MEXICO's NATIONAL GEOSTATISTICAL FRAMEWORK, and GEOSPATIAL TOOLS FOR the 2020 POPULATION AND HOUSING CENSUS

Rolando Ocampo Alcántar
Vice-president
INEGI México

INEGI

The 5 guiding principles of the GSGF are aligned with **Mexico's Geostatistical Framework**

Principle 5: accessible and usable geospatially enabled statistics.

5. Publication and free use of the Digital Map of Mexico / Free download of cartographic products

Principle 4: interoperable data and metadata standards

4. Online services that allow the exchange and use of information / Application of the Technical Standard for the elaboration of Geographical Metadata

Principle 3: common geographies for dissemination of statistics

3. Use of a unique Geostatistical Framework allows to have an infrastructure for the Statistical Information Subsystems

Principle 2: geocoded unit record data in a data management environment

2. Geostatistical Framework / Spatial Data Infrastructure / Administrative Records

Principle 1: use of fundamental geospatial infrastructure and geocoding

1. Topographic Chart / Geodetic Network / National Road Network / Catalogs: Geostatistical Areas, Roads, Localities, Services, Natural Resources
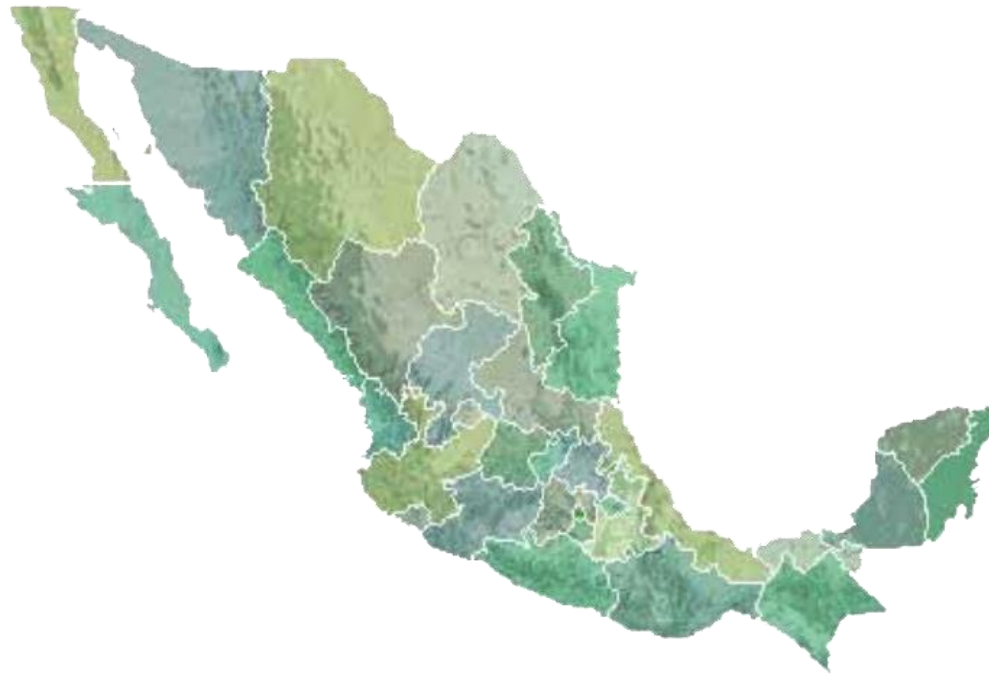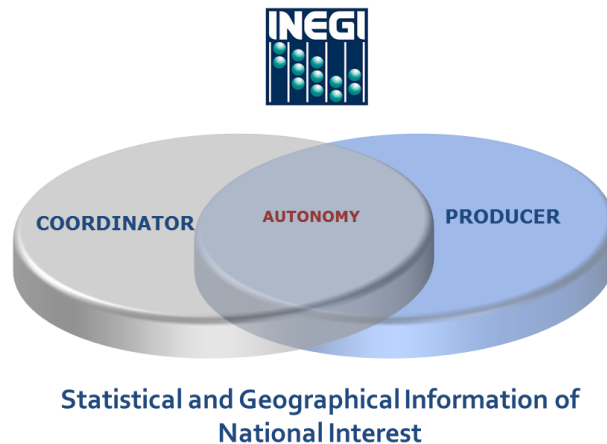
INEGI

II. BACKGROUND

INEGI and the National System of Statistical and Geographic Information (SNIEG)

Key Elements

- Statistical and Geospatial Information within the same institution, since 1983
- Constitutional-level autonomy, since 2008
- Coordination of the National System of Statistical and Geographic Information (SNIEG)

COORDINATOR — AUTONOMY — PRODUCER

Statistical and Geographical Information of National Interest

Demographic and Social

Government, Public Security & Justice

SNIEG

Economic

Geographic and Environmental

Since 2008, INEGI coordinates the SNIEG, which includes all units of the State (Executive, Legislative and Judicial branches, as well as sub-national governments)

INEGI is also responsible for the creation, use and promotion of the **system's statistical and geographic technical standards.**

Geographical data are based on International Geospatial Standards.
(http://www.inegi.org.mx/geo/contenidos/normastecnicas/default.aspx).

