

Comparative Analysis of NSDI Policies in Greece & Cyprus Two Different Systems within the EU

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Key words:

SUMMARY

This paper explores the main issues of the National Spatial Data Infrastructure (NSDI) policies in Greece and Cyprus, two countries sharing common historic and cultural characteristics. The development of a cadastral system, currently carried out in Greece and the ongoing reform of the cadastre of Cyprus, constitute a key block of the above infrastructure in both countries. The Government of Cyprus and the Department of Land and Surveys (DLS), have recently embarked on a program to develop a number of computerized land related systems (such as land management, valuation etc), and implement in stages a national data infrastructure, where all relative agencies can share available information. On the other hand in the case of Greece, the effort for establishing a nationwide cadastre is ongoing, offering valuable experience on this field, in terms of economic and managerial manipulations, as well as in difficulties faced during that process.

The above two case studies are similarly presented in this paper, to facilitate the comparison between the development & operation of the two Cadastral systems, mainly focusing on legal, technical and financial issues of their implementation and maintenance. Other issues including land information policies and strategies, the state of relative legislation and key elements of an NSDI are also examined.

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1. AN OVERVIEW OF THE TWO CADASTRAL SYSTEMS

1.1 The Hellenic Cadastral Project

Greece is currently in a transition period moving from the “Mortgage Bureaus” system to a fully digital Cadastral System. The project started in 1994, based on an initiative of the Ministry of Environment, Physical Planning and Public Works and the financial support of the EU (2nd Community Support Framework) and the Hellenic State. Ktimatologio S.A. a private sector firm established by a joint decision of the Ministries of National Economy and Environment, Physical Planning and Public Works (M.D. 81706/6085/6-10-1995 MDGG872B/19-10-1995) executes this project in co-operation with a private consortium, the Hellenic Cadastre Consult (HCC) for the promotion of the project. Responsible for preparing strategies and providing the necessary infrastructure data (topographic data and aerial photography) is the Hellenic Mapping and Cadastral Organization (HEMCO) (Law 1647/1986), a governmental organization under the Ministry of Environment, Physical Planning and Public Works. The development of the Hellenic Cadastre (HC) relies greatly on the collaboration between public sector and private surveying engineering companies, who have the means to complete the tasks contracted to them by Ktimatologio / HEMCO.

The system was designed as a parcel-based land information system, serving as a legally recognized record of land ownership. The aim of the project is to establish a complete, uniform, systematic and always up-to-date registration of land parcels in Greece and guarantee titles to those parcels brought on to the register by the adjudication process, issued according to relative legislation (Law 2308/1995 & 2664/1998). These registrations consist of the geometric description of the parcels and the ownership situation on them. The procedure of collecting and maintaining the data is overseen and guaranteed by the Hellenic State. The project also, aims to include additional valuable information, which is necessary to support developing activities of the country.

The project comprises so far two pilot programs and the 1st main program (as shown on the map in figure 1). It is expected that the ongoing cadastral works within this framework will cover 16% of urban areas, 10% of agriculture land and 7% of forestland areas, in 447 municipalities. In its operational phase the cadastral activity will be undertaken by regional and local cadastral offices, responsible for maintaining and updating cadastral maps and registers. The setting up of these offices will at first correspond to the existing mortgage bureaus, in order to ensure that legal support will be provided for the first registrations. Further on the system will be developed towards the establishment of an information system that will upgrade all cadastral activities, and provide the end users of the system (landowners, associated organizations, etc) with the necessary certificates containing all information concerning property rights, transfers of rights etc. This will greatly facilitate all legal transactions (Zentelis, 2001).

