

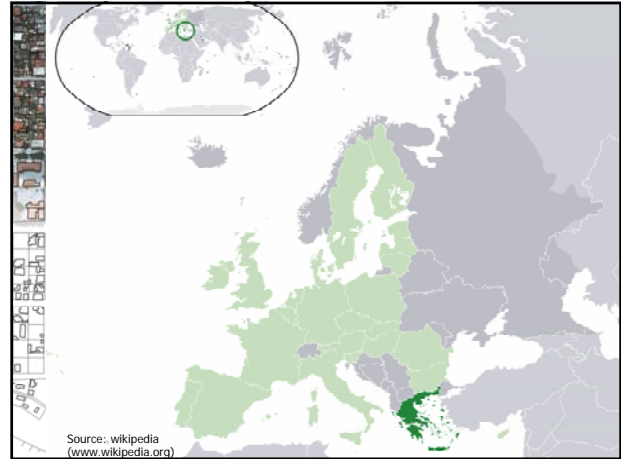

ΚΤΙΜΑΤΟΛΟΓΙΟ Α.Ε.

Setting up the infrastructure for improving the development of Cadastre in Greece

Dr. Dimitris ROKOS, Dr. Konstantinos KYRIAZIS
and Dr. Panos LOLONIS

ΚΤΙΜΑΤΟΛΟΓΙΟ Σ.Α. (Hellenic Cadastre)

FIG 2010, Sydney, Australia

ΚΤΙΜΑΤΟΛΟΓΙΟ Α.Ε.

Facts about Greece*

- Population: 11.000.000
- Area: 132.000 km²
- 80% of Greece consists of mountains or hills, making the country one of the most mountainous in Europe.
- Greece has over 1.400 islands.
- Greece has the tenth longest coastline in the world with 14,880 km

* Source: wikipedia (www.wikipedia.org)

Background

System of Registrations and Mortgages

- Since the early 19th century Greece operates under the French originated system of Registrations and Mortgages, as a public register of real property owners and the deeds that they have been involved in.
- This register:
 - ensures only the publicity of transactions and not legal security
 - is not complete (e.g. the rights of the State are not registered),
 - does not allow the identification of the existing owners
 - does not allow the identification of the location of a real property.

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The Hellenic Cadastre

- The Cadastral project was initiated in the mid 1990's by the Ministry of Environment, Physical Planning and Public Works, aiming to replace the existing system of Registrations and Mortgages as a:
- a uniform and always up-to-date system of registrations, which consist of the geometric description and the ownership status of all the real properties of the Country, overseen and guaranteed by the State.
- The new system combines Cadastre and Land Register.

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Pilot Cadastral Projects

- Pilot projects covered ~340 municipalities throughout the Country
- Cadastre now operates in 97 interim Cadastral Offices
- However, these projects were completed with considerable delays and budget overruns, because:
 - No adequate preparation had preceded the cadastral projects, in order to better prepare and organize existing "cadastral" information.
 - The contracts were many and small scale, each one covering a few municipalities, resulting in problems in contract management and coordination, high prices and lack of serious investments in technology by the contractors.

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- A new approach was needed in order to carry out successfully the development of the Greek Cadastre
- In order to do that, Ktimatologio S.A., with the assistance and the co - financing of the European Commission, drafted the terms of reference for a major infrastructure project

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Our Company

- **Ktimatologio S.A.** is a Legal Entity of Private Law and its mission is the study, development and operation of the Hellenic Cadastre.
- The sole shareholder of the company is the Ministry of Environment, Energy and Climatic Change.
- Staff: 400

<http://www.ktimatologio.gr/ktima/EN/index.php>



Major Project

- Title: **Data and IT Infrastructure for a Modern Cadastre**
- Budget: **80 million euros** (without VAT)
- Co-financing: **50% E.C. – 50% Greek State**
- Operational Program: **Information Society**
- Duration: **August 2005 – December 2009 (4,5 years)**



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Goals of the Major Project

The project aimed at:

- the establishment of a functional, high quality database at a national level which would contain preliminary cadastral data and the necessary IT infrastructure in order to support optimized cadastral survey projects until the completion of the development of the Cadastre in Greece