The National Geostatistical Framework (MGN)

In Mexico's censuses prior to 1980, cartography was scarce, with a diversity of sources, coverage, scales and update dates.

This did not guarantee geographical coverage, thus giving rise to the creation of a geographic reference framework for the collection of statistical information

For this reason, in 1978 INEGI created the National Geostatistical Framework (MGN), a system that allows the correct referencing of statistical information from censuses and surveys in their corresponding geographic locations.
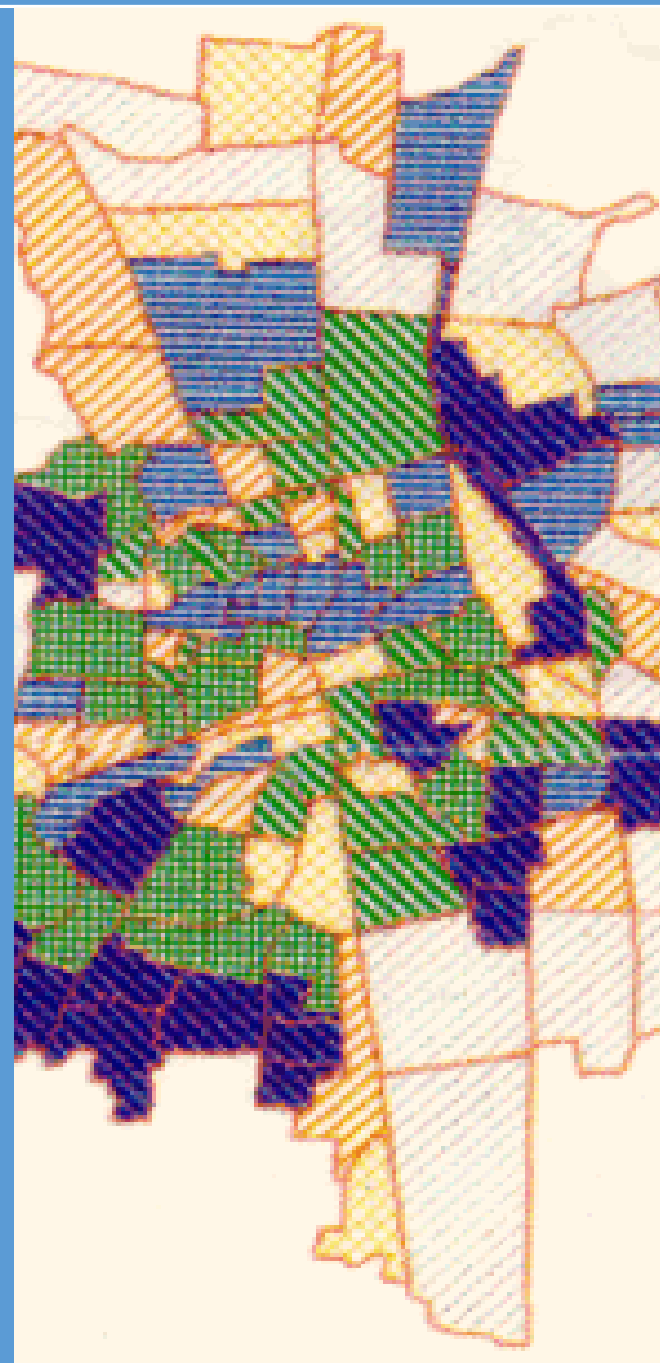
National Geostatistical Framework (MGN)