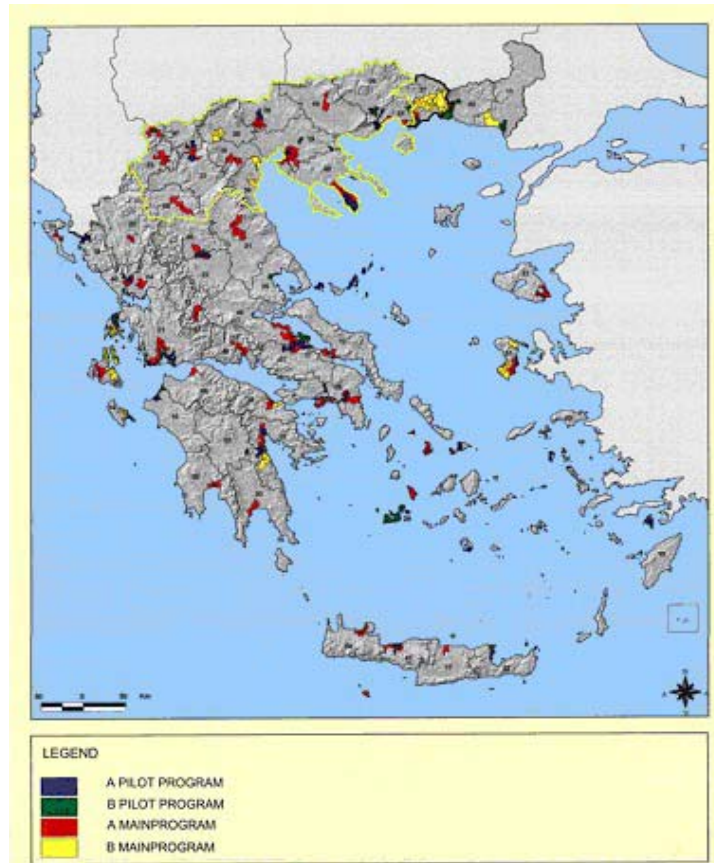


Figure 1: Hellenic Cadastral Project's work stages

1.2 The Cadastral System of Cyprus

The Land Registration system of Cyprus is the "Registration of Title" system, which is operating under the Department of Lands and Surveys (DLS), a State agency responsible for land registration, valuation of properties, management of State lands, surveying and mapping. Since 1989 the DLS is implementing a strategic plan for the development of a Cyprus Integrated Land Information System (CILIS), which will automate all Departmental procedures and will serve the Land Information community in the country. As a result of the study undertaken by SARGIC International in October 1989, a strategic plan was produced. Its aim was to "...address the land registrations procedures for which the DLS is predominantly responsible, to consider the improvements which could be gain by the application of the department's system and procedures".

Approach:

The general approach recommended for a new cadastral survey of Cyprus, and consequent implementation of a fixed boundary cadastre is as follows (fig.2):

- Survey the position of all available physical evidence that relates to land boundaries by either photogrammetry or electronic tacheometry
- Where no physical evidence exists, use the best available information to determine coordinates for the boundary turning points. In areas covered by Plane Table and Unsound Surveys, the existing graphical cadastre should be used. Where recent Chain

Survey field books are available, coordinates should be calculated using the data shown therein.

- Having determined an initial new cadastre, agreement of these boundaries by landowners should be obtained to ensure that the final plan of survey represent the true cadastre. Some alteration to the definition could result in cases where ether physical occupation may not be the agreed boundary between adjoining landowners.

Coordinates for BTPs and PSMs (Permanent Survey Marks) should be stored in the Survey Data Base (SDB), the repository for information gathered during the course of each survey. The survey plan should then become the basis for registration of parcels within each Registration Block that is the subject of a new survey.

The objectives of the CILIS program are summarized as follows:

- To establish a new Geodetic Network, on wich all resurvey work will be based.
- To resurvey the properties for the free part of the country (5,760 sq.km, 1,089,480 land parcels) by modern and accurate techniques, aiming at an accuracy of $\pm 0.07\text{m}$ to $\pm 0.30\text{m}$ for commercial urban to rural areas respectively.
- To use air photographs for surveying work, in combination with field surveys.
- To convert all registers into digital form.
- To develop a Computer Aided Valuation (CAV) System.
- To adopt a legally authorized business approach to the departmental procedures.
- To provide continuing education and training skills for the personnel.

1.3 Characteristics of the two Case Studies

The main characteristics of the Cadastral Systems in Greece and Cyprus along with some basic data concerning the two countries are briefly summarized in Table 1.

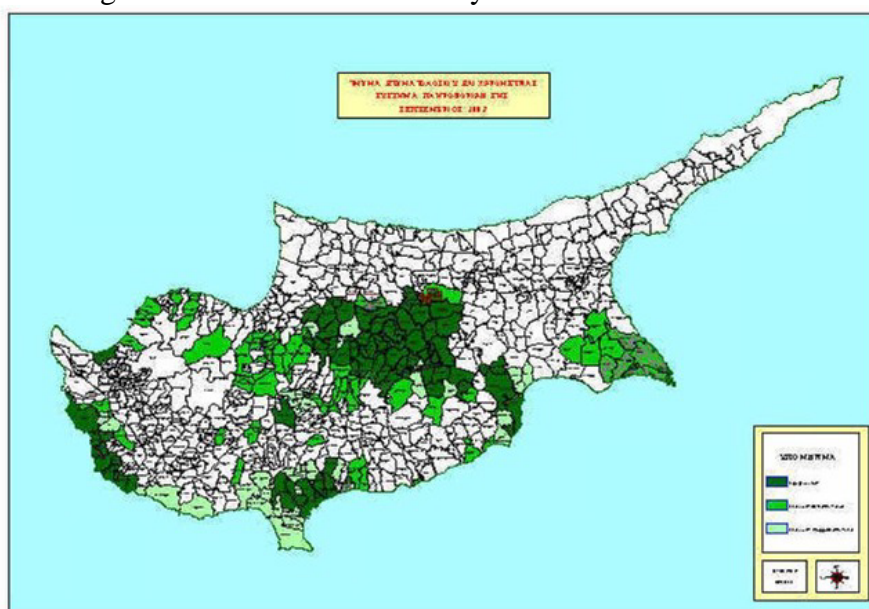


Figure 2: The CILIS implementation phases.

