

System for the integration of graphical parcel information in the urban cadastral database file

E Rubio Royo, J M Padron Hdez, J A Montiel Nelson

Departamento de Informatica y Sistemas, Universidad de Las Palmas de Gran Canaria,
35017 Las Palmas, Spain

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Abstract. The Spanish Ministry of Finance is carrying out, at the national level, a computerised verification of cadastral data with two fundamental objectives: to set up a file of land parcels in order to ease the task of making future revisions both to planning and value changes; and to establish a definitive method for administering urban land taxes. In this paper a project is described whose purpose is to digitise cartographic parcel information and integrate it with alphanumeric information in a standard computer document. The project is being carried out in the Municipality of Teror on the Gran Canaria island.

Résumé. Le Ministère des Finances Espagnol envisage, au niveau national, les révisions du cadastre au moyen de supports informatiques. Deux objectifs vont être privilégiés dans un premier temps: élaborer un classeur/fichier qui permette d'effectuer les révisions ultérieures aussi bien en ce qui concerne les valeurs que les modifications du projet; et mettre sur pied un instrument définitif qui permette le développement de la gestion tributaire de l'impôt foncier. Cette communication décrit un projet qui s'agit d'informatiser la cartographie des lots et de l'intégrer avec l'information alphanumérique dans un document unitaire. L'étude serait mise en pratique dans la commune de Teror située dans l'île de la Grande Canarie.

1 Introduction

This work is a modest example of the growing interest in Spain in the subject of computer-assisted cartography. Two essential facts, which are not unrelated, are the reasons for this growth of interest: (1) the existence of a project for the computerisation of cadastral cartography, under the responsibility of the Ministry of Finance; (2) the coming into force, from 28 December 1988, of the Law on Local Finance.

The principal aim of the project is to have a nationwide information system which will be of essential significance for the future development of the computerisation of cadastral cartography. Furthermore, local institutions will be able to use this system in all their spheres of action (Subdirectorship of Studies and Statistics, 1989). There are three reasons for the project: (1) The government administration, as well as local administrations, need a national information system to serve the purposes of planning. (2) There is a need to standardise computerised cartography in view of the great demand for such maps, and in order to avoid disorganised production. (3) There is a need to guarantee the maintenance and updating of maps.

The Law on Local Finance establishes and controls the property tax as a fundamental part of the new system of fiscal policy (Centre for Cadastral Management and Tax Cooperation, 1989). The main result of this new tax, which will entirely replace local rates, is the distinction between cadastral management (in the charge of the government administration) and tax management (in the charge of town councils), with all the consequences of this separation. The town councils will be responsible for managing the new property tax, including collection, from 1 January 1990. However the new law allows for the possibility that, during the first two

years of application of the property tax (1990 and 1991), town councils may request the government to take responsibility for its administration, so that the transfer of management may be smoothly effected.

2 Aim of the project

In order to explain more of the background and purpose of our study it is important first to emphasise the existence of the so-called *Fichero Informático Nacional* (FIN). The FIN comprises alphanumeric data files, stored in a format made up of standardised fields, in which are recorded census data for the whole country. These files provide the basis for making the CU-I, which is a document incorporating both graphical and alphanumeric information relating to the smallest significant areal unit in a region—that is, the 'cadastral plot'. The cadastral plot is a parcel of land under single ownership, and is the basic areal unit used for recording population in the census.

Using this document we can estimate the shape and size of a particular 'sector' by means of a sketch plan drawn to a specific scale, on the basis of information obtained through cartographic methods. The document also shows the location of that sector in relation to the adjacent streets and topography. These data are extracted from the FIN. It must be emphasised that the preparation of the CU-I, as with every document intended as a standard form of information storage with multiple uses, is subject to a series of rules and specifications governing the scale to be used, the thickness of lines, style of annotations, etc. All these rules allow the document to be correctly standardised.

At this point we will explain the essential aim of our project, which has been the automatic production of the CU-I using computerised methods (figure 1). In general we have tried to use existing software, supported by a network of PC-MS-DOS personal computers. This particular application could be used either independently

COD PROVINCIA		COD MUNICIPIO		COD100 SC		VIA PUBLICA		RP	Q	PARCELA CATASTRAL		CU-I															
27		TEROR		245		CL SINESIO YANEZ T		58		7461518 DS40765																	
OR	COD100		NOMBRE		VIA		PUBLICA		IZ	COD100		NOMBRE		VIA		PUBLICA		FD	COD100		NOMBRE		VIA		PUBLICA		DATOS GRAFICOS

CROQUIS ACOTADO ESCALA 1:200

FOTOGRAFIA

Figure 1. The CU-I document relating to a cadastral plot.

or as part of a wider computerised system of geographical information. The project has been developed using information relating to the Municipality of Teror (Gran Canaria). The results can be stored either in hard copy (standardised paper documents) or in magnetic form (on hard disk or floppy disk).

3 Description of the application

3.1 Interactive framework

The system is of an interactive graphic type. The development of the application is supported by two screens, a main and a working screen, the main screen having four windows as shown in figure 2. The generic framework for the application is presented on the main screen (windows 1 – 4), and the process under way is presented on the working screen. The contents of any of the windows on the main screen can be transferred to the working screen as the user wishes. In certain phases this transfer is effected automatically by the program.

