The Friends of the Chair (FoC) Group on Social and Demographic Statistics

The critical role of information on “places” and geography to improve social and demographic statistics

Theme 1: The role of place in the production and dissemination of social and demographic statistics

The Global Statistic-Geospatial Framework and the social and Demographics Statistics

Why Geospatial Information is Essential for Statistics

Claudio Stenner
Head of Institutional Relations in Geosciences of Brazilian Institute of Geography and Statistics (IBGE)
Co-chair of United Nations Expert Group on Integration of Statistics and Geospatial Information

10 October 2024

The Global Statistical Geospatial Framework

PRINCIPLES

5. Accessible and usable
4. Statistical and geospatial **interoperability**
3. **Common geographies** for the dissemination of statistics
2. **Geocoded unit record data** in a data management environment
1. Use of fundamental **geospatial infrastructure** and **geocoding**

INPUT

Statistical

- **Censuses**
- **Surveys**
- Administrative **data records**
- **Big Data** and other data sources

Geospatial

- **Fundamental geo** data themes
- **Supplementary** data
- **New data** sources

UN Fundamental geospatial data themes

OUTPUT

Outcomes & Benefits

- Data integration
- Data harmonisation
- Data comparability

Outputs

- Analysis
- Dissemination
- Decision Making

Governance & Institutional Capacity | Policy & Legal | Human Resources & Capacity | Data & Interoperability | Technology & Infrastructure

The key foundational elements

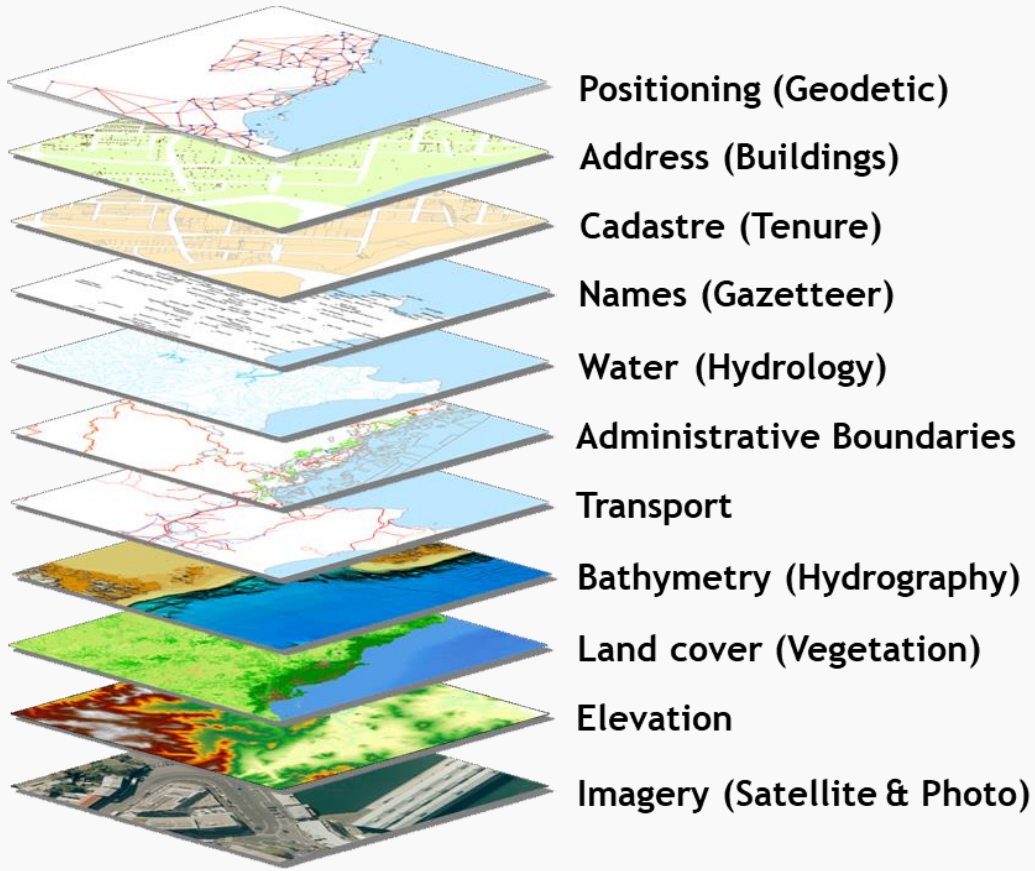
UN-IGIF 9 pathways

GSBPM

PRINCIPLE 1 – FUNDAMENTAL GEOSPATIAL INFRASTRUCTURE AND GEOCODING

PRINCIPLE 1 – FUNDAMENTAL GEOSPATIAL INFRASTRUCTURE AND GEOCODING

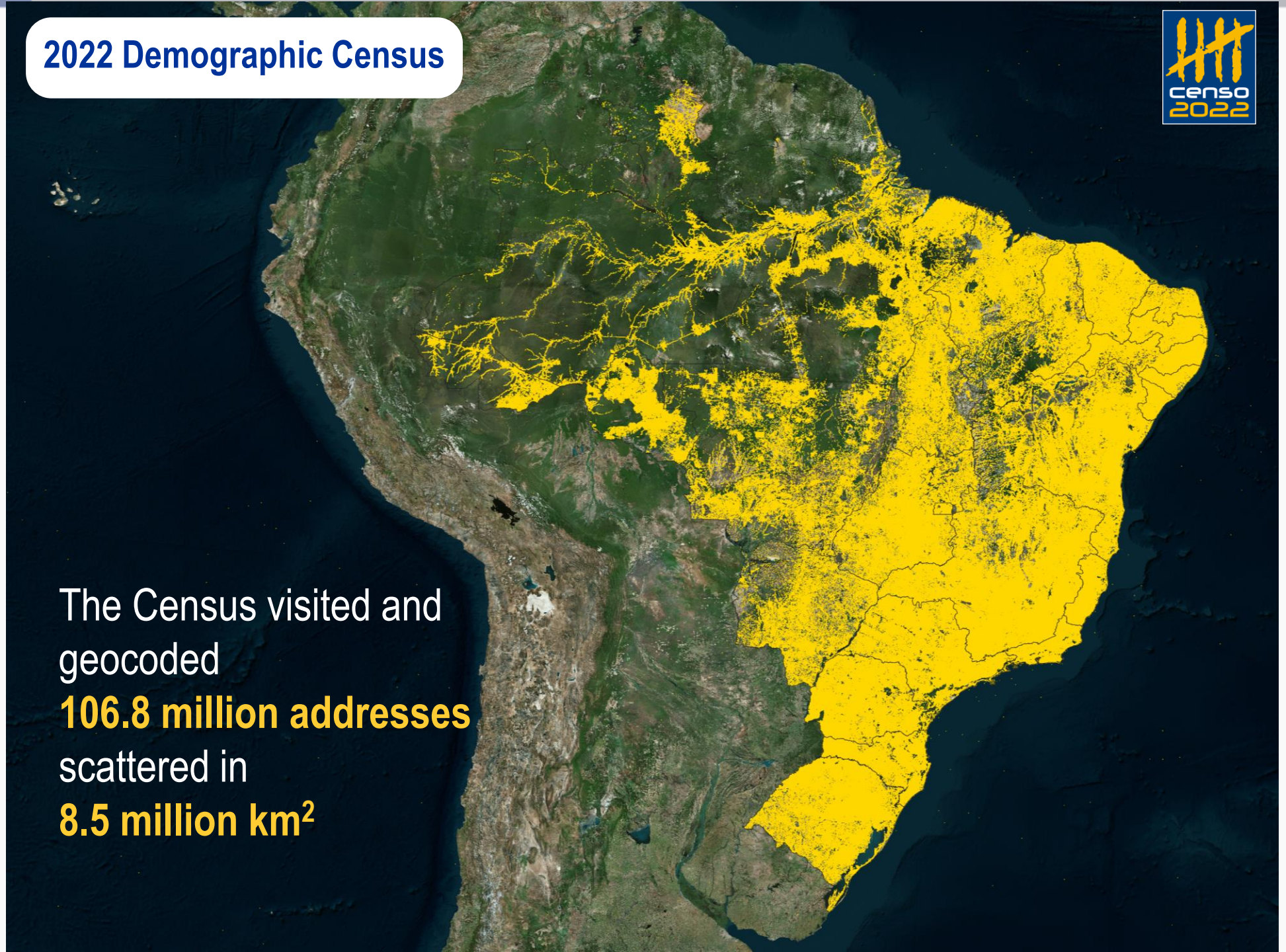
Facilitates the integration of statistical and geospatial information from different sources