Table 1: Summary of Cadastral Systems between the two countries

	Greece	Cyprus
<i>Population</i>	About 10.5 million	About 770,000
<i>Total Area</i>	About 132,000 sq.km	About 5,760 sq.km (free part)
<i>Land Parcels/Lots</i>	About 15 million/70 million	About 1.1 million/2.2 million
<i>Land Registration System</i>	Old System: Registration of Deeds Ongoing New System: Registration of Titles	Registration of Titles
<i>Responsible Organization(s)</i>	Hellenic Mapping and Cadastral Organisation	Department of Lands and Surveys
<i>Legislation under which land and title registration is administered</i>	L D 5.9.1923 For the codification of the modified legislation for the cadastral system in urban real estate RD 10.1.1949 For the introduction of administrable management and protection of the public land legislation to the Dodecanese L 674/1977 For the Land Reallotment L 133/1983 Extension of the Urban Planning maps, Urban development and relevant legislation L 1647/1986 HEMCO and other legislation L 2308/1995 For the National Cadastre MDGG 245B/1996 Definition of rights on the real estate for which a submission of statement is required for the registration in the cadastral books MDGG 639B/1995 Ratification of the technical specification, the content of the cadastral maps and tables and the list of fees for the Law 2664/98, "National Cadastre and other provisions", Government Gazette issue No 275A, December 3, 1998. Ministerial Decision 81706/6085/6-10-1995, Government Gazette issue No 872B, October 19, 1995.	The Immovable Property (Tenure, Registration and Valuation) Law, Cap.224 The Immovable Property (Transfer and Mortgage Law), 1965 Will and Succession Law Cap. 195 Civil Procedure Law, Cap.6
<i>Systems' administration and maintenance</i>	New Cadastral system: at a National level Old System: at a Regional level.	At a National and Regional level. Each of the 6 districts administers its own Land Registers under the overall control of the Director at a national level.
<i>Number of properties transferred and mortgages registered (annually)</i>	Properties within the private sector: 500,000 approx. Mortgages registered: 120,000 approx	Properties within the private sector: 90,000 approx. Mortgages registered: 27,000 approx
<i>Cost:</i>	HC project: initial budget US\$ 1.1 billion Recent estimates: US\$ 2.1 billion	Reform cost: Collecting Legal data: £ 1,700,000 GIS: £ 1,300,000 Fiscal data: £ 3,000,000 Resurvey work: £ 30,000,000 System development: £ 7,000,000 Operating & Support: £ 1,000,000

2. TECHNICAL ASPECTS CONCERNING THE TWO SYSTEMS

2.1 Hellenic Cadastral Project

The basic registry unit of the Hellenic Cadastre is the land parcel, a contiguous area of land that comprises an independent property and is owned by one or more persons ab indiviso. The land parcel is the basic reference unit of all cadastral information. A code number, the Hellenic Cadastre Code Number (HCCN), characterizes every parcel. This number consists of 12 digits, based on the administrative division of the country: the first two digits indicate the prefecture, the next three indicate the municipality or community, the next two the

cadastral sector, the next two the cadastral section in rural areas of the building block in urban areas and the last three digits the land parcel, as a serial number within the cadastral section. The Code Number is appropriately extended to identify uniquely buildings and other properties within a parcel.

The basic maps of the Cadastre are the Cadastral Diagrams. Cadastral Diagrams depict, among other information, property boundaries buildings and Hellenic Cadastre Code Numbers (HCCN). Depending on the kind of the area depicted, the Cadastral Diagrams are drawn at a scale of 1:1 000 for urban areas (figure 3), 1:5 000 for rural areas and 1:10 000 for the other areas of the country.



Figure 3: Cadastral Map Extract

The main component of the HC is the Cadastral DataBase (CDB), where all data concerning persons / legal entities, land parcels / partitions and property rights are recorded (Law 2308/1998). These data constitute both the geometric and the descriptive information on real estate properties. The CDB is structured hierarchically according to the following general schema (figure 4) (Arvanitis, 1999).

In order to build up the CDB, the private surveying engineering companies in compliance with the specific HCP provide the system with information on land parcels description and property rights, organized as follows (figure 5).

