IBGE
Instituto Brasileiro de Geografia e Estatística

2010 Census Mapping
Evolution, Potentialities and Integration to the National Spatial Data Infrastructure

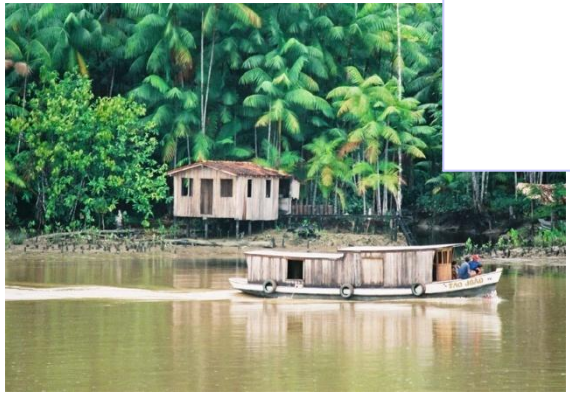
Miriam Barbuda, MsC

LATIN AMERICA GEOSPATIAL FORUM

Brazil, Rio de Janeiro, 15-17August 2012

BRAZIL	
Land area	8,515,692.272 km²
Sea area	3,600,000 km²
States	27
Municipalities	5,565
Population - 2010 Population Census	190,755,799
2006 Agriculture Census	5,200,000 Farms

Diversified physical space

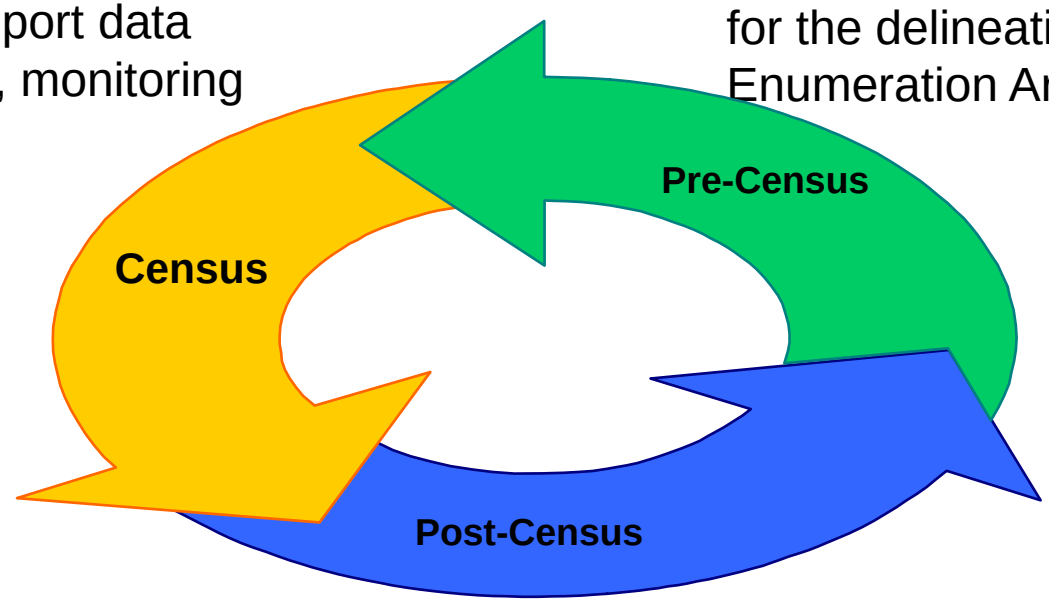


Geographic contribution to Census operations

Census Cycle

Enumeration
Maps support data collection, monitoring

Pre-enumeration
Maps provide cartographic basis for the delineation of Enumeration Areas



Post-enumeration
Maps make it easier to analyze, display and disseminate; also will support survey projects during the decade after the Census

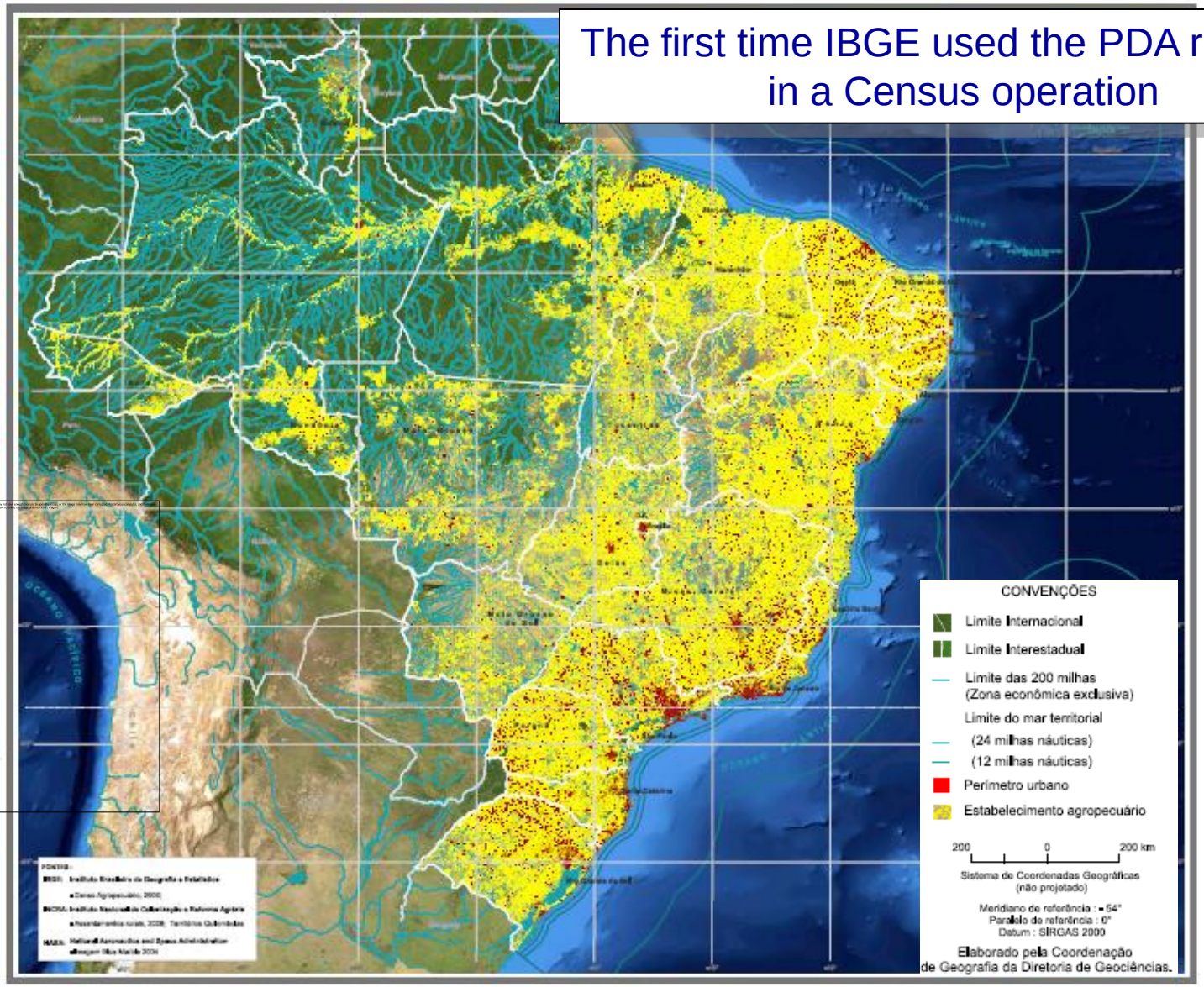
Regular Surveys
Continuous Census

Source: Digital Census Mapping Process: a conceptual framework and different implementation approaches

The 2007 Censuses Innovations

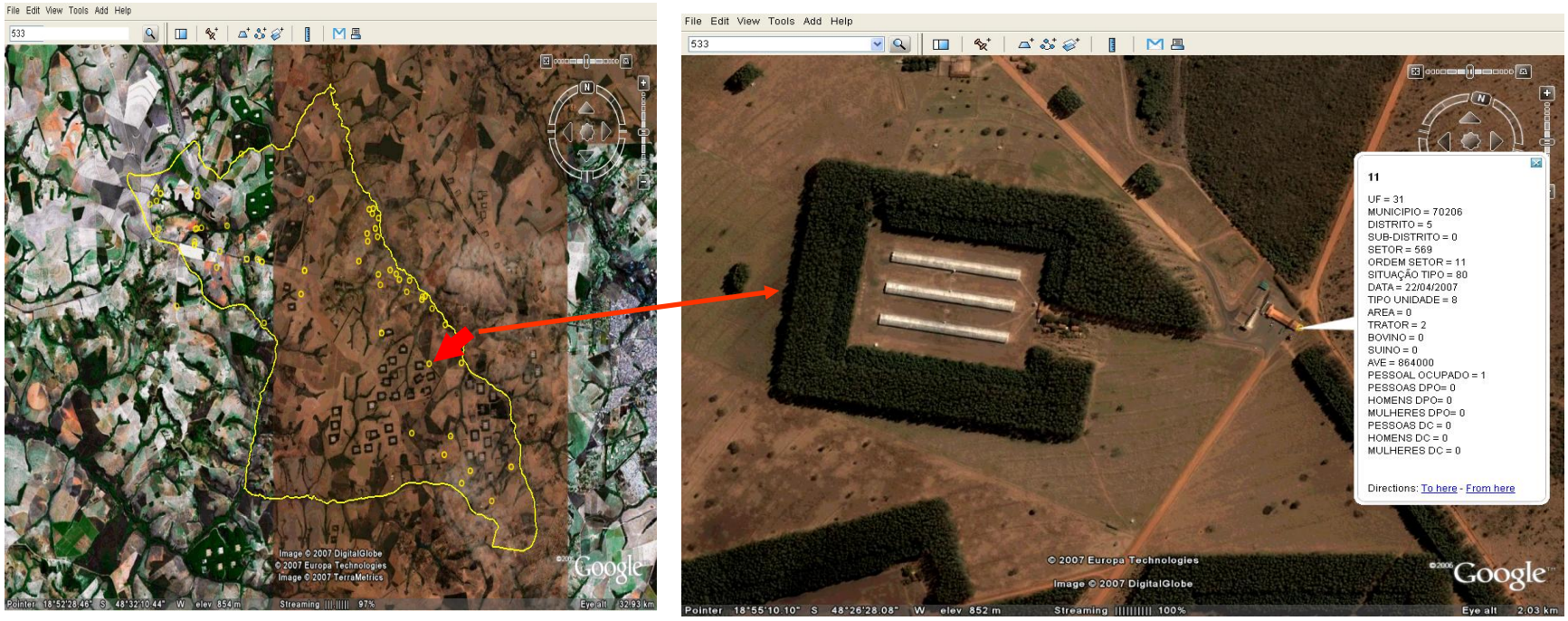
More than 5 million agricultural holdings georeferenced

The first time IBGE used the PDA resource in a Census operation



Example of Georeferenced Statistical data

Visually monitoring data collection



Collection seen with Google Earth®: The yellow line represents the enumeration area boundaries. The yellow points represent agricultural establishments georeferenced by GPS.

The red arrow indicates a selected unit for detailed viewing, shown on the right-hand side figure. The corresponding data can be seen by clicking on the point.

