics of aviation .

2 - Maritime

Provide meteorological services through centers of marine forecasting connected to the global information for the exchange of meteorological information marine where their merchant ships and other phenomena air at sea and during the entry and exit ports, according to this information in track forecasting of storms and bad weather, which leads to a selection of tracks safe for ships and issuing warnings appropriate air

before impact on the navigational areas.

3 - Armed Forces :
Provide meteorological services through Centers forecasts military and network monitoring stations scattered air navigation service to the Republic of air, sea and artillery, air defense and chemical warfare.

4 - Tourism:
The increase or shrink the tourist movement in a country affected by the direct impact the stability of the state of the weather and features of the climate, such as the type of precipitation which leads to take advantage of the climate data in determining the shape and type of tourism in the region and in certain periods as well as to determine the timing of the celebrations, festivals and games.

5 - Water Resources and Irrigation :
Provide meteorological service of the Ministry of Irrigation and Water Resources through the Nile Forecast, the airport and the floods and the operation and maintenance of buoys in Lake Nasser and weather station evaporation beach in Aswan in addition to the development and modernization of rainfall stations of the Nile Water Sector to contribute to the research necessary to estimate the losses from the waters of Lake High Dam and the Nile.

6 - Agriculture
It is known that each plant achieves optimal climatic environment at which the maximum rate of growth and the meteorologists on a year-round calendar thermal action for each type of crop to the National Commission shall issue a report on the
Agricultural Meteorology every 10 days includes the monthly averages of weather events and critical situations for some elements related to changes and weather phenomena distributed periodically on all agricultural institutions and research organizations in Egypt and created a body of 14 meteorological stations agricultural to assist in the horizontal and vertical expansion of agricultural production and these stations scattered all over the country.

7 - Environment:
The meteorological study the movement of pollutants in the atmosphere whether harmful gases or dusts..... etc. and measure its concentration in the air and forecasting Bmsaradtha addition to studies and research to monitor climate change and variability and their implications for society and the national economy. Notably, the body is the only party in Egypt,

which measures the amount of ozone in the upper atmosphere a day on a regular basis since 1986.

8 - Urban Planning :

Climate data is considered a factor when building new cities and choose the appropriate places for some public facilities such as airports and stadiums and sanitation and factory sites.

The knowledge of wind direction and determine the brightness of the sun and the relative humidity to achieve maximum ventilation health taken into account when building new cities and population distribution.

9 - Scientific Research:

The Authority numbers of studies and theoretical and applied research in the areas of multiple , including:

- In the field of weather forecasts using the numerical model.
- Research in the field of physics.
- In the area of climate change.
- Jawmaúaat in the field of hydrology.
- Research special nature of the civil and military sectors and according to the agreements signed between the two parties.

13-Research and Ground Water Authority (REGWA)

The General Company for Research and groundwater is a public research and groundwater leading company in the field of research and studies of the groundwater and the house experience, which is referenced in the definition and extension of underground tanks and the nature of these aquifers and the company has specialized centers to conduct this research, namely:

- Center for monitoring electrical and radiation.
- The computer center and information.
- Center of cadastral maps.
- Chemical Laboratory.
- Geological mapping and studies.
- Studies of land and soil classification.

14-ESRI Northeast Africa

Esri NeA is the first Esri branded Company in the Middle East and Africa. Esri NeA has managed to maintain its superiority over the years achieving a prominent regional and international position, through its commitment to excellence in the field of GIS application development and consultation services.

All Esri NeA services and solutions are designed on a world class level to

meet the needs of the diverse user community and to assist customers in successfully achieving their GIS goals. Esri NeA have a broad range of experience that enables to offer the customers the most efficient consulting, implementation and solutions support.

Esri NeA Professional Services employ the latest GIS techniques and tools to provide effective solutions and support to a broad range of user organizations in various sectors throughout the world. Services range from short-term implementation support, to the delivery of strategic corporate GIS databases and turn-key, mission-critical applications.

Business Consultancy at Esri NeA mainly deals with supporting our customers in terms of needs assessment, strategic thinking and planning for GIS needs, in addition to managing GIS implementation and the resulting change that occurs within the enterprise.

As part of the mission to enhance and build on the expertise, Esri NeA focuses on presenting its customers with solution frameworks that target certain industries, and require minimal customization, and very little deployment time. The solution frameworks are built on top of Esri software, and combine our extensive expertise in providing GIS solutions in that field, as well as endless libraries of components which have previously been used and tested in several previously implemented successful projects.

Esri NeA also provide a wide range of training programs tailored to meet various GIS users such as planners, managers, students, or just interested individuals aiming to learn more about GIS. All training courses provided by Esri NeA are taught by own Esri certified instructors who are with a total experience of more than 50 years in the field of GIS.

Esri NeA's Data Center provides regional market leadership in the field of geospatial data. To help leverage GIS solution and enhance its performance to maximum benefit, Data center offers different types of data in different formats to meet various business needs.

What differentiates Esri NeA and makes it unique is its exceptional down to earth experience combined with a distinct perspective directed to customer success. Esri NeA implementations are characterized by an enterprise nationwide perspective, solid system development methodology that is supported with a formal project management system, in addition to a staff having a wealth of real accumulated experience.

15- Quality Standards Information Technology (QSIT)

Stemming from ESRI's commitment to meet the needs and demands of the GIS community in the Middle East and North Africa, ESRI established ESRI Northeast Africa (ESRI NeA). ESRI NeA is a free zone company located in Egypt with business that is spread across the region. ESRI NeA

was established due to the success that was demonstrated by Quality Standards Information Technology (QSIT), ESRI's distributor in Egypt and the region since 1994.

The mission of QSIT is to introduce the Geographic Information System concept as an essential decision support tool for all businesses sizes and fields of operations. QSIT will empower decisions makers in each and every business in Egypt, the Middle East and Africa with the most useful, and efficient GIS for their business through a close personal relation built on trust. The Vision of QSIT is to become the leader provider of Geographic Information Systems in Egypt, the Middle East

1.4 *Use of Spatial Information in local decision making processes*

1.5 *Relevant national institutes, contact points*

Table 1. Relevant national institutes, contact points

Distribution Center	Organization Status	Type of Data	Data Availability	Sharing policy	Metadata
NARSS	Government	Orthophotos, geodetic, cartographic	Off-line	Sold	YES
Egyptian General Surveying authority	Government	geodetic, cartographic	Off-line	Sold	YES
Central Agency for Public Mobilization and Statistics (CAPMAS)	Government	geodetic, cartographic	Off-line	Sold	YES
Egyptian Cabinet's Information and Decision Support Center (IDSC)	Government	cartographic	Off-line	Sold	YES
Egyptian Mineral Resources Authority (EMRA)	Government	cartographic	Off-line	Sold	YES
Ministry of Agriculture	Government	cartographic	Off-line	Sold	YES
ESRI Northeast Africa	Private	Private	Off-line	Sold	YES
Quality Standards Information Technology (QSIT)	Private	Orthophotos, geodetic, cartographic	Off-line	Sold	YES

1.6 *Beneficiaries of ongoing or completed EU/national/regional projects*

Implemented the National Authority for Remote Sensing and Space Sciences series of projects with the European Union within a number of scientific departments in (Narss) and these projects will be mentioned in the following table:

Project Title	Beneficiary	Web Site	References
WATERMED Project	NARSS	link	link
RAMSES Project	NARSS	link	link
ALAMIM Project	NARSS	link	link
Technology management & integrated modeling in Natural resources: A university-enterprise win-win partnership (TEMPUS)	NARSS	link	link
Changes in Arid Mediterranean Ecosystems on the Long term and Earth Observation (CAMELEO), 1997-2001	NARSS	link	link
Medcoastland	NARSS	link	link

2. Data – Applications

2.1 National Spatial Data Infrastructure (NSDI)

Table 2. National Spatial Data Infrastructure

Applications/studies	Digital or Hardcopy	Format (if Digital)	Metadata
Agriculture	Digital and hardcopy	Vector, raster	Yes
Biota	Digital or Hardcopy	Vector	Yes
Confines	Digital or Hardcopy	Vector, raster	Yes
Climatology/Meteorology/Atmosphere	Digital or Hardcopy	Vector, raster, database	Yes
Economy	Digital or Hardcopy	Vector	Yes
Altimetry	Digital and hardcopy	Vector, raster	Yes
Environment	Digital and hardcopy	Vector, raster, database	Yes
Geoscientific information	Digital and hardcopy	Vector, raster	Yes
Health	Digital and hardcopy	Vector	Yes
Orthoimagery/basemap/land cover	Digital and hardcopy	Vector, raster	Yes
Military information	Digital and hardcopy	Vector, raster	Yes
Inland waters	Digital and hardcopy	Vector, raster	Yes
Geographical position	Digital and hardcopy	Vector, raster	Yes
Seas	Digital and hardcopy	Vector, raster	Yes
Spatial planning/Cadastre	Digital and hardcopy	Vector, raster	Yes
Society	Digital or Hardcopy	Vector	Yes
Construction	Digital and hardcopy	Vector, raster	Yes
Transportation	Digital and hardcopy	Vector, raster	Yes
Public services/Communications	Digital and hardcopy	Vector	Yes

2.2 National Census

Central Agency for Public Mobilization and Statistics (CAPMAS) Statistical Databases (Census data)

- Agriculture
- Building and Constructions
- Culture-Entertainment
- Education
- Environment
- Health-Social Protection
- Industry
- Transport
- Population
- Trade-Services

2.3	*Processing capability of Spatial data*

There are a specific number of public services and institutes at the government level and small number at the private sector that produce and maintain geodata in national, regional or local geographical coverage.

The most important of them, are given in 1.3.

2.4	*Spatial data collection capability*

The National Authority for Remote Sensing and Space Sciences organize aircraft flights for mapping with aerial photography camera and airborne laser scanning system.
The NARSS Receiving Station at Aswan (Upper Egypt - 1000 Km south of Cairo) has a footprint that cover the entire Egypt, the Nile Basin, most Arabian countries, most Africa and south Europe. The station was initially manufactured and installed by the American Company (L3-Datron Titan). It is designed to receive images from the American satellite (Landsat), the French satellite (Spot-4) and the European radar satellite (ERS).
The station is continuously upgraded to receive the downlink from the Egyptian satellite (Egyptsat-1). The station consists of two parts; the receiving part (in Aswan) is receiving the raw data while the second part (at NARSS main building in Cairo) for data archiving and processing.

- Spot multispectral 20 meter resolution.
- Spot panchromatic 10 meter resolution.
- Spot stereo pair 10 meter resolution
- EgyptSat-1 multispectral 7.8 meter resolution

NARSS BEECHCRAFT superking-200 aircraft is equipped with a TOPOSYS airborne laser scanning system. The system has a Falcon II laser scanner and an accompanying TOPOSYS digital camera. The laser scanner-digital camera system uses differential GPS and INS (inertial navigation system)

and performs GPS/INS measured data fusion by applying to APPLANIX navigation software to improve the accuracy of the laser scanner measurements.

The airplane is equipped with an IGI navigation system with Omni-star support to obtain high accuracy of the scanned laser measurements and to minimize the possibility of having gaps between scanned flight strips. The swath of a scanned laser strip ranges from 140 to 280 meters at flight altitudes of 600 to 1200 meters.

The TOPOSYS system on the BEECHCRAFT conducts 5 elevation measurements per square meters. This provides a digital surface model (DSM) that includes man-made features and vegetation superimposed on the terrain with 1 meter resolution. The system measurement accuracy is 15 cm in the vertical direction and 50 cm in the horizontal direction. The digital camera associated with the TOPOSYS system provides digital aerial photographs of 50 cm resolution. The DSM provided by the TOPOSYS system can be processed to eliminate the man-made features and vegetation to derive the associated DEM.

Falcon II is an opto-electronic LIDAR system (Light Detection And Ranging) developed by TopoSys for three-dimensional data acquisition of the earth's surface. The measuring method for generating digital elevation models is based on active distance measurement by means of a laserscanner and is complemented by GPS positional determination and inertial navigation system. In parallel with this, a passive RGB/NIR line scanner has been integrated for the direct generation of the digital RGB and CIR true ortho images.

NARSS HRPT (High Resolution Picture Transmission) receiving station has been installed at NARSS headquarters in Cairo, Egypt to receive images from American polar orbiting weather satellites controlled by NOAA (National Oceanic and Atmospheric Administration). There are two instrument onboard NOAA satellites; AVHRR (Advanced Very High Resolution radiometer) whose purpose is to give information (reflectance or temperature) on different types of surfaces (sea, vegetation, ice, snow), or on cloud cover (top) and ATOVS (Advanced TIROS Operational Vertical Sounder) sounding system with IR (HIRS) and microwaves (MSU/AMSU/MHS), which is dedicated to measurements of the atmospheric vertical structures. NARSS HRPT processing lab is using AAPP (ATOVS and AVHRR Processing Package) and IAPP (International ATOVS Processing Package) to get the following products

AVHRR Products:

- Normalized Difference Vegetation Index (NDVI).
- Albedo.
- Land Surface Temperature (LST).
- Sea Surface Temperature (SST).

ATOVS Products:

- Temperature Retrieval.
- Water Vapor Retrieval.
- Total Atmospheric ozone.
- Surface Skin Temperature.
- Total Precipitable Water.
- Microwave Emissivity.
- Total Cloud Liquid Water.
- Surface Ice Index.
- Surface Snow Index.

2.5 *GPS data availability and costs*

Data is not available

2.6 *Level of conformation with the EU INSPIRE Directive*

Data is not available

3. Capacities

3.1 *National budget allocation to Spatial Information*

Data is not available

3.3 *Funding initiatives and participation to research programs*

National Authority for Remote Sensing and Space Sciences (NARSS) since 1994 has been active in this field, by installing appropriate equipment; arrange staff training and gradual introduction of data to create the basis of a Geographic Information System, which will be enriched in stages to meet the needs of both government and the market in general to acquire appropriate information.

3.4 *Dedicated undergraduate, graduate programs, training centers*

Table 3. Dedicated undergraduate and graduate programs, curricula and personnel – Relevant education and training centers

Institute	Undergraduate program	Graduate program	Training
Egyptian Universities	4	Yes	No

National Authority for Remote Sensing and Space Sciences (NARSS)	-	-	Yes
Egyptian Cabinet's Information and Decision Support Center (IDSC)	-	-	Yes
Institute of Graduate Studies and Research - Alexandria University	4	Yes	Yes

REFERENCES AND USEFUL LINKS

Useful links (accessed February 2014)
http://www.narss.sci.eg/
http://www.agr-egypt.gov.eg
http://www.esrinea.com/Default.htm
http://ema.gov.eg
http://www.regwa.net
http://emra.gov.eg/index.php

PART A. CURRENT STATUS OF GEOSPATIAL INFORMATION IN LOCAL MANAGEMENT

1. Policies

1.1 National policies and implementation

The Royal Jordanian Geographic Centre (RJGC) is the national agency in Jordan that is responsible for providing national surveying and mapping services; aerial and land surveying as well as producing various maps at all scales.
(RJGC), previously known as the Jordan National Geographic Centre, was established in 1975 and concentrated its efforts on providing qualified technical staff in surveying, mapping and related modern applied sciences such as remote sensing, digital mapping, Geographic Information System (GIS), cartography, geodesy and Global Positioning System (GPS).
(RJGC) participates in providing all sectors inside and outside Jordan with qualified man power in the above mentioned fields through the Training and Research Section. Moreover, (RJGC) has achieved many developments in various fields such as developing the Geodetic Networks, updating topographic maps for the whole kingdom and producing tourist maps.
All the geographic documents the country needs, from aerial photographs to geomorphic studies and from road, tourist and educational maps to those needed for military or development planning purposes have been completed by (RJGC). Over the last few years, the (RJGC) has produced maps for the entire country at wide range of scales. A few of the main cities are available in a scale of 1:1,250, while the majority of cities and villages have been produced at both 1:2,500 and 1:5,000. Maps of the main cities and their surrounding areas have also been produced at 1:10,000, and the most heavily populated areas of the country have been mapped at the scale of 1:25,000. There are also maps of the entire country at 1:50,000 and 1:100,000 and archaeological maps at 1:250,000, showing all the main cites of antiquity, as well as tourist maps at 1:5,000 and 1:1,500.
Another major responsibility of the Center is concerned primarily with the production of national atlases of Jordan based on the maps produced by the Centre. Some of these products are the Climate and Agro-climatology of Jordan, deals with the country's climatic factors on a monthly, seasonal and annual basis and specifies the climatic requirements of different crops.