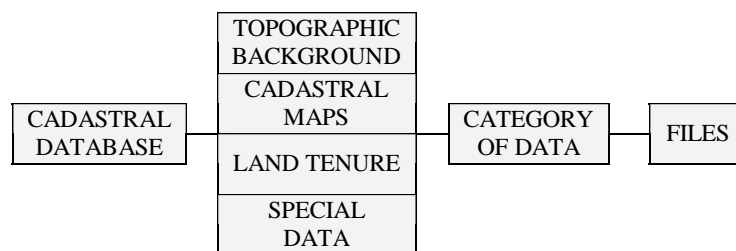


Figure 4: General conception of the CDB structure

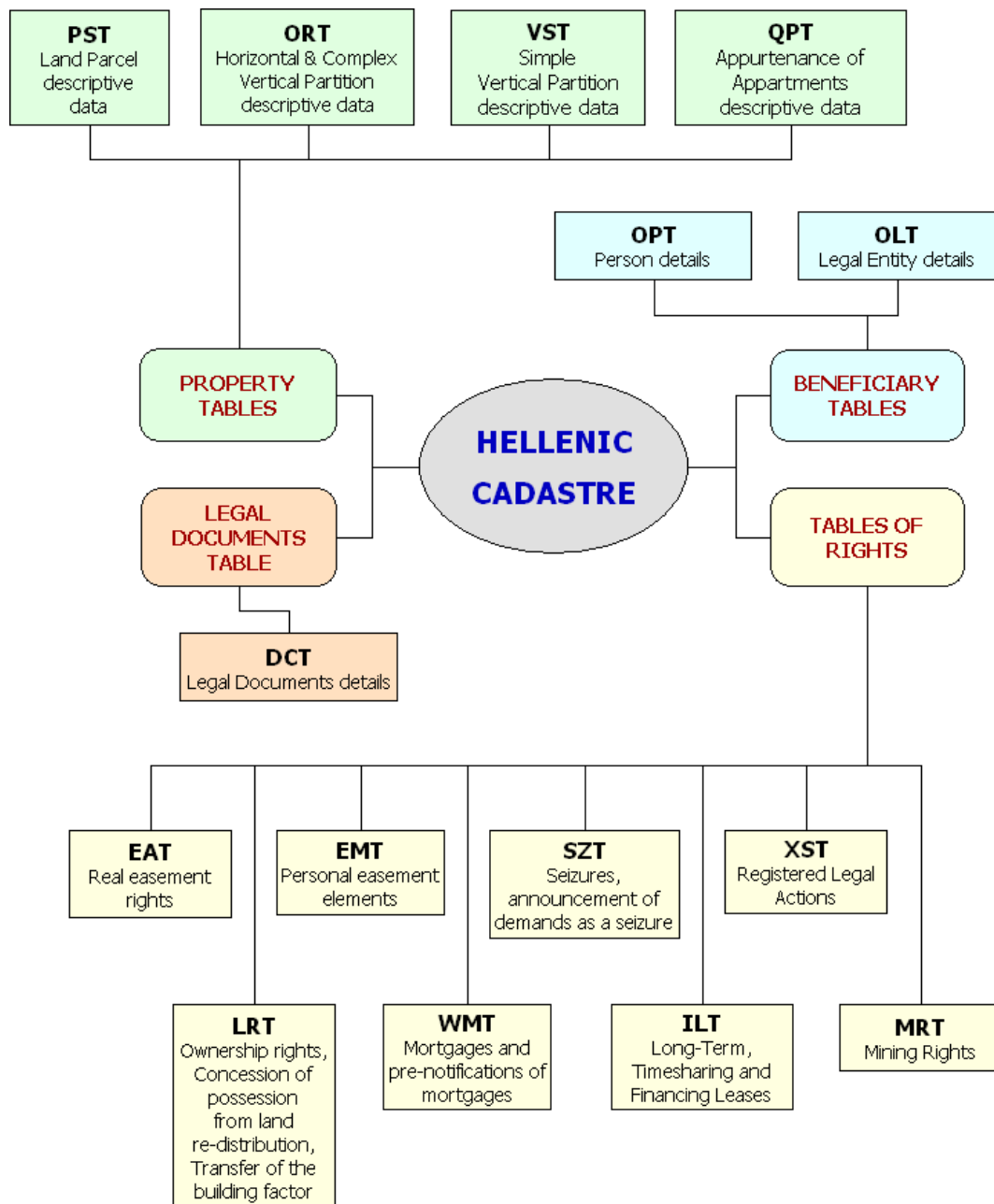


Figure 5: Structure of the cadastral data provided by the private surveying companies.

2.2 The Cyprus LIS Data Model

The purpose of the conceptual model is to provide DLS staff and potential users of the system with an accurate “mental model” of the content and physical structure of the database are interpreted correctly. Another objective of the conceptual model is to develop a logical framework for organizing the GIS sub-system data that is flexible and will accommodate future expansion of the database in the context of a national LIS.

Seven general categories of information are stored in the GIS sub-system database:

- Survey Database – Permanent Survey Marks (PSM), Boundary Turning Points (BTP) and registered boundaries
- Cadastral Database –Parcels, Buildings and topographic features such as fences and walls that are coincident with parcel boundaries
- Administrative boundaries –District, town/village, quarter, block and other administrative boundaries
- Topographic Feature –Point, line and area topographic and utility features
- Road centrelines -Linear network representing roads and streets
- Plan Indexes – Index map used in plan production
- General Themes –Thematic overlays related to planning and property valuation.