Different information, statistics and geospatial, can be analyzed together, improving the understanding of the studied phenomena

IBGE | Instituto Brasileiro de Geografia e Estatística IBGE

2022 Demographic Census



The Census visited and geocoded **106.8 million addresses** scattered in **8.5 million km²**

Principle 1 – Fundamental Geospatial Infrastructure and Geocoding

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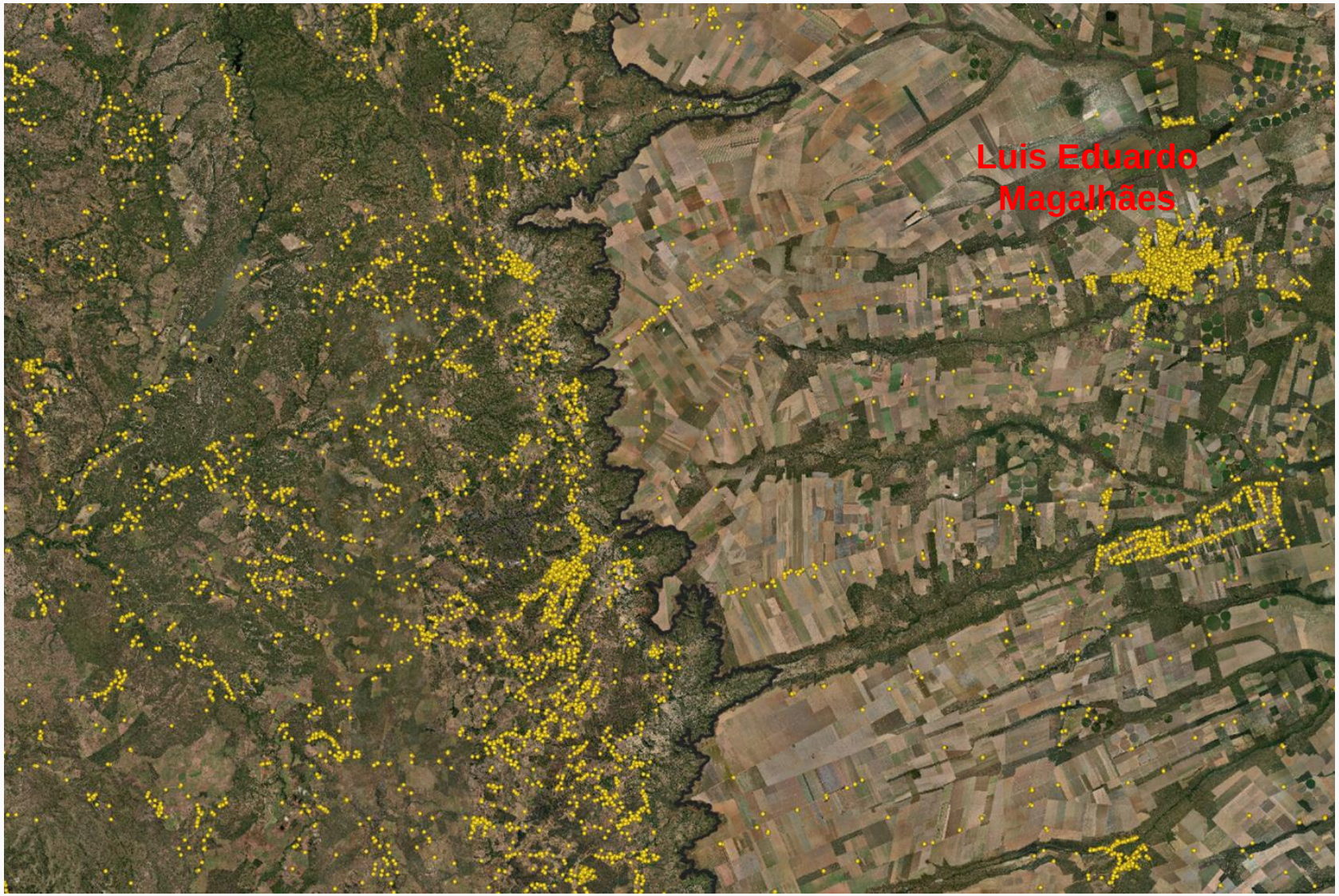
Principle 1 – Fundamental Geospatial Infrastructure and Geocoding

Provides a more accurate view of the distribution of people, households and human and natural phenomena in the territory, improving the allocation of human and financial resources



Distribution of households in Luís Eduardo Magalhães and surrounding areas, Brazil. This area is a large-scale soybean producer, on large mechanized properties. The rural population density is very low. On the other side of the escarpment, the density of rural occupation is significantly higher.

Source: IBGE, Brazil.

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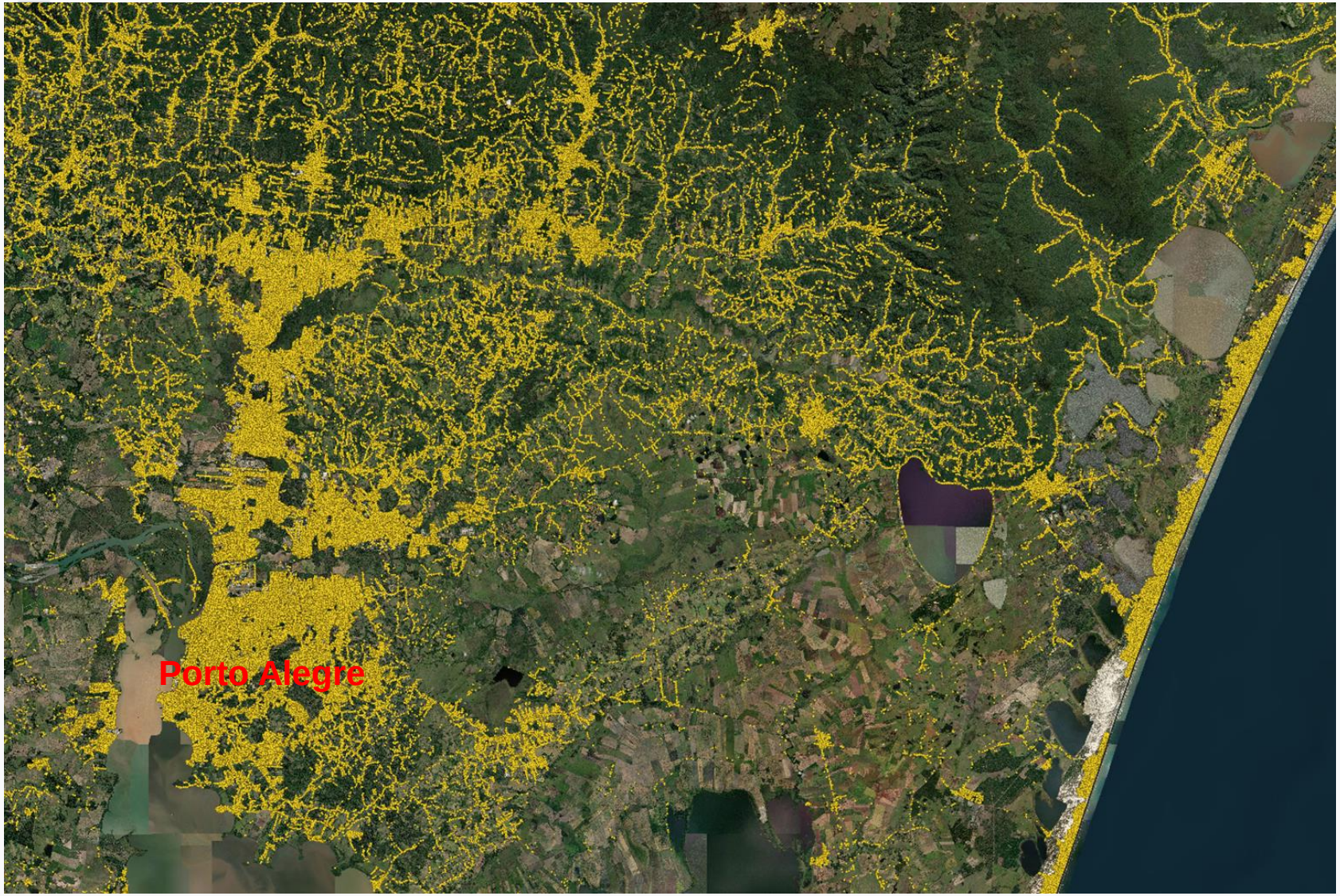