References:

- The Royal Jordanian Geographic Centre (RJGC): Link

1.2 National Census data

The National Statistical System (NSSJ) of Jordan aims at producing the statistical data that meet the current and evolving needs of national and international users in a transparent and timely fashion, using the best statistical practices.
The Department of Statistics (DoS) is an independent public authority that was

established in the late 1949 and assumed its activities in accordance with the Statistics Law No.24 for the year 1950 which identified its responsibilities and duties. The Department of Statistics, in conformity with up-to-date international practices and standards, conducts a long list of censuses and periodic sample surveys, in addition to collecting administrative data from their sources, and conducting non-periodic surveys.

The mission of (DoS) is to produce and disseminate timely and high-quality statistical data that meet the users' various and changing needs with a view to contributing to the comprehensive development process in Jordan. This mission was approached through maintaining standards that favor ably compare with those of the best international Statistics organizations and to develop into becoming a reliable national benchmark for high-quality statistics, in addition to following in the below values which will rule the National Statistical System of Jordan:

- Relevance of statistics for the different categories of users
- Impartiality
- Equal and user-friendly access to statistical data for all users
- Professional choice of methods
- Continuous enhancement of professional capabilities
- Efficiency of data collection and processing
- Transparency of methods and meta-data
- Prevention of misuse of statistics
- Respect for privacy and confidentiality of data
- Enhanced coordination of statistical activities within Jordan
- Use of international standards
- Continued international cooperation

Historical Background:

The (DoS) began its field and office work with a humble number of employees. During that period, basic statistical data covering the socio–economic aspects in the Kingdom had been produced. One of the most remarkable statistical activities conducted by the (DoS) was the first Housing Units Census in 1952, then the National Accounts Estimates in addition to the Statistical Yearbook.

While in the Sixties, the (DoS) conducted the first Population and Housing Units Census in 1961, in addition to the first Multi-Purpose Households Survey. It also issued many publications for the first time such as the Agricultural Statistics and the External Trade Bulletins. It also carried out the Households Expenditure Survey and constructed the Consumer Price Indices. The collected data were used to formulate the seven years socio–economic development program in Jordan (1964–1971).

In the seventies, the (DoS) focused its efforts on carrying out agricultural, industrial, labour forces, population and housing unit censuses in addition to sample surveys which covered households, demographic, social and economic topics. The (DoS) also implemented the National Fertility Survey for the first time.

The decade of the eighties witnessed the comprehensive coverage policy of the economic phenomena by conducting various Agricultural Surveys, the Disabled Survey, the Internal Migration and Returnees Survey. This decade was characterized by improving various economic statistics in accordance with the rules, standards and recommendations issued by the UN and other international organizations. New surveys were also added to the (DoS) activities such as the Constructions, Services and Commercial Establishments Survey.

The last decade of the previous century witnessed a big leap in information technology to facilitate the process of extracting the statistical data and

employing it in policy making, decision taking and carrying out specialized studies in various fields. During the same period, extensive efforts were made in forging links of cooperation and coordination with all national institutions which collect and use statistical data. It allowed saving time, efforts, and money. The (DoS) also assigned special importance on the process of statistical analysis since it believes in the futility of mere abstract figures.

During the first years of this millennium, the (DoS) has focused its efforts on enhancement of statistical capacity, including the infrastructures and human resources. It assigned special importance on enhancing statistical awareness among the public which is positively reflected on the quality of statistical products. It also worked on strengthening contacts with data users through employing all available means of communications for maintaining links of trust with them.

Jordan Statistical Database:

Jordan Info database Was created in the Department of Statistics using the *DevInfo* software. The database contains 222 indicators for the kingdom and the Governorates. These indicators covered 16 major sectors:

1. Demographics
2. Economics
3. Construction
4. Telecommunications and information
5. Education
6. Social Security
7. Travel
8. Women
9. Health
10. Societies and Syndicates
11. Nutrition
12. Energy
13. Agriculture
14. Housing and Households
15. Security and justice
16. Environment

The database covered the years 2000 -2009, used 305 sources of statistical publications, and the results of the surveys and censuses conducted by the department. The total number of statistical figures entered in the database was 15102.

Censuses:

Article 4B of the Law of General Statistics No. 8, of 2003, states that the Department of Statistics will conduct the following centennial censuses: The Housing and Population Census, The Agri-Census, The Industrial Census, and the Establishment Census. The aim of such censuses is to:

1. Provide detailed data on all "members" of the census community, whether such "member" is a household, economic establishment, agricultural holding, building, or dwelling.
2. Produce comprehensive data sets on the smallest geographic level.
3. Build a comprehensive frame (listing) to be used for sample design and drawing of samples for the various sample surveys.
4. Provide the foundation for Evidence-based Policy-making through detailed and comprehensive data produced by censuses.

References:

- The Department of Statistics: Link
- Jordan's National Statistical Strategy (2008-2013): Link

1.3	*Spatial data production distribution centers - sharing policies*

I. Organizations providing various spatial Data Sets

A. Lands and Survey Department

The Department of Lands & Survey owns reliable, comprehensive and accurate digital information which serves the objectives of maintaining, documenting, preserving and facilitating the use of the land property rights, and providing the data base necessary to build the national geographic information system.

Moreover, the Department of Lands and Survey plays a vital role in preserving land property rights and solving any conflicts concerning rights in land or water. DLS represents Jordan's land information bank.

Article 3 of the by-law (80) /1999 (organization of DLS) states that the duties and tasks of DLS should be the following:

1. Completion and maintenance of the cadastral system (the cadastral maps and the registration records), fixing the borders of the plots (parcels), settling (solving) disputes on land and issuing cadastral maps.
2. Registration of land property rights, maintaining them and facilitating their use.
3. Establishment and maintenance of triangulation networks of fourth and fifth orders, based on the national geodetic network, which was established and is maintained by the Royal Jordanian Geographic Centre (RJGC).
4. Processing property related transactions (sale, transfer, subdivision, partition, mortgage…etc). Determining and collecting land transfer taxes and fees.
5. Administering, protecting, renting, accrediting, and updating records of state land, as well as expropriation of land for public interest.
6. Establishing a comprehensive land valuation system, and maintaining its records for the purposes of registration transactions.
7. Archiving and maintaining land registry records
8. Establishing a Cadastral Information System (CIS), as part of the National Information System (NIS).
9. Organizing and carrying out the licensing of the private (chartered) surveyors, land valuers and real estate brokers.

B. Ministry of Tourism and antiquities

1. Department of Antiquities (DoA)

The c is an independent department within the Jordanian Government which is responsible for the implementation of archaeological policy in Jordan and the one that explore, conserve and monitor any tourism activities and services carried out by the private sector, and other governmental and non-governmental agencies in the archaeological sites. Moreover, (DoA) provides comprehensive information on archaeology and present assets in a manner that supports the national identity and serves the educational culture, while considering archaeological assets as a major factor for tourism attraction.

GIS serves as the primary tool for the (DoA) in its ongoing work to inventory, monitor, and manage Jordan's vast number of archaeological sites. In the process, it greatly facilitate the work of (DoA) leadership and

other staff, as well as Jordanian and international scholars, and, ultimately play an important role in preserving Jordan's archaeological treasures.

Following the above, (DoA) in corporation with the Getty Conservation Institute, and World Monuments Fund launched operation of the Middle Eastern Geodatabase for Antiquities, Jordan (MEGA–Jordan). MEGA-Jordan is a purpose-built geographic information system (GIS) to inventory and manage archaeology sites at a national level. It has been developed using state-of-the-art technology and requires no more than basic computer skills to enter site and site element boundaries and buffer zones; site details such as condition, threats, and other monitoring updates; and to print out detailed, up-to-date reports on Jordan's vast number of archaeological sites. The system, in both Arabic and English, is web-based and will standardize and centralize data throughout the Kingdom.

The fundamental design requirements identified for this new system include the following:

- The system is a map-based, Web-enabled inventory with access to data from all of DoA's regional offices.
- Have a user interface in both English and standard Arabic and be capable of handling data in both languages.
- The technical tools (i.e., software) used to build the system is a low-cost (or no-cost wherever feasible), open source, non-proprietary, and accessible both technically and financially by those who will need to support, maintain, and sustain the system for many years to come.
- The system is easy to use and not require extensive training for the general user—i.e., users need not be GIS experts.
- It has wide compatibility with similar systems of Jordanian national and local authorities, such as the Lands and Survey Department, city governments, and the like.
- The system allows the export of data that is fully compatible with other GIS tools such as Google Earth™, Quantum GIS, and ESRI's ArcView.
- The system includes the ability to record detailed data on monitoring of sites and site elements and archaeological surveys.
- It readily customizable to accommodate changes in practices that the (DoA) may make in the future.
- It ensures, wherever possible, consistent and valid entry of information.
- It provides the ability to prepare data electronically from the field.
- The system includes easy, instant reporting capabilities.
- All data is secure and appropriate back-up strategies need to be implemented.
- The system provides various levels of user access based on user roles—i.e., some users have full access to all data, while others only have read-access to certain areas of the database.
- The system is developed in such a way that the additions of tools to inventory, monitor, and help manage heritage buildings can be added without major redevelopment of the system.

References:

- Getty institute: Link
- MEGA Jordan: Link

C. Ministry of Public Works and Housing

The first nucleus of the Ministry of Public Works and Housing was founded in 1923 then called (Department of beneficial) and it seems that the name

was derived from the functions of this department; its work was useful to the community. In 1939 it was attached to the Department of Transportation, the Ministry of beneficial continued to work as a circle Departments of the Ministry of Transportation until the year 1954, where it became a special name and an independent entity and renamed the Ministry of Public Works.

Ministry's Functions:

- The development, preparation and implementation of plans and programs for the construction of road networks in the Kingdom and keep those roads constantly maintained.
- The development and implementation of a comprehensive plan for traffic safety capable to raise the level of security and provide advanced factors of traffic safety on the roads.
- Supervising the studies and designs necessary for the construction of road networks in the Kingdom.
- Applying the quality control on all road projects of the Ministry and conduct laboratory tests of construction materials.
- Conducting the research and theoretical and practical studies related to roads.
- Contributing with the other competent departments, institutions and bodies to the development and implementation of legislation relating to transport and maintain the roads.
- Managing the training programs for engineers and other professionals.
- Handling of the Jordanian Codes, circulation and publication thereof, and lay the foundations for the application of such codes through the National Building Council.
- Undertaking any other tasks assigned by the Council of Ministers.

References:

o Ministry of Public Works and Housing: Link

D. Ministry of Municipal and Rural Affairs

In 1965, The Ministry of Municipal Affairs was founded with the name of the Ministry of interior for Municipal and Rural Affairs. In 1976, The Ministry became The Ministry of Municipal Affairs (MMA).In 1980, The Ministry's name changed to The Ministry of Municipal, Rural & Environment Affairs. In 2002, the Ministry was renamed to The Ministry of Municipal Affairs after the Ministry of Environment was established.

Ministry's Functions:

- Establish, support and development of local councils.
- Preparation of urban studies within the scope of regional planning in order to achieve the desired organizational and residential status in terms of development and services.
- Preparation of the organizational structural charts for cities, villages and population groups as well as detailed charts for all cities and villages of the Kingdom and conducting the needed field surveys and studies.
- Following up international projects and programs related to developing the municipal work in Jordan.
- Enhancing cooperation between the Council of Ministers, other government bodies and the local councils.

References:

o Ministry of Municipal and Rural Affairs: Link

E. Greater Amman Municipality (GAM)

GAM was created to provide high quality municipal services of excellence and to focus on urban development in the capital of Jordan; Amman city. The Greater Amman Municipality GIS department has been supporting GAM in the speed up of the delivery of local government services

The idea of creating a geographic information system for the Greater Amman, in the interest "of Greater Amman Municipality on the development of methods to obtain information, and follow up the evolution of science and technology for the development and improvement of the overall planning, and improved methods of coordination between departments Secretariat, by providing a base of information shared between departments Secretariat and relevant institutions services within the boundaries of the Greater Amman Municipality.

More recently happened to become the structure of the unit circle and moving the management process of decentralization and central to that by giving the use of equipment and services unit of the beneficiaries of the geographic information system.

References:

Greater Amman Municipality (GAM): Link

F. Natural Resources Authority (NRA)

This authority is a department that belongs to the Ministry of Energy and Mineral Resources. (NRA) develops and harness Jordan's extensive energy and mineral resources. A regulator and also an instigator issuing permits, undertaking studies and attracting investors also they have a vast experience with international investors offering technical data, incentives and an open door policy.

It has conducted highly technical and geotechnical studies and geological mapping at different locations as Petra and Kerak, there were different standard procedures for environmental and cultural resources impact assessments for feasibility studies and to measure effects of any proposed projects on different resources, this authority has signed a cooperation agreement with the Department of Antiquities for such purposes.

Objective of (NRA)

- Use and follow up the latest development in information technology to build in house information management systems and to provide NRA's departments with the latest hardware, software and geographical information systems (GIS) services needed to support their projects and activities.

Tasks of (NRA)

- Provide, maintain and update hardware, software and infrastructure associated with IT and provide technical support services.
- Build a geographical information database and create various mapping products using GIS and Remote Sensing systems to support and assist NRA with its technical projects.
- Computerize NRA's information and activities by building in house information management systems.

Divisions

- Computer Division
- Geographical Information Division
- Programming & Systems Division

References:

o Natural Resources Authority (NRA): Link

G. Ministry of Agriculture

1. National Agricultural Information System (NAIS)

National Agricultural Information System (NAIS) is a national platform for Information dissemination and knowledge sharing and exchange for Agricultural Research and Development (ARD) for target groups and stakeholders in Jordan.

Objectives of (NAIS):

- To strengthen the capacity of the Ministry of Agriculture and other stakeholders to establish an effective and efficient information system that will support agricultural development and ensure food security in Jordan, based on the needs and demands of its stakeholders and integrating the various resources in the (MOA).
- To serve as an information and knowledge repository/exchange mechanism at the national level and a gateway to the national knowledge systems for Agricultural Research and Development (ARD) in Jordan, aiming for strengthening, coordinating, and adding value to initiatives by national programs and regional organizations in order to increase agricultural production and improve food security for the benefit of improving performance of farmers and agrarian businesses.

Reliable agricultural information constitutes a corner stone in the planning of agricultural development and formulating relevant policies. The availability of this information is critical in order to enable those involved in the agricultural sector, whether they are individuals or institutions, to make decisions on valid and scientific bases.

The common vision derived from the mentioned above was to establish a National Agricultural Information System (NAIS) that would strengthen and improve agricultural information generation, management, dissemination and exchange for policy-makers, senior managers and national stakeholder groups, using web-based applications and tools. In particular, the envisaged (NAIS) was expected to assemble and make accessible information that would:

- Support policy and decision-making in relation to national planning.
- Provide the basis for monitoring and assessing agricultural production and development.
- Support research and development, and disseminate the outputs.
- Support extension services.
- Provide an institutional memory for the (MOA).

The development of a relevant, effective and harmonized National Agricultural Information System (NAIS) is expected to lead (MOA), (NCARE) and other ministries/stakeholders to the following outcome:

- Improve the capacity to access and exchange information, and to convert it into useful knowledge, as it is very essential for the development objectives of poverty eradication, food security, sustainable development and increased productivity and competitiveness; and
- Preserve needed resources, make maximize use of the results of other projects and database applications, prevent redundancy and duplication of data and efforts, and ensure maximum co-ordination among various agricultural institutes, programmes and personnel for the benefit of agricultural development and food security.

The following groups of stakeholders in the (NAIS) were identified in a preliminary way, and it was recognized that these groups and their needs and demands needed to be further defined:

- Policy-makers in agriculture and rural development, especially in the (MOA).
- Department heads and professional technical officers within the (MOA).
- Other Ministries related to rural development.
- Universities and colleges with agriculturally-related faculties and departments.
- Farmers' and producers' organizations.
- Credit and marketing associations and Chambers of Commerce.
- Private sector involved in agricultural and rural development.
- Non-Governmental Organizations involved in agricultural development and food security.
- Regional and International Organizations involved in agricultural development and food security.
- General Public.