The CILIS has two major application components, the geographical and the legal one (figure 6). The first component includes two main subsystems: the *Data Input and Maintenance System (DIMS)* and the *Geographic Enquiry and Analysis System (GEAS)*, a module embracing the operations of geographic manipulation, analysis, display and hardcopy of the spatial and descriptive data held within the DataBases. The CILIS comprises so far four main Digital DataBases:

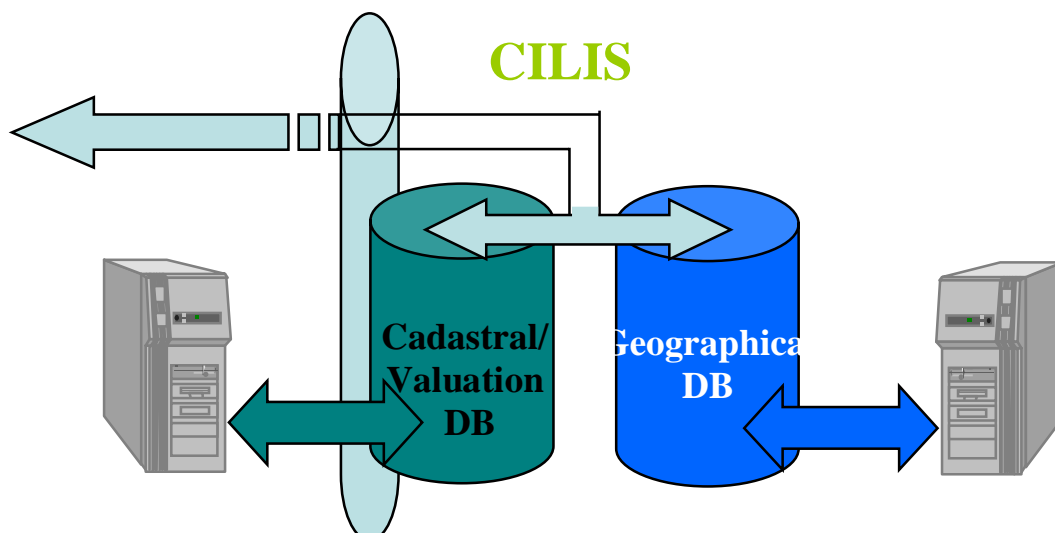


Figure 6: Overview of the Cadastral System of Cyprus

- The *Survey Data Base (SDB)*, for storing information related to the geodetic network, current survey data and historical records of all surveys. From a total of 1,089,480 land parcels, 25,000 have already been entered into the system
- The *Digital Cadastral DataBase (DCDB)*, designed to store digitized existing cadastral plans (3,679 plans in total) covering the free part of the island at different scales: 1:500, 1:1,000, 1:1,250, 1:2,500, 1:5,000. So far 380,000 land parcels have been converted, representing 9.3% of the total free land area. The CDB provides an up to date continuous cadastral map base to support cadastral mapping and LIS functions.
- The *Topographic DataBase (TDB)*, including all geographical data in support of digital cartographic work (road network data, land uses, hydrology data and isolines).

- The *Legal/Fiscal DataBase (LDB/FDB)*, for storing and maintaining in digital form all land registers and other land records (such as land parcels' and owners' identity, description, mortgages, etc). The LDB facilitates transaction, provides a document tracking system and supports CAV. So far 800 from a total of 1.3 million existing records have been transformed into the system, representing 19.13% of the surface of the free land of Cyprus. For valuation purposes sales history and other useful data are provided. It is estimated that from a total of 2.2 million sub-properties, 90,000 are already included in the FDB.

Around the CILIS Data Base (Figure 7), a number of application systems have been developed (e.g. the *Application Tracking System*), including data entry, maintenance, enquiry and output functions, managed by Oracle and ESRI Software. More specifically, the system requires a relational database for data storage and retrieval and a standard Geographical Information System capable of integration to the relational database. The GIS and the relational database can support all hardware and operational software. The system can be implemented in both a central and decentralised environment. SUN Servers and Workstations running UNIX Solaris, Oracle Database and ARC Info GIS System, run in a client-server solution (fig. 8).