2010 Census Mapping Project

For the 2010 Census, a unique Census Mapping Project that integrates Municipalities' urban and rural areas was developed, changing from the hybrid analog/digital format to a full digital format using modern technological resources (strongly based on imagery)

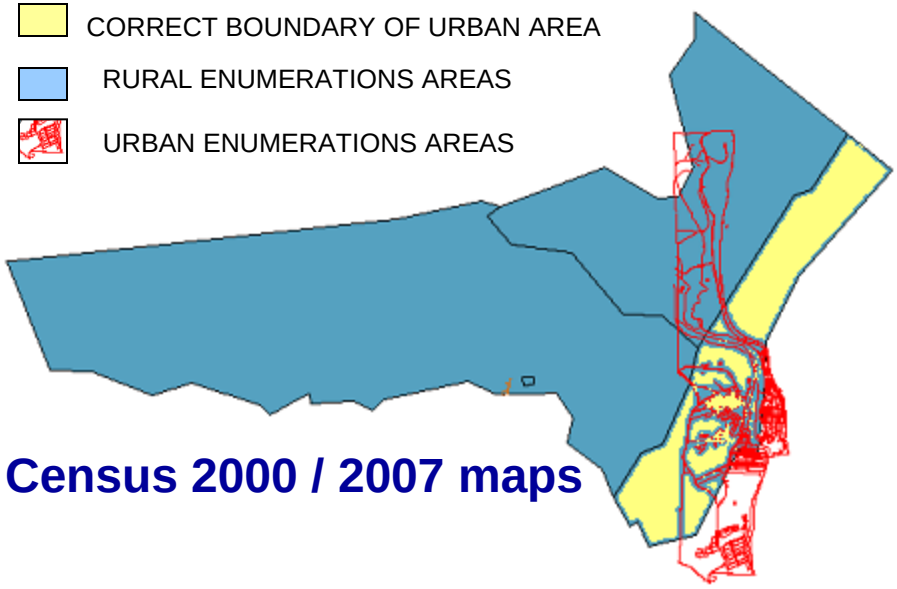
Main Objective

Building of an integrated Territorial Database in support of the 2010 census operations, from the planning to the collection and dissemination phase

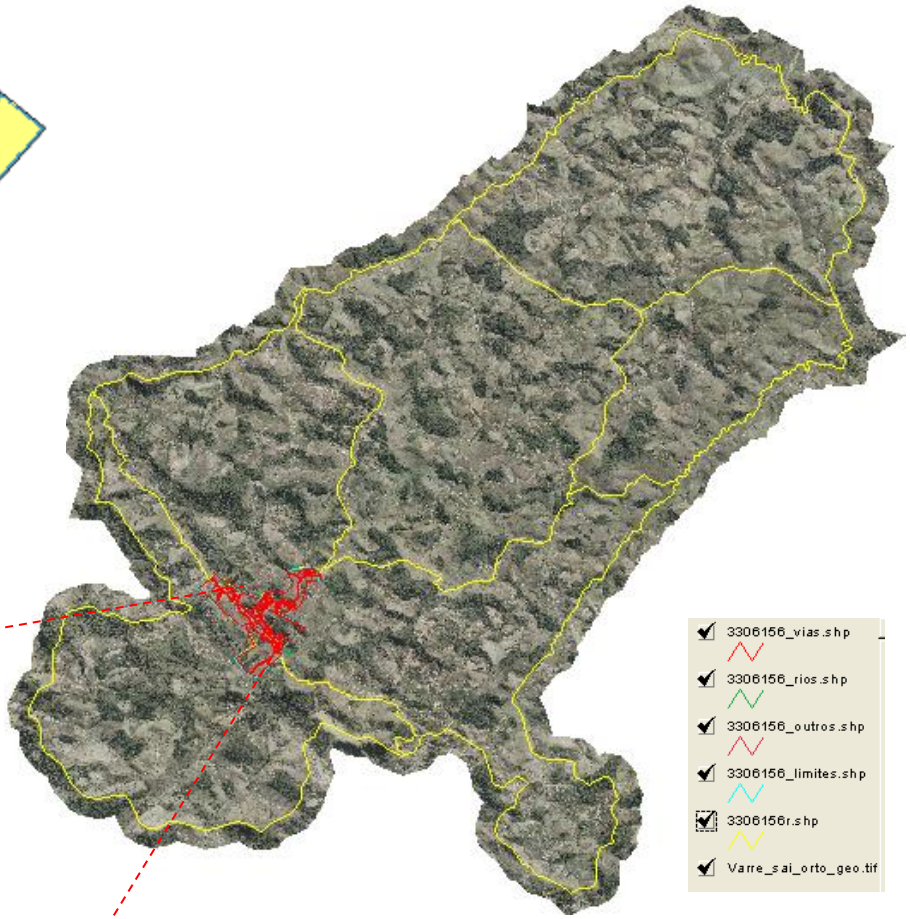
Specific Objectives

- Associate the CNEFE file to the blocks and block-face of 2007 urban enumeration areas
- Geometrically adjust the urban and rural limits for each Municipality

Production of Georeferenced Statistical Data



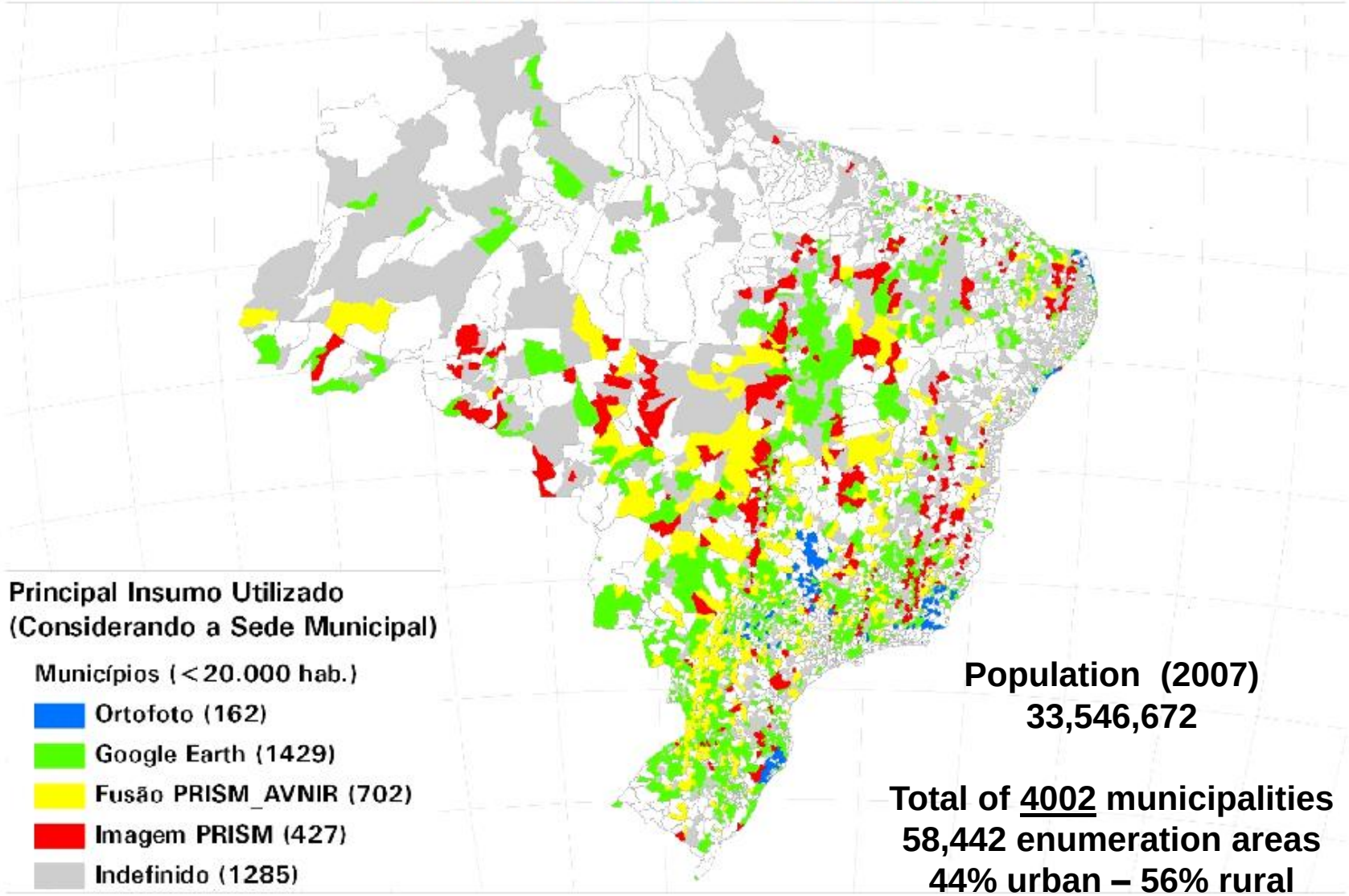
Census 2000 / 2007 maps



Integrated 2010 urban and rural census maps

Imagens para Base Territorial 2010

Planejamento de Insumos Raster para os Municípios com População Inferior a 20.000 Habitantes

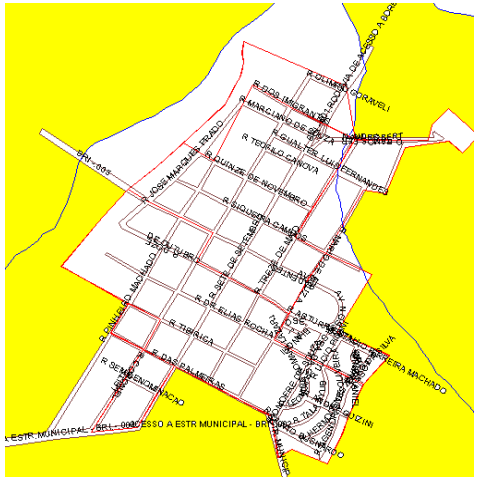


Population (2007)
33,546,672

Total of 4002 municipalities
58,442 enumeration areas
44% urban – 56% rural

2010 Census Mapping Tools

GEOBASE



- Developed by CDDI in IBGE
- Allows the adjustment of graphic shapefiles to existing features on the images covering the Municipalities
- Geocoding the blocks / faces to the National Addresses File

Mapa Temático - 1

Núm. de feições: 284

ENTID	TXTMEMO	COD_SETOR	QUADRA	FACE
75	R SIQUEIRA CAMPOS			777
76	R SIQUEIRA CAMPOS	350745605000004	001	999
83	R GUALTER LUIS FERNANDES	350745605000003	001	999
86	AV ROBERTO RAMOS FERNANDES	350745605000001	005	002
87	AV ROBERTO RAMOS FERNANDES	350745605000003	001	999
88	R ESTACIO FERREIRA MACHADO	350745605000004	003	999
89	R SEM DENOMINAÇAO	350745605000005	002	999
90	R AGENOR S DE OLIVEIRA	350745605000002		999
91	R SEM DENOMINAÇAO	350745605000005	001	999
92	R MARCIANO DE SOUZA	350745605000001		999
94	R SABATINO DANIEL	350745605000004	004	002

Detail in ALOS image – Borebi - SP

Note: The census maps prepared to the Census 2010, with intensive use of satellite imagery, will be a rich collection for the construction of NSDI

2010 Census Mapping Project

Municipalities with less than 20,000 inhabitants

Municipalities WITHOUT images

Global Positioning System - GPS

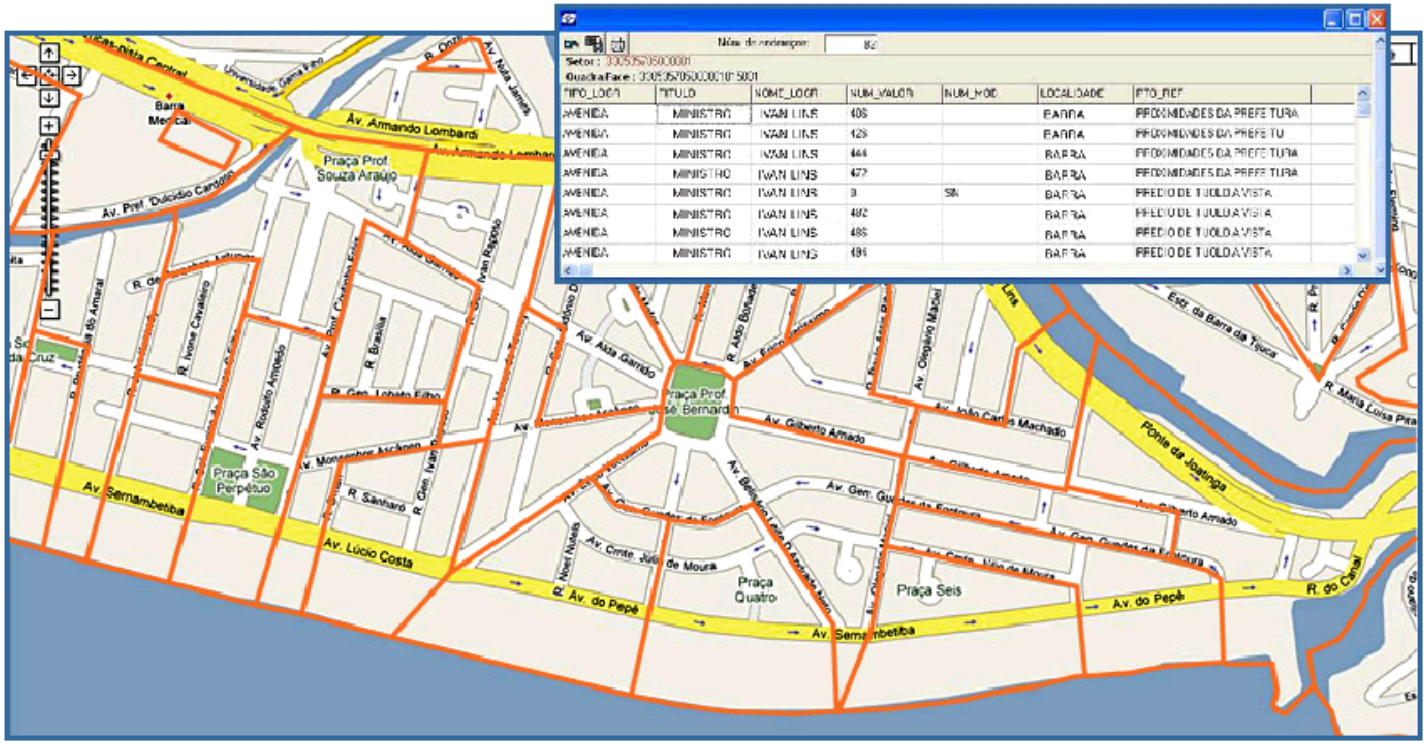
IBGE - MOBILE GIS Software acquired by IBGE and customized to fulfill the Censuses 2007 demands. New functionalities implemented to aid the processes of Census Mapping for Census 2010.