The development of the (NAIS) shall be underpinned by the establishment of the necessary management bodies and organizational structures that offer flexibility and adaptability, so that the (NAIS) can respond to the rapidly changing environment of information systems and technologies.

H. Public Security Diractrate-Command & Control Center

The public security directorate was so much aware in realizing the importance of command and control system and knowing its role in raising work efficiency and doubling the capacity to deal with incidents and events. Therefore, since the early eighties of the last century it started working on a system which was considered one of the best systems in the region at that time. That system was built on a structure of administrative leadership in the public security enabled the distribution of tasks and duties, competencies and business management effectively. Besides, that system was supported by a group of modern technologies most importantly, networks of telecommunication and information systems concerned, which covered all of its services throughout the kingdom. This center for command and control equipped as one of the main public security directorate's buildings.

Objectives of Command & Control Center:

The public security directorate aimed through applying the command and control projects to contribute in achieving the strategic objectives which are adopted in the public security includes the following:

- Decreases the rate of crimes and the fear of them, promote a sense of security and safety of members in the community.
- Reduces the traffic accidents proportion and control roads security effectively and efficiently.
- Raise the efficiency of human resources and develop them at all levels to become professional and highly skillful.
- Strengthen and modernize the administrational and technical parts of the public security directorate and updating its infrastructure.
- Use a strategic approach to achieve the goals efficiently and effectively.

References:

o **Public Security Diractrate-Command & Control Center: Link**

I. Ministry of Environment

Ministry of Environment seeks to improve and maintain the quality of the Jordanian environment and to preserve the natural resources and to achieve the sustainable development through the creation and development of policies, legislations and strategies as well as effective monitoring programs and the inclusion of environmental concepts in the national development plans.

Strategic Goals:

- Help in achieving sustainable development: Development and application of suitable policies, mechanisms and executive tools which link and promote the connection between the environment protection and the economic welfare and contribute to the inclusion of environmental concepts into the national development plants.
- Creation and implementation of effective policies, strategies and legislations to preserve and protect environment.
- Strengthening and development of inspection and monitoring programs and mechanisms and enforcement of laws and regulations to reduce the negative impacts on the environment.
- Creation of comprehensive information management programs in order to take appropriate decisions through collection of environmental information and the publication and analysis thereof.
- Dissemination of environmental education and raising the general public awareness in environment protection as well as the inclusion of environmental concepts in the various educational means.
- Support the cooperation with the relevant national, regional and international parties and to maintain clear and effective communication channels with them in order to realize the Ministry's vision and to achieve its mission.
- Promotion and development of the Ministry's resources to perform its functions and to implement its mission and realize its vision.

References:

o Ministry of Environment: Link

J. Aqaba Special Economic Zone Authority (ASEZA)

The Aqaba Special Economic Zone was inaugurated in 2001 as a bold and timely initiative by the government of Jordan to ensure that Aqaba's commercial and cultural prominence continues into the twenty – first century. With this transformation, Aqaba is recalled ASEZ pouring its historical role as a regional hub for trade, tourism, and culture. ASEZA is the financially and administratively autonomous institution responsible for the management, regulation, and the development of the Aqaba Special Economic Zone ASEZ. Six ministerial – level commissioners, each responsible for a major area of regulatory or operational activity, govern the ASEZ.

Aqaba Special Economic Zone Authority (ASEZA) gets its substantial values from the basic goals and objectives of its establishment. It is an advanced authority characterized by excellence and development. ASEZA represents a model of competent Jordanian institutions and achieves its goals effectively and efficiently equivalent to similar international institutions.

References:

o Aqaba Special Economic Zone Authority/Strategic Plan| 2007-2010: Link

K. Royal Scientific Society

The Royal Scientific Society (RSS) is the largest applied research institution, consultancy, and technical support service provider in Jordan and is a regional leader in the fields of science & technology.
RSS provides expert testing services via over 25 specialized locally & internationally accredited laboratories and prides itself on offering both the public and private sectors a unique scientific resource and a wide range of project expertise. Supported by more than 500 science specialists, researchers, technical support staff, highly skilled management, and faculty, the RSS has truly become recognized as a local, regional and international research and development hub.
The Information and Communication Technology (ICT) for Development Cluster, is one of the main technical arms of The Royal Scientific Society, its role is to conduct R&D in ICT yielding to products for commercialization locally, regionally, and internationally. The Information & Communication Technology (ICT) for Development cluster was founded in 1972, two years after the establishment of the Royal Scientific Society (RSS).ICT for Development cluster is committed to maintaining well-performed applied research and specialized technical consultation and services based on approved national and international standards, procedures and methods of software development and studies, ICT for Development cluster has been ISO 9001 certified since January 2001.

References:
o Royal Scientific Society: Link

L. The Ministry of Water and Irrigation / Water Authority of Jordan/Jordan Valley Authority

Three organizations are directly responsible for the water sector in Jordan: the Ministry of Water and Irrigation (MWI), the Water Authority of Jordan (WAJ), and the Jordan Valley Authority (JVA).
The MWI was established in 1992 (By-law No.54/1992) and became the official body responsible for the overall monitoring of the water sector, water supply and wastewater system and related projects, planning and management, the formulation of national water strategies and policies, research and development, information systems and procurement of financial resources. Its role also includes the provision of centralized water-related data, standardization and consolidation of data. The establishment of the (MWI) came in response to Jordan's recognition of the need for a more integrated approach to national water management.

The Minister of Water and Irrigation is the head of both organizations (WAJ) and (JVA). Each of these organizations has its own organizational structure, responsibility, and mission.
(WAJ) is responsible for developing, conserving, protecting and managing all water resources and sewerage projects. No official or local person or party is permitted to carry out any works related to water and sewerage of any nature, if these works are considered to be within the sole responsibility of (WAJ) under the respective law (WAJ Law No.18-1988) and the regulations issued in accordance with it, except after obtaining the Minister's written approval.
(JVA) is responsible for all activities within (JVA) boundaries including water, irrigation, construction work, etc. No ministry or government or semi-government agency is allowed to perform water and irrigation construction

activities in the Jordan Valley without permission from the (JVA) except for operation and maintenance activities. Moreover, no person is allowed to establish in the Valley any private buildings or structures of any kind for any purpose before obtaining a license from the (JVA). The only exceptions are the land irrigation works and the buildings and structures under construction before the effective date of the law. As for buildings and structures within the municipal boundaries, they shall be licensed in coordination with the concerned municipality.

References:
o The Ministry of Water and Irrigation: Link

II. Type of data

Royal Jordanian Geographic Centre (RJGC) has the most completed spatial data collection in Jordan which includes: Topographic maps in various scales, Tourist maps, Miscellaneous Maps, Thematic Maps, Wall Maps, Aerial Photos, Satellite Images and atlases. More detailed information on these types of data can be found on the following Link.

Software:

- ERDAS
- ArcGIS v10
- PCI v10

III. Royalties - Usage Restrictions

Sharing maps of Jordan publicly and free of charge can be illegal per the article (3) of the Law (18) of 1986 under information security clauses which is entrusted to the (RJGC) only. Moreover, there are sets of restrictions on the access to specific types of data for security issues "confidentiality".

1.4 *Use of Spatial Information in local decision making processes*

The projects on development planning, in regional and local level, are based in standard required data, that is:

DATA	PROVIDER
Base map "parcels"	Department of Lands & Survey(DLS)
cadastral map	Department of Lands & Survey(DLS)
ownerships map	Department of Lands & Survey(DLS)
Topographic map "Terrain contour lines"	Royal Jordanian Geographic Centre ((RJGC))
Aerial Photos	Royal Jordanian Geographic Centre ((RJGC))
Satellite Images	Royal Jordanian Geographic Centre ((RJGC))
Administrative boundaries	Royal Jordanian Geographic Centre ((RJGC))
Hydrological information	Ministry of Water and Irrigation (MWI)
Land use	Ministry of Municipal Affairs(MoMA)
Road network	Ministry of Municipal Affairs(MoMA)
Electricity network	National Electric Power Company
Archaeological Sites and Monuments	Department of Antiquities ((DoA))
Agricultural information	Ministry of Agriculture
Natural areas	Natural Resources Authority (NRA)
Mines	Natural Resources Authority (NRA)
Demographic information	Department of Statistics (DOS)
Transportation network	Land Transport Regulatory Commission (LTRC)

Most of these data is available to public agencies while it is limited to individuals and private agencies. Moreover, The projects in National level, besides the above mentioned data, possibly be require additional information to be specified in each

case.

1.5 *Relevant national institutes, contact points*

Table 1. Relevant national institutes, contact points

Distribution Center	Contact Info	Data Availability	Sharing policy	Data costs	Metadata
Royal Jordanian Geographic Centre (RJGC)	Link	Off-line	Sold	Starting from 0.5€ to 10,000€	YES
Department of Lands & Survey (DLS)	Link	Off-line	Sold	4.5€ per sheet hard copy 7.5 € per sheet soft copy	YES
Ministry of Planning and International Cooperation (MoPIC)	Link	Off-line	Sold	N/A	YES
Ministry of Information Technology and Communication (MoICT)	Link	Off-line	Sold	N/A	YES
Ministry of Water and Irrigation (MWI)	Link	Off-line	Sold	N/A	YES
Ministry of Interior Affairs(MOI)	Link	Off-line	Sold	N/A	YES
Ministry of Municipal Affairs(MoMA)	Link	Off-line	Free	N/A	YES
Public Security Directorate (PSD)	Link	Off-line	Sold	N/A	Yes
Natural Resources Authority (NRA)	Link	Off-line	Sold	N/A	YES
Greater Amman Municipality (GAM)	Link	Off-line	Sold	N/A	YES
Aqaba Special Economic Zone Authority (ASEZA)	Link	Off-line	Sold	N/A	YES
Department of Statistics (DOS)	Link	On-line	Free	N/A	YES
Ministry of Public Works and Housing (MoPWH)	Link	Off-line	Sold	N/A	YES
Ministry of Tourism and antiquities (MoTA)	Link	Off-line	Free	N/A	YES
Department of Antiquities (DoA)	Link	Off-line	Free	N/A	YES
Royal Scientific Society (RSS)	Link	Off-line	Sold	N/A	YES
Ministry of Agriculture	Link	Off-line	Sold	N/A	YES
National Electric Power Company	Link	Off-line	Sold	N/A	YES
National Centre for Agriculture Research and Extension (NCARE)	Link	Off-line	Sold	N/A	YES
National Broadband Network Project (NBN – MoICT)	Link	Off-line	Sold	N/A	YES
Land Transport Regulatory Commission (LTRC)	Link	Off-line	Sold	N/A	YES

1.6 Beneficiaries of ongoing or completed EU/national/regional projects

EU-Funds that were allocated for projects related to GEOSPATIAL INFORMATION

SYSTEMS in Jordan are very limited. Two main projects were found in this scope:

Table 2: Beneficiaries of ongoing or completed EU/national/regional projects

Project Title	Beneficiary	Web Site	References
Enhancement of the Cadastral System in Jordan	Department of Lands & Survey(DLS)	N/A	Link
HELAND "Promoting socio-economic sustainable development through innovative technological actions for Mediterranean tourism-heritage and landscapes protection clusters"	University of Malta - Institute for Tourism, Travel and Culture.	N/A	Link
MED-ROUTE" promotes thematic tourism and mobility in the Mediterranean"	Region of StereaEllada (Greece, StereaEllada)	Link	Link

2. Data – Applications

2.1 National Spatial Data Infrastructure (NSDI)

The National Spatial Data Infrastructure (NSDI) is a system which allows direct access to all available digital geo-information across the country, through the internet. Every organization in Jordan its own database but there is no National GIS database Including a full list of all available geo-data and services (geo-portal).

Moreover, institutions face difficulties either with accessing new technology or in adjusting to new ways of doing things, the challenge of showing and proving the benefits of using SDI can only be addressed through continuous awareness building. Furthermore, in order to achieve the business results from the Jordan SDI project, the project must have an awareness raising program aimed at all of the individuals, partners, and potential users of the project.

"In 2006, the Ministry of Information and Communications Technologies (MoICT) commissioned Bearing Point to produce a National GIS Strategy. A ministerial committee was established to assist the study team in directing this effort. The final report of the study constitutes a milestone and a solid base for Jordan in its ambitious plans to establish a national SDI.

The Ministry of Information and Communications already produces regular monitoring reports to management and this new SDI initiative would have its targets and a database will contain the necessary data for project monitoring.

That's because a well designed monitoring and evaluation system is important for any program's successful implementation and SDI is no exception."

In Jordan, there are a number of global drivers and trends that will impact the development and use of the Jordanian SDI. These include:

- New methods of communication: an SDI is really the integration of two new technologies that are already or are becoming main stream. These technologies are the Internet and digitized maps. The use and benefits of these two combined technologies will help Jordanian agencies communicate spatially.
- Social changes: civil society in Jordan and elsewhere is changing in that it is demanding more information and accountability from its government. The Jordanian SDI will help the Government of Jordan provide timely and accurate information to the population.
- The effect of globalization: as with the internal social changes in Jordan, external pressures exist from its neighboring countries to share and exchange data (particularly environmental data) for their edification and protection. This kind of data sharing was a significant driver for the INSPIRE initiative in

Europe. The Jordanian SDI will allow true geospatial interoperability at a local, national, regional and global scale.

- Institutional transformation: there is no better way to transform a bureaucracy than to give it a new mandate or project. This allows organizations to grow and transition to support the new requirement. The Jordanian SDI will allow several Jordanian governmental organizations to change their service delivery model.
- Business opportunities: as the Jordanian SDI develops and becomes another information tool, this will spur entrepreneurial opportunities through the provision of computers, computer services, communications services, Internet equipment and services and consulting. New well paying positions will be created with associated economic spinoffs.
- Institutional alignment: the development of the JSDI will compel cooperation between the MDAs and help break down some of the government "solos". Through cooperation and sharing, the MDAs will be able to accomplish much more than they could individually.

JSDI Web Services include but are not limited to:

- Public Web Services accessed via a Geospatial portal:
  - Data Catalogue
  - Data Search
  - Data Viewer
  - Data Downloader
  - Data Analyzer
  - Others
- Back-Office Web Service
  - Web Map Service (WMS)
  - Web Feature Service (WFS)
  - Web Coverage Service (WCS)
  - Others
  -

Table (3): National Spatial Data Infrastructure

Applications/studies	Digital or Hardcopy	Format (if Digital)	Metadata
Agriculture	Digital and hardcopy	Vector, raster	Yes
Confines	Digital and hardcopy	Vector, raster	Yes
Climatology/Meteorology/Atmosphere	Digital	Vector, raster, database, excel files	Yes
Economy	Digital	Vector	Yes
Altimetry	Digital and hardcopy	Vector, raster	Yes
Environment	Digital and hardcopy	Vector, raster, database, excel files	Yes
Geoscientific information	Digital and hardcopy	Vector, raster	Yes
Health	Digital and hardcopy	Vector	Yes
Orthoimagery/basemap/land cover	Digital and hardcopy	Vector, raster	Yes
Military information	Digital and hardcopy	Vector, raster	Yes
Inland waters	Digital and hardcopy	Vector, raster	Yes
Geographical position	Digital and hardcopy	Vector, raster	Yes
Seas	Digital and hardcopy	Vector, raster, database	Yes
Spatial planning/Cadastre	Digital and hardcopy	Vector, raster, excel files	Yes

Society	Digital	Vector	Yes
Construction	Digital and hardcopy	Vector, raster, excel files	Yes
Transportation	Digital and hardcopy	Vector, raster	Yes
Public services/Communications	Digital and hardcopy	Vector	Yes

References:

- Feasibility Study For A National Spatial Data Infrastructure In Jordan: Link
- World Bank Report: Link

2.2 National Census

The Jordanian National Statistical System (NSS) is largely managed by (DoS)in line with the UN Fundamental Principles of Statistics (UN FPOS) and with the aim to achieve full observance of recognized best statistical practice in all dimensions of data quality.
The (DOS) manages the Jordan Info Database, which was created using the DevInfo software. It includes 222 indicators, covering 16 sectors: demographics, economics, construction, telecommunications and information, education, social security, travel, women, health, enterprises and trade unions, nutrition, energy, agriculture, housing and households, security and justice, environment. The database is based on statistical publications and results of surveys and censuses conducted by DOS. The database has been published on a CD and is available on the website of the Department of Statistics. (Link to the source of Data)
Moreover, (DoS) has a web GIS that contains the national Census data for Jordan. These data can be accessed on the following Link.

