

SMIG/AML

What role in Metropolitan Planning and Development

Área Metropolitana de Lisboa

Paulo SOUSA, José FERREIRA, Jorge ROCHA, António RAMOS, Filipa MARIN, Gizela MOTA, Luis MALAQUIAS, Luís VIEIRA, Ricardo TOMÉ and Rita ROQUETE

This paper describes the method developed and the work done under transversal guidelines that promote the Metropolitan GIS. Adopting New Technologies, acquisition, storing and edition of information concerning the land uses of the 18 Municipalities of Metropolitan Area of Lisbon (AML) are optimised. This way, Metropolitan GIS project of Metropolitan Area of Lisbon (SMIG/AML) is conceived and implemented at Metropolitan Area of Lisbon site.

The System's implementation is composed by different phases, those consists, in general, in scanning, digitising, edition and processing. The information is structured in several guidelines: Planning, Land Use Restrictions, Transport and Communications, Waste and Waste Treatment, Sewerage, Water and Energy Supplies, Urban Areas, amongst others. Although this information management maintains a divided structure, this one allows analysis under an integrated regional perspective, which is the ultimate purpose.

The aim of this paper is to show the conceptual scheme of SMIG/AML its initial directions as well as the main problems urged during this process, and at the last, the state of art.

Keywords: Land Use Planning, Integrated Planning, Regional Planning, Municipal Planning, Geographical Information Systems (GIS), Data Base System, Metropolitan Area of Lisbon.

INTRODUCTION

The Metropolitan Area of Lisbon is a territory in mutation, with well defined internal breakdowns and occupying an area of 3.128 Km², where a quarter of total country population lives and more or less 36% (in 1991) of National Brut Product is generated.

In this field, the new technologies can draw a relevant role as they allow, easily and quickly, to integrate, treat and cross a great amount of information: An impossible task to the traditional methodologies. To a integrated territory planning the GIS potential arises as a tool to support managing in general and more specifically the decision making.

SMIG/AML

PRESENTATION

The project began in April 97 and is the result of a ten elements team joined effort. The team members background is Geography and Regional Planning (nine persons) and Computer Science.

OBJECTIVES AND INITIAL ORIENTATIONS

As what concerns to central objectives, the main line is to built a managing, ordinance and planning, supporting

instrument, which allows both a regional and municipal problem approach.

Quoted potentialities run over the knowledge and analysis of numerous factors, specially land use and other structuring elements who should be inserted in the system following a regional logic.

SMIG/AML capabilities made possible the manipulation and treatment of information referred to the 18 municipalities and as the same time they allow a new elements fast update.

Making compatible all the 18 Municipal Master Plans (PDM) land use classes, but in a regional overview, becomes possible when tools such as the Regional Plan (PROTAML), developed at the 1:100,000 scale in 1985 for all the Metropolitan Area of Lisbon, was adopted. The desire to integrate regional goals into the strategies of municipal development is emphasised in this document and represents de main objective of the SMIGAML project.

STATE OF THE ART

The fundamental features, support of all project, concern the digital information as follows:

- a) Planning

- b) National Ecological Reserve and National Agricultural Reserve
- c) Transports and Communications
- d) Waste and Waste Water Treatment; Sewerage; Water and Energy Supply
- h) Land Use Restrictions
- i) Spatial Geo-referenced Database (BGRE)
- j) Satellite Image (Spot and LandSat)

a) Planning

Planning is an ongoing partnership process that should involve all decision levels with public, private as public-private participation. That has been one of the first steps that allows us to initiate the SMIGAML project. It concerns a specific developed method applied to digitize the 18 PDM's, with (CAD) Computer Aided Design, as well the PROTAML so we can have a single spatial data base, with the aim of obtaining a new perspective of the space for further analysis.

In fact, that way it becomes possible, in a easy way, to identify must of the incompatibilities between methods follows in the conception of the several PDM's. That information is the fundamental importance, mostly when the second generation of PDM's are about to be started.

b) National Ecological Reserve and National Agricultural Reserve

The REN and RAN zoning, defines by each municipality, are also analysed at a regional scale in aim to obtain information about de development control regulations, so natural resources and environmental sensitive areas can be better protected.