The MGN divides the national territory into areas of easy identification in the field, these units are called Geostatistical Areas and are:
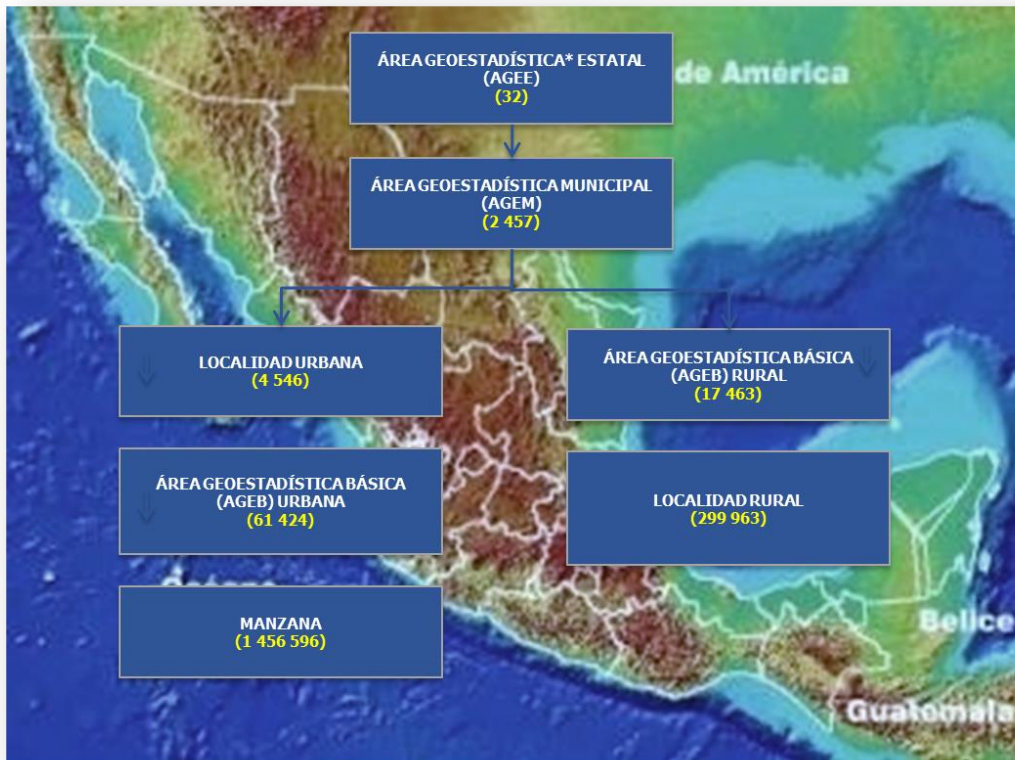
State (AGEE)

Municipalities (AGEM)

Basic (AGEB)

AGEBs are the fundamental unit of the framework, and are adjusted as much as possible to the political/administrative limits of the country. They are also divided into urban and rural localities.

Levels of the National Geostatistical Framework

Urban AGEBs delimit parts or complete localities of 2,500 inhabitants or more, or municipal capitals. These are made up of a set of city blocks.

Rural AGEBs cover an area of approximately 10,000 hectares, where land use is predominantly agricultural, or formed by are localities with fewer than 2,500 inhabitants.

III. UPDATING THE NATIONAL GEOSTATISTICAL FRAMEWORK

By cross-linking information, the entire system can use a single geostatistical framework;
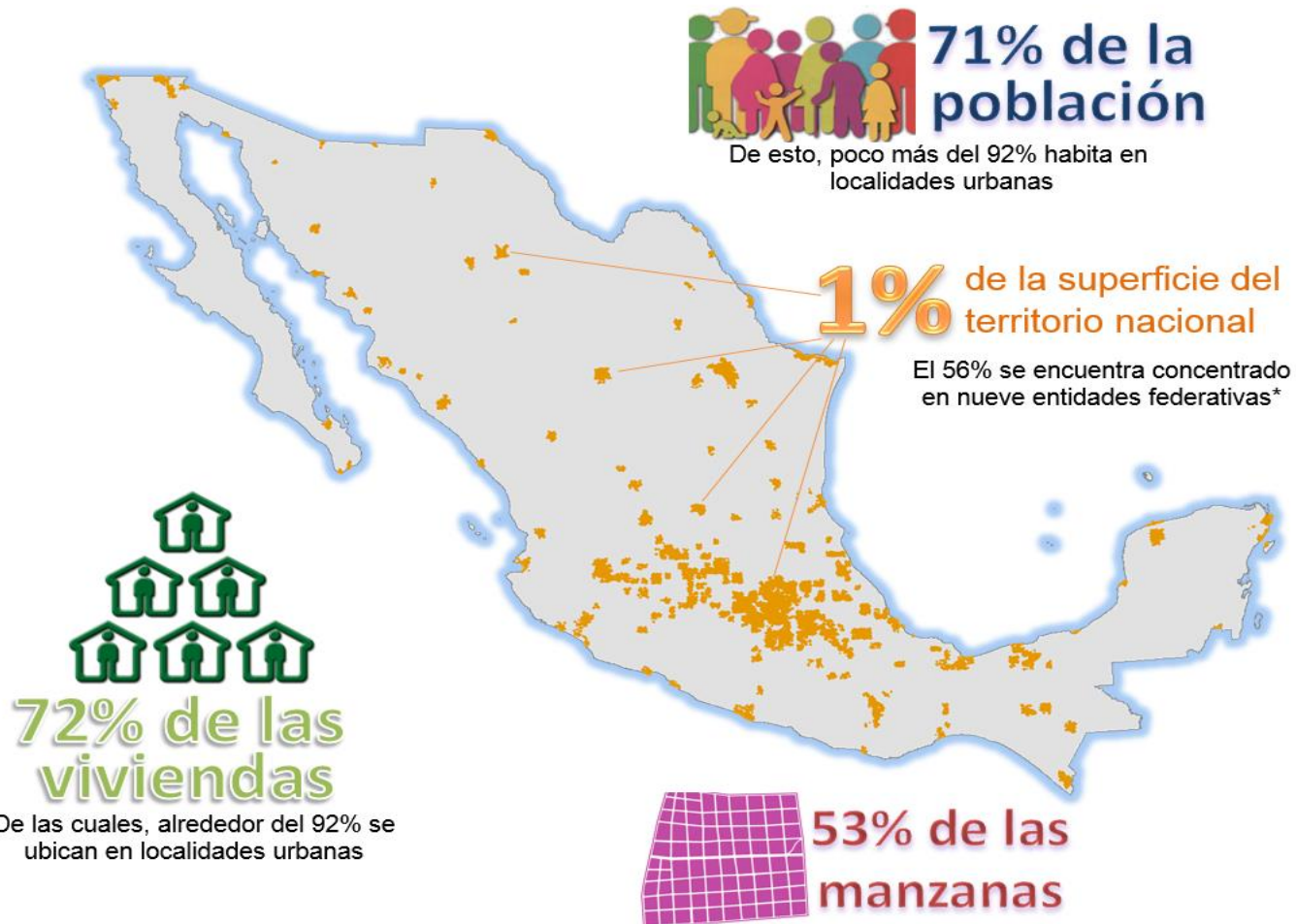
To link statistical and geographic information, updated maps are provided to the divisions of socio-demographic statistics, economic statistics and government/justice statistics;