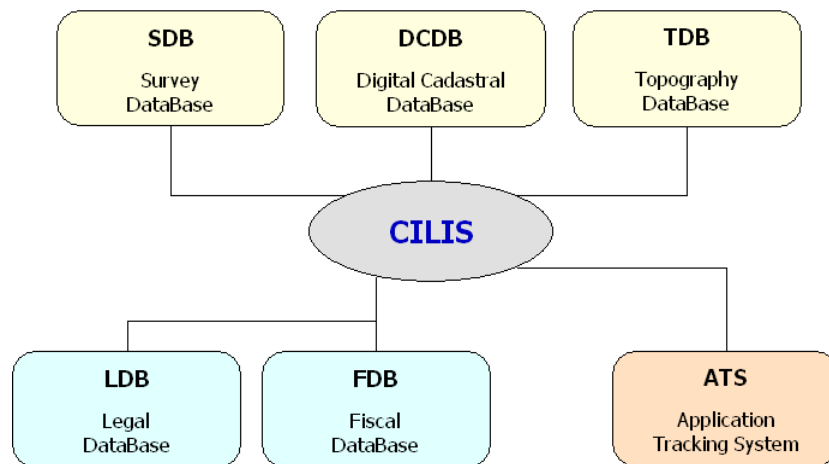


Figure 7: The CILIS DataBase Structure

The development of the Cyprus national LIS is controlled by a council, the *Cyprus Land Information Management Council (CLIMC)*, constituted in 1994 (Min.Dec.41657/1994) with the General Director of the Ministry of Interior as Chairman, and representatives of Government Agencies, Utility Organizations and Local Authorities, including the Director of the DLS (Roussos, 1995). The mission of the council is to develop a national strategy on land information management, with the aims of establishing cost efficient access to land information, to enable effective decision-making and providing the mechanism for efficient data transfer between a wide range of land information users, by developing a corporate and modern approach to the operations of the CILIS.

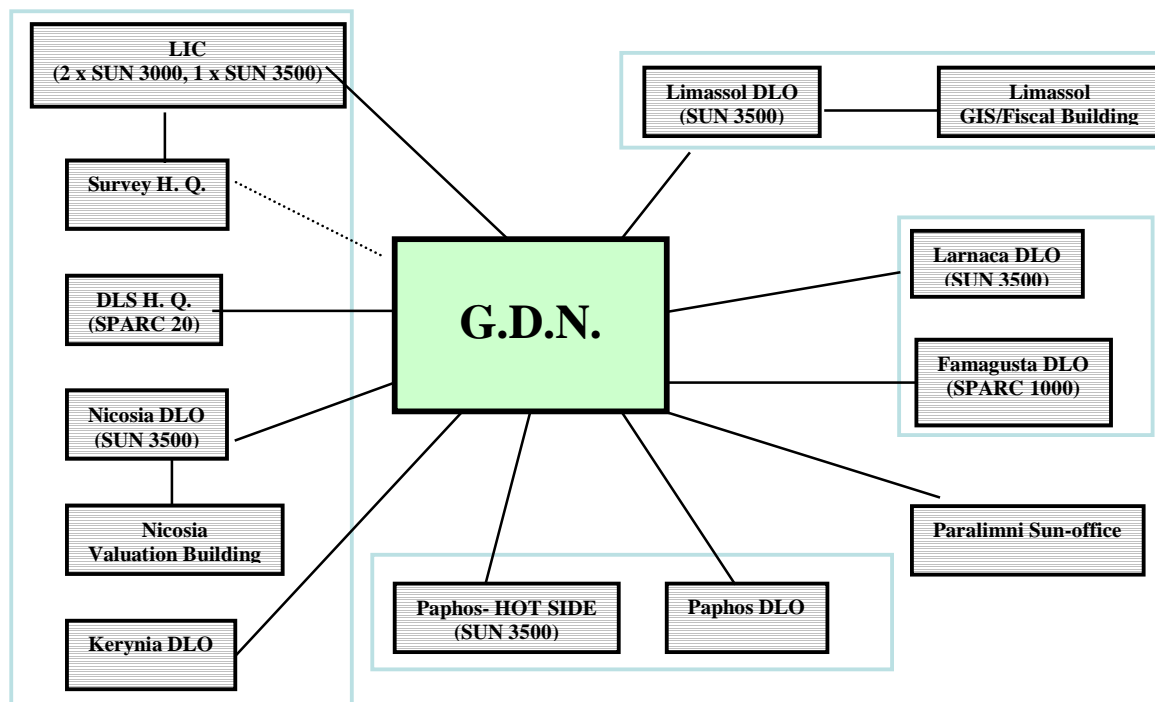


Figure 8: Hardware and Software installation in District Land Offices

2.3 Comments on Technical Issues

Cyprus is in the process of reforming its cadastral system, while Greece is developing a new system. The Cyprus LIS project is an umbrella program covering the systematic cadastral resurvey, the computerization of cadastral records and maps, the development of a number of applications to support and automate the activities of the DLS and the establishment of a National LIS. In the case of Greece, there is no system in place to maintain the information and work done so far. The principles of the information technology plan have been developed and accepted by the management team but still, considerable work has to be done in developing the system.

Both countries adopt a parcel-based cadastre, where each registered land property has a unique reference number. Cadastral maps form the spatial component of the two systems and both cadastral and registration data share the same Data Base. The initiatives of Greece and Cyprus are to develop their systems in such a way to provide access to several groups of authorized users. Therefore, cadastral data must be in conformity with the national standards and compatible with the NSDI.

