MANTAINING AND USING SIGCA

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INFORMATIZED CARTOGRAPHY AREA in CGCCT

SIGCA ("Sistema de Información Geográfica Catastral[1]") of the "Dirección General del CGCCT[2]" is a cartographic Database distributed between sixty five territorials managing offices and concerning an users potential number about four hundreds. SIGCA's elemental management unit consists in one municipality, grouping rural and urban cadastral areas.

Rural cadastral areas digitizing was made from ortophotos at a scale of 1:2000 or 1:5000. In the other hand, urban areas was digitized from analogic georreferenced plans standard in CGCCT at usual scales 1:1000 or 1:500. In special cases numeric photogrametric restitution was made including land parcels.

From 1.989, date of loading SIGCA begining, CGCCT undertakes experimental data model definition in order to establish its validity. It was take in account users' needs as query facilities, maintaining requirements, himself capture capabilities, all in the strict respect of the Database distributed characteristic. GIS has changed lightly its model adapting new aplications.

Now, taking advantage acquired experience, remodelation was faced to approuch GIS design to cadastral object as base software GIS let such object orientation.

SIGCA aplication is oriented towards generating, maintaining and using Cadastral Cartographic Database. For this it was necessary walking in two ways: 1) Adapting GIS general tool ARC/INFO at cadastral context bounds and deeping it down to satisfy its especific needings; 2) Making easy its use for a vaste group of persons not necessarily experts. All this implies the mixed use of following tecnics: **1) Graphic and alphanumeric interactivity; 2) Helps for drawing; 3) Removing language barriers; 4) Concretion of procedures.**

The developped aplication carry out the following functions repertory: 1) **Database depuration and generation from Management Center Format (FCG); Database generation for direct digitization; 3) Library building and data crossing with Alfanuméric Cadastral Database; 4) Cartographic maintaining:** extracting from library-editing-reinserting; **5) GIS using:** query/spatial analysis-cadastrals schedules-plotting; **6) Unloading transfer format FCG.**

This paper has the aim to give notice of new SIGCA design and new aplication characteristics.

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[1] Cadastral Geographical Information System.

[2] Headquarters of Cadastral Management and Tributary Cooperation Center

1. SIGCA functions.

1.1. General purpose.

The Cadastral Geographical Information System (SIGCA) must be considered in strict sense as a subsystem of the Cadastral Information System (SIC). Its specific aim is the spacial representation of real estate properties over the national territory. It so firstly pretends managing as a whole cartographic information recorded in Cadastral Cartographic Databases (BCC) and atributes recorded in alphanumeric Cadastral Databases (BDC).

SIGCA in order to reach its aims must overtake GIS full characteristics for

1. To increase cartography value and functionality.

2. To wait on, as an entity with special responsibility at a national level in great scales cartography, spatial georeferenced information requests, both public and private.

3. To coordinate cartographic production with cadastral and related purposes, and determine its normalization by means of standard creation acording the whole users' universe.

So, SIGCA carry out its main task getting and maintaining cadastral informatized cartography and make it easy graphic and alphanumeric interactive query and cadastral georreferenced information's exhaustive analysis.

1.2. Functions.

Both Cadastral Information System and SIGCA subsystem are managed in a distributed way between 65 CGCCT's Territorial Offices. Each Office executes following functions:

- Quality control and validation of the cartographic information digitized under contract.

- Loading of the digitized cartography from tapes in Management Center Format (FCG) to BDC (ARC/INFO).

- Depuration and correction of last errors found during validation process.

- Crossing of cartographic information with that one from alphanumeric BDA and making permanents relates between both kinds of information.

- Final storing of cartography in a continous map way (Map Library format (ARC/INFO)).
- BDC updating and maintaining.
- Getting of basic or thematic cartography on paper plotting outputs.
- Interactive queries of SIGCA's information as graphics or alphanumerics arguments.
- Getting of statistics, spatials, etc. analysis of the cadastral information.
- Cartographic information coordination and interchange with others Organisations and Entities: Municipalities, Comunities Governements, Universities, Enterprises, etc.

2. The aplication.

2.1. Informatic context.

At a first stage, CGCCT has equiped each Territorial Office with at least one workstation with the following configuration: 32 M-bytes RAM CPU with clock frequency about 75 MHz, colour monitor 19", 1 G-byte hard magnetic disc, 9 tracks and 1.600 BPI tape unit, DAT tape unit, UNE A0 plotter, A0 digitizer and laser or thinkjet printer.