Distribution of households in Porto Alegre and surrounding areas, Brazil. The rural area surrounding Porto Alegre has a high density of rural occupation on small properties. It is also possible to identify summer occupation on the coast.

Source: IBGE, Brazil.

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PRINCIPLE 1 – FUNDAMENTAL GEOSPATIAL INFRASTRUCTURE AND GEOCODING

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Distribution of households in Cametá and surrounding areas, Brazil. It is possible to identify the riverside population on the islands in the Tocantins River and in the streams inside the islands

Source: IBGE, Brazil.

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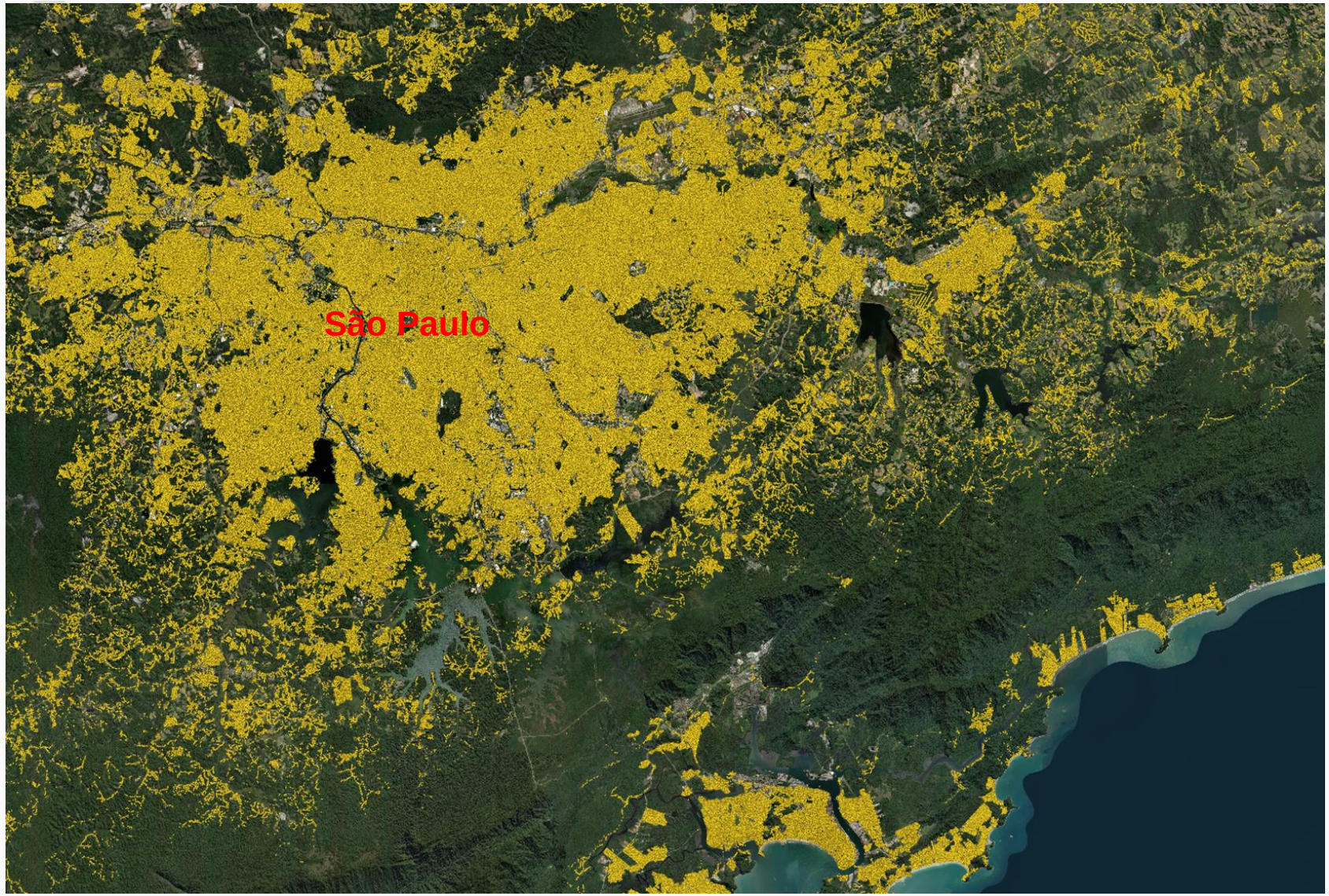

The metropolis of São Paulo, with 21 million inhabitants, spreads across the plateau. Surrounding the city is a densely occupied rural area. On the coast, the port city of Santos and summer occupation along the coast

Source: IBGE, Brazil.

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PRINCIPLE 2 – GEOCODED UNIT RECORDED DATA

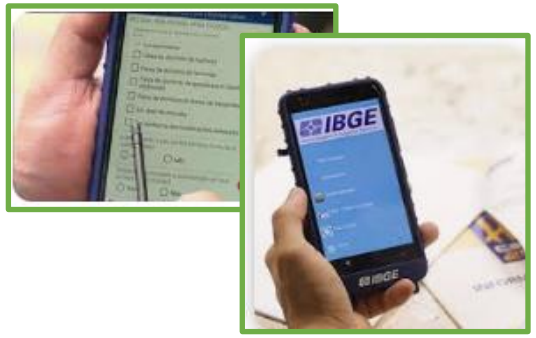
What is the Principle 2?