These maps are resolved at the city block level, and they identify roads, traffic lights, and other landmarks or public services;

These multi-layered maps are used to regularly update the Geo-statistical Framework and the Single Cartographic Database.
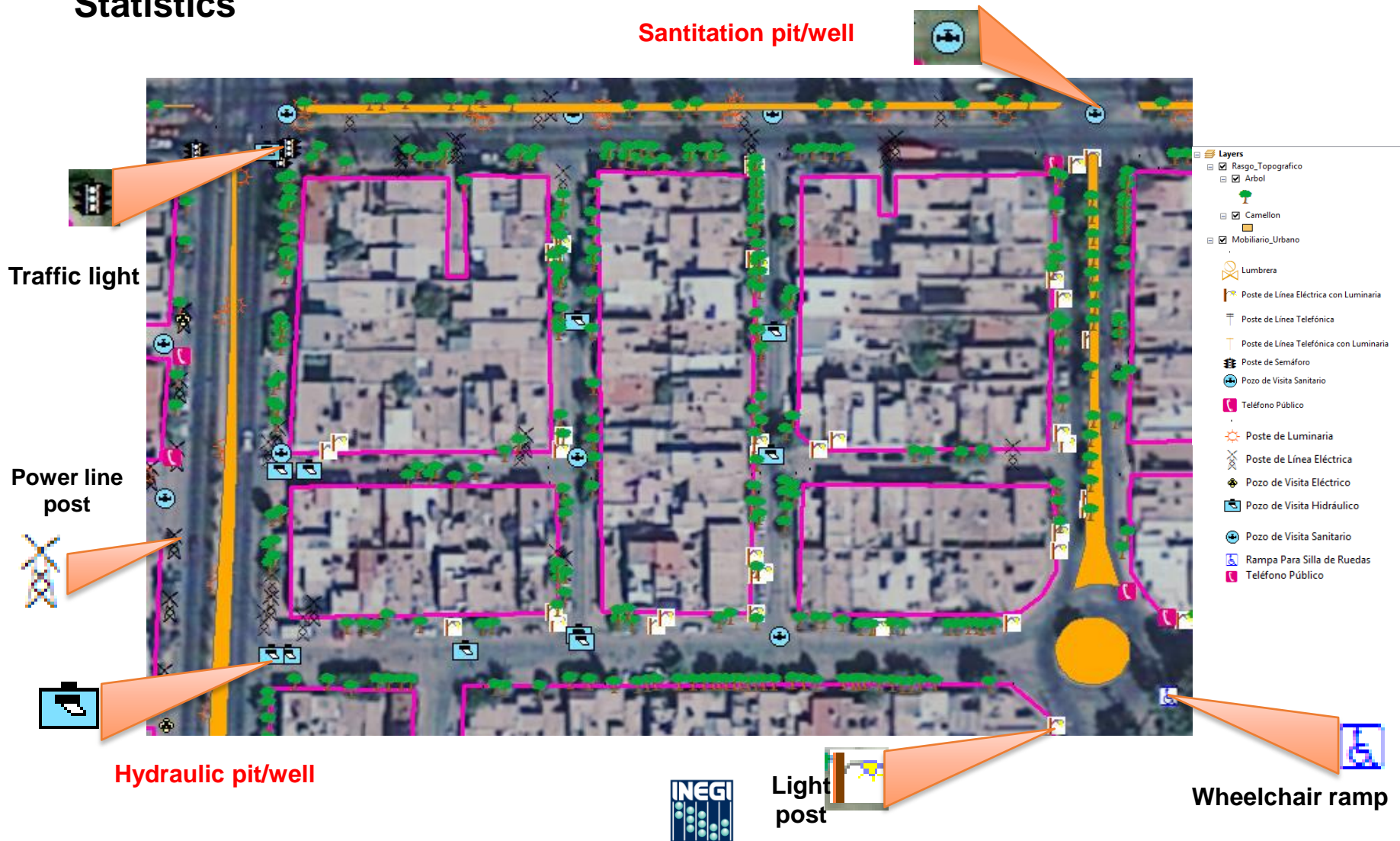
INEGI