New information technologies, such as GIS, had supply a huge contribution to planners as the deciders. In fact, the link between data base information and cartographic information allows, among other things, to select the areas affected to REN and RAN zoning or pointing gaps between neighbouring municipalities.

c) Transports and Communications

By it structure relevance in the territory management, in a different scales, this feature stays priority in the project. Never the less this information is not yet aggregating in the SMIGAML, because its treatment requires specific software for analysis.

d) Waste and Waste Water Treatment; Sewerage; Water and Energy Supply

All network's mentioned are the most important geographic space elements in the structure and in the physical planning at the metropolitan territory.

PDM's, as wheel some thematic maps have been the fonts for this kind of information. A metropolitan plan requires a broad array of spatial information at this level and even more when the planning tools are based in GIS technology as a support decision helper and also as a managing system.

- e) Boundaries (Administrative Limits, Management Units and Urban Areas)
- f) Geology and Hydrology
- g) Cultural and Historical Heritage

e) Boundaries (Administratives Limits, Management Units and Urban Areas)

Limits have been for centuries the reason for several discussions; not always with a physical representation, this linear elements have not been consider as land use.

Nevertheless, in cause of the sensitive issues involved, this boundaries have been individualised and plotted so land use classes as well municipalities code have a spatial definition. Military maps and PDM's have been the fonts for this specific kind of information.

This information acquires strategic importance as the planning implantation strategies pass through these two units managing. The collecting and treatment of information related with urban nucleus and urban boundaries it is most useful when monitored and processed in a semi-automatic computer aided visual analysis. Supplies a large contribution for metropolitan urban development planning.

f) Geology and Hidrology

The treatment of this information, acquiring from geological maps at 1:50000 scale and military maps at 1:25000 scale, represents the geo-physical issues for support of environmental planning. The goal is to classify the water lines and define the boundaries of most important watersheds in a regional level, so we can build a work base which allows this phenomena analysis and consequently to gather structuring territory information with a decisive role on a metropolitan scale managing and ordinance.

g) Cultural and Historical Heritage

It has been conceived a data base it all artificial accidents who, some how, represents the Human presence in the territory. The acquiring of that information as been from the PROTAML, PDM's, local publications as well in some bibliographic sources.

Next step, concern the recognition, position and classification to this object/elements of the land cover over a military map, from IgeoE, at scale 1:25000. The link of this graphic information with the data-base, allow us to made an all different range of consults to the system, such as: by date, historic buildings, age of the monuments, it state of conservation, ...

h) Land Use Restrictions

This are one of the most important issues mentioned in the PDM's. Its presence in the master plans assumes a determinant role at the quality live and well being of the population. The universe cover for this restriction includes cultural heritage (natural and artificial), infrastructures and buildings of national security, as well geodesic marks.

The technical process for managing this information for the 18 municipalities is, once again, materialised in a data-base with a linkage to the graphic (nodes, lines and polygons) elements, so we can obtain, in a automatic way, the display of the exact area under this legal directive.

i) Spatial Database

referenced spatial database (BGRE), provided by INE, as the particularity of put together na huge among of statistical information at district level (sub-seccção). This data-base cud be treatment/analyse individual or crossing with some other, in a way to obtain different zooms of geo-socio-economic objects.

j) Satellite Image

Satellite images acquires special efficacy in a large scale applications. It provides a perspective on constant change of geographic scale (national, regional and *zonal*), temporal scale geosystems analysis scale.

Due to is regional characteristics and it's permanent change, AML territory planning requires a broad array of spatial information. The digital information provided by satellite image supplies a unique perception (spatial, spectral and temporal), that are not available from other sources.

Remotely-Sensed spatial analyse information for Land-Use change at AML, it is a project for super-vision and managing AML landscape, more specifically the urban ecosystems, as well to obtain products, such as thematic cartography (land use/cover digital cartography) and DTM. Other aim of the project is to provide a easy way to obtain visual digital information of the roadway and railways infrastructures. The project himself stand as one the most important technical study tools for Earth and Environment Sciences. It represents powerful instrument for the revision of the PROTAML, completed in 1995, and a support for the new master plans, so natural or cultural resources make compatible with economic development.