(Principle 1)

Geocoded Holsehold, Schools and Health Facilities, in a controled precision and in acordence with National Spatial Data Infrastructure standards

... and other geospatial topics

Geospatial domain



Statistical domain

Civil Defense Registers

Education administrative Registers

Health administrative registers

Questionnaires of household sample survey and Census

... and other statistical topics

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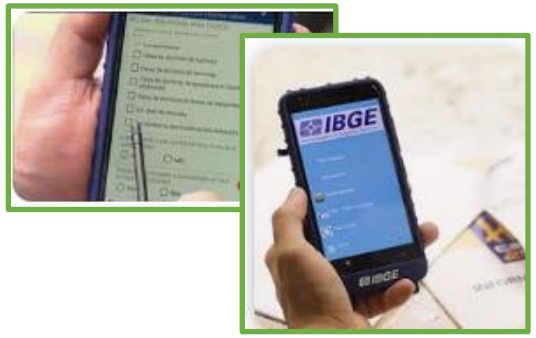

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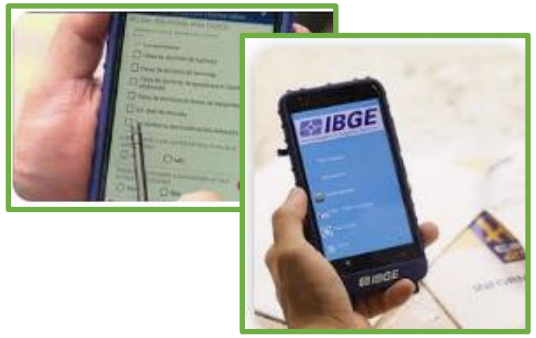

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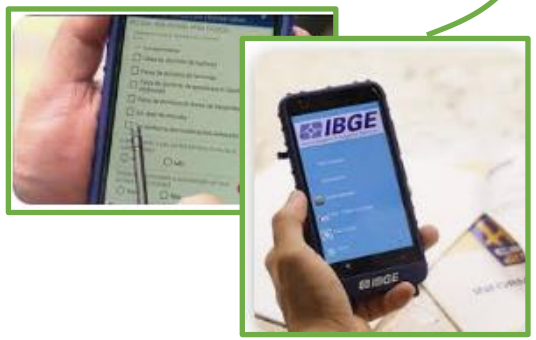

Questionnaires of household sample survey and Census

... and other statistical topics

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Geospatial domain

Statistical domain

Civil Defense Registers

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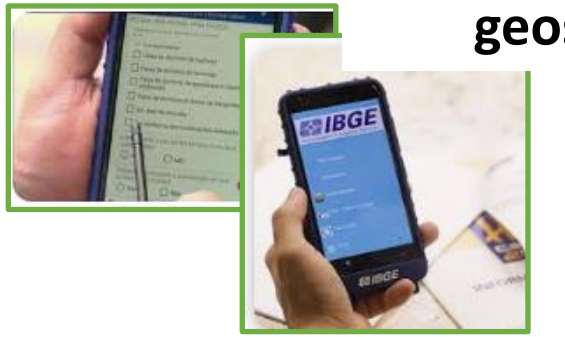
Health administrative registers

...with statistical microdata geospatially enabled



Questionnaires of household sample survey and Census

... and other statistical topics

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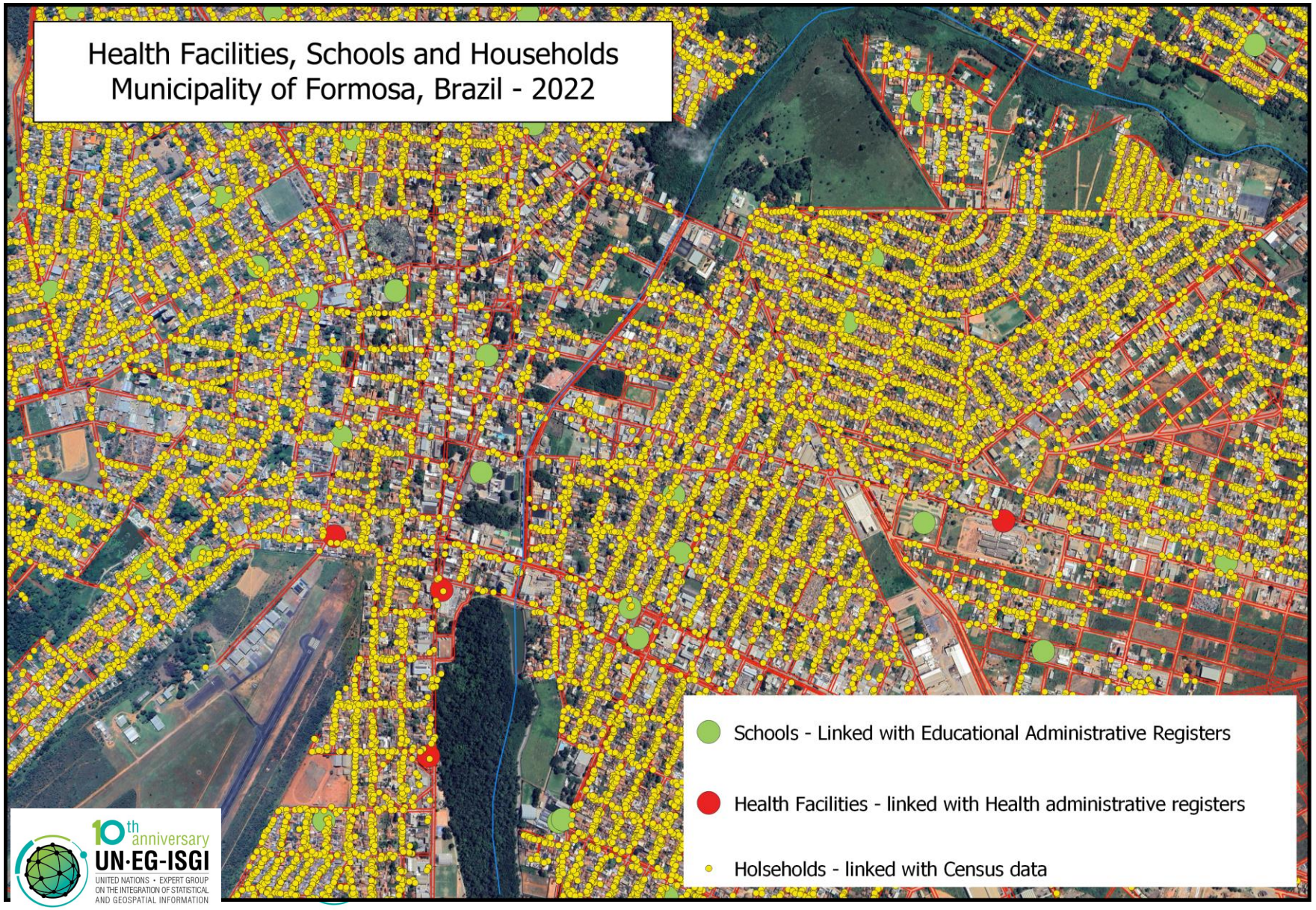
When we have Principle 2 Applied, What is the potential use?