- Determines the best track for the survey
- Establishes routes and waypoints
- Transfers the saved files on PDA to the computer to be dealt with by GEOBASE

2010 Census Mapping Project

Municipalities with more than 20,000 inhabitants

1562 Municipalities - acquisition of urban vector bases from Mapping companies



Population (2007)147,239,176

190,626 enumeration areas
82% urban – 18% rural

Enumeration Area - EA

Characteristics

- Working area of one enumerator
- Continuous area
- Located in just one zone, rural or urban
- Follows the legal limits of the municipality, districts and sub-districts
- Average: 150 agricultural holdings – rural or 300/350 houses - urban
- Rural areas with max 500 km^2

Enumeration Areas

Geocodification – 27 States - RJ

3	3														
UF		MUNICIPIO					DISTRITO		SUBDISTRITO		SETOR				

Geocódigo

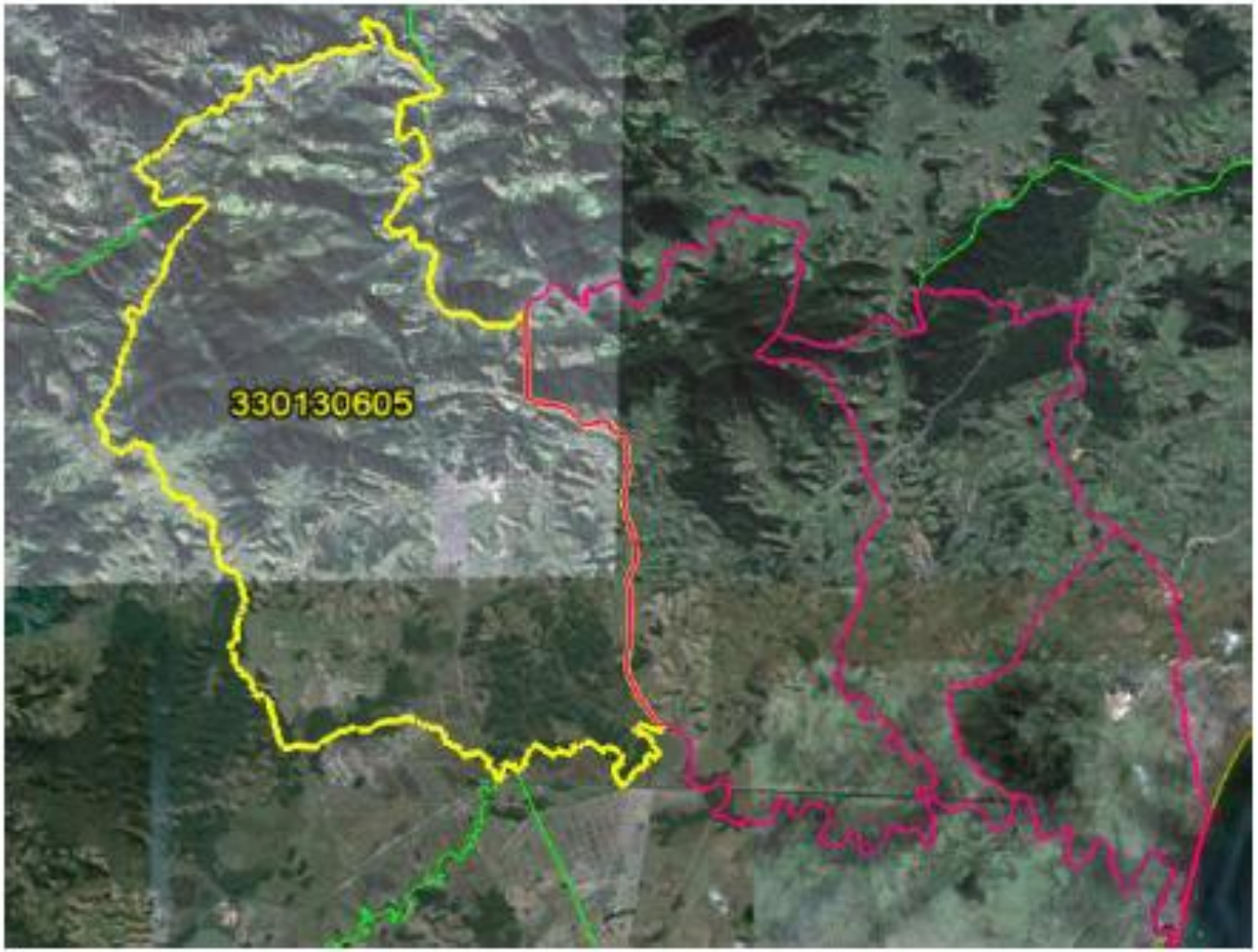
MUNICÍPIO = CASEMIRO DE ABREU

IBGE

3	3	0	1	3	0	6								
UF		MUNICIPIO					DISTRITO		SUBDISTRITO		SETOR			

Geocódigo

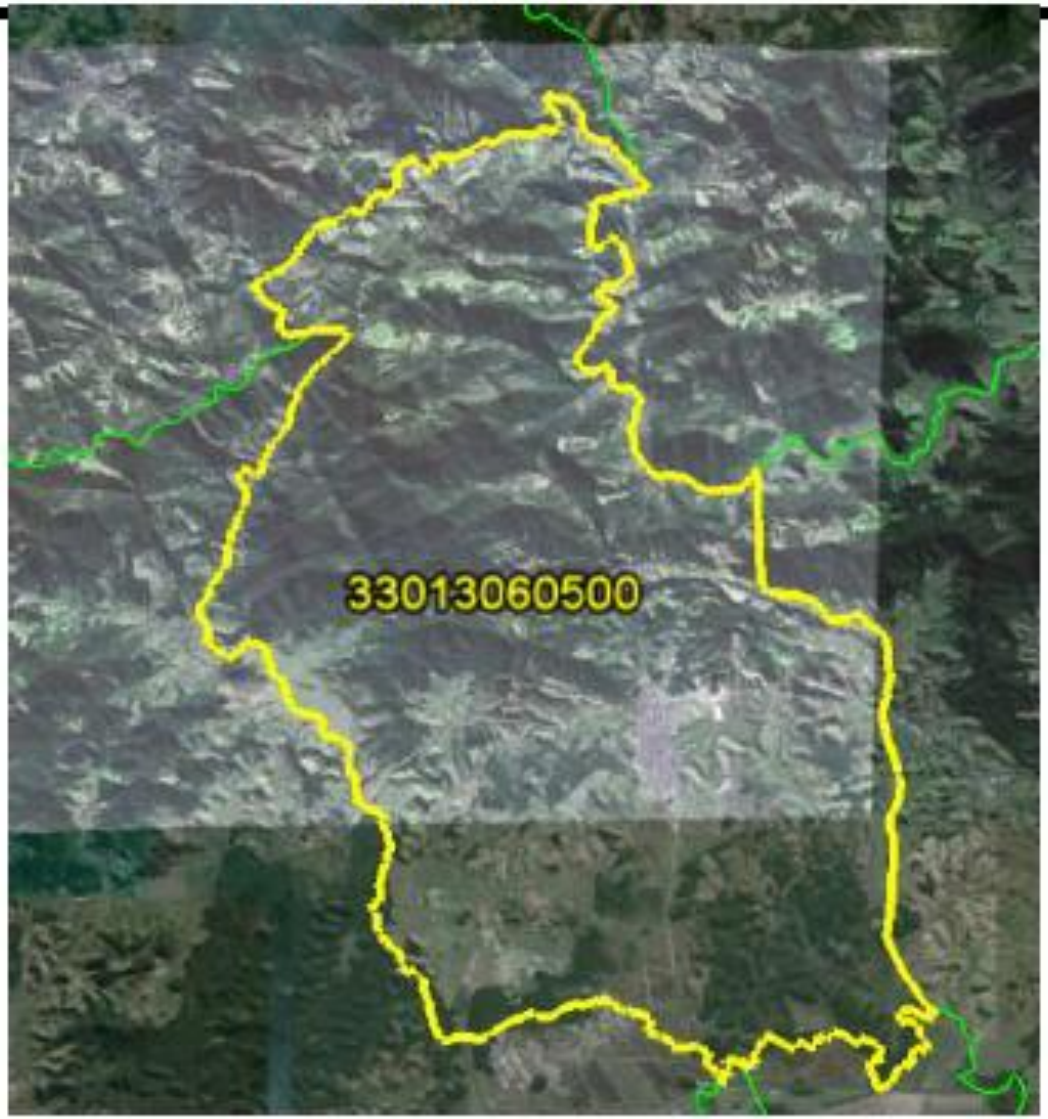
DISTRITO = CASEMIRO DE ABREU



3	3	0	1	3	0	6	0	5						
UF		MUNICIPIO					DISTRITO		SUBDISTRITO		SETOR			

Geocódigo

SUBDISTRITO ÚNICO

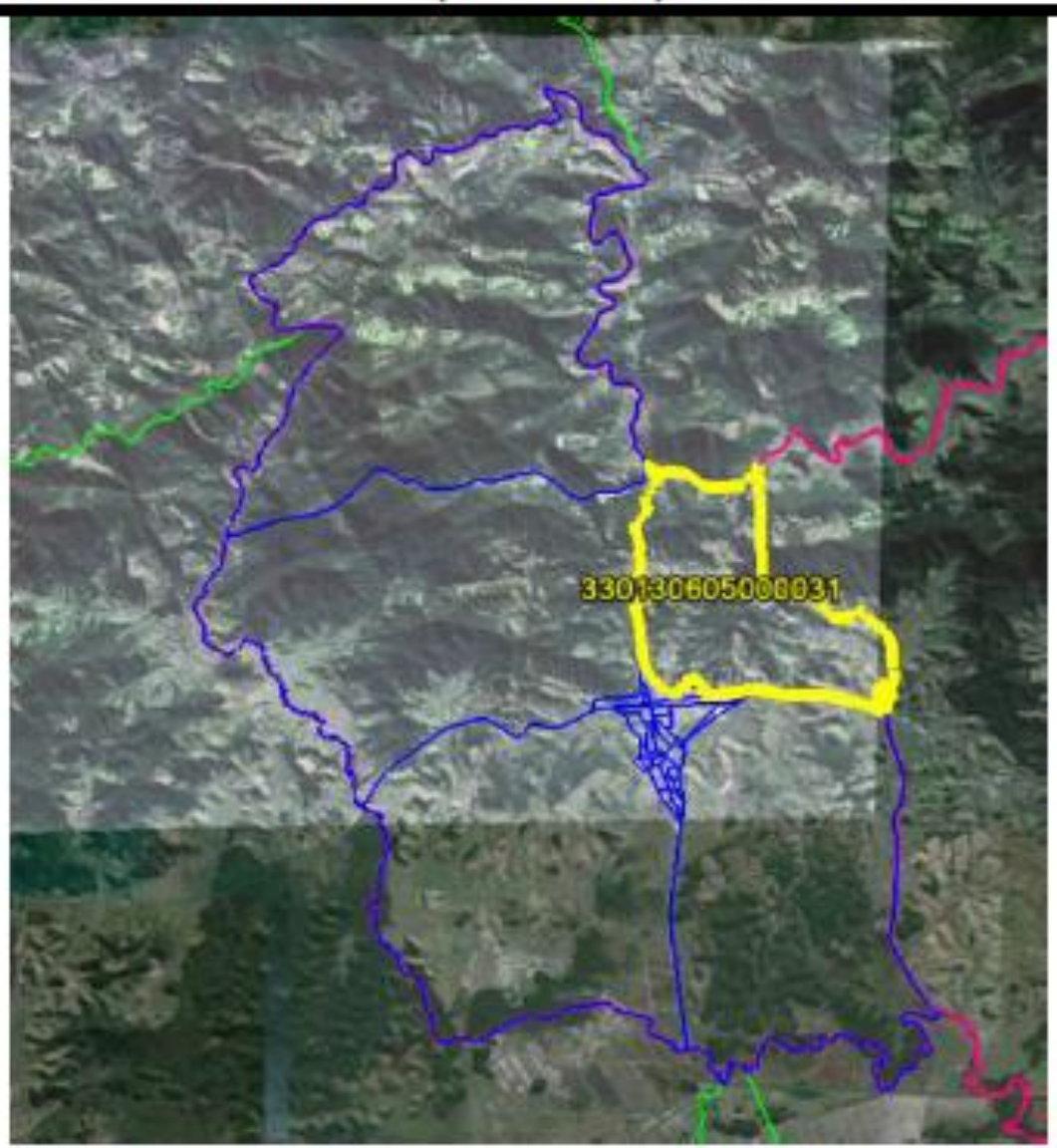


3	3	0	1	3	0	6	0	5	0	0				
UF		MUNICIPIO					DISTRITO		SUBDISTRITO		SETOR			

Geocódigo

CASEMIRO DE ABREU (DISTRITO) – SETOR 0031

IBGE



3	3	0	1	3	0	6	0	5	0	0	0	0	3	1
UF		MUNICIPIO					DISTRITO		SUBDISTRITO		SETOR			

Geocódigo

CASEMIRO DE ABREU (DISTRITO) – SETOR 0031

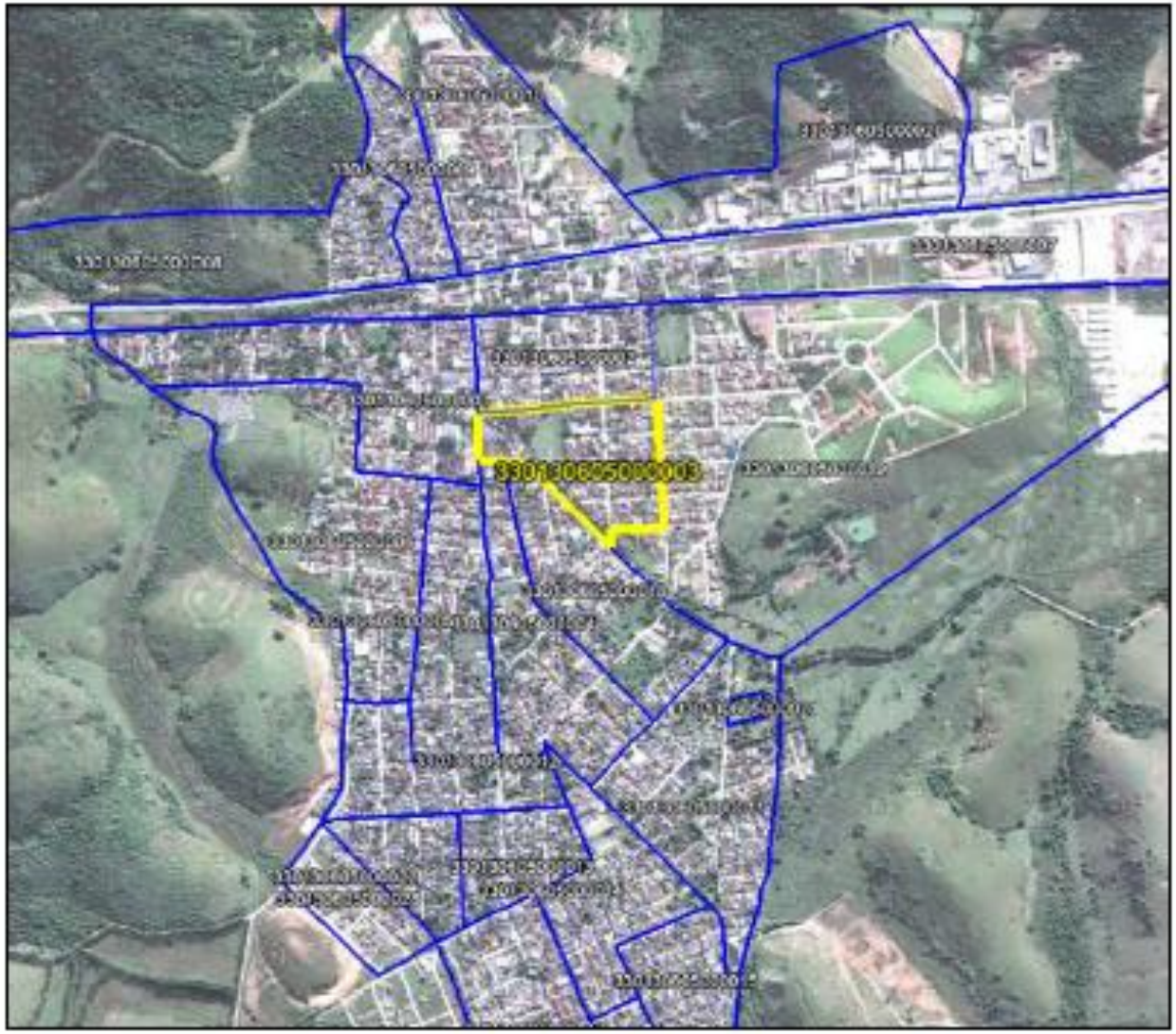
IBGE

3	3	0	1	3	0	6	0	5	0	0	0	0	3	1
UF		MUNICIPIO					DISTRITO		SUBDISTRITO		SETOR			

Geocódigo

CASEMIRO DE ABREU (DISTRITO) – SETOR 0003

IBGE



3	3	0	1	3	0	6	0	5	0	0	0	0	0	3
UF		MUNICIPIO					DISTRITO		SUBDISTRITO		SETOR			

Geocódigo

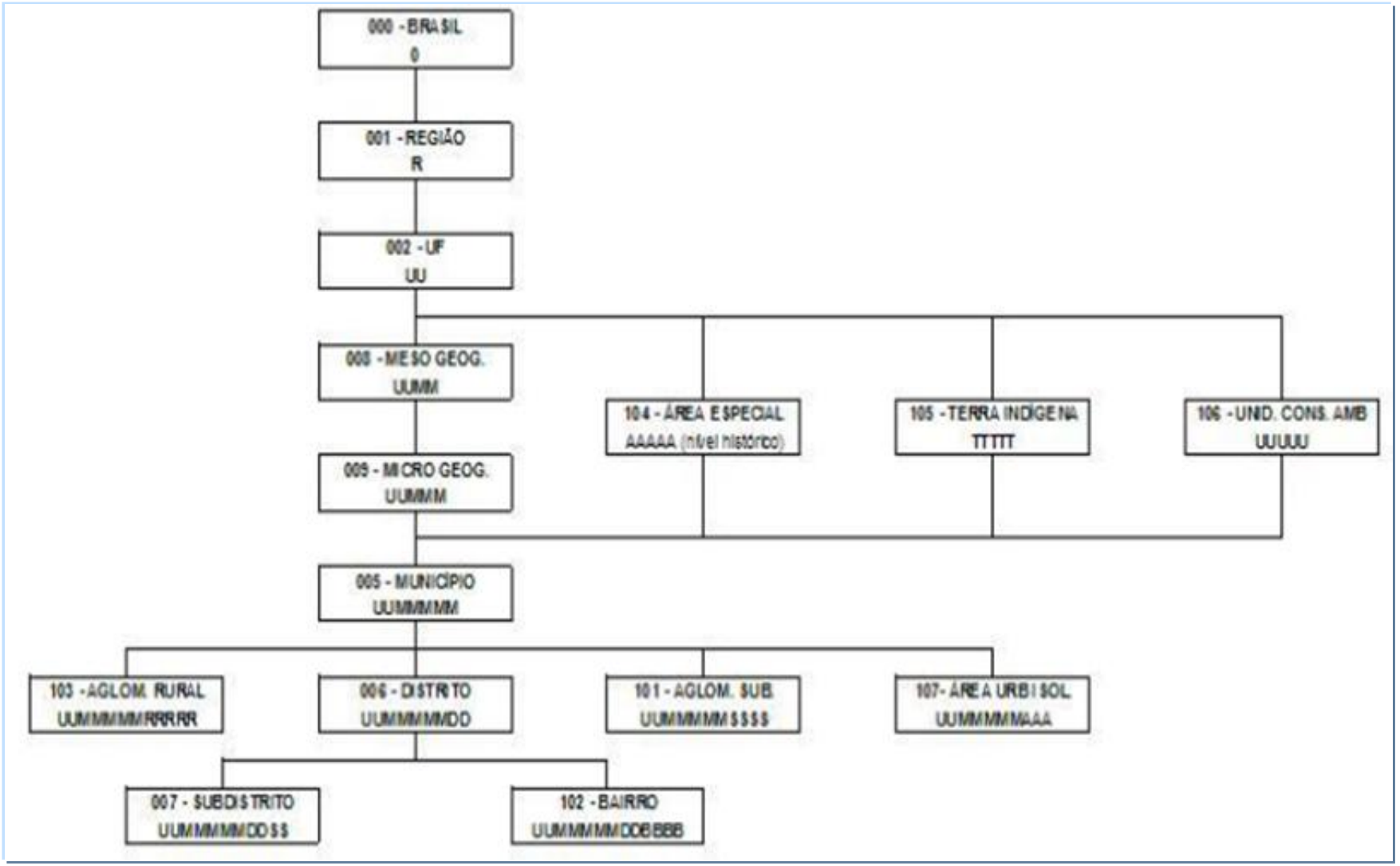
CASEMIRO DE ABREU (DISTRITO) – SETOR 0003