New Urban Cartographic Database

Oriented to update the cartography of urban areas, where 71% of the population is concentrated. It includes 783 formats, at a scale of 1:20,000

71% de la población

De esto, poco más del 92% habita en localidades urbanas

1% de la superficie del territorio nacional

El 56% se encuentra concentrado en nueve entidades federativas*

72% de las viviendas

De las cuales, alrededor del 92% se ubican en localidades urbanas

53% de las manzanas

*Ciudad de México, Guanajuato, Hidalgo, Estado de México, Michoacán, Morelos, Puebla, Querétaro y Tlaxcala

New Urban Cartographic Database

Urban Cartography for the generation of Urban Statistics

Santitation pit/well

Traffic light

Power line post

Hydraulic pit/well

Light post

Wheelchair ramp

Layers
- ☑ Rasgo_Topografico
  - ☑ Arbol
  - ☑ Camellon
- ☑ Mobiliario_Urbano
  - Lumbrera
  - Poste de Línea Eléctrica con Luminaria
  - Poste de Línea Telefónica
  - Poste de Línea Telefónica con Luminaria
  - Poste de Semáforo
  - Pozo de Visita Sanitario
  - Teléfono Público
  - Poste de Luminaria
  - Poste de Línea Eléctrica
  - Pozo de Visita Eléctrico
  - Pozo de Visita Hidráulico
  - Pozo de Visita Sanitario
  - Rampa Para Silla de Ruedas
  - Teléfono Público