The information is ready for geographical analyses



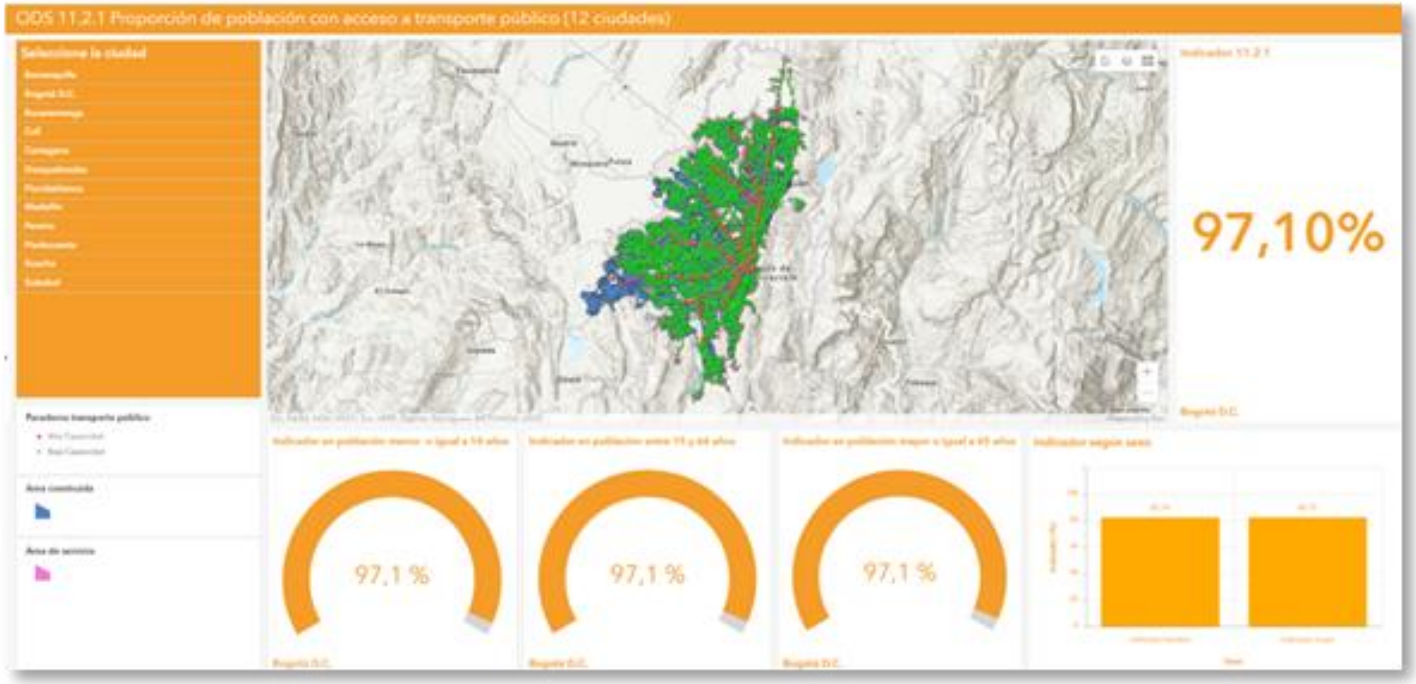
With Principle 2 applied, it is possible to relate in the territory, for example, administrative health information (number of doctors, available equipment, occurrence of diseases, etc.), administrative information on education (number of students and places per grade, school equipment, school evaluation, etc.) with data from the Demographic Census (age structure, household income, school attendance, etc.).

So, answer questions like:
How many children aged 8 and 9 live within 2 km of the nearest school and how many places are available in schools for these children?

When we have Principle 2 Applied, What is the potential use?

The information is ready for geographical analyses

Provides new information, which can only be achieved when the statistical and geospatial data are integrated

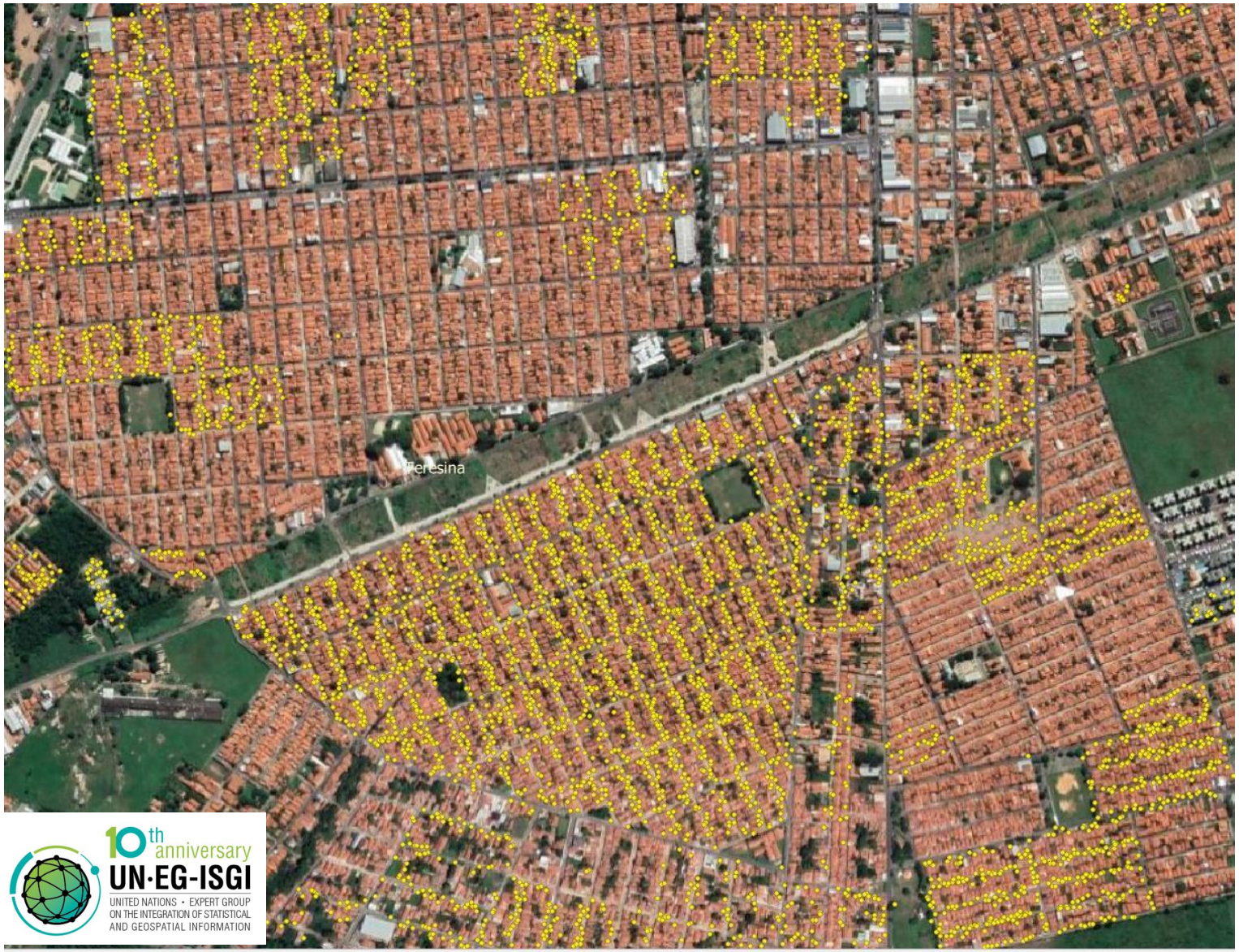


Source: DANE, Colômbia

Ex: SDG 11.2.1 - Proportion of the population that has convenient access to public transport. Need georeferenced information from Demographic Censuses and georeferenced information on public transport

When we have Principle 2 Applied, What is the potential use?

Capacity to Improve the quality and control of statistical operations



Source: IBGE, Brazil.

- By **capturing coordinates** during a census operation, it is much easier to identify the parts of the city that have **already been visited** by enumerators and thus **correct possible omissions**. IBGE use this kind of control during the 2022 Census Operation.

Yellow dots are address coordinates collected in the 2022 Census in Brazil.

When we have Principle 2 Applied, What is the potential use?

Capacity to Improve the quality and control of statistical operations

It is possible to compare the **information collected** in the field with **administrative records**, and thus guarantee coverage of the operation. In **blue**, addresses provided by electricity companies through the **national electricity agency (ANEEL)**. In **yellow**, the households visited by the **2022 Census** (Brazil).