IBGE

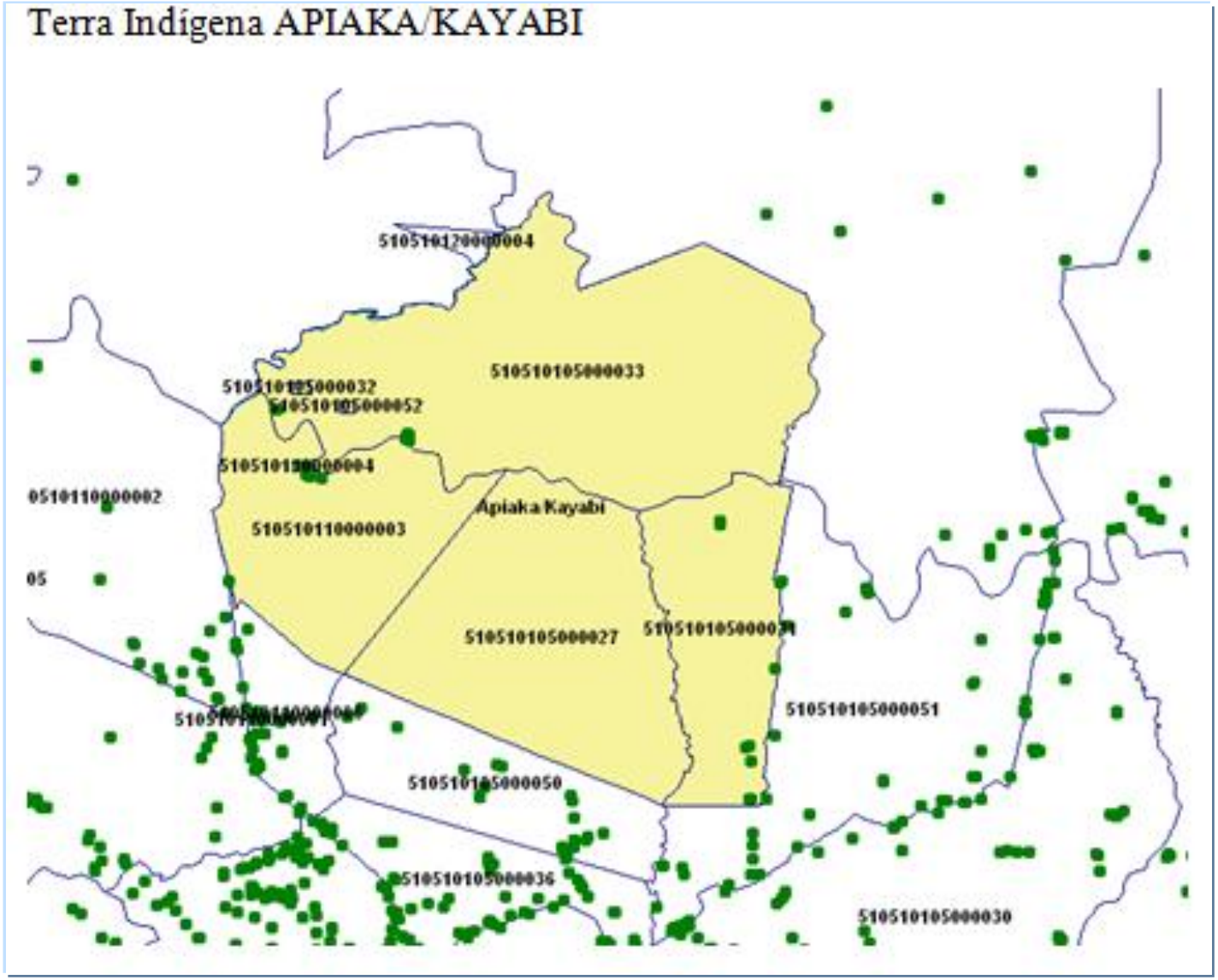
3	3	0	1	3	0	6	0	5	0	0	0	0	0	3
UF		MUNICIPIO					DISTRITO		SUBDISTRITO		SETOR			

