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Census Mapping and GIS in Mexico*

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CENSUS MAPPING AND GIS IN MEXICO

INTRODUCTION

In this paper present two main topics; the concept about of National Geoestatistical Framework (NFF) and the Geoestatistical Cartography., and the Automated System of Geoestatistical Information SAIG (by your initials in spanish). This system based tools of the Geography Information System, show their different components, input data, data base, until, applications, products and information.

NATIONAL GEOESTATISTICAL FRAMEWORK (NGF)

In the Mexico in 1978 the National Institute of Statistic, Geography and informatics (INEGI) created the National Geoestatistical Framework (NGF), which is a system to referential the statistical information caught by the censuses and the surveys with its geographic places that gave origin him to different levels from addition.

Levels of addition of National Geoestatistical Framework (NGF)

The part of adittion of the NGF starts off to divide to the country in 32 geographic areas, these correspond as far as possible to the states, and these are codified with two characters, denominated State Statistical Areas (AGEE).

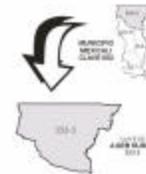
To the interior of each federal organization the municipalities are had or delegations that correspond to the municipal, denominated Municipal Geoestatistical Areas (AGEM), these areas codify themselves with three characters.

The interior of each municipality to be conformed by localities, when these have a greater or equal population to 2,500 inhabitants, or is capital town is created the Urban Basic Geoestatistical Areas Urban (AGEB) to them. The rest of the localities are circumscribed in Rural Basic Geoestatistical Areas (Rural AGEB). Always AGEB are codified with three characters plus a verifying digit.

- Área Geoestadística Estatal (AGEE)



- Área Geoestadística Municipal (AGEM)



AGEB Rural



AGEB Urbano

All the urban and rural localities to the interior of a municipality are codified as well in four characters.

In the urban localities the following level of separation is the urban AGEB and the smaller level is the block, they contain between 1 and 50 blocks.

In the rural scope to the interior of AGEB rural they are divided in control areas that are conformed by forest lands, deserts, rainforest, federal's zones, national's parks and agricultural lands. The control areas are identifying with four characters and the estates or lands with three digits.

CHARACTERISTICS OF THE GEOSTATISTICAL CARTOGRAPHY

The graphical expression of the NGF is the geoestadistical cartography, this one has three qualities.

- National cover. The NGF codifies to the country in geoestadistical areas, these geographically imagine in their cartography covering the 100% with the country, is taken care of that between the limits of each one of the geoestadistical areas it does not exist overlaps or sobreposition, is to say is possible to construct to a continuous national with the cartography elaborated specifically for up statistical information of the censuses and the surveys.

- Update. Previous to each censal event the INEGI updates their geoestatistical cartography in the scopes urban and rural. In the censuses events of 1990 population, the 1995 and 2000 cartographic update was made a year before the up of the statistical information. Between the 2000 and 2005 activity one became in permanent form. A filter more than in Mexico allows guaranteeing the 100% of the geographic cover of all the localities of the country is the checking and validation of the geoestatistical cartography on the part of the municipal and state authorities.
- Opportunity. In the national censuses (Population and Housing, Economic and Agricultural), the geoestatistical cartography is used in each one of its stages; planning, up and data processing of the data and publication of results, for each one of these stages the geoestatistical cartography is given on time according to the established programs. It is possible to indicate that from 1990 when it began with the automatization of the geoestatistical cartography, this one by itself became a result more of the censuses events.

AUTOMATED SYSTEM OF GEOESTATISTICAL INFORMATION

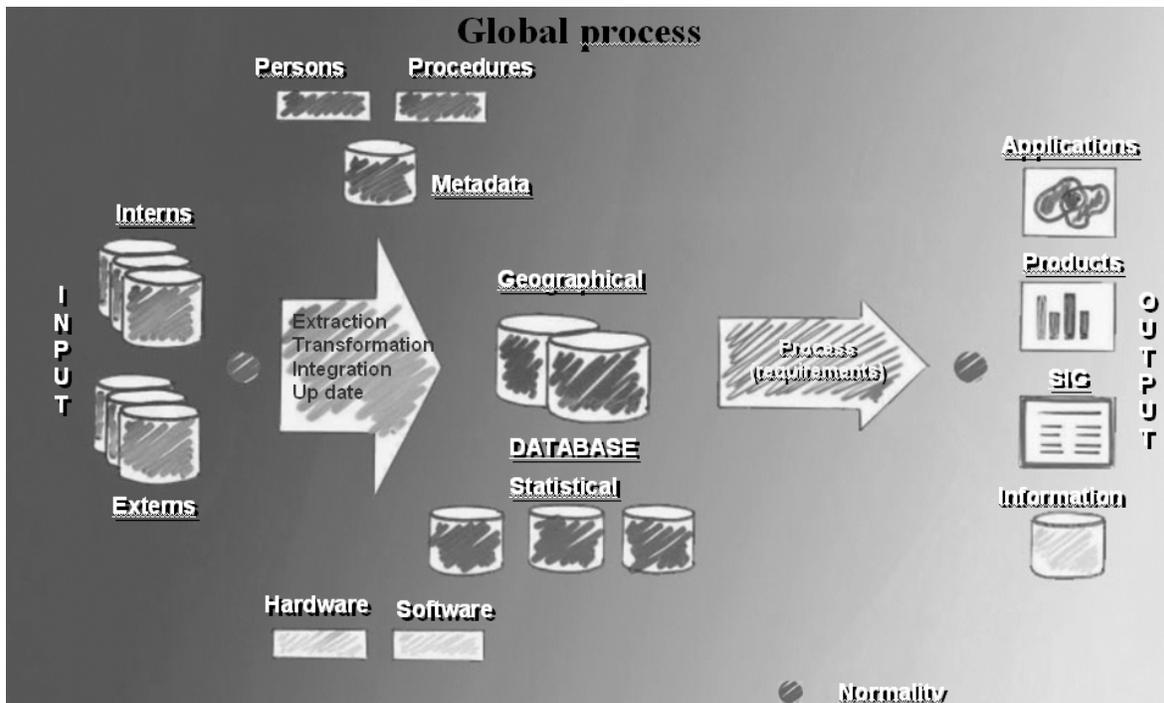
In 1987 start in Mexico the automate of national geoestatistical framework with the instrumentation of project named automated system of geoestatistical information (SAIG), this system locate into of the geography information system.