Source: IBGE, Brazil.

PRINCIPLE 3 – COMMON GEOGRAPHIES

PRINCIPLE 3 – COMMON GEOGRAPHIES

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Figura 1 - Quadro Geográfico de Referência para Produção, Análise e Disseminação de Estatística

Recortes legais publicados pelo IBGE

Divisão político-administrativa	Divisão regional	Tipologias geográficas
Grande Região	Recortes Metropolitanos	Área Urbana
Estado	Categorias Metropolitanas	Área Rural
Distrito Federal	Subcategorias Metropolitanas	Terra Indígena
Município	Aglomeração Urbana	
Distrito	Amazônia Legal	
Subdistrito	Área de Atuação da SUDENE	
Bairro	Semiárido	
	MATOPIBA	
	Municípios Costeiros	
	Municípios Defrontantes com o Mar	
	Municípios da Faixa de Fronteira	

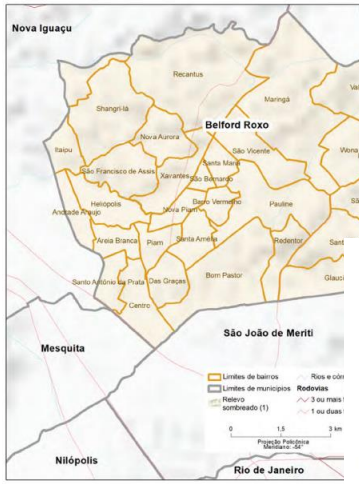
Legal geographies published by IBGE

Recortes institucionais do IBGE

Unidades de coleta e divulgação de pesquisa		Tipologias geográficas		Divisão regional
Divulgação	Amostra: Área de Ponderação	Áreas Urbanas	Área Urbana de Alta Densidade de Edificações	Região Geográfica
	Amostra: Área de Divulgação da Amostra para Aglomerado Subnormal		Área Urbana de Baixa Densidade de Edificações	Mesorregião e Microrregião Geográficas
	Universo: Grades de Referência Estatística		Aglomerado Subnormal	Divisão Urbano-Regional
	Universo: Setor Censitário		Núcleo Urbano	Região Rural
Coleta	Face		Demais Tipos de Setores Censitários	**Recortes Específicos**
	Endereço	Áreas Rurais	Aldeia Indígena	Bioma
			Aglomerado Rural	
			Área Rural (exclusive aglomerados)	
			Agrovila do Projeto de Assentamento	
		Concentração Urbana		
		Arranjo Populacional		
		Hierarquia Urbana		

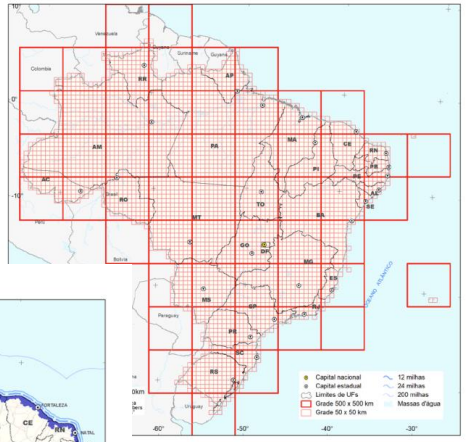
IBGE Geographies

Mapa 8 - Exemplo de divisão por Bairros no Município de Belford Roxo (RJ)



Fonte: IBGE, Diretoria de Geociências, Coordenação de Geomática, Coordenação de Geodésia e Cartografia.

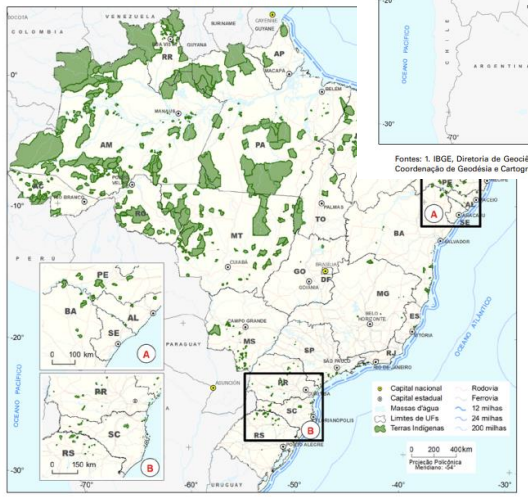
Mapa 30 - Articulação das células de 500 km e de 50 km das Grades de Referência Estatística



Mapa 19 - Municípios Costeiros

Fontes: 1. IBGE, Diretoria de Geociências, Coordenação de Geomática, Coordenação de Geografia e Meio Ambiente e Coordenação de Geodésia e Cartografia. 2. BRASIL, Ministério do Meio Ambiente.

Mapa 24 - Terras Indígenas



Fontes: 1. IBGE, Diretoria de Geociências, Coordenação de Geomática, Coordenação de Estruturas Territoriais e Coordenação de Geodésia e Cartografia. 2. Fundação Nacional do Índio - FUNAI.

21 - Municípios da Faixa de Fronteira

Fonte: IBGE, Diretoria de Geociências, Coordenação de Geomática, Coordenação de Estruturas Territoriais e Coordenação de Geodésia e Cartografia.

IBGE maintain **44** different Common Geographies

PRINCIPLE 3 – COMMON GEOGRAPHIES

Provides greater meaning to statistical information: A set of common geographies, based on typologies, regional divisions and political-administrative divisions allows the evaluation of statistics in significant geographies for a better understanding of society and to build better public policies.

EX: The Slum of Paraisópolis and the wealthy neighborhood of Morumbi are neighbors in São Paulo. The statistics for these two areas need to be analyzed separately. For this, it is necessary to have the Slums in the set of Common Geographies

Source: IBGE, Brazil.