Updating trough the Agricultural Census 2017

Surveying with the use of mobile devices

Satellite Images
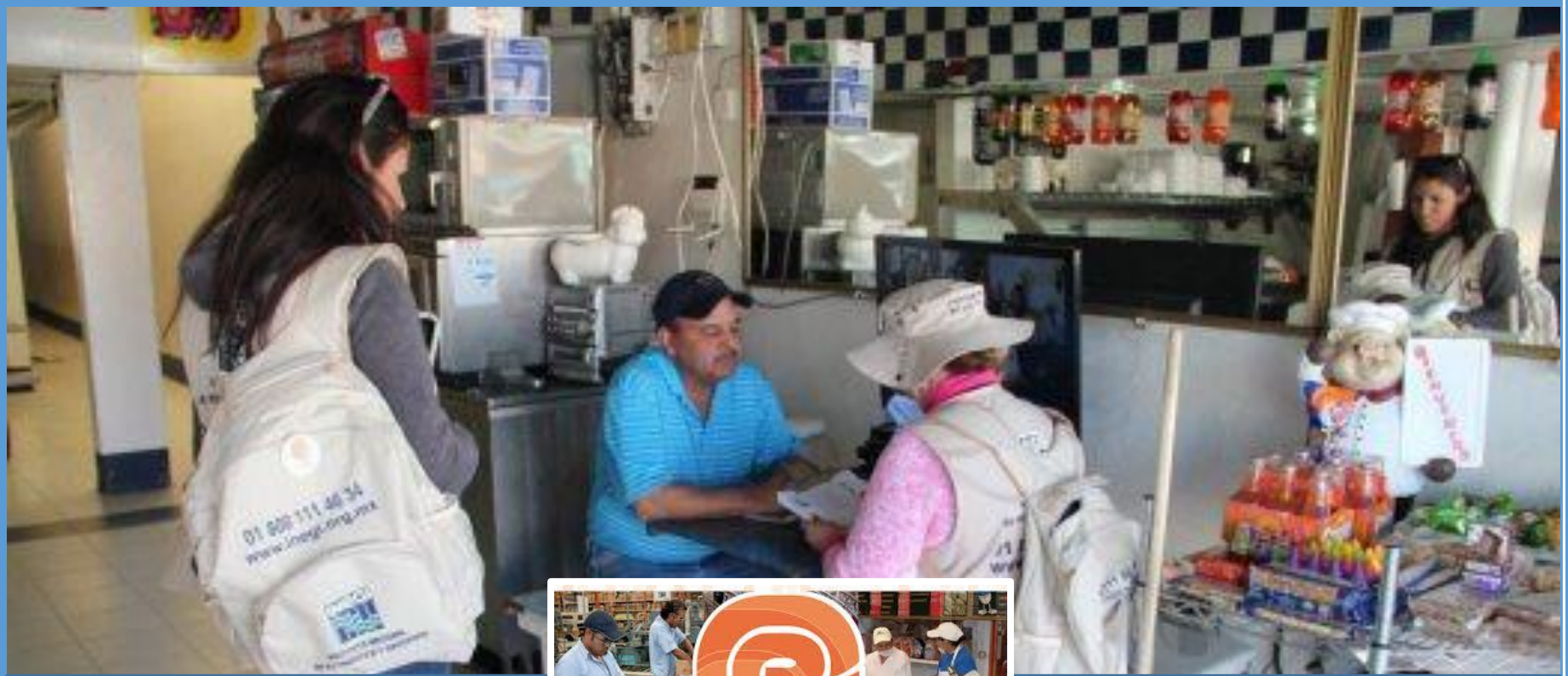Mapping
Questionnaire
Catalogs
Online validation
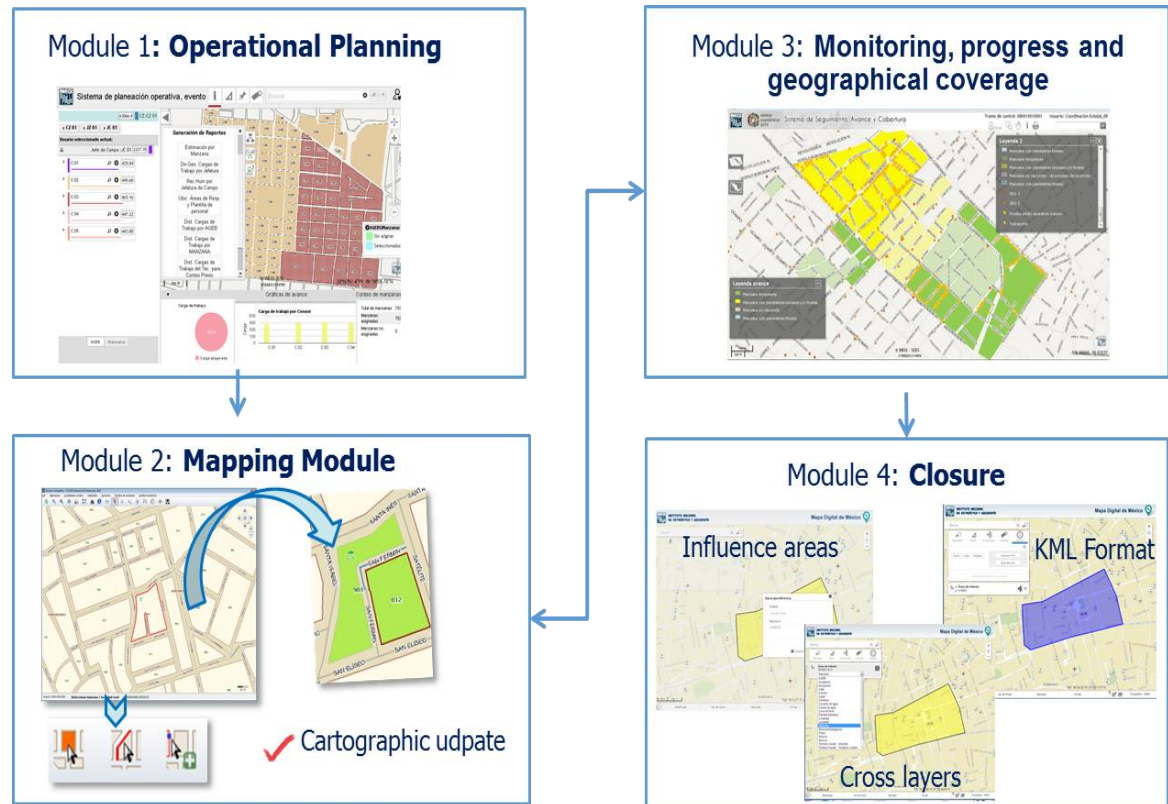Producer directory
Instructions and manuals

ECONOMIC CENSUS (2019)

