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NATIONAL REPORT OF MEXICO

**Instituto Nacional de Estadística,
Geografía e Informática (INEGI), México.**

“Geoinformation for All”

The transformations that have taken place in recent years - around the world as well as in Mexico -, and the challenge posed by the globalisation and growing interdependence of economies, have had a strong influence in the Mexican society. They have enforced the need to have more and better Information. Under this premise, INEGI decided to implement a Digital Project. This has been oriented towards the development and consolidation of the National Geographic Information System (NGIS) and to provide timely and efficient answers to the users' requirements in this field.

Within this framework, INEGI initiated a process to convert topographic and natural resources maps produced by manual methods until 1992, and stored in analogue (i.e. paper) form. The project includes the updating of the results by the use of new methods and tools that offer a greater diversity of products in a shorter time. The transformation process comprises the use of new methodologies and the adoption of digital technology, which allows faster cartographic updating. It widens the possibility of generate a range of diverse products created from the database in a much shorter period than was possible by the old methods.

Currently, INEGI is in the running stage of the digital production and updating of geographic information on several subjects, converging in a large geographic database.

Through the Digital Project, INEGI generates information that contributes to the definition of policies and the adoption of measures which, in turn, contribute to the better planning and use of the natural resources and, consequently, to the sustainable development of the country.

Conceptual Scheme of the Digital Project.

Society's rapidly evolving needs imply a substantial change, qualitative as well as quantitative, in the way we generate geographic information. Parallel to this, the advent of new technologies and processing resources, which offer greater speed and precision and the possibility of updating the information, solve critical problems and open new ways to diversification.

The INEGI's System has the analytical tools to allow that the maximum benefit to be gained from the existing data that is being integrated. This is in accord with our Statistic and Geographic Information Law, and it occurs within a pre-defined conceptual structure embracing economic, demographic and social phenomena, their relations to the physical surroundings and the territorial space and their interdependence.

The decision of make a new cartography was followed by the definition of the conceptual scheme for the database modelling and for the construction of national standards and specifications as well as the acquisition and installation of the “system”. The system adopted represents the integration of a group of resources in the technological vanguard within a scheme, which is unique worldwide.

From Analogue to Digital.

One important element in the Digital Project was the change from analogue to digital format. Geodetic work and aerial photograph are still used. Photogrammetric procedures and image analysis is also applied as the milestone, as well as fieldwork, editing and printing. These processes are modernised under the new conceptual framework or as support, components and they are part of the System as a whole. The Global Positioning System (GPS) has been implemented, a new National Geodetic Network has been designed and the ITRF 92 geodetic reference system has been adopted. Aerial photographs have been improved, with the incorporation of advanced cameras and airborne GPS. The photogrammetric

processes used are digitally based. Photo-interpretation capabilities have been broadened through the use of satellite image processing.

The digital system has six basic components. These are conversion; production; updating; visual deployment and automated reproduction, spatial analysis; and geographic database.

Conversion.

This is the first operational process and it is the most time consuming one. The basic purpose is the preparation of the information for the updating component. Digital elevation models are obtained as derived products from the digital conversion of the contour lines from the 1:50,000 topographic map series. DEM are one of the basic products of the system.

Production.

This component has two purposes. These are production of 1:250 000 scale "spacemaps" and of 1:20,000 scale orthophotos. The spacemaps are also used for the production of 1:250 000 thematic maps as well as for the updating program of the 1:250 000 scale Topographic Series, that was updated about 12 months, finishing at the ending of 1996. The orthophotos support updating tasks, rural cadastral mapping and other user requirements.

Updating.

Besides making available digital cartography, updating constitutes the central issue of the modernising programme in Geography. It implies complex processes aimed at decreasing production times under different priorities for each subject and map scale.

At first glance, the topographic cartography at 1:250 000 scale has the first priority. This is because it is the medium scale map series of Mexico, and it is the base for thematic and derived cartography. Next in priority are the topographic maps at 1:1 000 000 scale and land use and hydrological themes. The program of topographic maps at 1:50 000 scale is running only for urban areas over the biggest hundred cities, as the first priority.

The basic input data are structured digital files from conversion, digital elevation models, orthophotos and field information. Updating is done in each of the ten INEGI's regional offices across the country. The main product of this component is the vectorial data files, prepared on several layers: contour lines, hydrography and waterbodies, manmade features, and geographical names, basically.

Visual Deployment and Automated Reproduction.

This area performs cartographic editing from updated vector files linked to the database. Visual Display generates the digital files for the automated reproduction section, where the colour separation is done, proofs are generated and the printing originals are made.

Spatial Analysis.

Spatial analysis is dedicated to the image processing, geostatistical analysis, and deals with specific information related with geographic information systems projects. Due to the strong relationship between these aspects and the users, this component constitutes the communication link between the users and the Mexican National Geographic Information System. It largely comprises technical advice and technology transfer when required.

Geographic Database.

The Geographical DataBase is the core of the system. It contains the sets of data organised in vector, raster and alphanumeric files produced by the different components. All the system activities and the users have access to this GDB. MNGIS's GDB includes all the geographic data already generated by INEGI, properly customised and updated. It also includes those data produced by other sources if they meet the national standards and specs. The concept is integrated and global, and requires a great effort to gather, organise and analyse the huge amounts of data involved.

Geoinformation for All.

Because of the motto of the Congress we want to emphasize that Mexico is working today for paving the way to the future, by distributing geographical data in the fashion of Basic Digital Geographic Products. This are the Digital Elevation Models, Digital Orthophotos, Vectorial Data Sets and Geographic Names Data Sets, all of them, related with Topographic Map Series scale 1:50 000. The coverage of the production is about 35% of the Mexico territory, that means a little bit more of 800,000 km², equivalent to the Spain, Portugal, Switzerland, The Netherlands, Greece, and Belgium surfaces. Also it is available the complete national coverage of the Topographic Map Series on 1:250 000 scale, its Digital Products are Digital Elevation Models, Vectorial Data Sets and Geographic Names Data Sets. Metadata related with the products are available on the INEGI's Web site.

Such information and the one ongoing generating, have the proper legal rights, what allows its protection against abuses and non authorized reproduction, as well as to have available a useful and handling information users directory.

Final Comments.

The digital project described above has involved a deep change in INEGI, both at the conceptual and in the instrumental levels; it has required change both in viewpoints and in the ways of doing things. Changing mentalities and assimilating new schemes and processes, new requirements, training of personnel, new management styles and techniques are some of the manifestations of its impact. All these elements are being successfully achieved within the framework and expectations of the project.

As a conclusion, we can state that INEGI is generating information that contributes to the definition of government policies. This is also leading to the adoption of measures helpful to the better use of natural resources and hence to the sustainable development of the country.

Mexico is doing a continuous national effort for building and promoting standards and specifications for generating the geographic digital basic products, as well as to spread the Geographic National Database concept in which its content be compatible with GIS projects. In this manner, the INEGI is taking a position as a national leader on establishing standards for data generation. With that, a real base for a National Data Infrastructure is in a very near perspective.

Further more, the INEGI's work is to propitiate the information mobility by accepting information and metadata from different sources in its database, which necessarily will give more dynamics to the information knowledge and obtaining.