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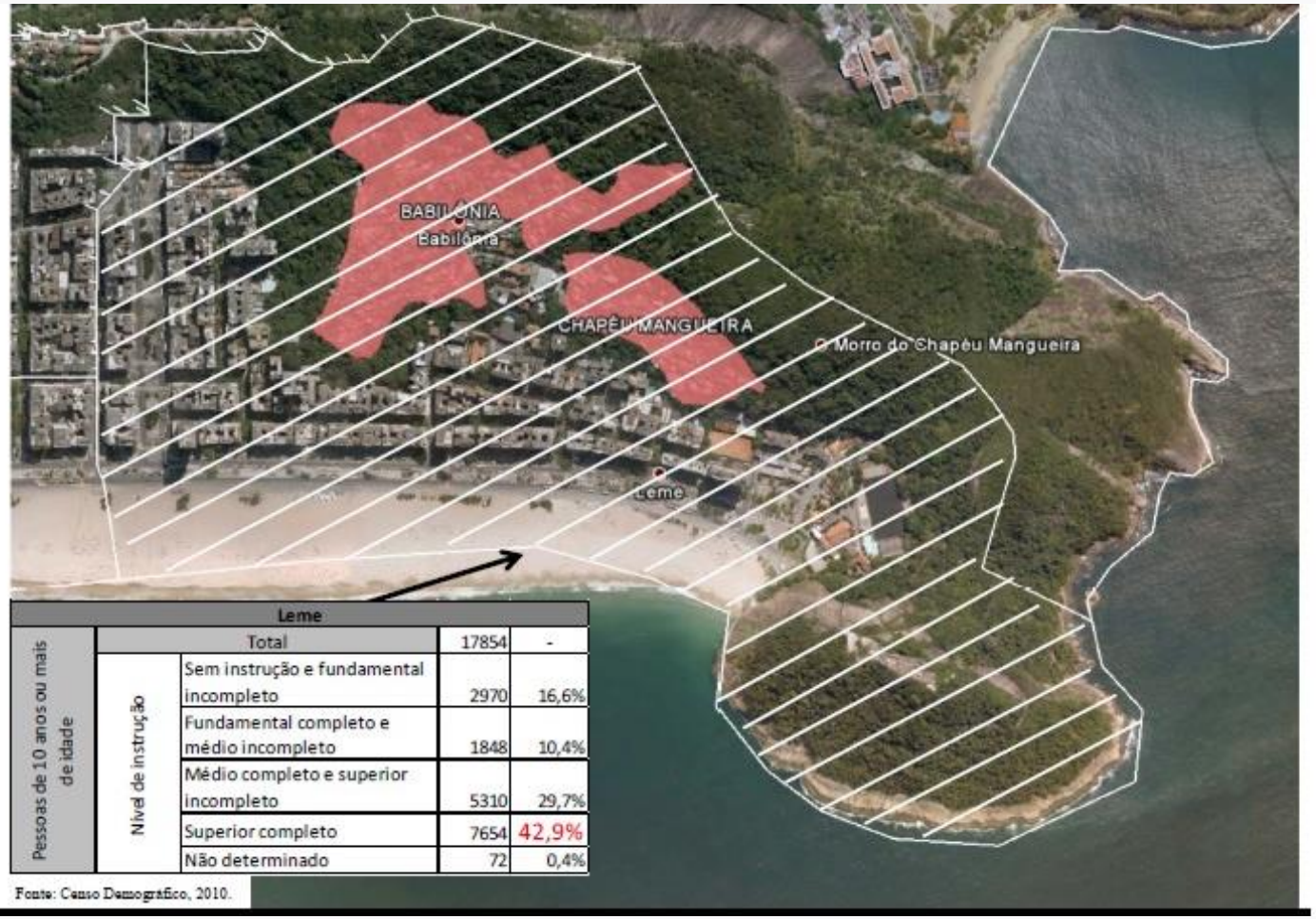

Leme			
Pessoas de 10 anos ou mais de idade	Total	17854	-
	Nível de instrução: Sem instrução e fundamental incompleto	2970	16,6%
	Nível de instrução: Fundamental completo e médio incompleto	1848	10,4%
	Nível de instrução: Médio completo e superior incompleto	5310	29,7%
	Nível de instrução: Superior completo	7654	42,9%
	Nível de instrução: Não determinado	72	0,4%

Fonte: Censo Demográfico, 2010.

Taking advantage of the Slum delimited areas, a work was done in the 2010 Brazilian Census to generate sample expansion areas that portrayed their characteristics. The image shows a regular expansion area of the sample, merging rich areas to the slum area. The result indicates that the whole area has **42.9%** of its population with higher education, but…..

Source: IBGE, Brazil.

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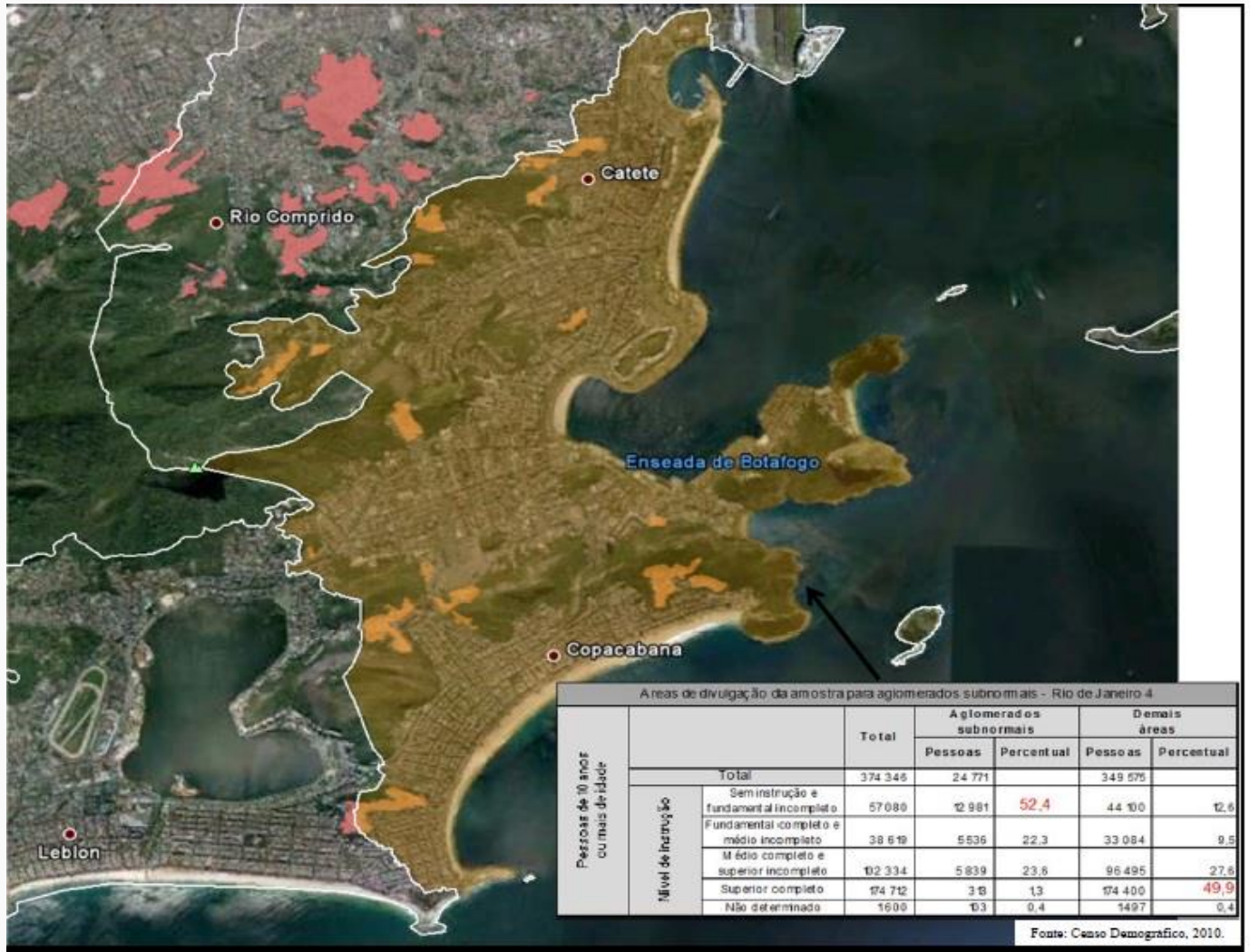

Áreas de divulgação da amostra para aglomerados subnormais - Rio de Janeiro 4

Pessoas de 10 anos ou mais de idade		Total	Aglomerados subnormais		Demais áreas	
			Pessoas	Percentual	Pessoas	Percentual
Total		374 346	24 771		349 575	
Nível de instrução	Sem instrução e fundamental incompleto	57 080	12 981	52,4	44 100	12,6
	Fundamental completo e médio incompleto	38 619	5 536	22,3	33 084	9,5
	Médio completo e superior incompleto	102 334	5 839	23,6	96 495	27,6
	Superior completo	174 712	318	1,3	174 400	49,9
	Não determinado	1600	103	0,4	1497	0,4

Fonte: Censo Demográfico, 2010.

……when the statistics of the slum areas are isolated, the percentage of population with a higher education is only **1.3%**, while in the regular areas of this part of the city the percentage is **49.9%**. Only integrated geospatial and statistics information can reveal this reality.

Source: IBGE, Brazil.