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Major Project outline

- A data and IT infrastructure for developing a modern Cadastre in Greece:
 - The Hellenic Positioning System (HEPOS)
 - Forest delineation
 - National coverage of orthoimagery
 - Coastal zone delineation
 - Digitization of land consolidation and land redistribution acts
 - IT infrastructure and web services for cadastral surveys
 - Digitization of the Dodecanese Cadastre

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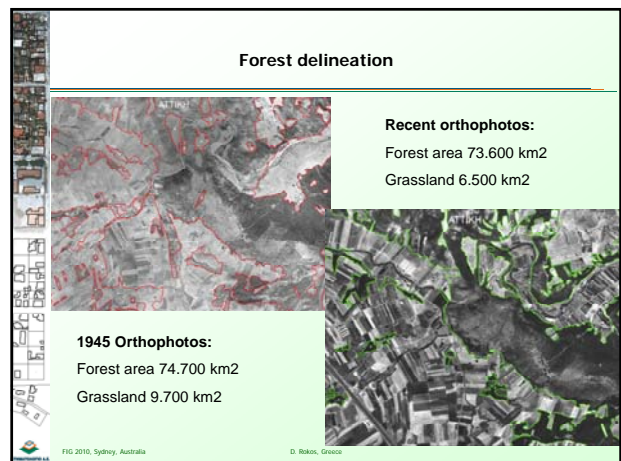
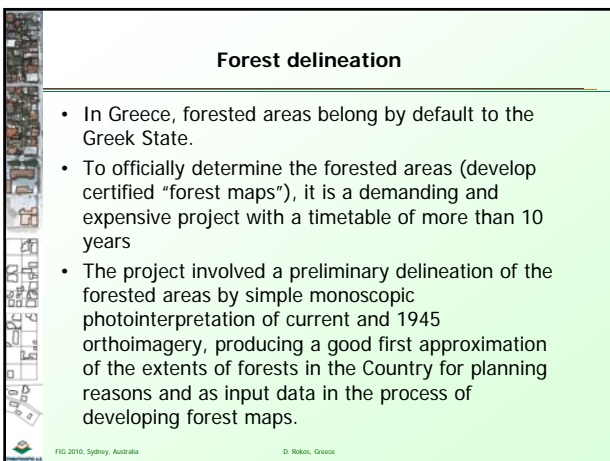
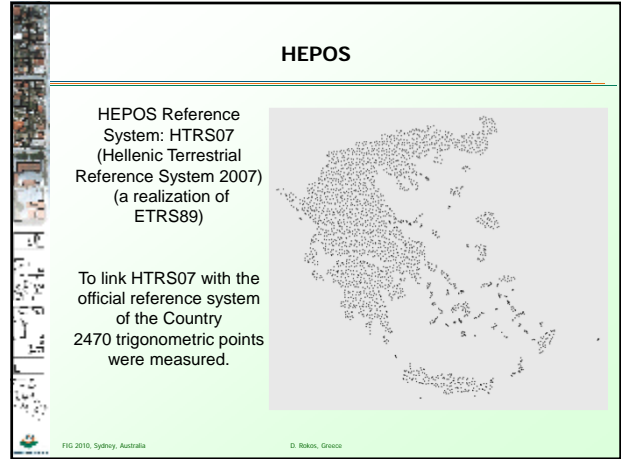
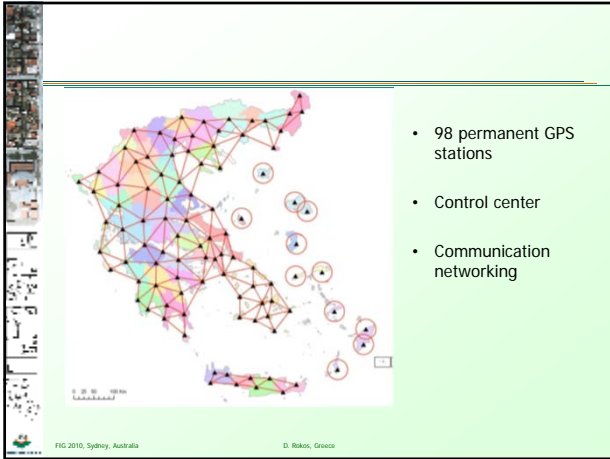
The Hellenic Positioning System

The Hellenic Positioning System (HEPOS) was established by KTIMATOLOGIO S.A. as the infrastructure to improve cadastral surveying activities in Greece. The system allows for the determination of high precision and homogeneous coordinates throughout the whole country reducing the cost and improving the effectiveness of GPS-surveying.