Geocódigo

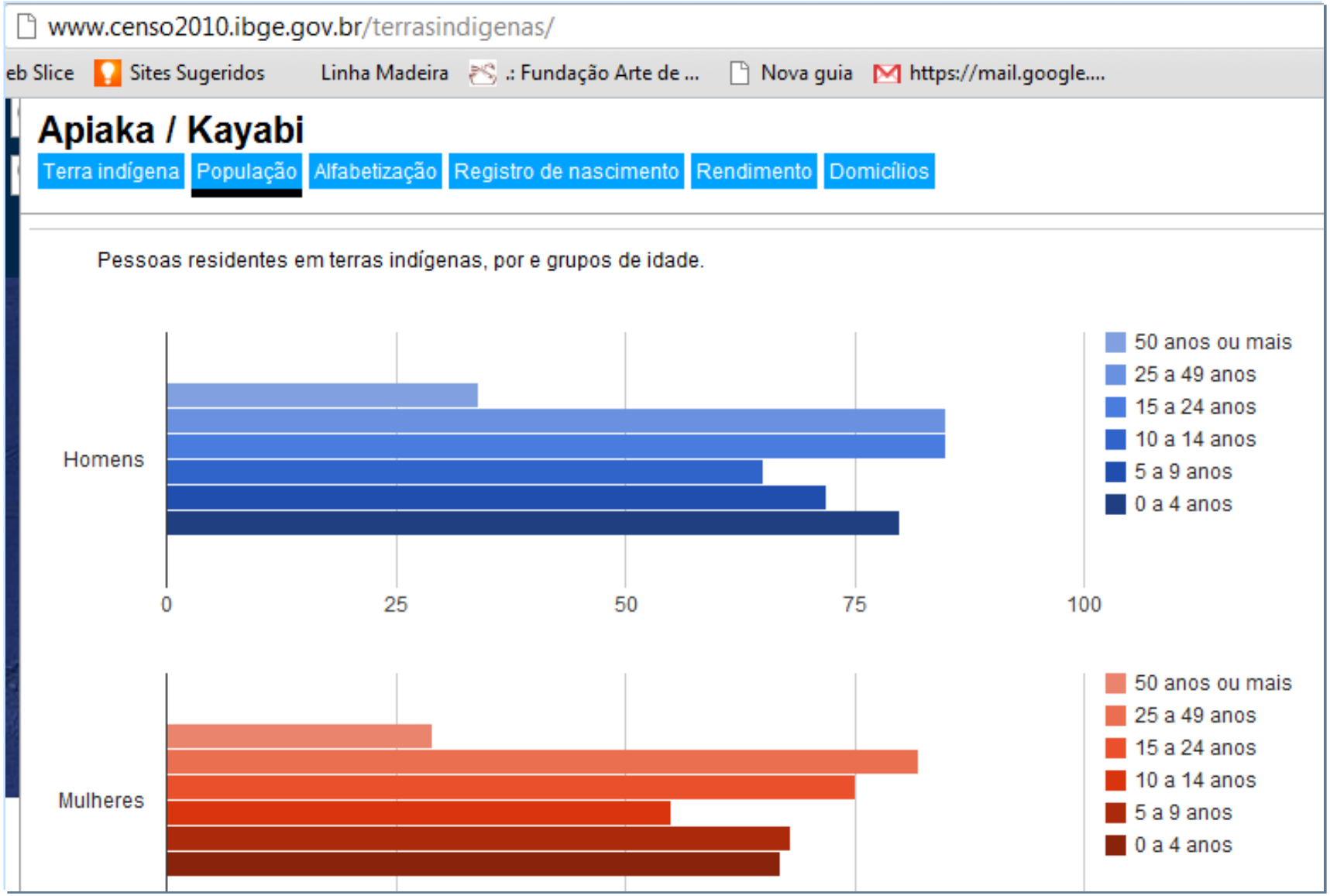
BET - Territorial Structure Database



Encoding for Special Areas – Indian Lands

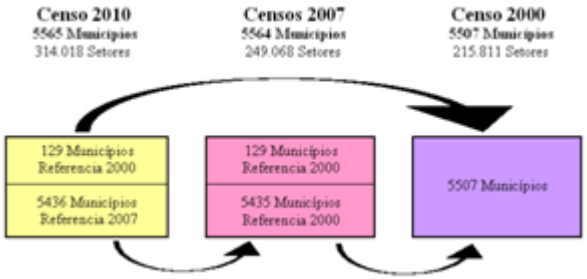


Demographic results – Indian Lands

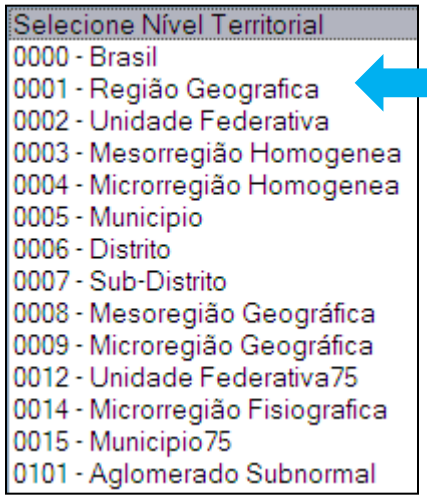


Census 2010 – Web Applications

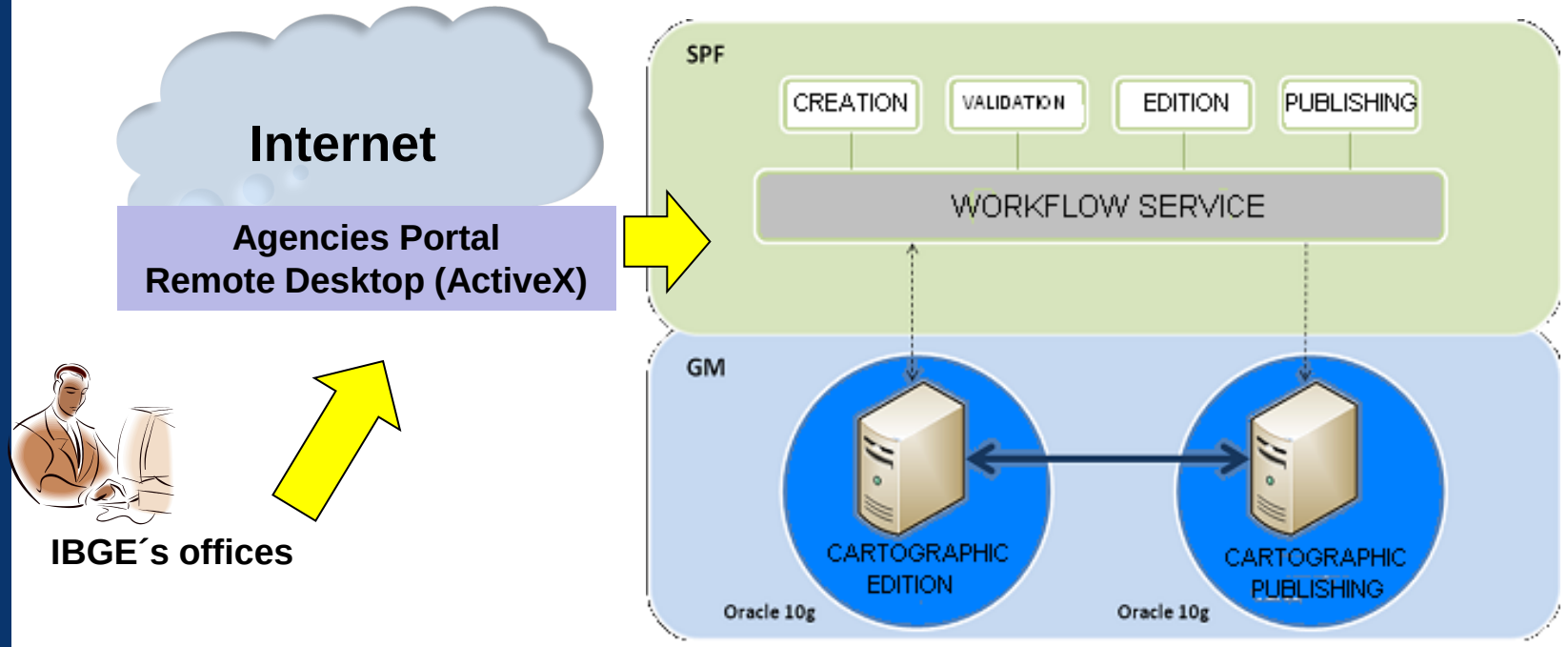
Comparability between Census

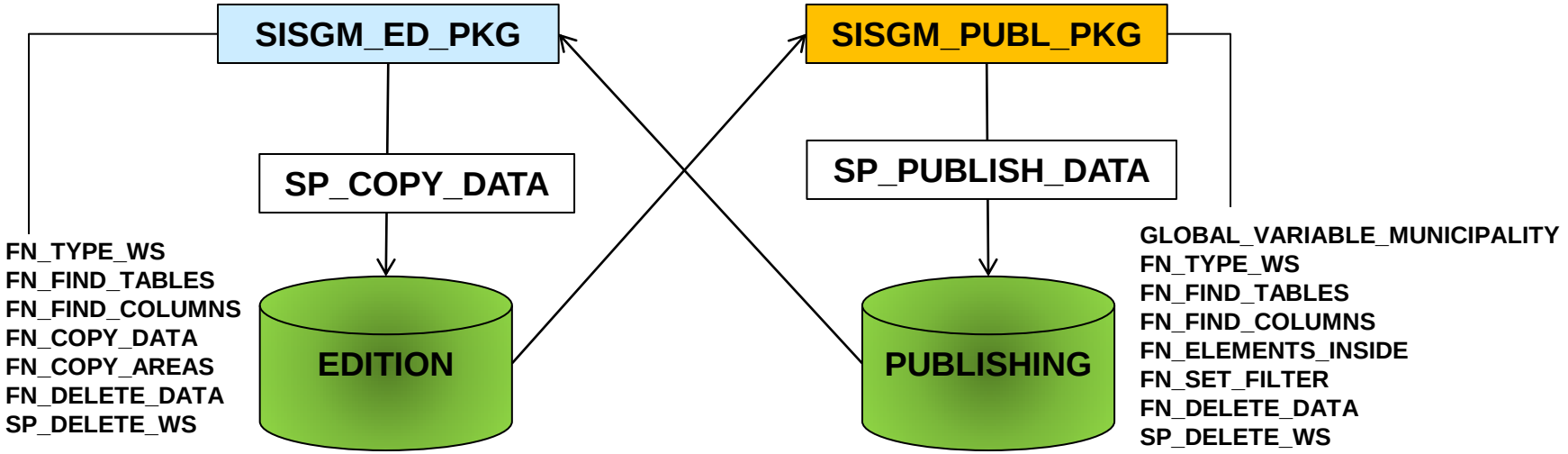


The evolution of Brazilian's Territorial Structure



SISMAP - Database Structure

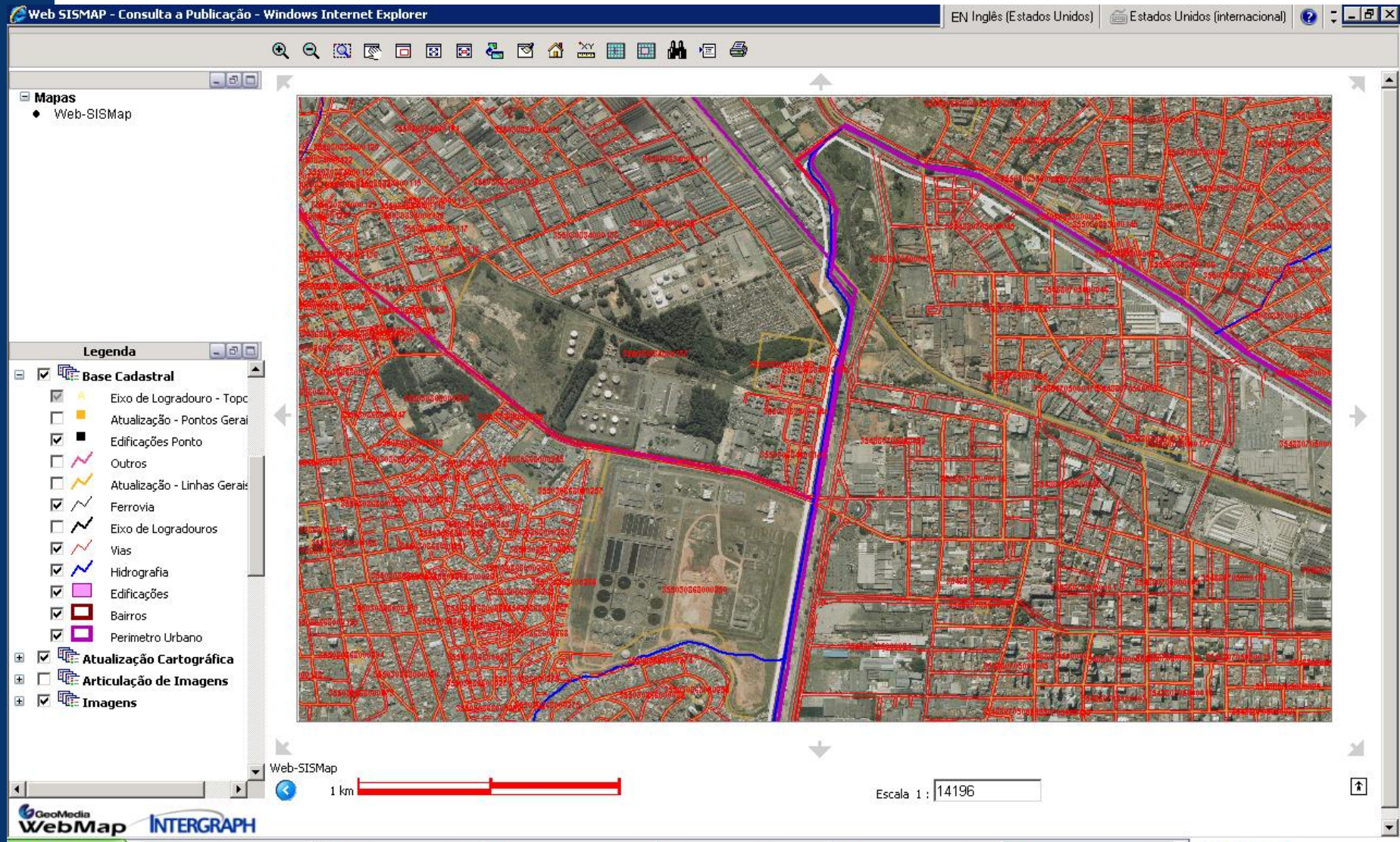




Spatial DataBase

IBGE

Detail of Municipality of São Caetano do Sul – SP with Ortophotos



Identification of the special enumeration areas (slums) for 2010 Census