2.3 Processing capability of Spatial data

Based on the mentioned above there are many governmental bodies and organizations that produce, manage and maintain spatial data in Jordan on all levels; locally, nationally and regionally. And the most active or major stakeholders are: (DLS, RJGC, GAM and NRA) which are the core spatial data provider institutions in Jordan (but not limited to). More details about those organizations are shown above in section (1.3).

2.4 Spatial data collection capability

The Royal Jordanian Geographic Centre (RJGC) is the national agency in Jordan that is responsible for providing national spatial data collection; including aerial photographs, satellites images, ortho-photo maps and other types of data that meets the needs of Jordan and other Arab countries (more details about these data are shown in 1.3, part II).

Table (4): Organizations delivering Aerial Photography

Organization	Type-Of Organization	Data Type	Delivery Time	Cost	Royalties
The Royal Jordanian Geographic Centre (RJGC)	Public	Aerial photograph	N/A	N/A	Reserved
Department of Lands and Survey	Public	Aerial Photograph*	N/A	N/A	Reserved

*Only hard copy

(RJGC) is the national leader in the field of maintaining and managing the positioning services using GPS (the Global Positioning System).
(RJGC) recently has obtained hardware and software that can transform aerial photographs to computerized and digital ones, in addition to the analysis capabilities which can help in the disclosure of natural resources, inferred of buried archeological remains and others. Additionally, the center has advanced global position system (GPS) which is linked to Satellites to determine the coordinates and geographic information system (GIS), as well as digital mapping tools and remote sensing.
Currently there is a project in Jordan to transform the satellite communication dish in the Baqa' area near Amman city to a large telescope (Millimetric Radio Observatory). This telescope will be used for radio astronomy meteorology, radio communications, studying the continental drift, earthquakes and natural disasters prediction as well as the importance of including Jordan and the Arab countries within the developed countries in astronomical field by linking it to the Global European Network (VLBI) to complement the global network.

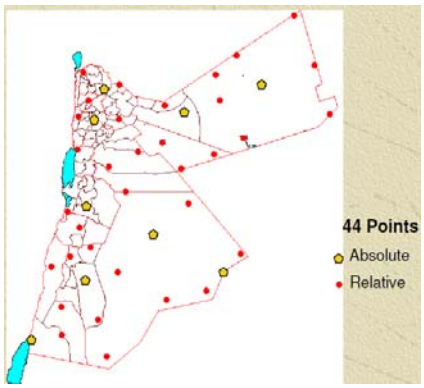


Figure (1): GPS Network in Jordan

The geodynamic GPS project JOGA (JOrdanian GPS Activities):
The Dead Sea region is a unique natural laboratory and provides an excellent opportunity to study fundamental geodynamic processes on a variety of scales. It allows studying the geometry of upper crustal faulting, the mechanics of and asperities in the seismogenic zone, the formation, growth and subsidence of pull-apart basins, as well as how the surface deformation extends to the lower crust and even into the lower lithosphere.
One of the key projects in Jordan is the GPS project JOGA (Jordanian GPS Activities). The primary aim of the GPS observation is the detection of the present day deformation field along the Dead Sea Fault System.
Of utmost importance for the GPS project was the thorough and careful reconnaissance and monumentation of 27 campaign-style GPS sites all over Jordan that are meanwhile extended to 46 sites including 4 continuously recording GPS stations in Amman, Ma'an, Ashquf, and in Al-Bayer, respectively. This task was performed by experts from NRA and GFZ in May 2005. The markers for three permanent GPS stations are installed on the roof of the cartography building of NRA in Amman, at the new building of NRA center in Ma'an, and on the new roof of the civil defense in Ashquf. The permanent site in Al-Bayer is a joint installation of German (GFZ), French (IPG) and Jordanian (NRA) partners.
The successful fourth re-observation of the JOGA network was performed in November/December 2010. Throughout the campaign, 7 observation teams

observed simultaneously during 5 sessions whereby each session lasted 3 days. At least 65 hours of high quality GPS data were collected at all sites. The data of the first three re-observations have been processed already and show good accuracies. The preliminary result is shown in the figure below.

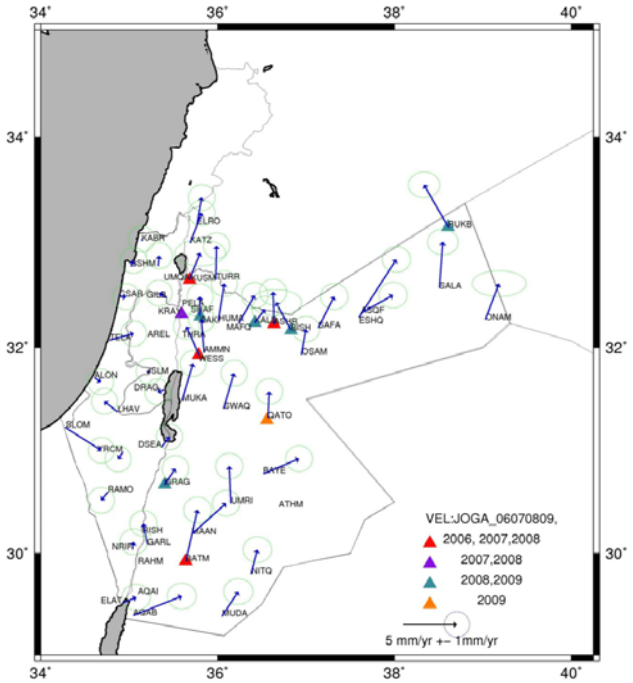


Figure (2): Velocities in Jordan estimated from the re-observation campaigns in the JOGA network during the years 2006-2009

All sites are now equipped with a special PC and the sites in Amman and Ma'an are connected to the Internet. Although permanent installations are more expensive than episodic campaign surveys, they provide site motions at the highest precision and are especially suited to observe transient deformation. In addition, it is indispensable to connect the campaign-mode observations with data from a number of continuously recording sites that should be either inside the investigated area and/or as close as possible to the campaign sites. Continuously observing GPS-stations are crucial for the detection of transient as well as secular trends in surface displacements.
More about the Global positioning systems (GPS) companies in Jordan can be found on the following Link.

References:

- Royal Jordanian Geographic Center: Link
- Global positioning systems (GPS) in Jordan: Link
- Geodynamic GPS project JOGA: Link

2.6	*Level of conformation with the EU INSPIRE Directive*

- Poor or zero level of conformation with INSPIRE Directive.

3. Capacities

3.1	*National budget allocation to Spatial Information*

For the year 2014 (2,413,213 EUR) has been allocated to the (RJGC) as a total

budget to Provide maps, sketches, and comprehensive geographical and survey databases for alldefence, development, and economic requirements in Jordan (Link).

Table (5): Budget of Jordan Royal Geographic Center For the Year 2014 Distributed According to Program

(InJDs)

Prog.	Description	Current Expenditures	Capital Expenditure	Total Expenditure
1301	Administration and Support Services	1,867,000	28,000	1,895,000
1305	Production of Maps and Charts	0	472,000	472,000
	Total	1,867,000	500,000	2,367,000

3.3 *Funding initiatives and participation to research programs*

(RJGC) is hosting "The UN Regional Centre for Space Science and Technology Education for Western Asia" since 2012 in cooperation with Jordan Meteorological Department, Al al-Bayt University and Jordan University of Science & Technology.
The Center grants Master degree in Remote Sensing, GIS, Satellite Communications, Space Sciences and Astronomy and Meteorology, in addition to short and long-term courses in these areas which lasts 3-9 months.
The main objective of the Centre is to develop the skills and knowledge of university students and scientists in research through the theory and applied programs which can contribute on the local and regional development of their countries. As well as strengthening the capacity of Member States, regionally and internationally in various branches of science and technology education with a focus on remote sensing and geographic information systems, satellite communications, satellite meteorology and space science.
This center is distinguished from the other regional centers in that it is the only one that teaches in Arabic, so it will serve countries in the Arab region, particularly in the field of space technology.

Courses Held at (RJGC):

- Basic Remote Sensing
- Advanced Remote Sensing
- Basic Geographic Information System (GIS)
- Advanced Geographic Information System (GIS)
- ArcScan
- Spatial Analyst
- 3d Analyst
- Watershed and Hydrology
- Aerial Photo Interpretation & Map Reading
- Basic Survey
- Advanced Survey
- Total Station
- Global Positioning System (GPS)
- "Qibla" Determination
- Cadastral Surveying
- Photogrammetry
- Cartography
- Geographical Names

References:

- Royal Jordanian Geographic Center: Link.

3.4 *Dedicated undergraduate, graduate programs, training centers*

Table(6): Dedicated undergraduate and graduate programs, curricula and personnel – Relevant

Institution	Department	Classes	Undergraduate program	Graduate program	Training	Personnel	Website	Curricula
Royal Jordanian Geographic Center (RJGC)	The UN Regional Centre for Space Science and Technology Education for Western Asia	Core	No	Yes	Yes	12	Link	Link
The University of Jordan (UJ), Science Faculty	Geology	Core	4 years	Yes	Yes	1*	Link	Link
The University of Jordan (UJ), Art Faculty	Geography	Core	4 years	Yes	Yes	4	Link	Link
The University of Jordan (UJ), Faculty of Engineering and Technology	Civil Engineering	Elective	5 Years	Yes	Yes	1	Link	Link
The University of Jordan (UJ), Faculty of Agriculture	Land Water andEnvironment	Elective	4 Years	yes	yes	3	Link	Link
The University of Jordan (UJ), Water , Energy, Environment Center	--	--	No	No	Yes	3	Link	Research and training only
Yarmouk University, Faculty of Art	Geography	Core	4 Years	No	Yes	3	Link	Link
Yarmouk University, Faculty of Science	Earth Sciences and Environment	Core	4 years	Yes	Yes	3	Link	Link
Yarmouk University, Hijjawi for Engineering and Technology	Civil Engineering	Elective	5 yeras	No	Yes	Non	Link	Link
Jordan University of Science and Technology (JUST), College of Architecture and Design	Urban Planning	Core	5 years	YES	YES	1	Link	Link
Jordan University of Science and Technology (JUST), College of Architecture and Design	Architecture	Elective	5 years	YES	YES	1	Link	Link
Jordan University of Science and Technology (JUST), Faculty of Engineering	Civil Engineering	Core	5 years	Yes	Yes	3	Link	Link
Jordan University of Science and Technology (JUST), Faculty of Agriculture	Natural resources and Environment	Core	4 years	Yes	Yes	4	Link	Link
The Hashemite University, Faculty of Engineering	Civil Engineering	Elective	5	Yes	Yes		Link	Link
The Hashemite University, Faculty of Engineering	Architecture Engineering	Elective	5	No	Yes		Link	Link
The Hashemite University, Faculty of Natural Resources and Environment	Environment and Earth Science	Core	4	Yes	Yes	2	Link	Link
The Hashemite University, Faculty of Natural Resources and Environment	Lands Management and Environment	Core	4	No	Yes	*1	Link	Link
The Hashemite University, Faculty of Natural Resources and Environment	Water Management and Environment	Core	4	No	Yes	1*	Link	Link
The Hashemite University, Queen Rania Institute of Tourism & Heritage	Department of Cultural Resources and	Core	4	No	Yes		Link	Link

	Museology							
The Hashemite University, Queen Rania Institute of Tourism & Heritage	Conservation Science	Core	4	No	Yes		Link	Link
Al-al Bayt University (AABU), Faculty of Engineering	Surveying Engineering	Core	5 years	No	Yes	2	Link	Link
Al-al Bayt University (AABU), Institute of Earth and Environmental Sciences	Earth and Environmental Science + Geographic Information System and Remote Sensing	Core	4 years	No	Yes	2	Link	Link
Al-al Bayt University (AABU), Institute of Earth and Environmental Sciences	Geographic Information System and Remote Sensing	Core	4 years	NO	Yes	Non	New Program	
Al-Balqa Applied University, Faculties of central, Faculty of Engineering	Surveying & Geomatics Engineering	Core	5	Yes	Yes	1	Link	Link
Al-Balqa Applied University, Faculty of Agricultural Technology	Water Resources and Environmental Management	Elective	4	No	Yes	1	Link	Link
Al-Hussain ben Talal University College of Engineering	Civil Engineering	Elective	5	No	Yes		Link	Link
Al-Hussain ben Talal University College of Engineering	Mining Engineering	Elective	5	No	Yes		Link	Link
Al-Hussain ben Talal University College of Engineering	Environmental Engineering	Core	5	No	Yes		Link	Link
Al-Hussain ben Talal University Petra College for Tourism and Archaeology	Archaeology	Core	4	No	Yes		Link	Link
Tafila Technical University College of Engineering	Geological Engineering	Core	5	No	Yes		Link	Link
German Jordanian University The School of Natural Resources Engineering and Management	Water & Environmental Engineering and its Management	Core	5	Yes	Yes		Link	Link
German Jordanian University School of Architecture and built Environment	Architecture	Elective	5	Yes	Yes		Link	Link
Middle East university, Faculty of Engineering	Civil engineering	Elective	5	No	Yes		Link	Link
Middle East university, Faculty of Engineering	Civil engineering	Elective	5	No	Yes		Link	Link
Philadelphia University, Faculty of Engineering	Architecture Engineering	Elective	5	No	Yes		Link	Link
Philadelphia University, Faculty of Engineering	Civil engineering	Elective	5	No	Yes		Link	Link
Isra University, Faculty of engineering	Civil Engineering	Elective	5	Yes	Yes		Link	Link
University of Petra, Faculty of Architecture and Design	Architecture	Elective	5	No	Yes		Link	Link
Jerash University	Civil Engineering	Elective	5	No	Yes		Link	Link

* Joint appointment

REFERENCES AND USEFUL LINKS

http://data.worldbank.org/country/jordan

http://www.(RJGC).gov.jo/Default.aspx?lang=en
http://www.dos.gov.jo/dos_home_e/main/
Jordan's National Statistical Strategy (2008-2013):
http://www.dos.gov.jo/dos_home_e/main/linked-pdf/JordanStrategyDraft.pdf
http://www.getty.edu/conservation/our_projects/field_projects/jordan/
http://www.megajordan.org/
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http://www.infodev.org/articles/feasibility-study-national-spatial-data-infrastructure-jordan

PART A. CURRENT STATUS OF GEOSPATIAL INFORMATION IN LOCAL MANAGEMENT	
1. Policies	
1.1	*National policies and implementation*

Directorate of Geographic Affairs (DGA) affiliated to the Ministry of Defence in Lebanon is responsible of handling the national geospatial data based on the law of 29/7/1963 amended by the Memorandum number 24/2007 decreed by the Presidency of the Council of Ministers, whilst the Central Administration of Statistics (CAS) is in charge of the collection, processing, producing and disseminating social and economic statistics at the national level based on the Law No 1793/79.
The Center for Remote Sensing (CRS) was established by the Lebanese National Council for Scientific Research (CNRS) in 1995 and became fully operational in 1997. This came as the culmination of a focused effort to catch up with recent advances in remote sensing and GIS technology.
The Prime Ministry created on 2002 the National GIS Committee (decree 78/2002) including DAG, CRS-CNRS, Ministry of Agriculture, Ministry of Environment, Ministry of Public Work, Ministry of Post and Telecommunications, Ministry of Energy and Water, Ministry of Finance and Ministry of Health. The National GIS committee was assigned to develop the national spatial data information system and to create the national geoportal (www.gislebanon.gov.lb).
General Directorate of Cadastral Affairs affiliated to the Ministry of Finance is responsible for the compilation and establishment of the National Cadastre for the country.
Ministry of Agriculture is in charge of the collection and procession of agriculture census. Ministry of Health is in charge of the collection and processing of health facilities. General Directorate of Urban Planning (DGUP) is in charge of land use planning. Ministry of Water is in charge of National Water Information System. Ministry of Environment is in charge of collection of geospatial data about forest fire and protected areas.
Geo-spatial data and information in Lebanon have been recently adopted in several governmental institutions at various levels. Some of this data are still on-processing to be converted from hard copies into digital form. Nevertheless, each of these institutions has its own geospatial database and information, which are mainly produced by expertise from other specialized entities. There is no policy on the national level for geospatial data implementations. However, each institution has its own policy for data accessibility and sharing, which are almost limited. In other words, each institution is working independently and yet there is still a lack for data convey and exchange between these institutions unless joint works are carried out.