3.2 Description of the selection menu

Given that the census is organised at a provincial level and that the province of Las Palmas is made up of the islands of Gran Canaria, Lanzarote, and Fuerteventura, we have included the following options in the selection menu: ISLAND, MUNICIPALITY, DISTRICT, BLOCK (MANZANA in Spanish), CU-I, and EDITOR. When ISLAND is selected, all the islands in the province are shown in window 1 (figure 2). The computer asks the user to choose one, which then appears in windows 1 and 4, with the names of all the municipalities contained within it. MUNICIPALITY shows the selected municipality, presented in windows 1 and 4, with its name. DISTRICT shows the selected district, divided into blocks, in windows 1 and 4. BLOCK shows the selected block scaled to window 4, divided into plots and containing all the features related to it. CU-I shows the graphical menu of the CU-I in window 2. EDITOR activates a graphic – alphanumeric editor which moves and deletes text or graphics, edits text, etc.

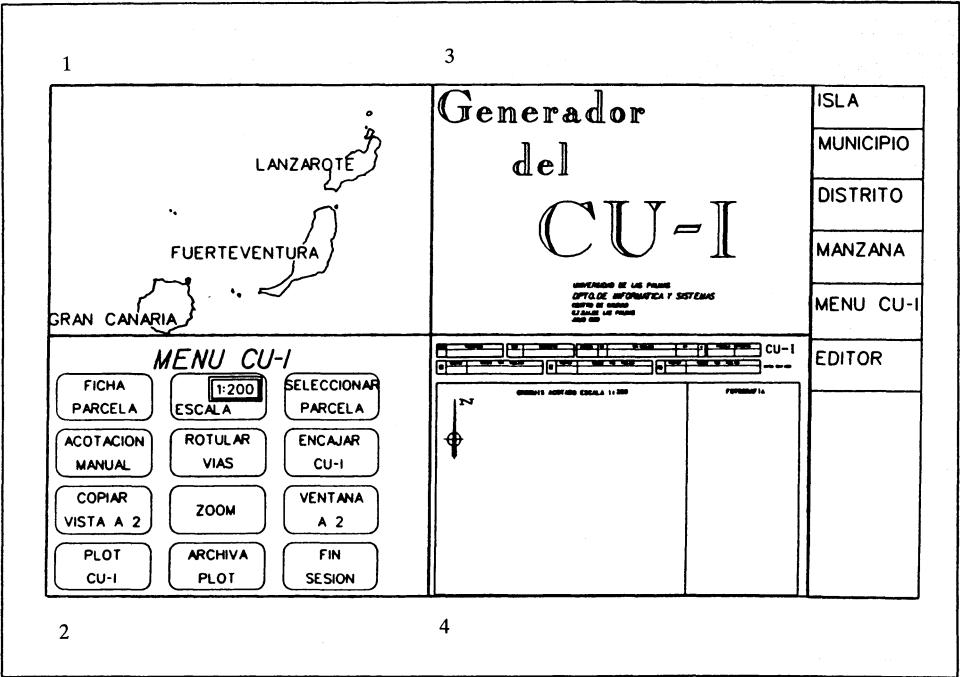


Figure 2. The main screen, divided into four windows.

3.3 Description of the main menu or CU-I

The different options can be grouped into the following four generic blocks:

(1) *The generation block* includes all options related to the making of the CU-I. SCALE allows the scale to be set at 1 : 100, 1 : 200, or 1 : 500. SELECT PLOT asks the operator to choose a plot. The program identifies the selected plot in the FIN, fills in the CU-I with data taken from the FIN and draws the plot. Then it sets the plot within the format of the CU-I, centred on the area assigned to it. The CU-I, almost completed, appears in window 4. The whole process is shown in real time in window 3. PLOT CARD permits the user to see (on the main screen) the alphanumeric data corresponding to a plot selected either by graphical or alphanumeric methods (by its cadastral reference), which are used to centre the plot on the working screen. The drawing can be enlarged or modified manually with MANUAL DRAWING. ROAD LABELLING attaches labels to streets or to the topography surrounding the plot, according to the specified rules. (2) *The facilities block* contains all options relating to the graphical editing of the CU-I. INSERT CU-I allows the operator to insert the plot previously drawn and lettered. COPY A2 allows the copying of any image on the working screen. WINDOW A2 allows the enlargement of any image, and shows this action on the working screen. ZOOM allows a zoom out centred on a selected point in any image. The action is shown on the working screen. (3) *The output block* contains two options: PLOT creates a plot file for the current CU-I and stores it on the hard disk; PLOT STORAGE makes possible the storage of the current CU-I on floppy disk. (4) *The end of process block* contains the END OF PROCESS option. Besides ending the process, this allows the current framework to be stored in memory for use in later processes or restored if it is not displayed.

4 Implementation of the application

The necessary hardware resources consist of a PC/AT 86286 plus 86287 coprocessor with a minimum of 640 kbytes of memory and a hard disk. Input devices required are digitiser and mouse, and output devices needed are one or two graphics screens, plotter, and laser printer with Postscript. The software consists of MS-DOS operating system version 3.1 or later, Microstation PC (Integrgraph Corporation, Huntsville, AL), dBASE III plus (Ashton-Tate, Torrance, CA), and Microsoft C (Microsoft Corporation, Redmond, WA).

The process of implementation itself was in three phases. The first stage consisted of digitising a map of cadastral plots, checked by measurement in the field: specifically a map of The Palmar situated in the Municipality of Teror (Gran Canaria). After digitising, the graphic database was verified to check for repeated lines and connectivities. Then the plots were converted to polygons, and lettering added for cadastral reference codes, street names, etc. In the second stage the alphanumeric database was designed (Primary Cadastral File, Secondary Cadastral File, Street File), taking as a reference the structure of the FIN (National Informatic File), and using from the FIN those fields which are directly related to the application in hand. In the final stage the link or connection was established between the Cartographic File and the Primary Cadastral File, leaving the databases ready to be used by the program.

References

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