George I. Soulis
Dipl. Eng, MSc

"Benefits of exploiting and implementing new generation Geographical Information Systems for the Hellenic Cadastre "

The scope of this presentation is to shed light on the benefits pertaining to the use of new generation, "open", Geographical Information Systems (GIS) for administering spatial data within the framework of the Hellenic Cadastre. A prime example of this kind of software is the GeoMedia KT application which, we believe, is the most reliable, integrated solution for meeting the workflow demands of the Hellenic Cadastre projects.

The experience gained by implementing the specific solution to current cadastre projects, as well as the broader, worldwide knowledge of administering spatial data has proven the following three factors very crucial to the management of spatial data of this type.

Use of third generation, object oriented technology. Use of these technology means that a system can be more flexible and customizable, in order to meet the project-tailored and often complicated specifications, as well as the inherent complicated nature and structure of the geospatial data.

With this technology, possible changes in application specifications or requirements do not necessarily call for complete software update but can rather be incorporated into those segments of the software code that are affected by these changes.

A brief example, deriving from an engineer's daily work routine, might illustrate the advantages of employing object oriented programming methods. When the query "Show all parcels with landuse OLIVE GROVE" or "List all parcels where the absolute difference of the declared vs. calculated area is larger than 5 square meters" is set, the GeoMedia KT application connects to the database and creates an object which is called Record Set. This object incorporates all geoparcels with landuse OLIVE GROVE or, based on the second set of requirements, all geoparcels with absolute area difference larger than 5 sq. meters. As a result, all geoparcels, meeting the criteria set, are returned.

At the same time, this object maintains an interactive linkage with the database in a way that if a change is made to the data content, this object will also be dynamically changed.

In addition to the database linkage, this object is also linked with another type of objects, called Pipes. The pipe takes the information in the record set and does something to it. It might, for instance, re-project it to a new map projection. All pipes connect, and the final pipe outputs the results to the screen.

Pipes are in fact, independent software components and for this reason they can easily be changed according to new software requirements, without making necessary a complete redesign of the application. In this fashion, any change made will automatically affect the end result of the whole process.

Concluding, as far as our example is concerned, any changes made either to the data or to the functionality of the objects comprised by the software, will immediately affect the end result of the posted query and the user will be presented with the most updated and reliable result of his search.
Yet another advantage presented by third generation, object oriented technology is the ability to design modular applications, in the form of independent subprograms, to provide for very specific needs. In the case of the National Cadastre, such possible independent submodules could be the following: Declaration Data Entry program, Map Data Entry, Quality & Control, Extracts & Reports, KT Input/Output

Moreover, an immediate advantage deriving from the implementation of latest technology programs is the ability to escalate the application from a standalone system with only one

user, updating a small local database, to a system, comprising thousands of desktops, with thousands of users accessing corporate data in an enterprise database.

A second determining factor is the use of open geographical information systems. In recent years, there have been many vivid discussions on the necessity for laying down the standards for the generation of open geospatial data and systems. For each one concerned, this definition of "openness" becomes a matter of perception. For some, "openness" is determined by the nature of the data and the way they are modeled, for others by the fact that both data and systems abide with the definitions provided by the Open GIS Consortium (OGC), for some by the fact that their characteristics are publicly described and available to anyone, and others judge based on the ability to freely produce and share geospatial data.

However, in practice, engineers involved with cadastre projects perceive and define open systems based on three main principles:

Ability to read and integrate existing cartographic information (topographic maps, photogrammetric data, orthophotos, etc.) that can be found distributed over a number of possible locations and in several, often proprietary, GIS formats as, for example, Arc/Info, Arc/View, MapInfo, MGE, AutoCad, MicroStation, Oracle, Access, etc.

Optimally, what is required is simultaneous "live" connections with these data, with no middleware interference. At the same time, as in the case of GeoMedia KT, coordinate system and projection transformation and feature definition should be performed on the fly, so there would be no need for a time-consuming translation process that potentially could result to data loss.

Ability to store both spatial and attribute data into an industry standard RDBMS (e.g. Oracle, Access), as it will be illustrated further on.

Ability to export these data either in any of the afore mentioned formats or in the form of documents, extracts, tables, printed maps and even as live maps on the web.

The last (but not least) factor that plays a crucial role to the management of spatial data is the storage of both graphic and non-graphic data in a single unified, industry standard relational database which is readily accessible by the application software, in this case GeoMedia KT. No longer it is needed to store geometric data in proprietary GIS or CAD databases that require cumbersome software to access. As a result, throughout the enterprise, departments can maintain tight control over their data, keep maps and related information up to date, and reduce redundancy and error.

Moreover, engineers and users can take advantage of standard editing and security tools built into the database software, whereas geospatial data management is brought into the realm of the IT professional. Capabilities to add, delete, edit or append database records or other objects are easily handled by the RDBMS. Extra tools include referential integrity, auditing, transactions management, versioning, backup and archiving, replication and distributing processing. Tables can be virtually joined to existing tables using the application software (e.g. GeoMedia KT) in order to support data that does not contain spatial elements. Users can display items within these tables or hide them from view at any time. Finally, standard data formats ensure the free and flawless exchange of geospatial information within the enterprise.

Summarizing, all points mentioned thus far provide maximum benefits to the management of spatial data within the framework of the National Cadastre, as well as provide a solid basis for any future system expansion. It is along these lines that GeoMedia KT has been developed, establishing new standards for the automation of cadastre work with the implementation of new generation GIS (GeoMedia), the reduction of required actions on behalf of the user and the engineer, the increase in implementation speed and user friendliness, thus securing the timely completion of projects.