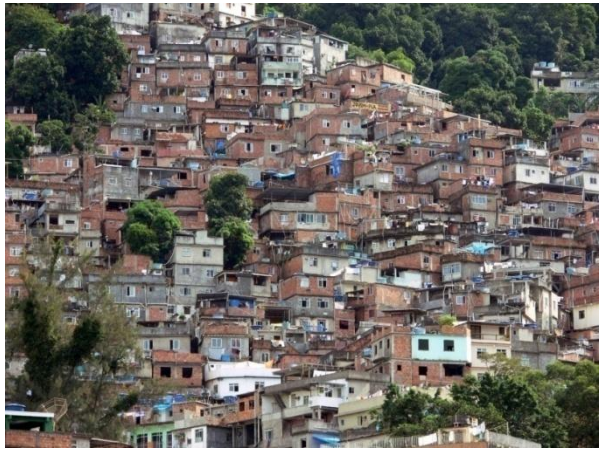
- Preliminary identification (statistical and spatial sources)
  - Survey of Territorial Information: covering the topics of urban patterns, density of occupation and location / characteristic of the area;
  - Survey information from municipalities (legal situation and land tenure);
  - Use of remote sensing images of high spatial resolution

Example: patterns identified using several sources

PALAFITAS

Macapá – AP

Manaus - AM

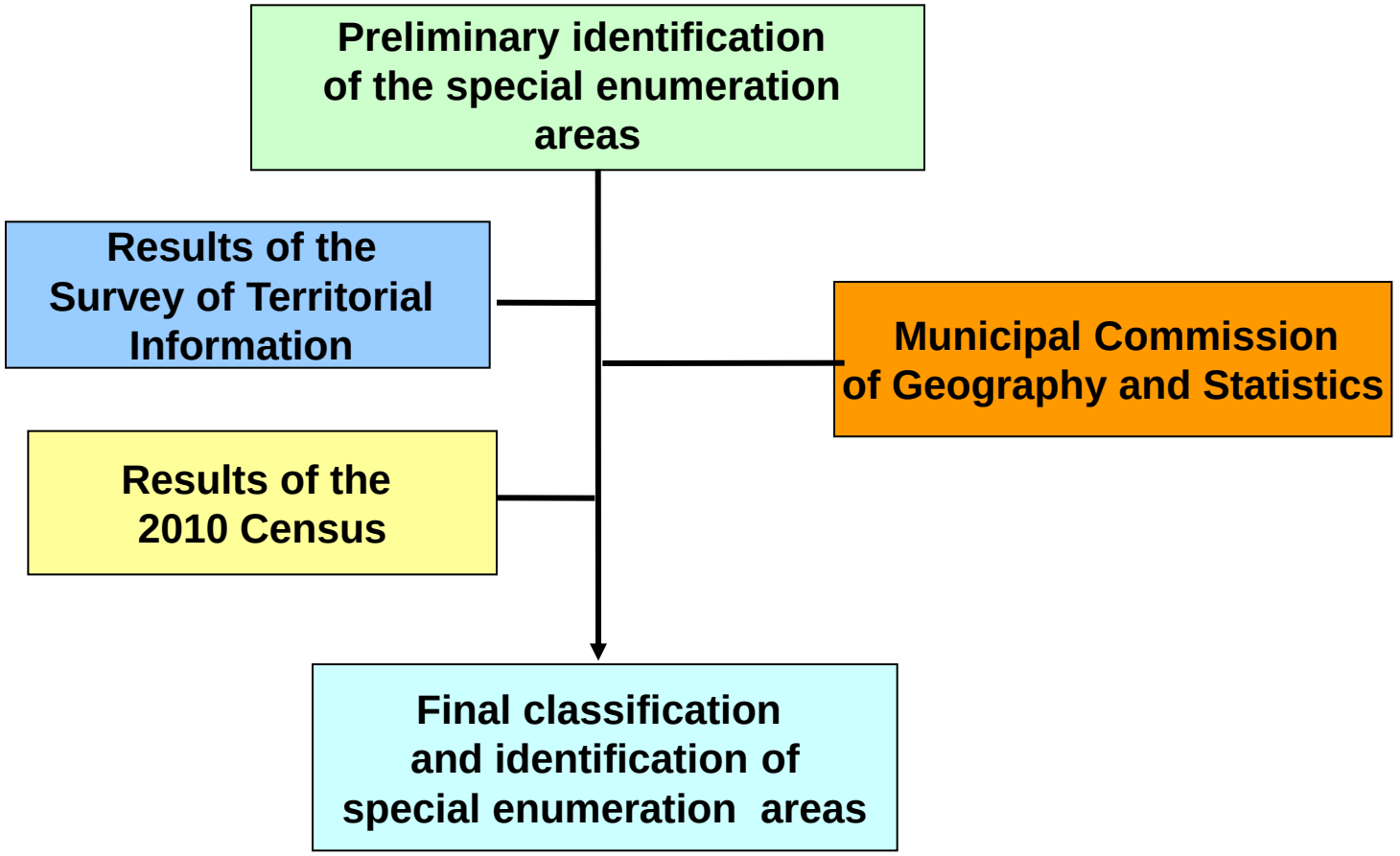


Rocinha – Rio de Janeiro - RJ

AGSN - areas of poor public services

Slums in Rio de Janeiro - Juramento and Vila Primavera Hill

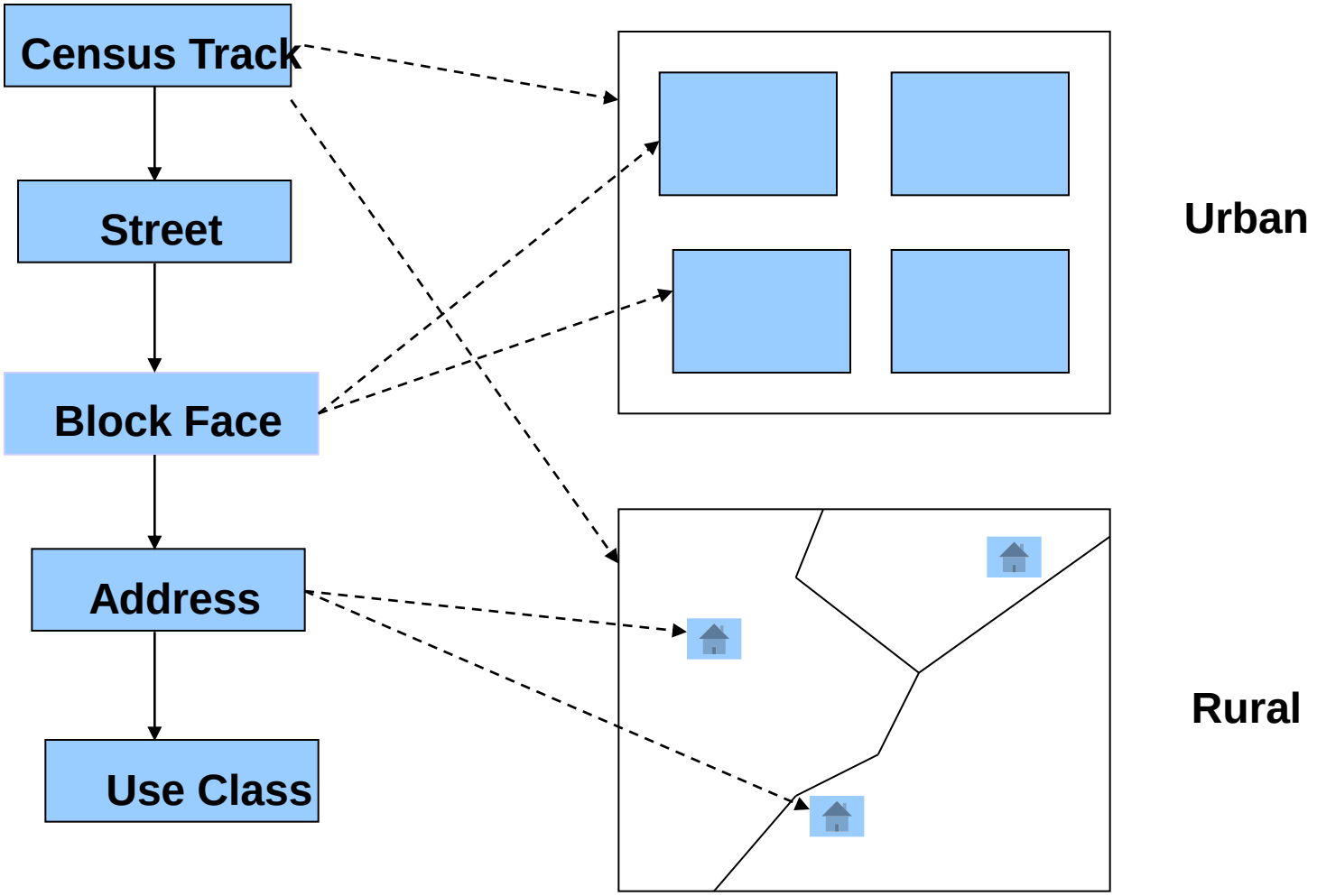
Special areas for dissemination 2010 Census