1.2	*National Census data*

Given the absence of comprehensive population surveys, and with the last census held in 1932, sample studies provide the only option for estimating the number of residents in Lebanon, as well as to identify their demographic, health, immigration and other characteristics. Moreover, population surveys are not periodic and depend each time of international funds. Source of data is mainly from Lebanese Central Administration of Statistics (CAS), the National Council for Scientific Research (CNRS), Ministry of Social Affair and Ministry of Health.1960's: First Agricultural Census in Lebanon; 1970 : Agricultural census on sampling basis; 1980: Survey on Livestock by MOA; 1998/1999: General Agricultural Census (FAO); 2012 to check General Agricultural Census.

1.3	*Spatial data production distribution centers - sharing policies*

A. I. Organizations providing various spatial Data Sets

1. Ministry of Defense

Directorate of Geographic Affairs

The most complete and updated topographic map and aerial photos collection is available from the Directorate of Geographic Affairs (DGA). All kinds of basic maps in paper and some EO products in various scales may be found and purchased. A detailed pricelist of the mapping data can be found in:
http://www.lebarmy.gov.lb/en/d_a_g/?100#production
The request to acquire geospatial information is presented at DGA, Archive Section. Fees are paid at the archive section after approval. A date is set for delivery. For the production of new aerial photos the requested Documents are: Industrial certificate of the company, Copy of registration certificate , Address of the company with phone and fax, I.D of the owner(s) of the company with their addresses , List of technical personnel working at the company , Technical equipment owned by the company (along the plane and the photography equipment specifications) and a list of works and tasks conducted by the company in the field of aerial photography and topography (in Lebanon and abroad).

2. Ministry of Public Works and Transports

2.1. Directorate General of Urban Planning

The Directorate General of Urban Planning is responsible for the regulations and management of all the Lebanese territories including (comprehensive and detailed planning, policy and regulation of the natural and built environment, rural and urban management and development of housing policies). Produced spatial data is mainly zoning maps.

2.2. Directorate General of Civil aviation

The DGCA is the responsible Government agency for civil aviation activities in Lebanon. Recently the Directorate is working with the EUROMED 2/MEDUSA project on utilizing the GNSS system in Navigation, through defining a plan for the Augmentations systems within the European Geostationary Navigation Overlay Service (EGNOS)

2.3. Lebanon National Meteorological Service

The LNMS mission was to cover all the meteorological and climatological needs of our country as well as for the physical conditions of the atmosphere. http://www.transportation.gov.lb/. Current climatologic data are available on a table format to the public through several international websites like:

http://www.timeanddate.com/weather/lebanon/beirut/ext

3. Ministry of Environment (MoE)

http://www.moe.gov.lb/The-Ministry/Organizational-Chart.aspx

The MoE is a governmental sector that has been effectively established in 1993, and was identified to carry out tasks relate to environmental management in terms of protection and sustainable conservation of natural resources, and initiation and activation of Lebanon's participation in the global environmental conventions.

http://www.moe.gov.lb/Projects.aspx

4. Ministry of Energy and Water (MoEW)

http://www.emwis-lb.org/EN/Institutions/ministry_if_energy_and_water.htm

The Ministry of Energy and Water (MEW) is composed of two directorates: the General Directorate of Hydraulic and Electric Resources and the General Directorate of Exploitation. MEW implements the water policy and monitors the implementation of hydraulic and electric projects. Data management at the MoEW is mainly in-charge of two bodies. These are: Water Resources Services (WRS), and the Litani River Authority (LRA). The functions of WRS are Gauging of all important rivers and springs in Lebanon and Studying underground water resources in the south Lebanon and the South Bekaa.

There is no GIS unit among the platform of the LRA. However, there is a proposition to establish such a unit. LRA introduced proposals to several concerned funding institutes in order built a GIS unit, but it is still unavailable to date. While, GIS and geospatial data applications are usually utilized by LRA where foreign experts are nominated to do such jobs, which are applied for different water and electricity projects of different scale.

5. Ministry of Agriculture (MoA)

http://www.agriculture.gov.lb/SiteCollectionImages/MOA_Structure.jpg

The Ministry of Agriculture is a public institute representing the principal responsible body on building strategic platforms for the agricultural sectors in Lebanon. MoA is composed mainly of five major components. These are: The Ministry body itself, Cooperation and Planning Organization, The Higher Council of Agriculture, The Lebanese Agricultural Research Institute (LARI) and the Green Plan (GP). Only the Division of Planning and the Division of Documentation and Information, which are mainly concerned with geospatial data and information. Directorate of Studies and Cooperation.

6. Ministry of Tourism, Directorate General of Antiquities

The Directorate has a GIS Unit and exhaustive GIS layers for the main archeological sites in Lebanon. They have also several instrumentations in geophysics and 3D mapping using laser system data: archeological map of Lebanon, archeological map of Tyr.

7. Ministry of Social Affairs (MoSA)

The Ministry of Social Affairs was created in 1993 by Law Number 212 and modified by Law Number 327 and Decree Number 5734. http://www.socialaffairs.gov.lb/. Amongst the ten departments of the MoSA, there one section called" Information and Statistics Center", which is still vacant and under preparation. It belongs to the Department of Planning and Research. Nevertheless, other departments have no geospatial data

involvement, but they contain various archived documents, which are classified by region.
However, geospatial data and application are created when projects are executed, notably those funded by the international agencies. In this case most geospatial data remains reserved with these agencies and some of them submitted to the MoSA, but there is still no knowledge to manipulate such data.

8. Council for Development and Reconstruction

The CDR was created in 1977 in order to manage the enormous task of the reconstruction of Lebanon. The mission of the CDR is to establish a plan and a schedule for the rebirth of reconstruction and development in Lebanon and guarantee the fund of projects. It looks after the execution of the projects. The CDR use ArcGIS and ArcMap during their studies and reports, in order to create maps for development project like urban transport project and national physical master plan for the Lebanese territory.

9. National Observatory

Initiated in 2012 and officially launched in 2014, the National Observatory mission is to study the critical zone of the earth around the Mediterranean, including the study of water resources, biodiversity, natural hazards, and management of the environment and ultimately the study of land use. The observatory aims to construct environmental databases and create collaborative software tools. Using ArcGIS, a common environmental database will be created to help the researchers accomplishing their missions.

10. Centre for Energy Conservation

The Lebanese Center for Energy Conservation (LCEC) addresses end-use energy conservation and renewable energy at the national level. There is an urge for using geospatial models and techniques to assess and built environmental concepts and strategies for energy conservation, the utilization of these techniques is still rare. One of the main projects that were conducted through utilizing geospatial information/models was the project funded by the Spanish government Through the UNDP- CEDRO project in 2011.

11. Directorate General of Civil Defense

Civil defense is necessary organization for protecting citizens, public and private properties from fire hazards, disasters, wars, and different accidents. Civil defense tasks cover all Lebanese territory and can be identified as follows:
In the last decade the Civil Defense and through the cooperation of Active NGOs (AFDC) and the CNRS-Remote Sensing conducted various projects for mapping forest fires risk potentiality and building relevant geodatabase. The Civil defense in corporation with CIMA Research Foundation provides end users (municipalities, farmers and related Ministries) with a set of tools for fire risk mapping, fire danger forecasts and propagation model useful to manage the different phases of fire risk management. RISICO model has been implemented in Lebanon since 2011 enabling local civil defense to issue a daily bulletin of forest fire hazard. The RISICO model is being updated and tuned using near-real-time satellite imagery based data in cooperation with the CNRS-Remote Sensing Center (WB/GEF funded project-CAPWATER).

12. Geospatial data

Each of these authorities has its own archives of miscellany data and limited geospatial information, representing various documentations. However, ministries and other governmental bodies are working and elaborating geospatial systems, some have their own experts in the field of geospatial data extraction and manipulation. Others need external assistance to produce and handle geospatial data. Geospatial data and information are mostly as hard copies for different themes and regions, at different scales, time and scale need to be archived in GIS system.

13. National Council for Scientific Research (CNRS).The National Council for Scientific Research (CNRS) is a public institution established in 1962 and assigned with the task of formulating national science and technology policy, initiating, guiding, supporting and conducting scientific research programs and activities in Lebanon. It advises the Government on all science and technology issues. The CNRS conducts research through its specialized four centers (Marine, Geophysics, Remote Sensing and Atomic Energy) and supports research projects having an impact on the socio-economic development of the country.

13.1. The Center for Remote Sensing (CRS) maintains a vast set of EO data including:

I) Aerial photographs black-white at 1:12000 scales
II) Cartographic maps in various scales
III) Satellite images in various scales
IV) GIS data supporting database information including CORINE LAND COVER in 1:50.000 and 1:20.000 scale and administrative boundaries cazas and villages.
V) Soil maps and database at different scales.
VI) Digital Elevation Models extracted from different satellite platforms at scales of 30, 20, 25, & 5m resolution.
VII) Natural hazard maps of Floods, Landslides, forest fires, erosion at national scale (1/50 000 & 1/ 20 000).

A user friendly tool working over the internet is available (http://tis.cnrs.edu.lb/login.php) in order to explore the available GIS maps in two pilot areas of Lebanon (Byblos-Baalbeck and Tyr-Nakoura). A user friendly interactive GIS system allows the users to browse, view basic and thematic socio-economic and natural resources maps, centers of excellence in agro tourism and ecotourism, combine different layers to produce and print own map.

A new geonetwork webportal was established in 2013 at CNRS-CRS (http://incam.cnrs.edu.lb:8080/geonetwork/srv/eng/main.home) containing the basic and derived geospatial Lebanese maps at different scale within INCAM, EU ERAWIDE funded project.

13.2. Marine Research Center

The Centre for Marine Sciences (CMS) was established in 1977.

The main mandates of the center are to:

13.2.1. Supervise permanently the coastal zone and the sea by creating a national network of observation. (Modeling of the cycles of the contaminating and usage of the bio indicator).

13.2.2. Evaluate the specific diversity by characterizing the migrant communities and their habitats.

13.2.3. Produce, transform and transfer the matter in the coastal and marine ecosystems.

Activities focused on National network for observing the Lebanese coastal waters for Physical, chemical, bacteriological and biological characteristics and impact of contamination. A recent activity was the bathymetric mapping of the Lebanese coastal sea floor between zero and 200 meters.

13.3. Geophysics Center

The oldest center established by the Government in 1975 according to a CNRS recommendation, the Center for Geophysical Research is both an observatory and a research laboratory. Main activities focus on assessing, monitoring and mapping of seismic hazards.

13.4. Lebanese Atomic Energy Commission

The CNRS established the LAEC in 1996 with the full support of the IAEA for preparing the national legal and technical infrastructures allowing an effective implementation of a comprehensive radiation safety scheme in the country.
Main activities are mapping of radiation hazards, heavy metal background in Lebanese soils, soil radioactivity and the depleted uranium, ozone level map, aerosol content and distribution across Beirut.

14. The Lebanese GIS Portal **www.gislebanon.gov.lb**

The Lebanese GIS Portal website of the Ministry of Administrative Reforms (OMSAR) serves as a one-stop gateway to a network of geospatial information provided by government and noncommercial organizations. The website contains information on available GIS categories including map images, map services, geographic datasets, geographic activities, spatial solutions, clearinghouses, and land references. The Map Viewer allows searching for map service, geographic datasets, activities, etc., data theme, keywords or date ranges.

15. Royalties - Usage Restrictions

No restrictions for use of low resolution geospatial information. The results of the search are displayed along with metadata and if appropriate a map. Users can view the metadata detail and the full metadata, browse through information to locate what they are looking for. Map data can be viewed in the Map Viewer or with GIS software to display multiple data sources from the GIS Portal Toolkit along with data from local sources.

1. Intellectual Property Rights

Intellectual property rights are under the mandate of the Ministry of Commerce and Trade. Like any other property rights – they allow the creator, or owner, of a patent, trademark, or copyrights to benefit from his or her own work or investment.
A new and modern Copyright Law was enacted on April 3, 1999, and entered into force on June 6, 1999. The copyright protection originally available to literary and artistic works is now extended to computer software, video films and all kind of audio-visual works. The law now provides stiffer penalties for offenders and better compensation to the persons whose rights have been infringed. The manner in which the copyright is breached has also been extended.
Trademarks are provided protection under the “Regulations and Systems of Commercial, Industrial, Literary, Artistic and Musical Property in Lebanon" (the 1924

law). The 1924 Law does not explicitly protect notorious trademarks and geographical indications. However, those are provided protection via Lebanon`s membership to the Paris Convention and the Madrid Agreement respectively. Moreover, Geographical indications are provided protection under the provisions of the new Law on Customs, the Law on Fraud Control and the Criminal Law.

Most of the agencies and bodies call on the protection of intellectual property rights for the spatial data they produce and maintain themselves like the Directorate of Geographic Affairs and the CNRS-Center for Remote Sensing. The protection of intellectual property rights of third parties constitute a restriction to the access to spatial data sets and services held by public authorities. Examples are satellite images held by the DGA, the CNRS-CRS or large scale digital spatial data that were compiled by governmental organizations and private companies.

1.4	*Use of Spatial Information in local decision making processes*

1.4.1. At national level

The UN is working in South Lebanon on creating maps showing trips between villages using the main roads. The ESCWA is producing GIS maps for the Transportation Networks (Roads, Railways, Marines). The DGA is updating topo maps and road maps. All these studies are used to assist the demining process after long history of wars and occupations. Urbanization, urban expansion on natural and agricultural lands and coastal cities management was developed with the support of UNEP and EU. The Global Urban Observatory (GUO) of UN-Habitat implemented an exercise on urban mapping from space using satellite images and Geographical Information Systems (GIS) technology to analyze the population situation and needs kin the country. The information gathered and researched provides a database of statistics and indicators on the state of urban development in Lebanon much needed for decision making at national and local levels.

The Mapping of Living Conditions (MLC) by CAS for Lebanon is designed to provide sufficient information for policy makers needed for the elaboration of program and projects aimed at improving living conditions in Lebanon. The UNEP is funding project on protected Mediterranean areas (PMA), implemented at the MoE (2014) aiming at promoting the local development and sustainability of protected areas in Lebanon through building geodatabase on biota serving the elaboration of management plan and the production of thematic maps for users, visitors and local governance.

The UNDP has recently (2013-2014) supported a national project on flood management which was implemented by the Prime Ministry Disaster Management Unit and executed by the Center for Remote Sensing-CNRS. The project mapped the flood hazard in all Lebanese watersheds using WSM and projected hazards up to 2100. Results are being disseminated and stakeholders trained by a WB/GEF funded project called CAPWATER to improve local preparedness. A previous project (2002) supported by the UNDP and GTZ (GIZ) and Spanish Cooperation mapped the vulnerable zones for flush floods in north east Lebanon and identified suitable sites for anti-erosion measures and water harvesting to protect life and infrastructure in affected area.

The FAO supported the production of the first national land cover map at 1:50,000 in 1990. Later on, this map was updated by the Center for Remote Sensing-CNRS into more detailed land cover/land use map at 1:20,000 in 2000 in cooperation with the MoE and MoA using Corine classification. This map was updated in 2006 by the Center for Remote Sensing-CNRS with the financial support of the FAO. The FAO Regional office funded national study on land tenure and land degradation in Lebanon (2012). The study used a

large set of geospatial information to analyze land degradation and link it to environmental conditions, human practices and governance and land tenure while emphasizing the shortcomings in legislation and their implementation. The land use planning developed by the Council for Development and Reconstruction (CDR) with the assistance of DAR, IAURIF and technical support from CNRS-CRS, which developed the land capability map of Lebanon, identified the territories of urban expansion, special natural, agricultural and environmental interest.
The first National Forest and Tree Assessment was implemented by the Ministry of Agriculture (TCP/LEB/2903) during 2003-2005 under the TCP of the FAO. This information is used for sustainable management of forest resources based on an environmentally, socially and economically balanced forest policy and development of a National Forest Action Plan.
The UNHCR developed maps for the distribution of Syrian refugees to organize human help and provide wintering for those who settled above 500m asl. Since 1998 the EU supported the updating of the soil information for Lebanon and the production of soil geodatabase. The resulting thematic maps were used for the elaboration of two important projects for Lebanon: land use planning and national action plan to combat desertification.
Surface water quality was assessed since 2004 in a series of projects showing the level of organic and chemical contamination in Litani River and Qaraoun lake with the assistance from IDRC and USAID to promote environmental management of water resources and create real time maps, based on spatial complex water quality index, showing the pollution to create early warning system at national and local, village, level. In 2012 BGR supported a project assessing the protection of Jeita springs feeding the capital Beirut with drinking water showing the vulnerability of the upper and lower sub basins and protection of the springs.