The target of the system

- Stablish a procedure automate for drive of National Geoestatistic Framework, the cartography for the census and surveys with the goal of reference geography the statistical information with place of origin.
- Create a Data Base that permit asociate the geography and statistical information to each state , municipality, locality and block of the country.
- Generate the infrastructure for producing thematic cartography with results of the census.

GLOBAL PROCESS.

The global process describe all the components of the system, start of a tipical process with input data; continue with transformation, integration and up date information; create a Data Base with two components (geographical and statistical data); after with out put speak it about some products and applications.



Another components of global process are hardware, software, metadata, normality and persons.

The global process show the interaction of all components into of system.

Input

Since point of view carography the system had input intern, what consist in geography information that producing the INEGI, as air photography, geodetic data, digital models and images of satellite.

For census cartography the INEGI have been use three kind of images of satellite:

- Landsat image panchromatic was made taking 1993/1994 with a space resolution of 10 meters, with a process of georeferenced simple.
- Spot image multi-spectral was made taking 2002-2003, with a space resolution of 10 meters, with a process of georeferenced simple.
- Spot panchromatic was made taking 2005-2006, with a space resolution of 2.5 meters, with a process a ortophoto rectification.

The externs input is basically to geographic information that produce federal ministres and government states and municipalites.

Data Base

One components is the geographical database, was integrate for information:

- Topographic.
- Thematic.
- Geostatistics.
- Rural Cadastre.
- Ortophotographies.

The second component is the statistical information of population and housing, economic and agricultural census.

In the data base of the system is integrate, up date and prepare the geographical and statistical datas for generation of products and specific application, manly in subjet of the census.

Products

As output of the system their have many products, between are:

- Maps of urban localities.



Vectorial files: SHP, MIF, DGN, DWG and Coverage.

YEAR OF CENSUS	AMOUNT DE LOCALITIES	AMOUNT OF BLOCKS
1990	3,621	850,703
1995	3,835	1'019,813
2000	4,028	1'096,946
2005	4,201	1'183,678

- The System for Consultation of Censuses Information (SCINCE).

SCINCE for population 1990, 1995 and 2000.

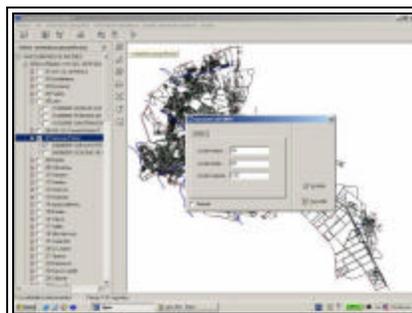


SCINCE for metropolitan areas 1990.

SCINCE for language natives 1990.



SCINCE for unid primary 2000.



- The referenced information system geospacially and integrated in a system (IRIS) with information of population and housing 2000, join urban an rural cartography, and topographic information, and use of land, etc.



The SCINCE and IRIS uses the tools of the GIS for the production and dissemination of the geographic, statistical and cartography information in the way has created products that integrate the statistical information caught by the censuses with the geographic one, of souch that allows the users to make space analyses of very friendly way.

There are examples products that produce the institute.

- Applications.

One application of the GIS technology for the censal institutional activity has represented a lot of strategic advantages, according to the stage of the event of wich is:

- Planning.
 - ❖ Use of the information and of the existent technology.
 - ❖ Control of the observation unit, like a database.
 - ❖ Integration of the information of the one Cadastral Rural, of the Use of the Land and Vegetation and Geoestatistical Information.
 - ❖ General planning and to detail of the event.
 - ❖ Distribution of work loads.

- Collect.
 - ❖ Pursuit of the collect of the Census, by the geographical database.
 - ❖ Elaboration of general and specific reports.
 - ❖ Redistribution of resources and work loads.
 - ❖ Validation of the information.

- Dissemination.
 - ❖ Publication of results through a Geographical database.
 - ❖ Local and remote access to the geographical information and statistic.
 - ❖ To provide cartographic elements, for the conformation of sampling framework.
 - ❖ Look for the adoption of a continuous outline up date the information of the sector.
 - ❖ To contribute to the study, knowledge and analysis of the sector, for the establishment of development plans.

One example is show in the generation of cartographic products for next agricultural census 2007, the pack consists in:

- 32 Condensate states.
- 2,455 Cartographic of municipalities.
- 2,414 Topography map scale 1:50,000.
- 4,201 Cartography of localities urban.
- 27,303 Sketches of localities rural of 250 – 2499 inhabitants.
- 27,707 Plans ejidales (Catastro rural).
- 291,148 Plans of control area.



Plan of control area