Census Operational Process

Our **Census Operational Process** has **4 modules**: Operational Planning

1. Operational Planning
2. Mapping Module
3. Monitoring progress and Geographical coverage
4. Closure.

Module 1: **Operational Planning**

Module 3: **Monitoring, progress and geographical coverage**

Module 2: **Mapping Module**
✔ Cartographic update

Module 4: **Closure**
Influence areas
KML Format
Cross layers

INEGI

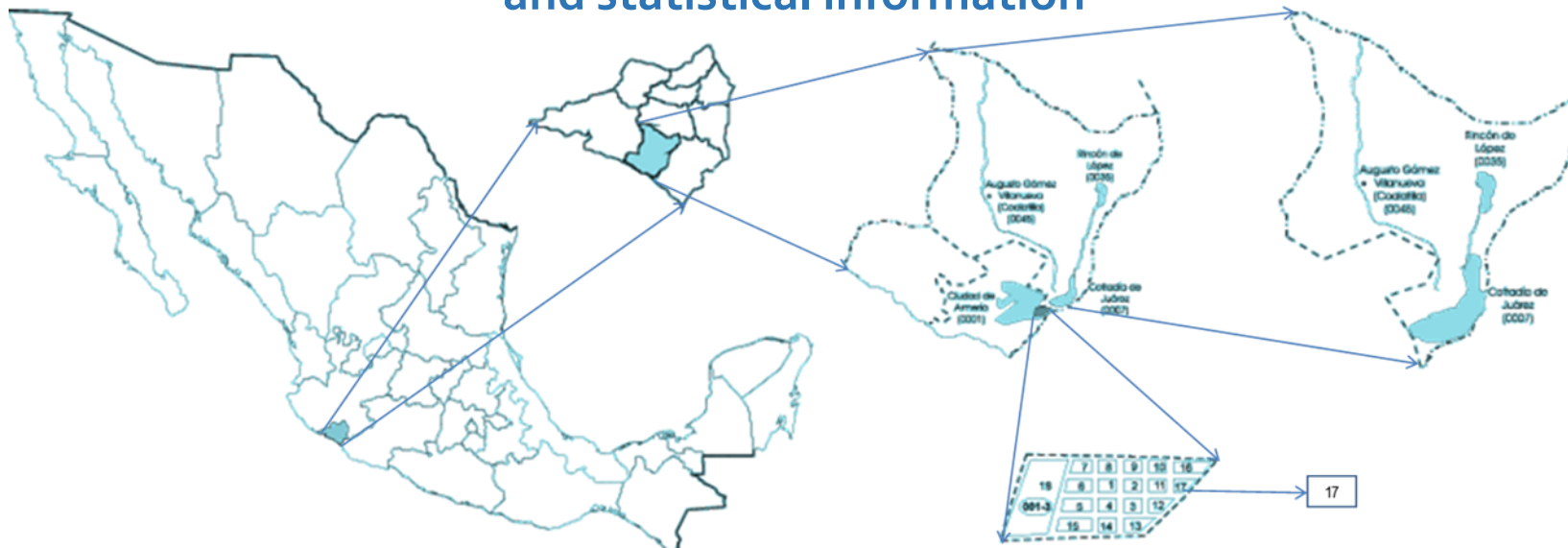Censo de Población y Vivienda 2020

2020 POPULATION AND HOUSING CENSUS

Geo-referencing through the use of GPS in mobile devices

INEGI

Use of cartography in census operations

Traditionally, geo-statistical coding has been used to link geographic and statistical information

Traditionally, INEGI has used cartography to geo-reference census information.

Recently, GPS technology has been successfully used to update economic information, through the Economic Census.

GPS technology will again be tested in 2019, during a trial run for the 2020 Population and Housing Census.

The expectation is that the 2020 Census will fully incorporate this technology, for a more effective integration of statistical and geographic information.

INEGI

Cartographic updates through the trace of areas with GPS coordinates
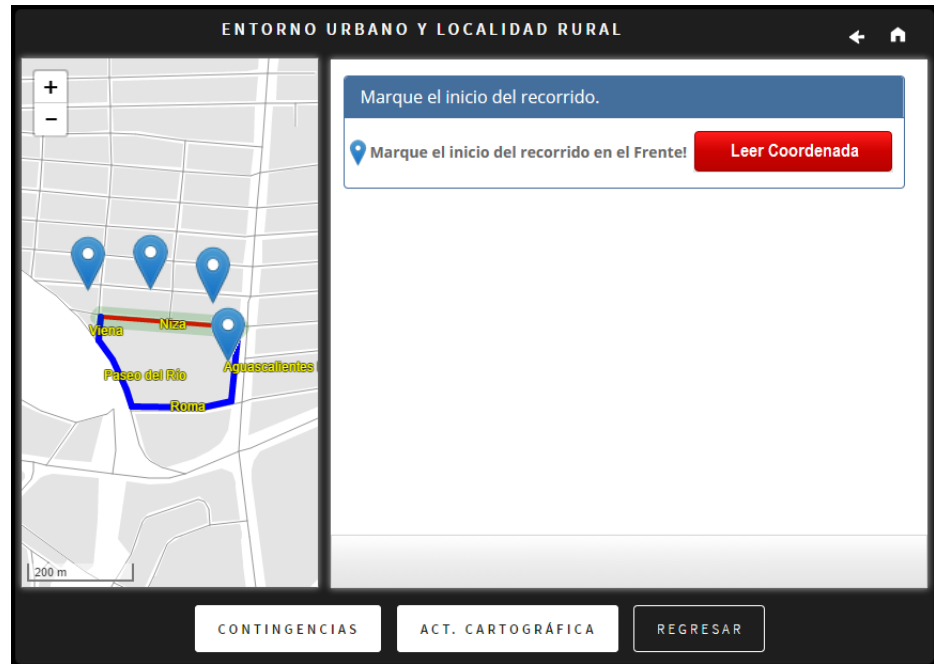
Methodology