1.4.2. at Municipalities level

Only 60% of the municipalities in Lebanon have cadastral maps. It is one of the major problems of the implementation of geospatial data within the municipalities in Lebanon. The private sector concerned by the use of geospatial data has developed several GIS systems dedicated for the activities of the municipalities in Lebanon: E-municipality solution by ArabiaGIS and GISMOS by GIStransport. The following municipalities have either Geodatabase or power map municipal solution with online GIS service: Amioun, Brummana, Beirut, Dahr Es Souwan, Dbayeh, Batroun. GIS Transport has developed GIS-Based Municipality Operations Systems (GISMOS) that handles several financial, managerial and engineering municipalities' issues. Ten municipalities in Lebanon are using this system like Roumieh, Beit Mery & Ain Saade, Dedeh, Jieh, Halate, Ras Maska, Louaize and Tyr.
City of Tripoli has developed a GIS system dedicated for creating and maintaining a directory of the city's streets and postal addresses, as well as for enabling better strategic planning of the municipal services delivered to citizens. Tripoli benefits greatly from the GIS database that helps managing the city more efficiently.
The three parties University of Balamand Engineering Faculty, ArabiaGIS and Amioun Municipality joined forces in order to put in place a fully functional GIS web-based system offering electronic local authority services to the public. These services ranged from tax payments, tourist information, property and business advertising to utility networks and many more (www.amioun.org). UNDP is conducting a project (Building a Geospatial database and its corresponding application For "LIVE YOUR TOUR" project). This project covers Baalbeck municipalities' federation and Chouf municipalities

federations. the project handle gathering all related touristic data, which include: Restaurants, Resorts, night clubs, recreational areas, Parks, forests, historic (temples, tombs, monument), religious places (church, mosques, and shrines), sport leisure, reserve areas, Shops, markets. In addition, to hospitals, schools, universities, Red Cross, villages, municipal district, road network update, police stations.
All data are either assembled from existing maps or gathered directly through handheld GPS, and digital cameras. The project will have a User Interface portal which is simply a data entry form contains the needed information related to a touristic site (Point representation on the Map) and other related data, That facilitate the work of the personnel working on gathering data with a little background on GIS.

1.4.3. At the NGOs level

Till early 2000, geospatial data was not part of NGO activities as it requires skills, know how, experience and expensive software. More and more NGO which have funds and technical support from international NGO and agencies and working in critical areas such as North Lebanon and Bekaa, are using geospatial data notably for humanitarian crisis. NGOs working on environmental problems, their reliance on GIS is progressive. Finally for the rest of the NGO the use of GIS is timid but is growing slowly.

1.5 Relevant national institutes, contact points

Table 9. Relevant national institutes, contact points

Distribution Center	Organization Status	Contact Info	Type of Data	Data Availability	Sharing policy	Data costs	Metadata
DGA	Government	link	Orthophotos, geodetic, cartographic	Off-line	Sold	link	YES
CNRS-CRS	Government	link	Orthophotos, maps, cartographic	Off-line	Sold and free of charge	link	YES
CNRS-CRS	Government	link	Orthophotos, maps, cartographic	Online	Open access	link	YES
CNRS-CRS	Government	link	Orthophotos, maps, cartographic	Online	Open access	link	YES

1.6 Beneficiaries of ongoing or completed EU/national/regional projects

Table 10. Beneficiaries of identified ongoing or completed EU/ national/ regional projects

Project Title	Beneficiary	Web Site	References
Improving National Assessment and Monitoring Capacities for Integrated Environmental and Coastal ecosystem Management – INCAM	CNRS-CRS.	link	link
Network on governance, science & technology for sustainable water management in the Mediterranean – Role of DSS (NOSTRUM)	Centro Interdipartimentale IDEAS/CESD Università Cà Foscari of Venice	link	link
Land-water Med Network	IRD	link	link
Sustainable Management of carce resources in coastal zone – SMART	Environmental Software & Services GmbH.	link	link
Mediterranean coordination, dissemination & management to combat land degradation in coastal zones (MEDCOASTLAND)	IAM-Bari	link	link
Improving coastal land degradation monitoring in Lebanon & Syria- CoLD	CTM/ERS/RAC	link	link

The soil geographical database for Lebanon at 1:1000000 scale	CNRS-CRS.	link	link
Updating of the soil map of Geze (1952) at 1:200,000 scale	CNRS-CRS.	link	link

2. Data – Applications

2.1 National Spatial Data Infrastructure (NSDI)

Table 11. National Spatial Data Infrastructure (off-line)

Applications/studies	Digital or Hardcopy	Format (if Digital)	Metadata
Agriculture	Digital and hardcopy	Vector, raster	Yes
Land cover	Digital	Vector	Yes
Forest	Digital and hardcopy	Vector, raster	Yes
Climatology/Meteorology/Atmosphere	Digital	Vector, raster, database, excel files	Yes
Orthoimagery/basemap	Digital and hardcopy	Vector, raster	Yes
Inland waters	Digital and hardcopy	Vector, raster	Yes
Geographical position	Digital and hardcopy	Vector, raster	Yes
Spatial planning/Cadastre	Digital and hardcopy	Vector, raster, excel files	Yes
Society	Digital	Vector	Yes
Construction	Digital and hardcopy	Vector, raster, excel files	Yes
Transportation	Digital and hardcopy	Vector, raster	Yes
Public services/Communications	Digital and hardcopy	Vector	Yes

2.2 National Census

The national Statistical Databases (Census data) focus on population, agriculture, building and Constructions, culture-Entertainment, education, environment, municipalities, centers of excellence, industry, roads and natural hazards.

2.3 Processing capability of Spatial data

According to the above mentioned paragraphs there is a large number of public services and bodies at all levels of government and the private sector, that partly produce and mainly use geodata in national, regional or local geographical coverage.
The most important of them, (i.e., the ones producing and maintaining the largest volume of data) at national geographical coverage or with a legal mandate of national geographical coverage are given in 1.3.

2.4 Spatial data collection capability

The **DGA** is able to fly aircrafts and capture photographs and digital images for mapping purposes. However, They subcontract foreign firms to implement the flights.
DGA is the most responsible public institution to organize flights for official mapping and cadastral expeditions and has developed a workflow to generate true ortho images in very large scale (VLSO) in urban areas and large scale (LSO) in rural areas of the entire country that are also available offline.
The **CNRS-CRS** is downloading available open source satellite data. The rest is purchased with licenses.
Fugro MAPS Fugro Maps is the leading provider of geospatial products and services in

the Middle East and Africa. Utilizing the latest state-of-the-art technologies in airborne and satellite imaging, LiDAR, ground based collection systems and customized GIS software solutions; Fugro MAPS serves all land-use and natural resource industries in the region.

GIS Transport GIS Transport, Ltd is a company able to provide high resolution orthophotos images, multispectral satellite data, DEM and many applications of GIS.

2.5	*GPS data availability and costs*

The GPS data are available at the DGA with the old astronomic stations triangulation and points of second order map (http://www.lebarmy.gov.lb/ar/d_a_g/?400#!lebarmy[d_a_g]/1/) and scheme of reassembling the points of the triangulations of first order (http://www.lebarmy.gov.lb/ar/d_a_g/?400#!lebarmy[d_a_g]/0/).
The recent GPS map is also produced
http://www.lebarmy.gov.lb/ar/d_a_g/?400#!lebarmy[d_a_g]/4/
Cadastral information can be purchased in colored print and digital from the DGA upon a written request showing the area and purpose and if there is a land ownership trial for a cost of 20$/point. http://www.lebarmy.gov.lb/Documents/NDE52.asp#.U1zK5_mSySo
Real estate data and detailed maps can be purchased from the Directorate general of Real estate of the MoF (http://www.dlrc.gov.lb/) upon a written request (http://www.dlrc.gov.lb/Common/pdf/aff.pdf).

2.6	*Level of conformation with the EU INSPIRE Directive*

Some of the Lebanese geodata is produced according to the ISO level. The only available metadata and list of available geodata files are published in www.gislebanon.gov.lb, http://tis.cnrs.edu.lb/login.php and

http://incam.cnrs.edu.lb:8080/geonetwork/srv/eng/main.home

3. Capacities

3.1	*National budget allocation to Spatial Information*

The Ministry of Administrative Reforms (OMSAR) has been assigned by the Lebanese Government to develop the National Geographic Information Infrastructure serving as GIS Portal of geospatial information provided by government and noncommercial organizations.
The effort will incorporate technical implementation of the national geoportal as well as the organizational and data sharing and open access. Partner of the GIS Portal for this activity are the CNRS (www.cnrs.edu.lb), DGA, CAS and ministries representing public bodies for the compilation and establishment of the National Cadaster for the country. CNRS was also assigned as the contact point for Lebanon for FP7.
The DGA produced the cadastral map of Lebanon at 1:100,000 vector format and it sells it by a request in digital and paper format.
http://www.lebarmy.gov.lb/Documents/NDE52-38.asp#.U1y8EvmSySo
Starting from 1998, the Directorate General of Public Real Estates begun the modernization and mechanization of land registry to develop an integrated information system and convert the paper into digital and mechanized format serving business real estates. www.dlrc.gov.lb/

3.2 *Funding initiatives and participation to research programs*

The DGA since 1963 and CNRS-CRS since 1997 have been active in this field, by installing appropriate equipment, arrange staff training and gradual introduction of data to create the basis of a Geographic Information System, which will be enriched in stages to meet the needs of both government and the market in general to acquire appropriate information.
Some of these data is available to public agencies and individuals.
The Ministry of Administrative Reforms (OMSAR) implemented GIS portal as a general pilot GIS which covers the whole country. The DGA zand CNRS-CRS have been taken the initiative to formulate a national system for the transfer of digital data and for collaboration on activities related to GIS.

3.3 *Dedicated undergraduate, graduate programs, training centers*

Table 12. Dedicated undergraduate and graduate programs, curricula and personnel – Relevant education and training centers

Institute	Undergraduate program	Graduate program	Training	Personnel	Web site	Curricula
CNAM Lebanese University/Institute of Applied Science and Economics	5 years	Yes	Yes	900	link	link
OEA Order of Engineers and Architects	One/two weeks	No	Yes	NA	link	link
LU Lebanese University	3 years	Yes	No	NA	link	link
AUB American University of Beirut	3 year	Yes	Yes	NA	link	link
USJ University saint Joseph	3 years	Yeas	Yes	NA	link	link
USEK Holly Spirit University-Kaslik	3 years	Yes	Yes	NA	link	link
University of Balamand	3 years	Yes	Yes	NA	link	link
LAU Software Institute	No	No	Yes	NA	link	link
NDU Notre dame Unicersity	3 years	Yes	Yes	NA	link	link
BAU Beirut Arab University	3 years	Yes	Yes	NA	link	link
LIU Lebanese International University	3 Years	Yes	Yes	NA	link	link
IU Islamic University of Lebanon	3 Years	Yes	Yes	NA	link	link
AUST American University of Science and Technology	3 Years	No	Yes	NA	link	link

REFERENCES AND USEFUL LINKS

Useful links related to Lebanon (accessed April 21, 2014)
http://planbleu.org/sites/default/files/publications/villes_lbn_syr_tur.pdf
(http://unhabitat.org/lebanon/
http://www.undp.org.lb/programme/pro-poor/poverty/povertyinlebanon/molc/sotundp.htm

http://www.cdr-adelnord.org/5/8/5/7/0/9/Rapport_mission_Parc_-_Version_finale-low2.pdf
http://www.undp.org/content/dam/lebanon/docs/Energy%20and%20Environment/Publications/SOER_en.pdf
http://www.cdr.gov.lb/study/SDATL/French/Chapitre%205.PDF
http://www.fao.org/forestry/15565-0f921641e230ef06f11d15b8856f2ff07.pdf
http://www.lri-lb.org/mapping.php#mapping
http://www.unhcr.org/453f21484.html
http://data.unhcr.org/syrianrefugees/country.php?id=122
http://www.unhcr.org/pages/49e486676.html
http://www.bgr.bund.de/EN/Themen/Boden/Projekte/Ressourcenbewertung_und_management_abgeschlossen/ACSAD_Management/ACSAD_management_schutz_en.html
http://www.unccd.int/ActionProgrammes/lebanon-eng2003.pdf
http://www.bgr.bund.de/EN/Themen/Wasser/Projekte/laufend/TZ/Libanon/factsheet_gw-vulnerability.pdf?__blob=publicationFile&v=2
http://www.lebarmy.gov.lb/en/d_a_g/?100#production

GIS Training Centers:

1. ESRI Lebanon: www.esrilebanon.com/
2- Geoconsult: www.geoconsult-int.com/
3-GISTransport: www.gistransport.com/
4- Geovision: www.geovision.com.lb/#!/
5- GIS Arabia: http://www.arabiagis.com/home.aspx
6-ELARD: http://www.elard-group.com
7- Geospatialminds: www.geospatialminds.com
8. Fuguro Lebanon: www.fugromaps.com

PART A. CURRENT STATUS OF GEOSPATIAL INFORMATION IN LOCAL MANAGEMENT	
1. Policies	
1.1	*National policies and implementation*
Multiple attempts have been set out to establish a body to be in charge of national spatial data in Palestine. Unfortunately, none of these attempts have been realized. Therefore, each ministry has its own geo-spatial data related to its role and implementation. However, the basic national geo-spatial layers (such as borders, governorate boundaries layers, etc.) are shared among them based on mutual agreements The National Spatial Planning Office in the Ministry of Planning handles geo-spatial planning. The Ministry of Agriculture handles agricultural statistics and the land use/land cover classifications. The Ministry of Local Government creates and updates master plans for each governorate and community. The Ministry of Environment and the Palestinian Water Authority handle all spatial and statistical information related to wells, springs, aquifers, groundwater resources, and climate data; while cadastral maps are the responsibility of the Palestinian Land Authority. The Ministry of Public Work and Housing handles the spatial information related to roads, railways and infrastructure issues. The Palestinian Central Bureau of Statistics is responsible for all statistical data in all fields. It is worth mentioning here, that the Palestinian Authority has a particular need for accurate and reliable geospatial information because such information is used throughout its negotiation process with the Israelis. For this reason, ARIJ had been keen on establishing a separate GIS department, presenting the policy makers and negotiators with reliable up to date information about the physical changes that are taking place on the ground and depicting the resulted transformed Palestinian landscape. Such data also involves core issues within the Palestinian-Israeli conflict such as settlements, water, Jerusalem, territorial contiguity among others. Accordingly, it is important for the Palestinian Authority and other policy makers to have a scientific, technical, and relatively objective perspective and analysis of the overall geo-political situation, in addition to panoramic view of it all. ARIJ works in partnership with other active NGOs in this field (who happen to be few), we mention here The Land Research Center (LRC). There is also the United Nations Office for Coordination of Humanitarian Affairs (OCHA) which is UN international organization who is active in this field but does share geospatial data with national and local authorities like ARIJ does, they do however, provide some maps, and research, and reports in hardcopies. In fact, ARIJ currently acts as a technical advisor to the Palestinian Negotiation team.	
1.2	*National Census data*
The Palestinian Central Bureau of Statistics (PCBS) is the official statistical institution of the State of Palestine. It is an established independent statistical	

bureau. Its main task is to provide credible statistical figures at both national and international levels. It is a state institution that provides service to the governmental, non – governmental and private sectors in addition to research institutions and universities. The (PCBC) is the Palestinian official source of statistics. In regards to the use of spatial data, (PCBC) provides urban areas for all Palestinian localities as GIS layers. It also provides the built-up areas as GIS layers interrelated with all other statistical data. It is worth mentioning here that the (PCBS) has recently (2012) published a special poverty atlas using geo-spatial data.
Functions of The Palestinian Central Bureau of Statistics PCBS:

- ✓ To establish a comprehensive and unified statistical system to serve Palestinian authorities as an instrument of guidance for diagnosing problems and evaluating progress made.
- ✓ To provide truthful and impartial official statistics on demographic, social, economic and environmental states and trends to serve the Palestinian citizenry.
- ✓ To enlighten the public with information provided through the mass media, and cooperate with university and other research organizations.
- ✓ To serve the instrumental needs of businesses and their organizations for statistical information on states and trends.
- ✓ To conduct a population and housing census and agriculture census every ten years or less in accordance with the rules of a special census act issued by the President of the Palestinian National Authority, and to conduct an Establishment census every five years or less.
- ✓ To participate in the international cooperation and exchange of official statistics in accordance with international standards which guarantee Palestinian membership in international organizations
- ✓ To compile essential statistics published on Palestine and the Palestinians by any country or international organization and analyze such statistics.
- ✓ To establish statistical training centers in order to prepare qualified personnel to carry out the statistical activities conducted by governmental or non-governmental departments or agencies.
- ✓ To create and maintain a library of Palestinian and international statistics and an archive of Palestinian censuses and surveys covering the areas listed.
- ✓ To participate effectively in building the different administrative records and central registers to meet the administrative and statistical needs of the Palestinian society.
- ✓ To publish statistical yearbook annually.

http://pcbs.gov.ps/site/lang__en/539/default.aspx Accessed March 2014

1.3	*Spatial data production distribution centers - sharing policies*

I. Organizations providing various spatial Data Sets: what do they provide and how do they share them

1. Ministry of Planning (MoP)

The role of MoP can be summarized as follows: to lead the cross-sector planning, to develop comprehensive development policies with the participation of all relevant Palestinian institutions, and to coordinate and support sector planning in the concerned ministries and institutions so as to ensure their consistency with the comprehensive cross-sector approaches and plans. MoP also provides support means to different plans and programs and to follow up on this in coordination with the executing parties on one hand, and with international donors, on the other hand.