2010 Census

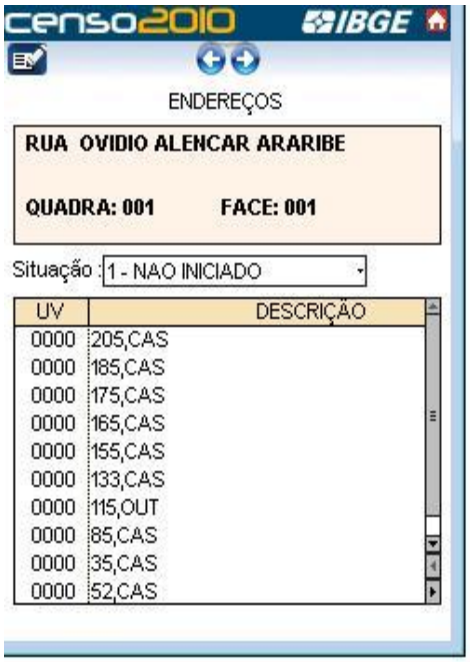
- Map – Address Association
- The “Pre-collection” Operation
  - Only urbanized areas (with block) 224.000 of the 314.000 census tracks
  - Map updating
  - Collecting addresses
  - Block Face characteristics - “Entorno”
- Enumerator uses the “Pre-collection” address list

Address File Structure

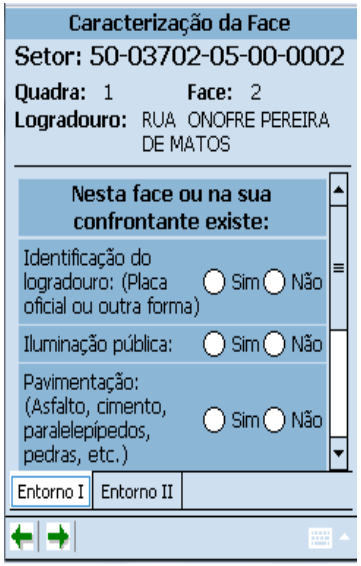


2010 Census Application

- ✓ Use of maps on PDA with GPS
- ✓ Click on block/block face
- ✓ Open address list
- ✓ Click on address
- ✓ Open questionnaire



2010 Census


Caracterização da Face
Setor: 50-03702-05-00-0002
Quadra: 1
Face: 2
Logradouro: RUA ONOFRE PEREIRA DE MATOS
Nesta face ou na sua confrontante existe:
Identificação do logradouro: (Placa oficial ou outra forma)
Sim
Não
Iluminação pública:
Sim
Não
Pavimentação: (Asfalto, cimento, paralelepípedos, pedras, etc.)
Sim
Não
Entorno I
Entorno II

top
Internacional
FREE

2010 Census

- Streets – 3.732.066
- Faces – 10.360.217
- Addresses – 82.996.347
  - SN(No numbering): 19.102.287

2010 Population Census

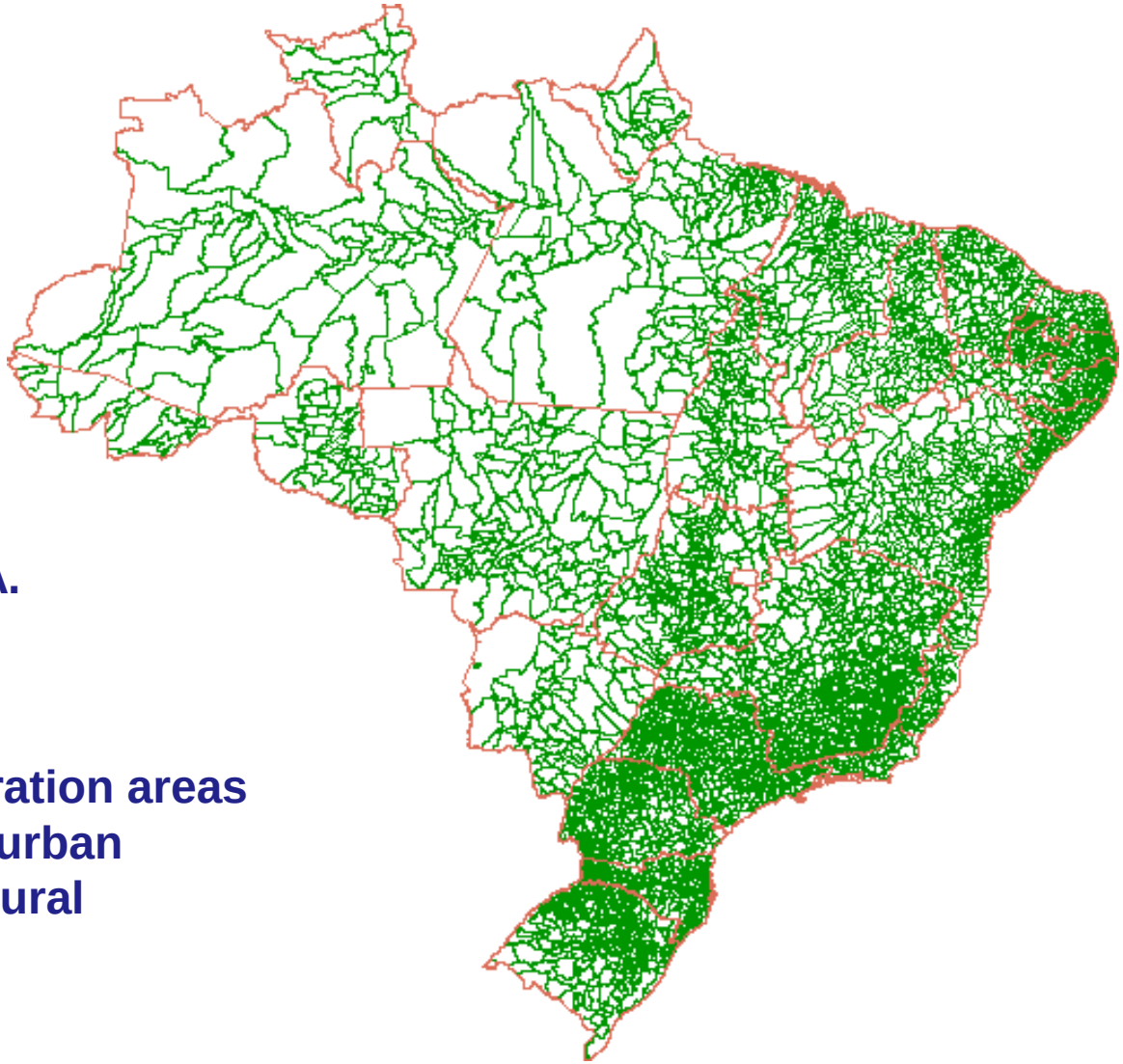
Territorial Database

27 Federation Units (States)

5,565 Municipalities

10,283 Districts

662 Subdistricts/R.A.

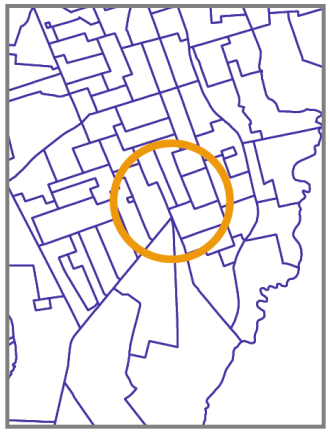


316,574 Enumeration areas
240,382 urban
76,192 rural

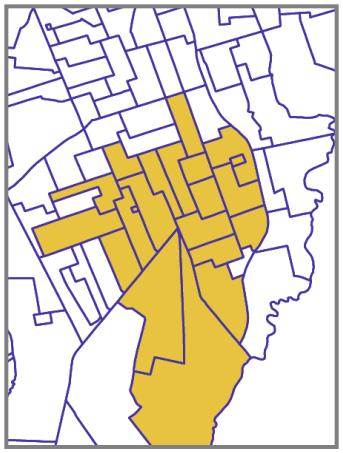
New ways of dissemination

Up to 2007 Census

Enumeration areas corresponded to the minimum area for statistical data analysis



Area of interest

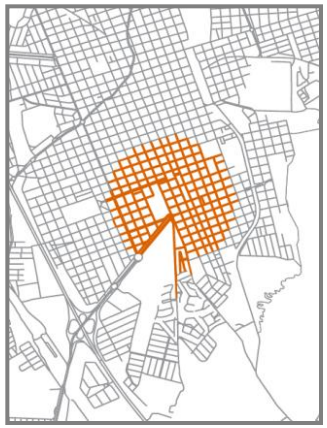


Selected area

As of 2010 Census

Block-faces correspond to the minimum spatial area for statistical data analysis

Need of dissemination rules to fulfill information confidentiality



Selected area

http://www.censo2010.ibge.gov.br/

IBGE

censo 2010

português español

IBGE

2010 CENSUS | DATA COLLECTION | MATERIALS | RESULTS

CARACTERÍSTICAS GERAIS DOS INDÍGENAS

Visualize através desta ferramenta os dados do censo sobre a população indígena no nosso país, através de mapas temáticos e gráficos

GENERAL SAMPLE RESULTS

Navigate through the 2010 Population Census sample results using thematic maps and graphs.

2010 CENSUS RELEASES

Seminar on the 2010 Census methodology and technology brings together representatives of 20 countries

29/09/2010
IBGE holds this week the 2010 Population Census Assessment of Field Work and International Seminar ...

2010 Census: 48% of the population has been counted

30/09/2010
At 10 a.m. today (09/30), IBGE will present the second partial assessment of the 2010 Census ongoing data collection...

READ MORE | SHARE

URBAN CHARACTERISTICS OF HOUSEHOLD SURROUNDINGS

Graphs and cartograms show details about the urban infrastructure of our country.