3. LEGAL ISSUES

Cyprus has a “Registration of Title” system, highly trusted by the public, although the title is not guaranteed by the State. On the other hand Greece is moving from a “Register of Deed” to a “Register of Title” system, which is a very difficult task, requiring much effort and trouble. Therefore the status of each country has a direct affect on the way property and other rights are registered, transferred and protected. The following summarizes some of the main differences in terms of legal aspects between the two countries:

- *Notaries:*
 - *Cyprus* does not have a notary system. All documents required when a land parcel is transferred or mortgaged, must be completed and signed by the interested persons and deposit with, the Lands Office accepting the transfer/mortgage. So the functions of the notaries are left to the registration authorities. This is possible due to the high degree of simplification and formalization of documents needed. Most transactions are carried out on standard forms and, without particular problems, may be completed within one hour.
 - In *Greece*, notaries are authorized to create documents with the help of the lawyers of the interested parties.
- *Division of land into building sites:*
 - In *Cyprus* the division of land into building sites presupposes the issue of a division permit by the appropriate authority. When the permit is obtained and even before the commencement of the constructions, the divided land must be demarked and staked out. Upon completion of the construction works, the appropriate authority issues a certificate of completion of the construction works and the owner files an application (on a specific form) for registration of the division and the issue of new certificates of registration.
 - In *Greece*, when a land parcel is partitioned (horizontally or vertically) the new property rights are registered only upon declaration, the construction being completed or not.

4. FISCAL ISSUES

4.1 Tax Rates for Real Estate Transactions in Greece

In the case of Greece, tax rates for Real Estate Transactions, range in certain intervals. (Labropoulos et al, 2003). When a property is being sold, the following apply (Table 2):

Table 2: Transfer Tax Rate for Sale purposes

Taxable Value	Area not covered by a public fire - protection service	Area covered by a public fire - protection service
≤ 15.000 €	7%	9%
>15.000 €	9%	11%

7% is the tax rate on the Taxable Value for a property valuing up to 15,000 € and 9% on the remaining part of the value for a property valuing for more than 15,000 € (when other tax exemptions such as first residence, do not exist). These rates are generally increased by 2% when the property is situated in an area covered by a public fire protection service. Certain exemptions apply on industrial, educational, trade or hotel properties.

In the case of Parental benefit, Donation or Heritage, the following percentages are valid:

Table 3: Transfer Tax Rate for other purposes

Taxable Value	Parental benefit	Donation	Heritage
≤ 20.000 €	0%	0%	0%
20.000 € - 40.000 €	2.5%	5%	5%
40.000 € - 160.000 €	5%	10%	10%
>160.000 €	10%	20%	20%

4.2 Tax Rates for Real Estate Transactions in Cyprus

In Cyprus, tax rates are significantly lower and are imposed either on the Market Value, or on the Assessed Value of the property, according to the nature of the Transaction.

Table 4: Transfer Tax Rate imposed on the Market Value

Value	<ul style="list-style-type: none"> ▪ Sale ▪ Donation (from non-relative, non-spouse) ▪ Heritage (to non-legal heir) ▪ Auction ▪ Concession of Government Land 	
≤ 10.000 £	5%	on the Market Value
10.000 £ - 20.000 £	6%	
20.000 £ - 35.000 £	6.5%	
35.000 £ - 50.000 £	7%	
50.000 £ - 75.000 £	7.5%	
>75.000 £	8%	

Table 5: Transfer Tax Rate imposed on the Assessed Value

Registration after Foreign Possession	4%	on the Assessed Value
Heritage (from parent to child)	4%	
Heritage (from child to parent)	8%	
Heritage (to spouse or up to 3rd degree relative)	8%	
Exchange (of equal Market Value properties)	2 x 4%	

In the case of Parental Benefit, the imposed Tax is very low and equals the initial (of the first contract) Market Value of the Property.

Table 6: Transfer Tax Rate for Parental Benefit

Parental Benefit	The initial Market Value of the property
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4.3 Differentiations between the Two Systems

A basic differentiation is that in Cyprus, Real Estate Taxation is incorporated in the Cadastral system and taxes are paid within the Cadastral Offices, while in Greece it is imposed by the IRS offices.

Let's symbolise : t_1 = tax on the contract, t_2 = transcription tax & t_3 = loan/mortgage tax

<u>In Cyprus</u> $t_1 = t_2 = t_3$ stabilising the Real Estate Market	<u>In Greece</u> $t_1 \neq t_2 \neq t_3$ causing the feeling of insecurity
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5. NSDI POLICIES IN GREECE AND CYPRUS

Both countries have the initiative and are under procedure to realise a National Spatial Data Infrastructure (NSDI). For Greece, HEMCO is the responsible organization for coordinating and leading this kind of data. For Cyprus the DLS is an umbrella organization covering all matters related to legal, fiscal and spatial aspects of land. The NSDI policy and operational issues in the two countries are summarized as follows:

5.1 NSDI in Greece

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

- CORINE LAND COVER (digital maps of land use at 1:100000, where every polygon refers to a three digit code according a special nomenclature, using satellite raster data).
- Digital maps of Municipality & Community Administrative Boundaries (digitalized 1:50000 maps, provided by the Hellenic Military Service), containing coastline, country and regional borders, capital, cities, area, name and codes.
- Coordinates (local system of reference) of the national network of points of reference (available under negotiations).
- Digitized maps of Greek Wetlands 1:1.000.
- From the National Cadastre Project, a very important database containing Land and Building Use will be available when ready.
- HEMCO has proposed the creation of “Geospatial Information Infrastructure”, which will be realized when approved by the European Community. HEMCO has also proposed the creation of a National Cartographic Data Base.