1. Do a recon test run of assigned routes

2. Identify city blocks through cartographic updates

3. Enable the reading of geographic coordinates through GPS, during the course of the run through the areas and perimeters being updated.
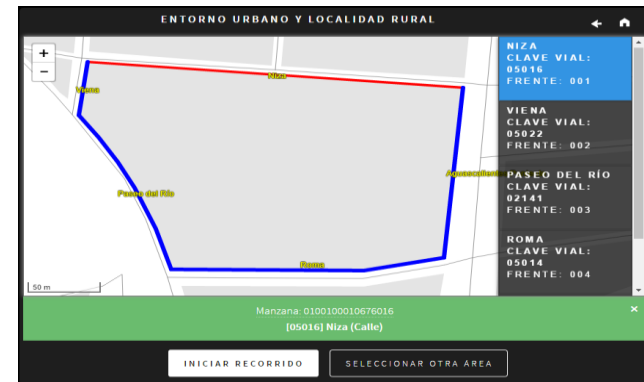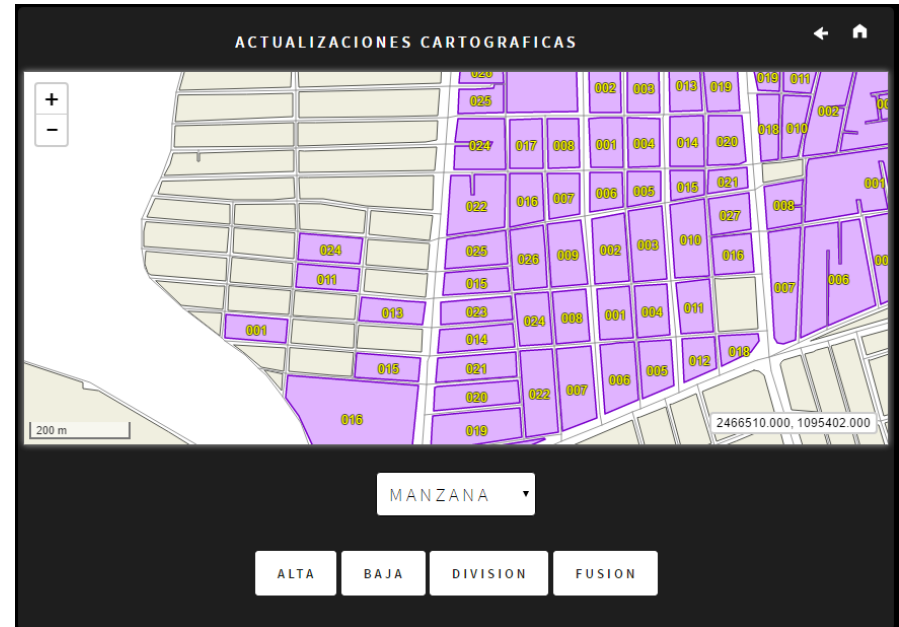
4. Run the routes and mark thecoordinates, for future geographic reference of both surveyors and supervisors

Route run and validation using GPS coordinates

5. The supervisor goes through route, registering the questionnaire and the GPS coordinates

6. Surveyor then applies questionnaire to each dwelling in route

7. Validation through matching of coordinates and buffers

ENTORNO URBANO Y LOCALIDAD RURAL

Marque el inicio del recorrido.

Marque el inicio del recorrido en el Frente!   Leer Coordenada

CONTINGENCIAS   ACT. CARTOGRÁFICA   REGRESAR

This method would ensure the capture of all dwellings' coordinates during the course of the surveyor's route.

INEGI

IV CONCLUSIONS

Conclusions

- Having statistics and geography in a single national institution has allowed Mexico for a better integration and use of complementary information systems;

- With the associated tools from this integration, it is possible to geo-reference relevant statistics;

- Integration determines location of economic and social inequalities, overall needs, as well as risks and damages from natural disasters;

- The use of integrated geographic and statistical data allows for better design and monitoring of public policies and internationally-agreed goals—such as the SDGs.

MEXICO'S NATIONAL GEOSTATISTICAL FRAMEWORK AND ACTIONS TROUGH OUR POPULATION AND HOUSING CENSUSES

2020

Mexico's National Geostatistical Framework and our Population and Housing Censuses

Rolando Ocampo Alcántar
Vice-president INEGI