One of MoP main objectives is to take part in developing information systems on the national level especially geographic information. Moreover, MoP oversees the geographic center; It also endeavors towards developing the

center so as to become a national institution that provides specialized services in its work area. In addition, MoP prepares the national construction plan, which is considered the organizational framework of local and regional construction development. The implementation of this plan takes place in coordination with the Ministry of Local Government and other concerned ministries and institutions through the Supreme Council of Planning and Regulation.
http://www.mopad.pna.ps/en/index.php?option=com_content&view=article&id=9&Itemid=135

2. Ministry of Agriculture (MoA)
The Ministry of Agriculture performs major duties in the regulation and management of the agricultural sector in addition to the oversight, supervision and delivery of certain basic services tasks. The Ministry carries out its assigned functions from its headquarter, agricultural and veterinary directorates and offices in the governorates and main gatherings. For the purpose of preparing agricultural plans and policies, MoA uses spatial data in agricultural statistics defining land use and land cover areas. Such statistics are shared upon request.
http://www.moa.pna.ps/bssMulti.aspx?cat_id=2

3. Ministry of Local Government (MoLG)
The vision of MoLG is to achieve sustainable development with effective community participation; working on building the capacities of local authorities, and enhancing their resources to enable them achieve the welfare of their citizens/ constituencies within the framework of good local governance. It's strategy is summarized by:
- ✓ Enabling local authorities to possess effective institutional capabilities.
- ✓ Raising the efficiency of MoLG to perform its tasks of planning, oversight and guidance in Local Governance sector.

One of the main roles of MoLG is to monitor all local authorities to assure applying all master plan standards according to MoLG regulation and polices. Accordingly, MoLG already started developing a geo-spatial data for all existing municipalities' master plans. However, MoLG is in the process of launching a geo-spatial web-application has all related information and layers.
http://www.molg.pna.ps/Default.aspx?lang=2

4. Ministry of Environmental Affairs (MEnA)
The establishment of The Palestinian Environmental Authority (PEnA) and then MEnA stems from the fact that the environmental situation in Palestine has been rapidly deteriorating due to multiple and varying reasons over the last and recent history. The shortage of natural resources, particularly water, degraded vegetation and cropland races coupled with very high population growth, few job opportunities and many years of negligence created environmental hazards and practices with detrimental results.
MEnA is playing an important role as the planning, coordinating and executive body to improve environmental standards and attitudes. Being the central representative authoritative body responsible for all environmental issues, MEnA has been working very hard to address all environmental constraints, including natural resource depletion and environmental pollution, as an approach towards sustainable development. MEnA aims at developing human resources and capacity building, promoting environmental awareness programs and activities, for the sound use and protection of environmental

resources, arid land management, desertification combat, biodiversity conservation, pollution control, and awareness raising. For all these purposes, MEnA shares spatial data with different ministries and stakeholders upon request. In particular it provides maps about protected areas, industrial zones, water resources as well as climatic data.
http://www.mena.gov.ps/about/index.htm

5. Palestinian Water Authority (PWA)

PWA's Mission is sustainable development of water resources by adopting a fair and integrated management. Its goals aim at achieving economic growth and water and food security through securing the water rights of the Palestinians and the equitable distribution of water resources amongst different sectors and the sustainable development of these resources by protecting and effectively and fairly managing all water resources .The PWA shoulders main responsibility of managing these resources. These goals can be summarized as follows:

General Goals:

✓ Organize and manage the water and wastewater sector in Palestine in a way that ensures the attainment of the water rights of the Palestinians and the realization of a fair distribution of water amongst different sectors.

✓ Ensure the most effective and optimal methods of managing all available water resources in Palestine and in sustainable development in order to achieve a balance between the quality and quality of water and the Palestinian current and future needs.

✓ Achieving the optimal utilization of water resources through the development of water services in order to assure the water and food security and the economic development of the Palestinian state.

In working to achieve all these goals, it is important for the PWA to have documented data about the different water resources in Palestine which involves the use of geo-spatial applications. Thus the PWA provide spatial data upon request about water networks, ground wells, springs, streams and aquifers.
http://www.pwa.ps/page.aspx?id=QUv1WMa1538984601aQUv1WM

6.Palestinian Land Authority (PLA)

PLA manages land sector, and delivers various land-related services like registration, boundaries, and titles among other services.

Among the responsibilities of PLA are the following:

✓ Property registration for documentation and maintaining purposes and to facilitate any registration activities.

✓ Conduct a comprehensive survey of the Palestinian territories, identifying boundaries and, resolving land issues, and arraying its maps.

✓ Inventory of, surveying registering, and maintaining state property; follow-up leasing transactions, privatization and land acquisition for public purposes.

✓ Regulate the profession of land registering and real estate offices.

✓ Keeping and updating real estate data base.

✓ Establishing national Geodesics and triangle system in Palestine

✓ A comprehensive assessment of the values of registered properties and modifying it for the purposes of conducting transactions using GIS applications.

✓ Raising the capabilities and productivity of PLA staff through trainings and information sessions including special GIS capacity building provided mainly through the World Bank.

http://www.pla.pna.ps/aboutUs.aspx?id=5

7.Ministry of Public Work and Housing (MoPW)

MoPW works to achieve sustainable urban development in the housing sector and infrastructure in Palestine.

Tasks and responsibilities

- ✓ Conducting research and scientific studies for the continuous development of planning, production, implementation, supervision and follow-up projects and activities of the different ministries.
- ✓ Preparation of plans, policies, programs and projects that serve the practical achievement of the objectives of the national strategies.
- ✓ Preparation and updating of systems, laws and legislation, and the development of specifications and standards for urban planning and architectural design.
- ✓ Development of programs for the development and organization of the construction sector and the development of regulations for contractors and private sector participation.
- ✓ Preparation and management of rehabilitation programs and training for engineers and professionals.
- ✓ Participate in the preparation of the national plan for the overall development and policy-making and development of laws and relevant national legislation.

http://www.mpwh.ps/index.php?option=com_content&view=article&id=11%3A2012-02-01-18-39-26&catid=3&lang=en

To achieve all these tasks, MoPW uses spatial application and publishes spatial reports upon request. These reports include maps about existing road networks, road classifications, and residential environment in random urban and degraded areas in addition to management needs. It is worth mentioning here that the MoPW manages a GIS road management and maintenance system which was developed by ARIJ. More data about this system is included in the best practices section of the report.

8.Applied Research Institute Jerusalem (ARIJ)

Founded in 1990, the Applied Research Institute - Jerusalem (ARIJ) / Society is a non-profit organization dedicated to promoting sustainable development in the occupied Palestinian territory and the self-reliance of the Palestinian people through greater control over their natural resources. ARIJ works specifically to augment the local stock of scientific and technical knowledge and to introduce and devise more efficient methods of resource utilization and conservation, improved practices, and appropriate technology.

ARIJ represents 23 years of combined organizational experience in the Palestinian territory in the fields of economic, social, natural resources management, water management, sustainable agriculture, and political dynamics of development in the area. ARIJ plays an active role in the local community as an advocate for greater co-operation among local institutions, as well as international and non-governmental organizations. In its capacity as a national research institute, it frequently provides current data and research necessary to the formulation of position papers and policy strategies on such issues as land and water resources.

ARIJ has four main programs: Natural Resources Management Program, Sustainable Agriculture Program, Good Governance Program, and Information Technology Program.

ARIJ Geo-Informatics Department uses state of the art data and mapping technology in its research studies on land use analysis and planning,

environmental, water management and sustainable development in Palestine. Over the past 15 years, ARIJ has worked diligently to promote its technical and human resources capabilities in the field of GIS and RS. ARIJ has a well-developed Geographic Information System and Remote Sensing Unit based on ArcGIS 10.1, manifold 6.0, ArcView, E-cognition and open source GIS software for the GIS mapping technology; in addition to having acquired the professional image processing software ERDAS Imagine 10.0, Er Mapper 7.2, and PCI 9 to accurately analyze and interpret satellite images and aerial photos.

The Geo-informatics Department continues to act as a service provider, constantly supporting the other ARIJ departments with statistical data, maps and geographic records needed for their research and other projects. The GIS at ARIJ is involved in variety of applications as diverse as natural resource sciences, urban development and analysis, automated mapping and facility management (AM/FM) systems, land information systems (LIS), agriculture and geopolitics.

ARIJ introduced and used the GIS as a Decision Support System (DSS), to enhance the performance of the municipalities and local government. Moreover, the GIS and RS at ARIJ have supported many other national organizations with related reports, data and maps. The unit has also worked with the local communities to build their capacities and skills and to enhance their knowledge of GIS. ARIJ continues its contribution to the training of the "new generation" of Palestinian and Arab specialists in the area of GIS, remote sensing and their applications in natural resource management.

The Geo-informatics Department provided many services to the local community by:

- ✓ Providing assistance on roads and maps for Hebron University.
- ✓ Providing numerous lectures for students of the Al-Quds University (Abu Dees) in the field of GIS & RS.
- ✓ Providing many services on roads and maps to the Palestinian Municipalities.
- ✓ Mapping for the Palestinian Customs Office.
- ✓ Printing geopolitical map posters of the West Bank in English and Hebrew.
- ✓ Printing geopolitical map posters for each Palestinian governorate in the West Bank in English.
- ✓ Providing a training course for the World Food Programme (WFP) on geopolitical status in the West Bank.
- ✓ Providing maps for Palestinian citizens to help them raise issues against the confiscation of land
- ✓ Helping many students with their master and bachelor graduation projects by providing them with data and maps on the geopolitical status of Palestine.

http://www.arij.org/index.php/about-arij/background/fields-of-interventions

II. Type of Data

The Types of GIS data include: Orthophotos, Maps (topographic and thematic) in various scales, Aerial and Satellite images, Geodetic data (Geodetic control points and leveling control points) Thematic maps, Historic maps, hydrological maps (Wells and springs locations, groundwater, aquifers…), land use land cover maps, geopolitical maps, cities and tourist maps, geological maps, soil maps, climate maps and details maps in locality level in addition to AutoCAD format and Digital Elevation Model (DTM).

III. Royalties – Usage Restrictions

In Palestine, there are no royalties or usage restrictions imposed by the

Palestinian National Authority. Nonetheless, there are restrictions imposed by Israel which significantly complicate the process of acquiring spatial data. These restrictions are mainly as follows:

- ✓ Acquiring high resolution aerial photos: Israelis fully control and restrict the use of airspace without security clearance from the Israeli Ministry of Defence.
- ✓ Purchasing satellite images: there are also restrictions on purchasing satellite images which hinders the process of collecting information.
- ✓ Restrictions on movement: the movement of the Palestinians from one area to another is often restricted due to closures, checkpoints, the presence of closed military areas and second, the restrictions to enter the Israeli settlements; therefore, it is difficult to get first-hand information. Moreover, the Segregation Wall made it difficult to access areas isolated behind the Wall to collect necessary and needed information.

1.4	*Use of Spatial Information in local decision making processes*

Geospatial data is an important tool in local decision-making. It is effective in depicting the current situation for local authorities through master plans, and short and long term planning.

Local authorities in Palestine are one of two: municipalities and village councils. Municipalities are small and large depending on population. Most of these local authorities were established after the introduction of Palestinian National Authority in 1993. Some Palestinian local authorities lack geospatial data because they lack financial resources to utilize and develop such data. Some of the larger municipalities were able to take great steps in applying geospatial data in the fields of planning and local decision-making. This application had a positive impact on sound planning and improving the quality of service delivery in these municipalities.

In regards to the use of spatial GIS database by the Palestinian Local Authorities, more and more Palestinian municipalities are realizing the benefits of spatial information in local decision making; not just the big municipalities. In particular, municipalities are using GIS applications for the management of geo-spatial data. These applications are addressing a critical problem the municipalities are facing which is scattered spatial data, enabling the municipality to have the information required for physical and urban planning.

In addition, some municipalities are developing GIS systems paired with street naming and numbering plans, enhancing municipalities' ability to plan urban development and geospatially map projects. All these applications lead to better physical and metropolitan planning. Furthermore, some municipalities are using advanced GIS applications for the purpose of improving the efficiency of provided services. Such local services include, electricity, water among other services. We will include more on the use of GIS Application in the water service in the best practices section of the report. Some of the GIS application used in big municipalities like Ramallah, Nablus, and Hebron are as follows:

- ✓ Drawing units, maps, naming and numbering unit and information entering unit.
- ✓ Reconstruction, processing, analysis & visualization
- ✓ Systems and sensors for monitoring urban environments
- ✓ Semantic web for urban applications
- ✓ Customer Service Center and related
- ✓ Management and its Financial Application
- ✓ Integration of GIS and Financial Applications
- ✓ Cooperation among local authorities in urban data management
- ✓ Services to government IT/data production/distribution/use

- ✓ Uses and applications of GIS among local and national governments
- ✓ Real State Application
- ✓ Open data, open government
- ✓ Customer e-Services and e-Services Platform

There are also local spatial data infrastructure also known as; Decision Support System (DSS) or Land Information System (LIS) used by a number of municipalities. The development of these systems is introduced as a step towards e-municipality, where all kind of information and communication technologies are realized in an electronic environment, in order to make effective use of spatial or geographic data leading to efficient decision making, through an effective management of resources.

An interoperability infrastructure is actually at the heart of e-municipality. Therefore, Geographic Information System (GIS) is acknowledged as a core part of many Palestinian municipalities, due to its applicability on the many pertained municipal disciplines, including: administration, management, planning, development, and decision making. The spatial applications also used for field coordination, billing and taxes, capital planning, distribution of infrastructural lines, digital mapping and information systems, and flexible analysis (spatial analysis, networking, 3-D Analysis, and geo-political analysis) among others.

The use of GIS in Palestinian local governance is particularly important because of the political context especially in relation to Oslo Accords and their resulted divisions of the Palestinian localities. The Oslo Accord divided the West Bank into three administrative divisions: the Areas A, B and C. Area A (full civil and security control by the Palestinian Authority); Area B (Palestinian civil control and joint Israeli-Palestinian security control); Area C (full Israeli civil and security control). The distinct areas were given a different status, according to the amount of self-government the Palestinians would have over it through the Palestinian Authority, until a final status accord would be established. The Areas are not contiguous, but rather fragmented depending on the ethnicity of the population in the areas, as well as the destination Israel has reserved for itself on the basis of what it perceives to be military requirements. Therefore, it is important for Palestinian local authorities to use GIS in order to define these areas accurately using cadaster maps and local spatial maps.