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

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National coverage of orthoimagery

- The development of the Cadastre in Greece is based on aerial photography which is used for the preliminary identification of land parcel boundaries.
- In this context, in order to cover the whole country, 3 contracts were carried out in parallel to produce a national coverage of orthoimagery with a pixel size of 50cm and the corresponding digital elevation model.
- Especially for the large urban centers of the Country covering about 3.500 square kilometers, a separate contract was carried out that produced fully orthorectified orthoimagery with a pixel size of 20cm and the corresponding digital surface model (DSM).

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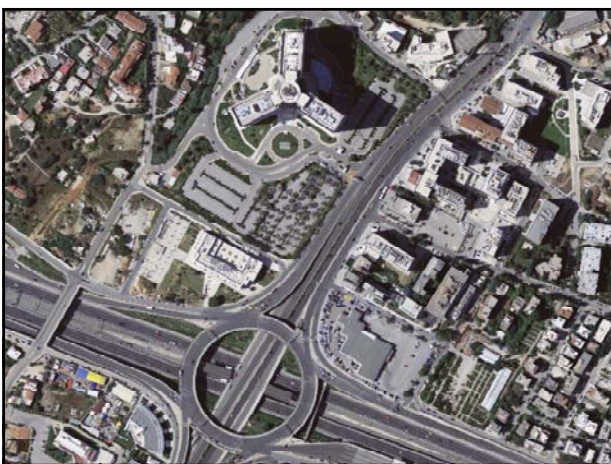
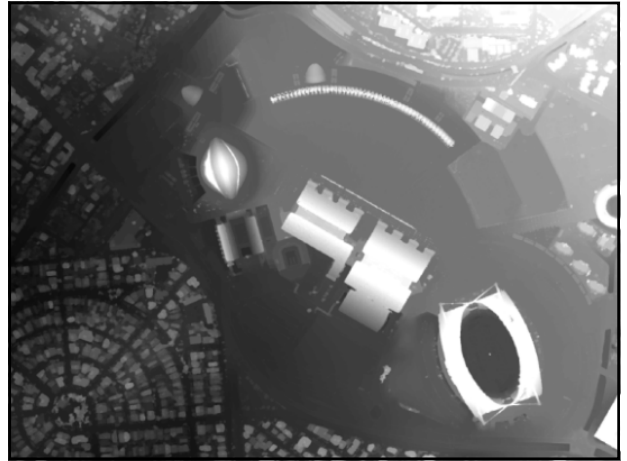


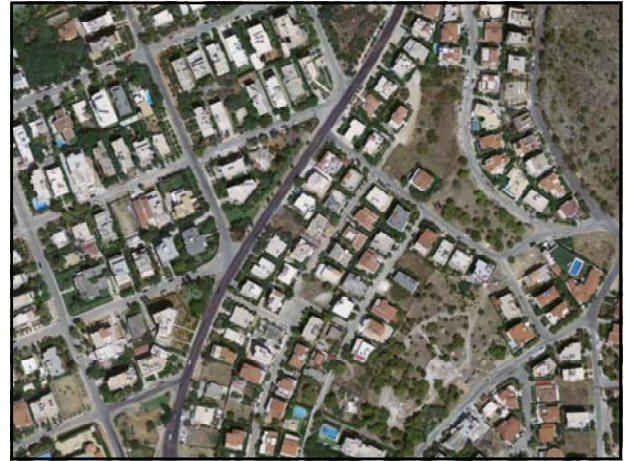
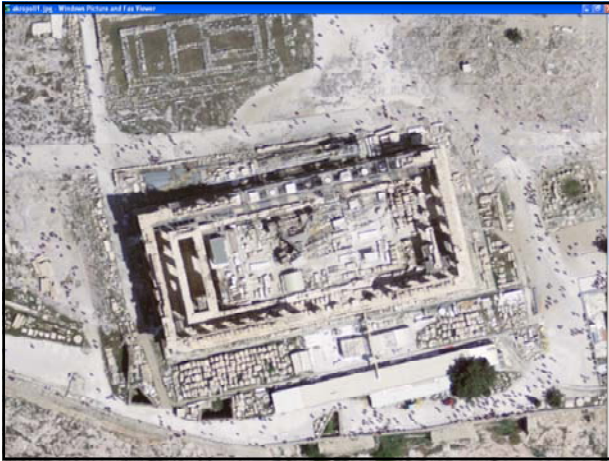
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Coastal zone delineation