This plan is at this moment accomplished in a 88% of the whole of Territorial Offices, so that 57 Offices have enough equipment in termes of first stage and only 8 remain without any. The total equipment of Central Services and Territorial Offices consists in 81 workstations for management SIGCA. Furthermore, last months, it was begun another etage in the equipment plan which consists in connecting two X-terminals to every workstation so that multiplies by three accesses to Database. That permits connection as final users of Rural and Urban Areas in Territorial Offices. In that new etage we have yet installed 27 X-terminals for 23 Offices.

The whole of workstation installed on Offices and Central Services has the operating system UNIX (HP-UX). The whole of workstations have installed ESRI ARC/INFO Revision 6.1.1 for managing GIS.

Over that logical platform CGCCT has developped, partly directly by own partly with technical aid of EPTISA, ESRI España and SITESA entreprises,the aplication which is the object of this communication, which serves functions of SIGCA.

2.2. Development functional premises.

Development of this aplication, which is dedicated to **generating, maintaining and using SIGCA**, substantially obeis following principles:

1) To concentrate operativally inside software ARC/INFO's vaste generality and deeping into characteristic procedures of the Cadastral Information System.

2) To "trivialize" its usage for a vaste, various and not specialized group of final users.

For this we was determined to walk on the way marked by two vectors: **1) graphic and alphanuméric interactivity; 2) Removing language barriers and concreting procedures.**

2.3. Modules and menus.

Design structure of the aplication is entirely modular. Modules, which are in charge of making particular fuctions of SIGCA, have been programmed each one in a isolated context but using commons sub-programs from an aplication wide library. Module programmation was made using, depending cases, FORTRAN, "C" or ARC MACROLANGUAGE (AML) from ARC/INFO.

The developped ensemble permits accomplishing a functions repertory that succinctly we resume as:

- Generation and depuration.
- Cadastral alphanumeric atributes insertion.
- Libraries building.
- Integrated cartographic-alphanumeric updating and maintainig.
- New zones digitization.
- Exploitation.
  - .. Spatial query and analysis.
  - .. Plans plotting and informs printing.
- Uncharge to the transfer format FCG.

So the spatial context for working ellection, inside disposal cartography, as functional modules to use are governed by an articulated and hierarchically organized system of menus which, beginning from one general of the aplication, drives through a branched and self- explained way to any function or municipality.

All generation, depuration, alpha-numeric crossing and libraries building consists in an operative chain which begins with cartographic digitization files from a process

unit (generally cartographic data from a rural or urban municipality) and ends obtaining the respective ARC/INFO map library according SIGCA design and crossed with alphanumeric atributal information from BDC, depured and correct.

Integrated graphic-alphanumeric updating and maintainig is the ensemble of operations which makes changes (additions, deletions or modifications) for all or a part in a cartography from a rural or urban municipality which was stored into BDC according SIGCA model.

Maintaining modes depending on cartographic information fonts used for updating can be diverses (blocks interactive edition, digitization from A0 digitizer or maintaining from CU-1 sketches) but in all cases it works in a transactional way (by transactions or logical working units) as following three steps:

1. SIGCA (library) to MSIGCA (discontinous blocks) extraction of the context to modify. Extraction implies transactional blocking control of the extracted spatial context.
2. Maintaining as selected modes and information fonts.
3. Reinsertion of the modified extract into SIGCA library.

SIGCA exploitation consists in a varied repertory of modules which works on base library of a rural or urban municipality and executes spatial analysis or gets cartographic, alphanumeric or mixed informs related with cadastral thematic. As an example we can mention this:

- Design and writing of "Ponencias de Valores" (cadastral evaluation of real estate urban properties documents).
- Query or analysis of the cadastral or urbanistic planning information.
- Plotting (or printing) of plans or cadastral schedules (or documents) with CGCCT simbology.

3. Conclusions.

Regular exploiting and maintainig of a territorial information system on geographical basis requires development of especific tools supported on ellected general purposes GIS software, in our case and now ARC/INFO, which implies in one hand a restriction of the horizontal potentiality of that software and, in the other hand, an strong deeping on the way of the aplication thematic. We think so at least for two kinds of reasons: 1) Need to restrict at every step the increasing generality and wideness of tool to stricts bounds of problem; 2) Expedience of "trivialize" direct use GIS functions for a wide group of final unspecialized users.