In addition to the use of spatial information in local decision making processes, spatial information is used on the national level. We refer to here to one recent initiative which involves the connection of the spatial data of Ministry of Local Government (MOLG) with the Ministry of agriculture via services (URLS). These URLs can be consumed in web mapping applications. Data changes are reflected on the URLS and thus the two ministries can access the most updated data.

1.5	*Relevant national institutes, contact points*

In Palestine, there are no distribution centers that are specialized in providing spatial data as we have identified among weaknesses and gaps in part B. Nonetheless, different Palestinian ministries and some non-governmental organization do provide spatial data upon request depending in their area of interest. Another main gap that we have identified is that there are no national policies regarding the sharing of spatial data among different local and national institutes. These institutes share data based on bilateral memorandum of understanding that specifies the kind of spatial data to be shared and the cost of this data if applicable. Accordingly, no data is available on line. The following table includes a list of ministries and local non- governmental organizations that have spatial data.

Table 1 : Geospatial Data Distribution Centers

Distribution Center	Data Availability	Metadata
Ministry of Planning (MoP)	Off-line	Yes
Ministry of Agriculture (MoA)	Off-line	Yes
Ministry of Local Government (MoLG)	Off-line	Yes
Ministry of Environmental Affairs (MEnA)	Off-line	Yes
Palestinian Water Authority (PWA)	Off-line	Yes
Palestinian Land Authority (PLA)	Off-line	Yes
Ministry of Public Work and Housing (MoPW)	Off-line	Yes
Applied Research Institute Jerusalem (ARIJ)	Off-line	Yes
Land Research Center	Off-line	Yes

1.6 Beneficiaries of ongoing or completed EU/national/regional projects

The Applied Research Institute Jerusalem Association (ARIJ) had and is implementing a series of projects funded by the European Union as follows:

Table 2 : EU Projects

Project Title	Beneficiary	Web Site	References
Capacity Building for Sustainable Treatment and Valorization of Olive Mill Waste in Palestine - OLITREVA. Fund: Seventh Framework Programme (FP7)	ARIJ	Link	Link
From Grove to Market - EU' – Developing the value chain for subsistence and small-scale farmers in the occupied Palestinian Territories Fund: European Commission	Oxfam GB	N/A	Link
Addressing the Geopolitical Changes in the Occupied Palestinian Territory - Settlement / Phase VI Fund: European Commission/ Partnership for Peace Programme	ARIJ	Link	Link
Promoting socio-economic sustainable development through innovative technological actions for Mediterranean tourism-heritage and landscapes protection clusters - HELAND Fund: ENPI-CBCMED / European Neighborhood and Partnership Instrument, Cross-Border Cooperation in the Mediterranean - Program funded by European Union	University of Malta - Institute for Tourism, Travel and Culture (Malta)	N/A	Link
Towards Better Services in the Vulnerable Communities of the oPt through engaging Palestinian non State Actors in Local Community Development Fund: European Commission / Non State Actors and Local Authorities in Development Actions in the oPt	ARIJ	N/A	Link
Improving the local governance processes through exchange of good practices, pilots and training in geospatial technologies – LOCAL SAT Fund: ENPI-CBCMED / European Neighborhood and Partnership Instrument, Cross-Border Cooperation in the Mediterranean - Program funded by European Union	Larnaca District Development Agency	N/A	Link
Sustainable Planning as a Tool to Promote Dialogue and Cooperation between Palestinians and Israelis Fund: European Commission/ Partnership for Peace Programme	Arab Center for Alternative Planning (ACAP)	N/A	Link
Environmental Sustainability for a Better Life: An Integrated Approach for Localizing Agenda 21 in Bethlehem District – Agenda 21 Fund: European Commission /Life Program	ARIJ	Link	Link
Monitoring Israeli Colonizing Activities in the Palestinian Territories (West Bank and Gaza) - Settlement / Phase I & Phase II Fund: European Commission/ Partnership for	ARIJ	Link	Link

Peace Programme			
Monitoring the Israeli Settlements Activities in the Occupied Palestinian Territory and assessing their impacts on the viability of a future Palestinian statehood – Settlement /Phase III Fund: European Commission/ Partnership for Peace Programme	ARIJ	Link	Link
Monitoring actions and transformations in the Palestinian Territory to develop policies and strategies for conflict management and peace building – Settlement / Phase IV Fund: European Commission/ Partnership for Peace Programme	ARIJ	Link	Link
Addressing the Geopolitical Changes in the Occupied Palestinian Territory – Settlement / Phase V Fund: European Commission/ Partnership for Peace Programme	ARIJ	Link	Link
Sustainable Access To Food and Economic Security and Economic on Jenin (SAFES) Fund: European Commission	ARIJ	N/A	Link

2. Data – Applications

2.1 National Spatial Data Infrastructure (NSDI)

There is no national spatial data infrastructure in Palestine which allows direct access to all available digital geo-information across the country, through the internet. We consider this as a major gap as included in part B. However, it is worth mentioning in this regard that Palestinian civil society and media organizations have been worked hard in the past few years to influence the adoption of a "Right to Information Law" by the Palestinian Authority. Accordingly, a draft law is on its way of being officially and legally endorsed.
Through the "Right to Information Law", the Palestinians will have the possibility to access, generate, process, and communicate information in the context of governance and citizenship. This of course applies to geo-information among other type of data. Once endorsed, this law will also contribute to the empowerment of community and civil society enabling them to hold duty bearers accountable.

2.2 National Census

The Palestinian Central Bureau of Statistics (PCBS) aims to develop and enhance the Palestinian official statistical system based on legal grounds that organize the process of data collection and utilization for statistical purposes. Official statistics provide an indispensable element in the information system of a democratic society, serving the Government, the economy and the public with data about the economic, demographic, social and environmental situation. To this end, official statistics that meet the test of practical utility are to be compiled and made available on an impartial basis by official statistical agencies to honor citizens' entitlement to public information.
This PCBS directory guides users through the statistics. Starting at the subject directory, a simple point-and-click connects users to relevant statistics or the subject group of their choice. This includes the following topics: Agriculture, Balance of Payments, Constructions, Environment, Education, Financial Intermediation, Gender, Health, Industry, Jerusalem, Labor force, National Accounts, Prices and Price Indexes, Science and Technology, Tourism, trade, Water and Waste Water.

PCBS possesses large amount of data in various statistical domains obtained through surveys, censuses and administrative registers conducted and still being conducted by PCBS. Most of these important data groups are classified according to subject as follows:
Data user should use the data for statistical purposes only and abide by data security and confidentiality rules stated in the General Statistics Law without disclosing any individual data. Data user should respect PCBS internal regulations and refer to data resource upon publishing any material derived from PCBS data.

Procedures of data usage:

- ✓ Filling out a form at the Division of User services with clear reference to the needed data and the study resulted from the data.
- ✓ Processing and approving the user request internally (within two weeks at the most).
- ✓ In case the request is approved, the applicant is contacted to sign the agreement and clarify the procedures and terms of use.

The PCBS also has a scientific research center. This center was opened at the main premises of PCBS for using the raw data according to the procedures and standards of PCBS. Opening the Scientific Research Center comes in line with PCBS policy which aims at enhancing the usage of statistical data in the domain of scientific research and to enable researchers to access different types of data which serve various scientific purposes.
PCBS provides the required data according to standards which maintain data confidentiality and individuals privacy according to article (17), first paragraph of the Palestinian General Statistics Law 2000 "All individual information and data submitted to the Palestinian Central Bureau of Statistics for statistical purposes shall be treated as confidential and shall not be disclosed, in whole or in part, to any individual or to a public or private body, or used for any purpose other than for preparing statistical tables."
Finally, PCBS has a statistician library which was founded in 1993 serving the statistician and researchers at PCBS, and others. PCBS Library contains many books for many subjects in Arabic and other languages, and many audio-visual materials, classified according to Dewey Decimal Classification.
The PCBS has three branches; Nablus, Hebron and Gaza and it contains books, periodicals, reports, seminars, conferences, courses, encyclopedias, dictionaries, atlases and forms in addition to audio-visual materials.
http://www.pcbs.gov.ps/default.aspx

2.3	*Processing capability of Spatial data*

According to the above mentioned paragraphs there is are a number of public services and bodies at all levels of government and the private sector that produce and maintain geo-data in national or local geographical coverage. The most important of them are given in 1.3.

2.4	*Spatial data collection capability*

In regards to the collecting capacity, there are major limitations as mentioned earlier due to the political situation. Accordingly, Palestinian organizations are not able to fly aircrafts and capture photos for mapping purposes. Acquiring aerial photos with high resolution is therefore a major problem, as the Israelis fully control and restrict the use of airspace without security clearance from the Israeli Ministry of Defense.

Moreover, the collecting capacity by the field workers on the ground is also affected by Israeli restrictions. First, the movement of the field workers from one area to another is often restricted due to closures, checkpoints, the presence of closed military areas and second, the restrictions to enter the Israeli settlements. On top of all that, the Segregation Wall has made it difficult to access areas isolated behind the Wall to collect necessary and needed information.
In spite of all these challenges, the Applied Research Institute Jerusalem (ARIJ) is always developing its spatial data collection capability. As ARIJ implements a number of projects that involve having credible sources of information including geo-spatial data, it had become the main source of such data. For acquiring satellite images ARIJ purchases these images through different sources. As for its other capabilities, ARIJ GIS team collect secondary data; revise literature; analyze satellite images; conduct field works studies and interviews; synthesize information and data; and map Israeli activities.

Table 3 : Spatial Data Collection Capability

Organization	Type of Organization	Data Type	Delivery Time	Cost	Royalties
ARIJ	NGO	Geo-Spatial Data	N/A	N/A	No royalties
Good Shepherded Engineering and Computing	Private Sector	Aerial-Photographs Cadastral Maps Geo-Spatial Data	N/A	According to company prices	No royalties
Sky Map Engineering Company	Private Sector	Aerial-Photographs Cadastral Maps Geo-Spatial Data	N/A	According to company prices	No royalties

2.5 GPS data availability and costs

There are some Palestinian organizations that have Global Positioning System (GPS) as follows:

1. AXIS GPS & Surveying Instruments LTD: The Trimble NetR9-a highly versatile, ground-breaking GNSS reference receiver for infrastructure and network applications. A full-feature, top-of-the-line receiver with an industry-leading 440 channels for unrivaled GNSS multiple constellation tracking performance, the Trimble NetR9 was designed to provide the network operator with maximum features and functionality from a single receiver. In addition, it can be used as a campaign receiver for post-processing, as a Continuously Operating Reference Station (CORS) receiver or portable base station for Real-time Kinematic (RTK) applications, and as scientific reference station.

AXIS deployed NETR9 receivers to construct a geodetic network of CORS, we then used PIVOT Software to process and calculate a network solution, and after achieving MM accuracy we are able to provide RTK corrections in CM level.
state of the art receivers, geodetic antennas and processing servers, the company is using multiple servers to host the PIVOT software and Database in order to provide maximum backup and redundancy to be able to provide the VRS service uninterrupted 24 hours a day.

Map 1: APN Network Stations

Calculating Local N,E,H Points:
The network itself works in global GPS coordinates system WGS-84; In order to produce local Palestine New Grid N,E,H coordinates, a transformation of 7 parameters (Helmert transformation) is applied to the WGS-84 coordinates to produce GRS-80 coordinates, the transformation converts WGS-84 coordinates to GRS-80 coordinates using the following seven parameters: (Translation (X), Translation (Y), Translation (Z),Rotation (X), Rotation (Y), Rotation (Z) and Scale Factor)

After the first transformation a Transverse Mercator projection is applied to the GRS-80 coordinates which produces the required local N, E, H coordinates.
The Transverse Mercator projection works using 5 parameters: (Central Latitude, Central Longitude, False Northing, False Easting and Scale Factor)
axis@axis-gps.com

2. ARIJ Differential GPS Station: this differential GPS station located in ARIJ premise in Bethlehem. It was established 1997. This satiation performs the following for ARIJ purposes only; data is not shared on the web.
   - ✓ Provides improved location accuracy, from the 15-meter nominal GPS accuracy to about 10 cm in case of the best implementations.
   - ✓ Uses a network of fixed, ground-based reference stations to broadcast the difference between the positions indicated by the satellite systems and the known fixed positions.
   - ✓ Broadcast the difference between the measured satellite pseudoranges and

actual (internally computed) pseudoranges, and receiver stations may correct their pseudoranges by the same amount.
- ✓ It covers all West-Bank area.

3. Good Shepherd Engineering & Computing Co. Ltd. (GSE): GSE is a Palestinian Company that specializes in services of High Technology in the Computer Aided Design and Drafting (CAD), Geographic Information Systems (GIS) and Remote Sensing Software and Engineering Consultation. GSE also performs the following business activities:
   - ✓ Mobile Application Development
   - ✓ Enterprise Solutions
   - ✓ Web portals
   - ✓ E-Government
   - ✓ Application Service Provider
   - ✓ Custom Software Development
   - ✓ Software publishing

http://www.gsecc.com/index.php/en/

4. Other GPS Services: Ramallah Maps - road map, satellite view, street view and GPS Ramallah Maps is a home page for any search about Ramallah: accommodation, rent a car, real estate, business, jobs, ads and much more. The map of Ramallah enables users to safely navigate to, from and through Ramallah. More, the satellite view of Ramallah lets the user to see full topographic details around actual location or virtually explore the streets of Ramallah in addition to using GPS sensor to get directions in Ramallah or to find a specific place in Ramallah. This is compatible with any computer, laptop, tablet or smartphone having an Interne browser.

http://www.maps-streetview.com/Palestinian-Territory/Ramallah/

2.6	*Level of conformation with the EU INSPIRE Directive*

No national studies have been conducted to evaluate the size, type, extend and level of confirmation of all generated geo-data provided by public stakeholders in Palestine.

3. Capacities	
3.1	*National budget allocation to Spatial Information*

The Palestinian National budget does not include a budget line item or a particular allocation for spatial information.

3.2	*Funding initiatives and participation to research programs*

In regards to funding, there are limited funding opportunities for research and development project in Palestine. As for geo-spatial research, there are no particular funds for this topic. It normally included as research component in other research implementation projects. We mention the World Bank funds some projects for the Palestinian Land Authority.
For example the development objective of one of these projects is to improve the design and implementation of the land registration system in the project area. The project provides resources to the Palestinian Land Authority (PLA) to complete Systematic Land Registration (SLR) of at least 180,000 dunums of land in the West Bank. The project also assist the PLA in implementing its mandate and, in particular, managing systematic land registration through institutional

strengthening including provision of enabling technology and office modernization. http://documents.worldbank.org/curated/en/2012/03/16251055/west-bank-gaza-second-land-administration-project

3.3	*Dedicated undergraduate, graduate programs, training centers*

Palestinian universities do not offer undergraduate and postgraduate GIS certificate as a full specialization. They do however provide GIS courses as part of other majors such as Geography, Environment, Engineering as well as other fields. There are also training centers that offer professional and advanced GIS training. Following is a list Palestinian universities and training centers:

Table 4:Geospatial Academic and Professional Training Centers

Institute	Undergraduate Courses	Graduate Courses	Training	Personnel	Web-site	Curriculum
Hebron University	8 credit hours	-	-	2	Link	n/a
Palestine Polytechnic University	20 credit hours	-	yes	10	Link	n/a
An-Najah National University	20 credit hours	4 credit hours	yes	30	Link	n/a
Al-Quds University	6 credit hours	3 credit hours	no	3	Link	n/a
Bethlehem University	3 credit hours	-	yes	3	Link	n/a
Birzeit University	20 credit hours	4 credit hours	yes	10	Link	n/a
Palestine Technical University-Kadoorie	3 credit hours	-	no	2	Link	n/a
Palestine Academy	3 credit hours	-	no	2	Link	n/a
Applied Research Institute Jerusalem (ARIJ)	Short training course	-	yes	7	Link	n/a
Good Shepherded Engineering and Computing	Accredited training certificate	-	yes	3	Link	n/a

REFERENCES AND USEFUL LINKS

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