In Greece, the coastal zone belongs to the State. The delineation of the coastal zone is prescribed by law as a very expensive procedure of ground survey that is initiated by individuals that wish to develop a real property which lies close to the sea shore. For this reason, less than 10% of the Country has a delineated coastal zone and this delineation is in many cases problematic to adjudicate on the field.

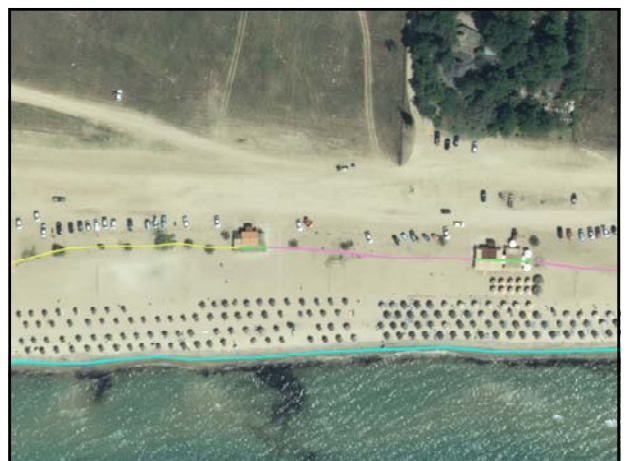
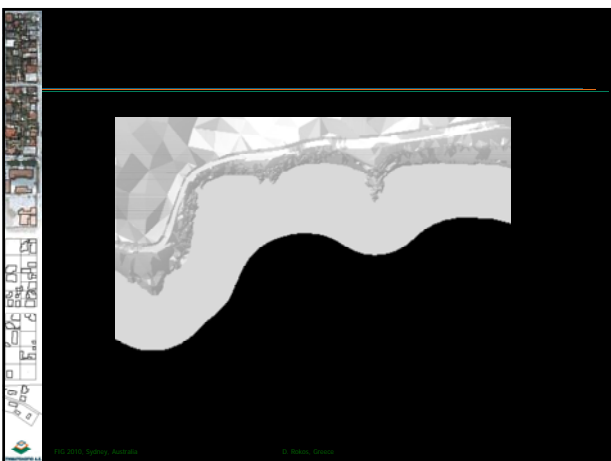
Realizing the benefits that modern technology can offer in this field, a project was carried out that covered with corridor mapping (25 cm pixel), the entire coastal zone of Greece, as well as, all the navigable rivers and the large lakes of the Country. A detailed digital elevation model was also produced.

The total length of the area covered was about 16.000 km.

In the context of the same project, a preliminary delineation of the coastal zone was carried out using objective criteria such as the edge of vegetation or the relief.

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Digitization of land consolidation and land redistribution acts

- Land consolidation and land redistribution acts are the basis for developing cadastre in agricultural areas.
- The official archives are dispersed in prefectural level in paper form kept by the local competent agencies.
- Klimatologio S.A. with the co-operation of AGROGI S.A. carried out a project that involved the collection of all the acts from the local agencies, scanning of the maps and tables, georeferencing the maps and producing a digital geo-database with all the information of these acts.
- As a result, the valuable archive of all these administrative acts has been preserved and for the first time useful information on a national scale can be extracted on the characteristics of ownership in agricultural land in Greece.