CMGE

Assista ao vídeo sobre áreas de ponderação

PUBLISHING CALENDAR

Click here to see the release dates for the results of the 2010 Census

RESULTS

See the latest results of the 2010 Census

LOOK AT THE 'VOU TE CONTAR' MAGAZINE

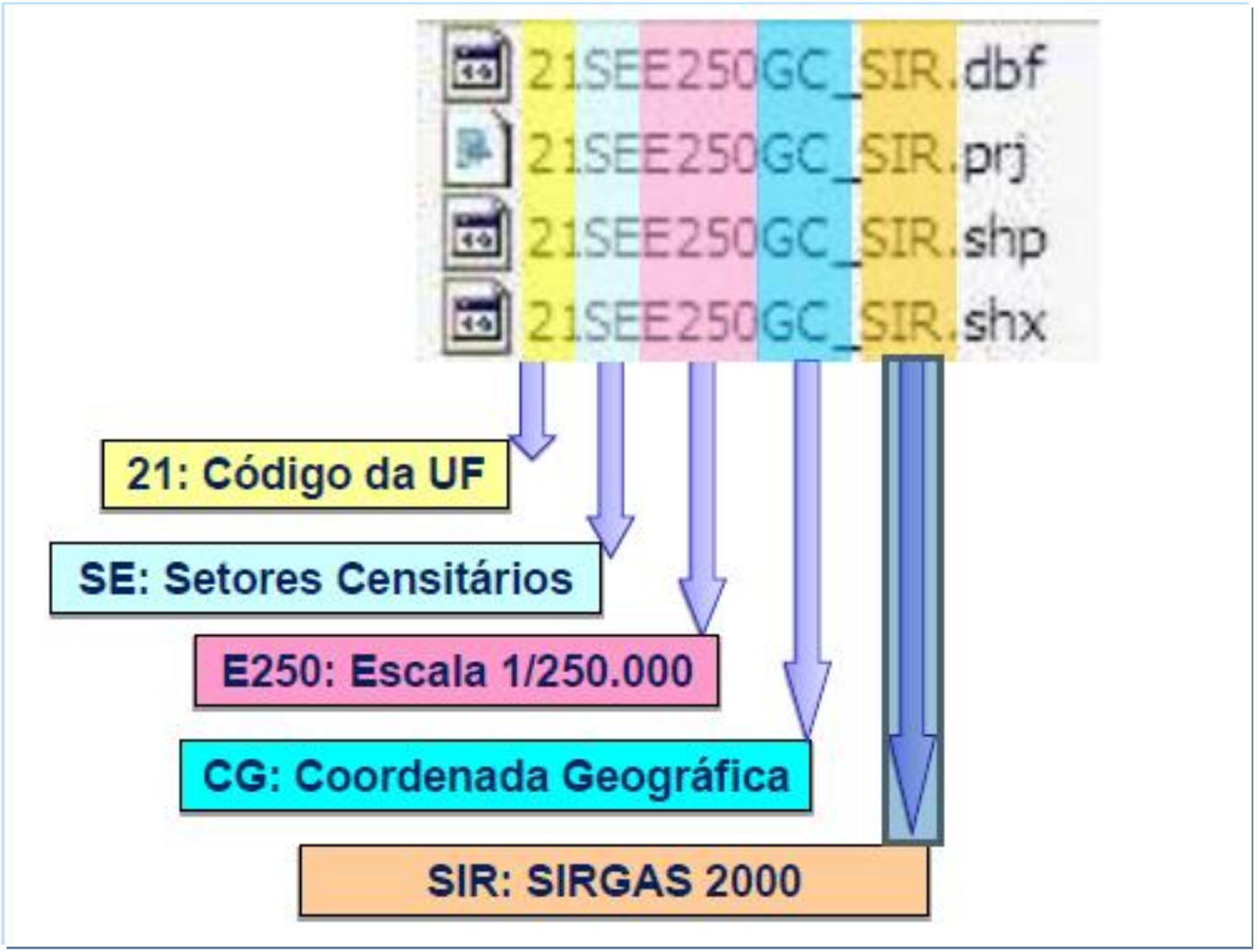
Vou Te Contar no. 20 - Jan/Feb 2011 (PDF)

Access the spatial data of the Census

ftp://geoftp.ibge.gov.br/mapas/malhas_digitais/Censo_2010/Setores_Censitarios

1st - downloading the SHP files

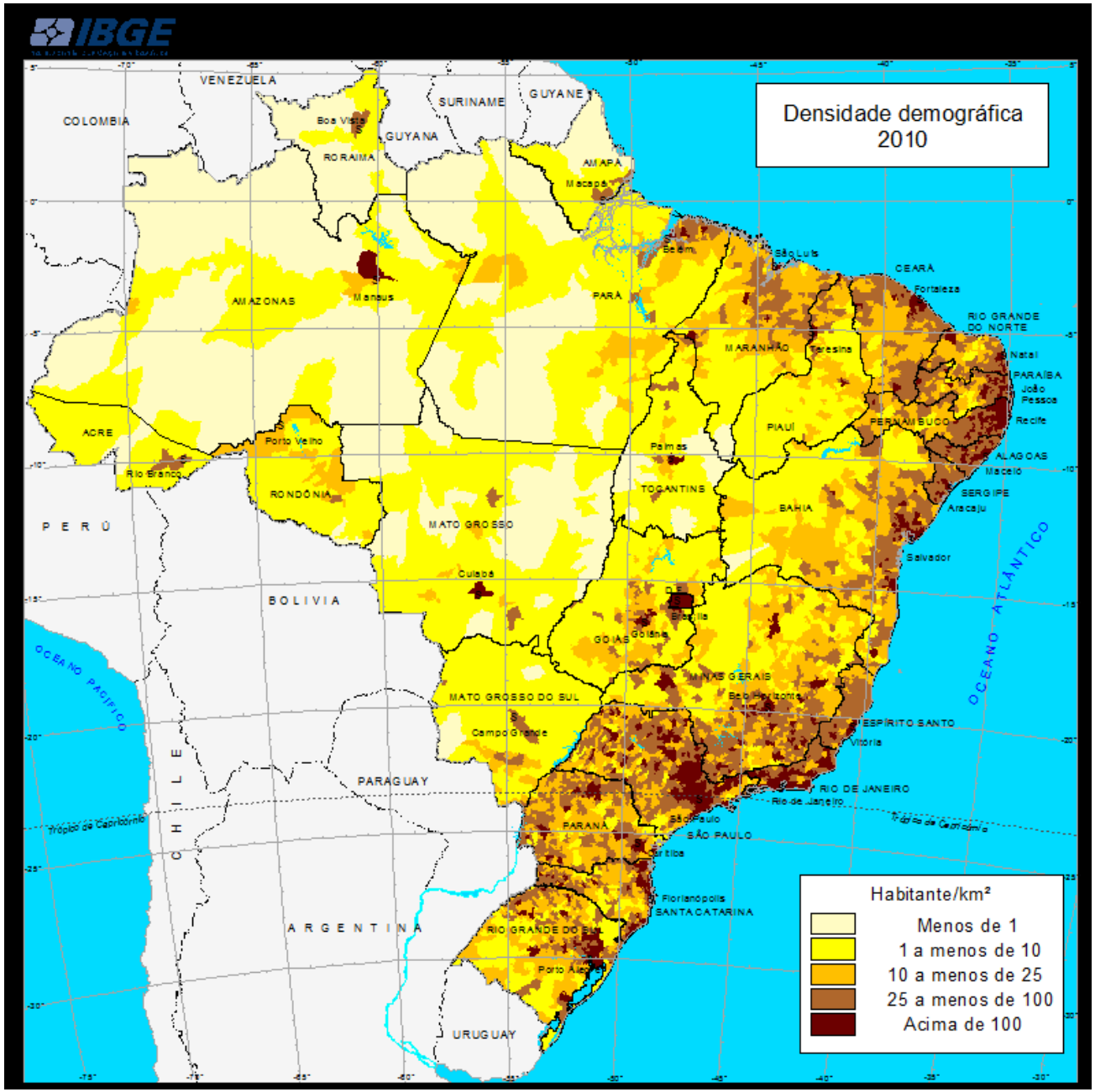
Access the spatial data of the Census

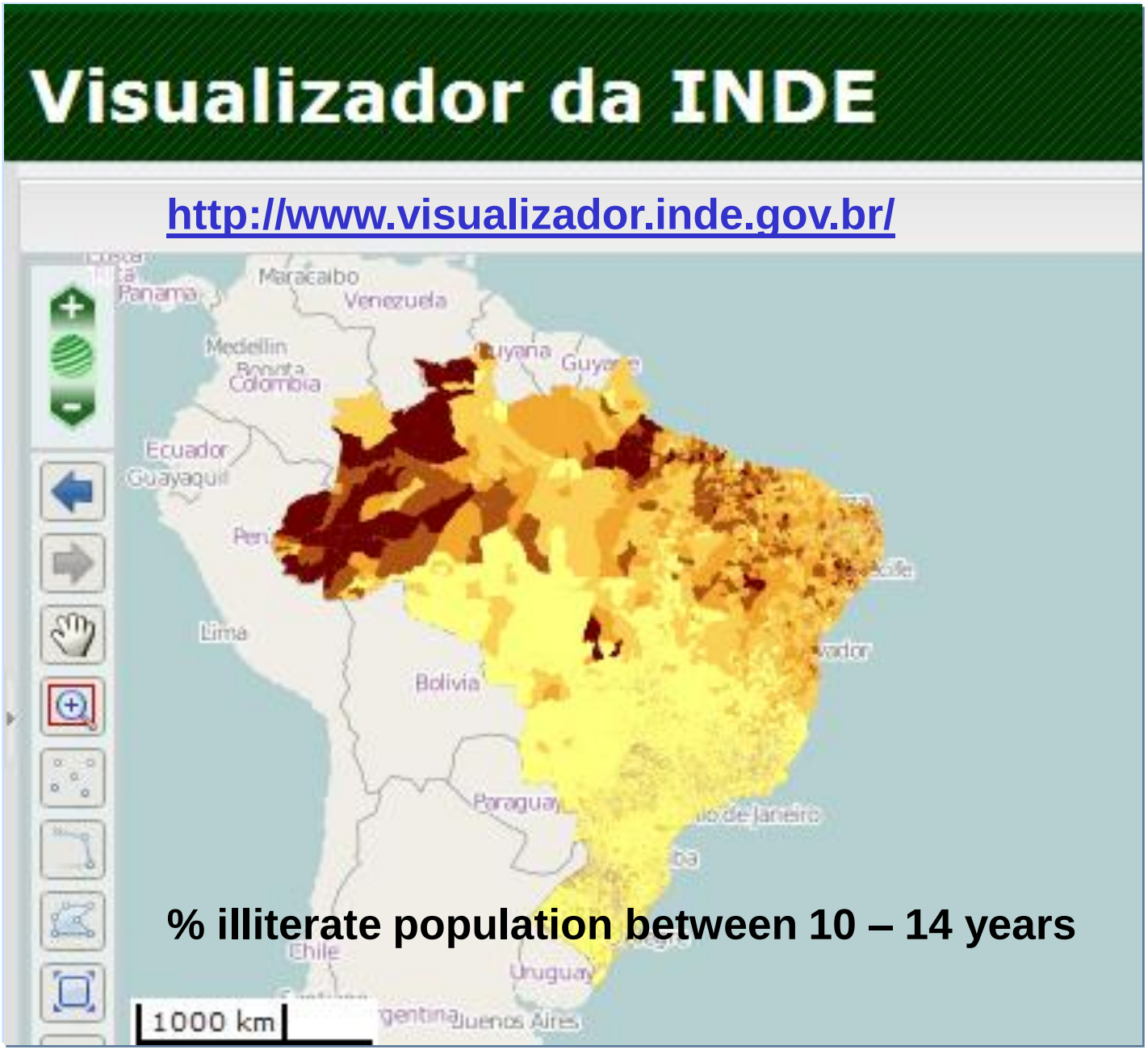


2st - from using the applications in our web site – Estatcart or SIDRA

Using Spatial Analises

Demographic Density - 2010




Visualizador da INDE
http://www.visualizador.inde.gov.br/
Maracaibo
Venezuela
Panama
Medellin
Colombia
Ecuador
Guayaquil
Peru
Lima
Bolivia
Paraguay
Chile
Uruguay
Buenos Aires
1000 km
% illiterate population between 10 – 14 years

Concluding Remarks

- The new **web based** technologies allow NSO to produce Census Mapping in a full digital way, integrating maps, enumeration areas boundaries, graphic and text files, and addresses register

- The current availability of low cost **high resolution** orbital and aerial imagery can help updating the Census Maps

- A permanently updated register is a basic condition for the good quality of statistical information and the determination of new tasks in the scope of the national statistics system. A big challenge is how to manage the balance of disclosure risk with dissemination of spatial statistics

- The statistical infrastructure represented by these registers opens several possibilities for the Brazilian agricultural and statistical surveys

- Integrating statistical data into NSDI opens new horizons, based on the possibility of **correlating** this data with all other data layers, like the ones related to natural resources, environment, education, health, etc.

THANK YOU ! MERCI !

Our Mission:
To portrait Brazil with information necessary to the knowledge of its reality and the exercise of citizenship

www.ibge.gov.br

Miriam Mattos da Silva Barbuda

Coordinator of Territorial Structures

miriam.barbuda@ibge.gov.br