To access this information, one has to be addressed to the owner of the data. Some data are available to the Internet, i.e. the site of the Ministry of Environment, Planning & Public Works, where i.e. the quality of the seawater is presented for the whole of the country. Some private companies, who have also developed digital databases or applications, can be accessed to their Internet site i.e. <http://www.eranet.gr>, where there is a GIS application for a small part of Athens. Finally, data also exist and are provided by international agencies such as satellite data, i.e. in <http://www.terraserver.com>, where satellite images of all the region of Attica are available. The above digital data (when available) are usually for sale under the

conditions that the user declares the reason he needs them and that the information cannot be transferred from one user to another. So far, there is no special regulation governing the procedure and details for establishing a NSDI. The initiatives rely mainly on the providers of the information.

5.2 NSDI in Cyprus

For Cyprus (Hadjiraftis, 1998), spatial information that is captured and maintained by the DLS constitutes the official database reference on which other Government Departments, semi-government authorities, local government and other private land related agencies, base or intend to base their local spatial networks. This information includes the geodetic control network, cadastral boundaries, buildings, topographical, survey measurements, administrative boundaries, map index etc. The collection of this data is coordinated internally within DLS. Government and semi-government departments are encouraged to base their data collection programs on DLS spatial databases. The CLIMC coordinates the data collection projects among LIS parties in order to avoid duplication of data and waste of money. Private commercial firms are partially involved in the spatial data capture projects through commonly agreed procedures and contracts.

Since the Government of Cyprus through DLS embarked upon a program to establish a National LIS, all Departmental procedures will soon be automated and will serve the Land Information community in Cyprus. Spatial data can be accessed by officially applying to DLS Director, since this data is currently considered as property of DLS and the Government, and is not readily available to the public without official permission. However, DLS is studying different methods to revise the law and better serve the community by providing digital LIS data more efficiently. The NILIS was designed in such a way to provide several security levels and to provide access to several groups of authorized users. Confidential information is kept only for internal DLS use and access is restricted. Client/server architecture was adopted based on UNIX operating system. Leased telecom lines are used for exchanging data between district offices. DLS is trying to encourage all LIS users to use the same DLS spatial database in order to ensure that it will be technically possible to exchange and synchronize data.

6. CONCLUSIONS

This paper similarly presents the cadastral systems of two countries; Greece, a EU Member State and Cyprus, a candidate accession to the EU. These case studies have been chosen as examples of the situation that is emerging across a diverse group of countries, making significant strides both in the road to joining the EU, and in developing and implementing an NSDI. The difficulties faced by the accession countries in implementing GI strategies and infrastructures are largely the same as those of the EU Member States and include a lack of awareness across different levels of the public sector, lack of management support and technical skills, varying policies with respect to access to data and pricing, weak motivation and coordination across agencies. (Craglia, 2002)

It is evident that the legal status and the historical evolution of each country have a direct affect on the characteristics of their Cadastral Systems. Although the Cadastre as such is not included as a matter of harmonization in the EU, it may be included indirectly to the extent

that the policies, which are based on cadastral information, are harmonized (Perez, 2002). The EU considers the Cadastre to be a basic infrastructure that supports land related strategies on key areas of development. Consequently, a common land information basis is required among the EU countries in matters of environmental protection, agrarian policy and economic development. More precisely:

- Each EU country has to develop its Cadastral DataBase on standardized specifications (reference system, metadata, interoperability etc.), on national as well as European level, making possible to combine information (such as land uses and land limits, interoperable road data and services, real property characteristics and statistical information) from different sources across Europe and to share it between many users and applications.
- Cadastral System within the EU should aim at harmonizing their use for:
 - Fiscal purposes
 - Urban and rural development and related land policies
 - Creating a common shared statistical database concerning real property characteristics
- Regulations governing Cadastre and Land Property should be harmonized in respect to the above priorities. Cadastral legislation included in the sections of rural and urban development, environmental policies, real estate market and taxation should be harmonized, and thus provide improved access to information from different national land registries (e.g. land use and land limits changes).

To conclude, the diversity of traditions and legislation on land administration in Europe has to be highly accepted, having a direct affect on the length of the road to harmonization to the EU. On the other hand, a coordinated approach within cadastral developments among Member States and accession countries to the EU is necessary to satisfy both national and European modern needs. The EU should include an organ responsibility for cadastral affairs, to prepare guidelines for the harmonization of land administration according to EU requirements.

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