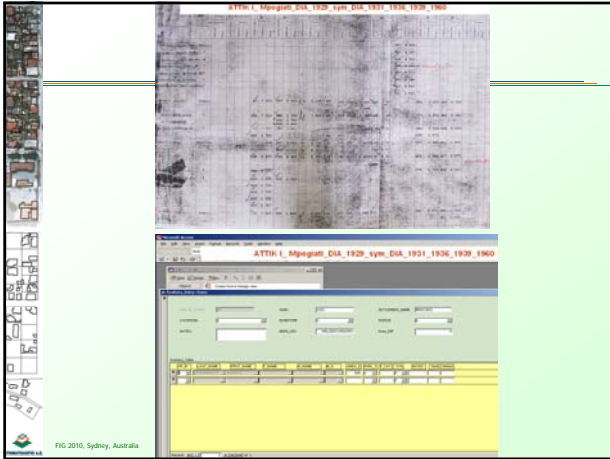
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Digitization of land consolidation and land redistribution acts

Area covered:
>36.000 km²

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IT infrastructure and web services for cadastral surveys

- KTIMATOLOGIO S.A. has taken major steps into setting up a technological infrastructure that:
 - supports effectively the development and operation of the Cadastre, by providing advanced technological solutions that ensure security, high availability and performance, standardization and quality control of all the procedures,
 - provides modern services to the citizens especially during the cadastral development stage,
 - builds up a high performance data infrastructure that can effectively support the operation of state administration in multiple levels, as well as become a major player in the context of INSPIRE.

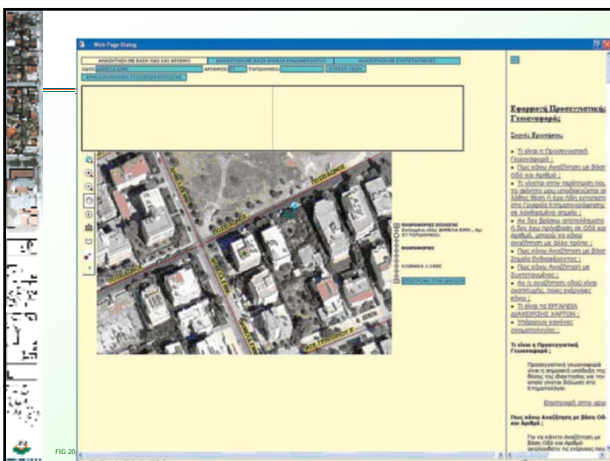
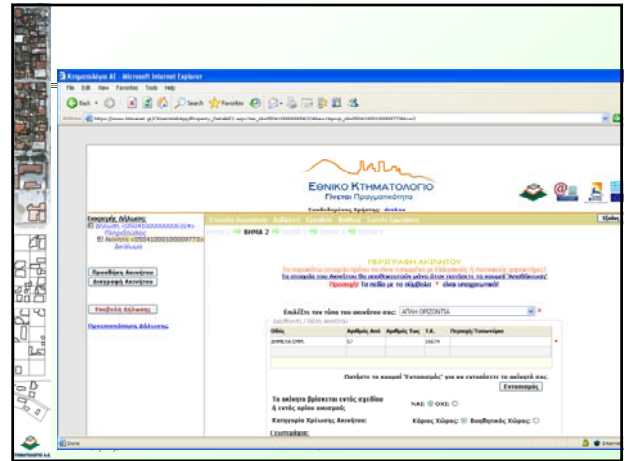
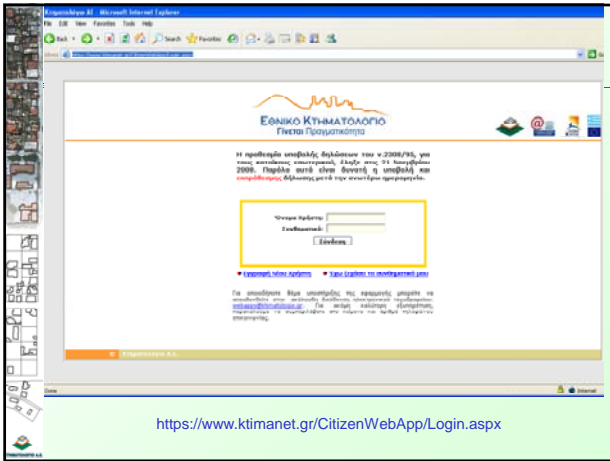
IT infrastructure and web services for cadastral surveys

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



IT infrastructure and web services for cadastral surveys

- To improve the efficiency of new cadastral survey studies and to provide better services to all interested parties, a series of applications have been developed in-house:
 - to citizens
 - to legal persons with many real property rights (i.e. banks)
 - to cadastral contractors
- An Enterprise Resource Planning System was introduced in Ktimatologio S.A. in order to manage the daily operations of the company.



Digitization of the Dodecanese Cadastre

- Since 1929, a cadastral system implemented by the Italians was set up for the islands of Rhodes, Kos and part of the island of Leros. Since then the system is operating in paper form.
- The project involved the scanning of the existing archive of these cadastral offices, georeference and vectorizing of the cadastral maps, legal checking of each registration in order to decide on the “active” owners of each property and finally the development of a GIS database compatible with the data model used for the Greek Cadastre.
 - Scanning of about **6,2 million pages**
 - Development of a digital database consisting with about **800.000 “active” rights**

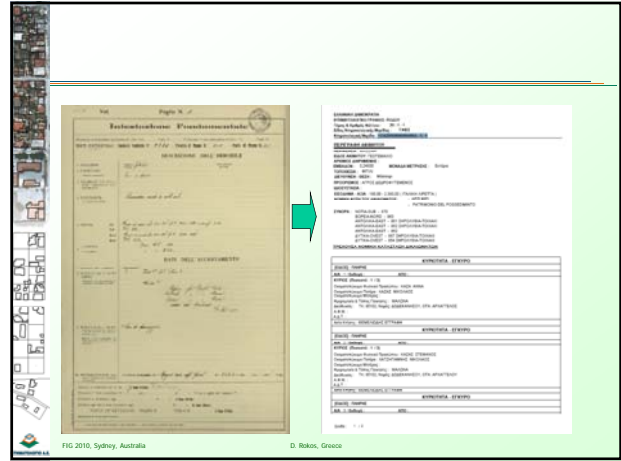
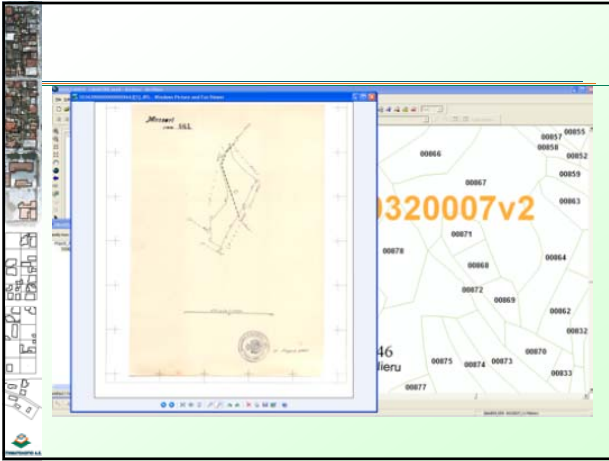


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Conclusions - 1

- All actions included in the Ktimatologio's CSFIII large project were organised on the basis of experience acquired from the first three cadastral survey programmes. In particular, an effort was made to avoid the barriers and risks encountered during their implementation which led to delays in the completion of the projects and increased costs. The Major Project were designed and organised in such a way as to:
 - Achieve the maximum possible economies of scale
 - Ensure optimum contract management
 - Ensure maximum cost savings due to the use of state-of-the-art technology
 - Ensure optimum use of existing data in cadastral surveys
- This new management approach translates into more cost effective and more efficient implementation of the work required to develop the Greek Cadastre.

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Conclusions - 2

- Moreover, the deliverables of the Large Project offered unique opportunities and advantages to Greek society above and beyond the development of the Greek Cadastre. These opportunities and advantages include:
 - Many of the databases produced in the context of the Large Project are powerful tools, readily available in the hands of the Greek authorities to effectively protect environmentally vulnerable areas which are under pressure.
 - Improving the position of individual beneficiaries in order to clarify any restrictions or claims which exist in relation to real properties before the continuation of the Cadastre.
 - Giving Greek businesses the opportunity to invest in state-of-the-art data collection and processing technologies.
 - Finally, with the deliverables of these projects, Greece takes a significant step towards implementing the aims of the INSPIRE directive

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