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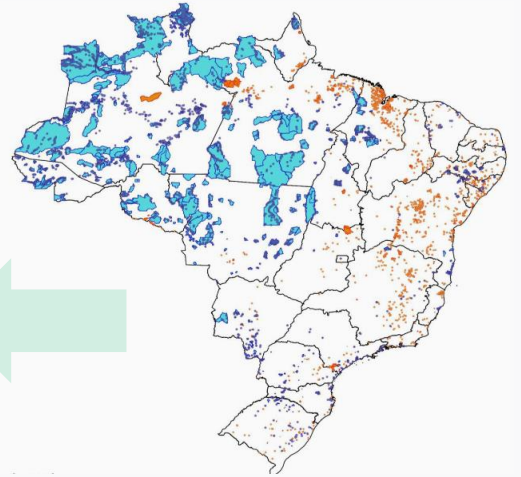
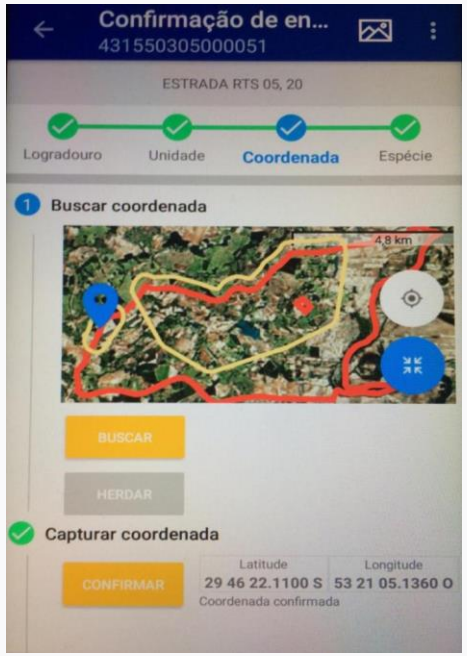
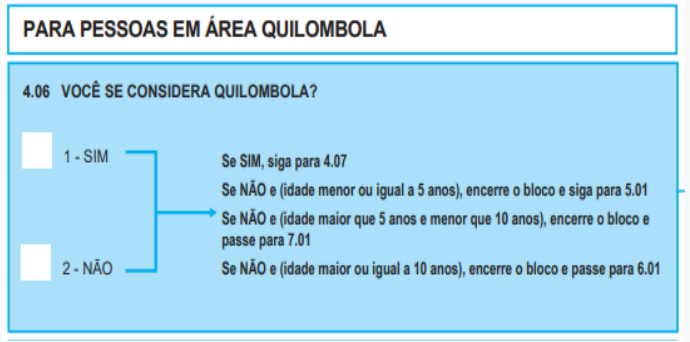
Geospatial base independent of the enumeration areas/census tracts where specific questions will be geo-enabled via GNSS (at the time of the interview).

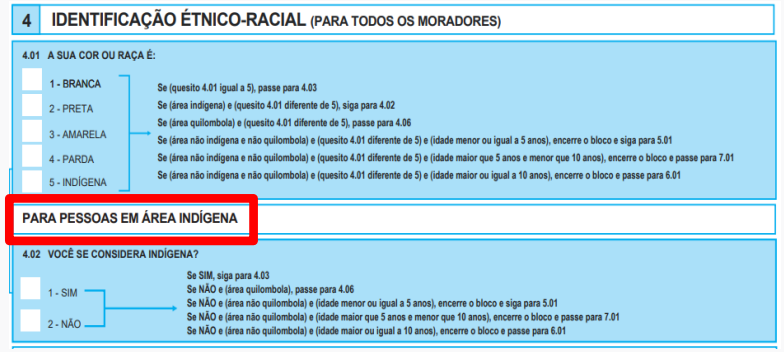
It can be used to ask specific questions for specific population groups.



Administrative records
+
Mapping routine







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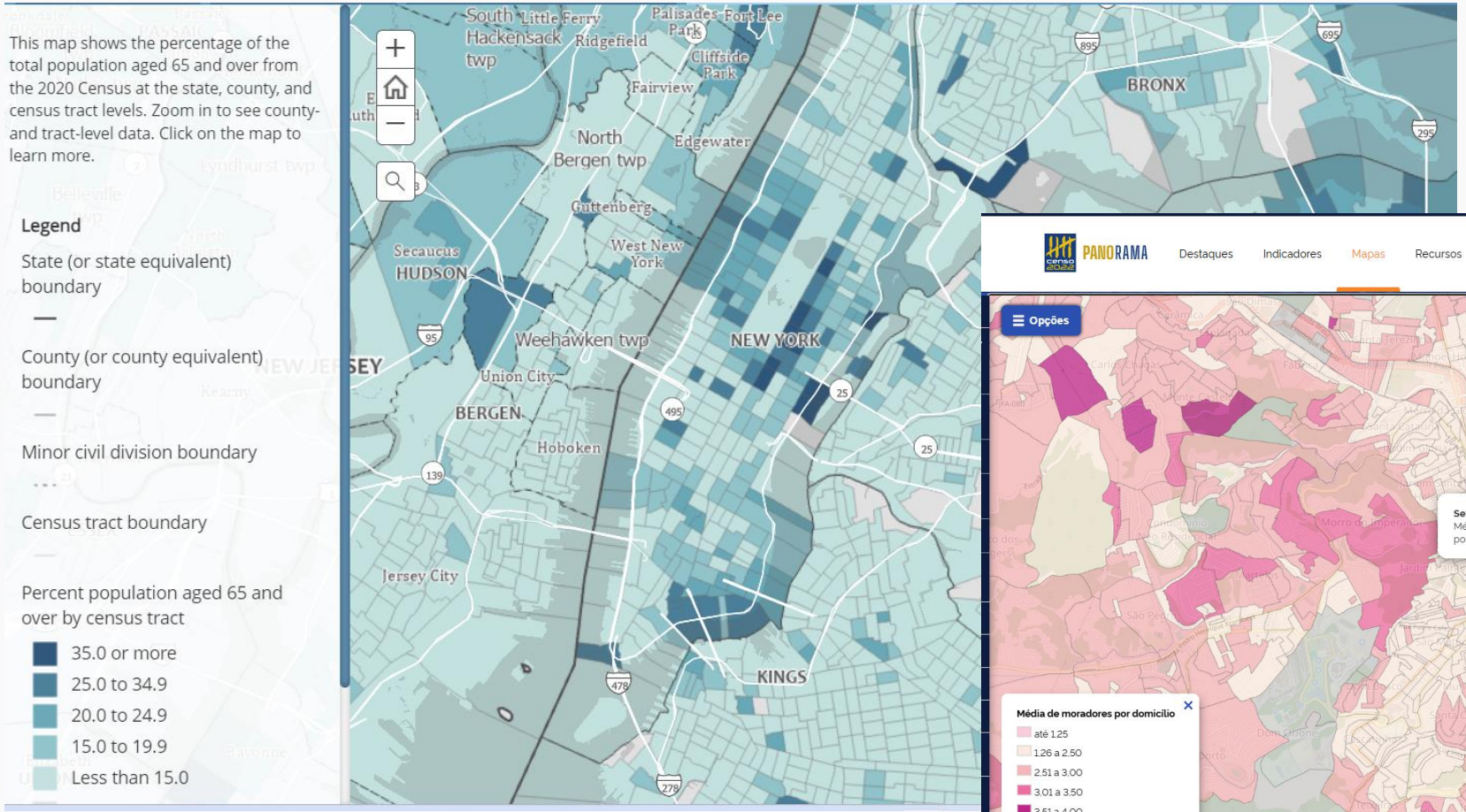
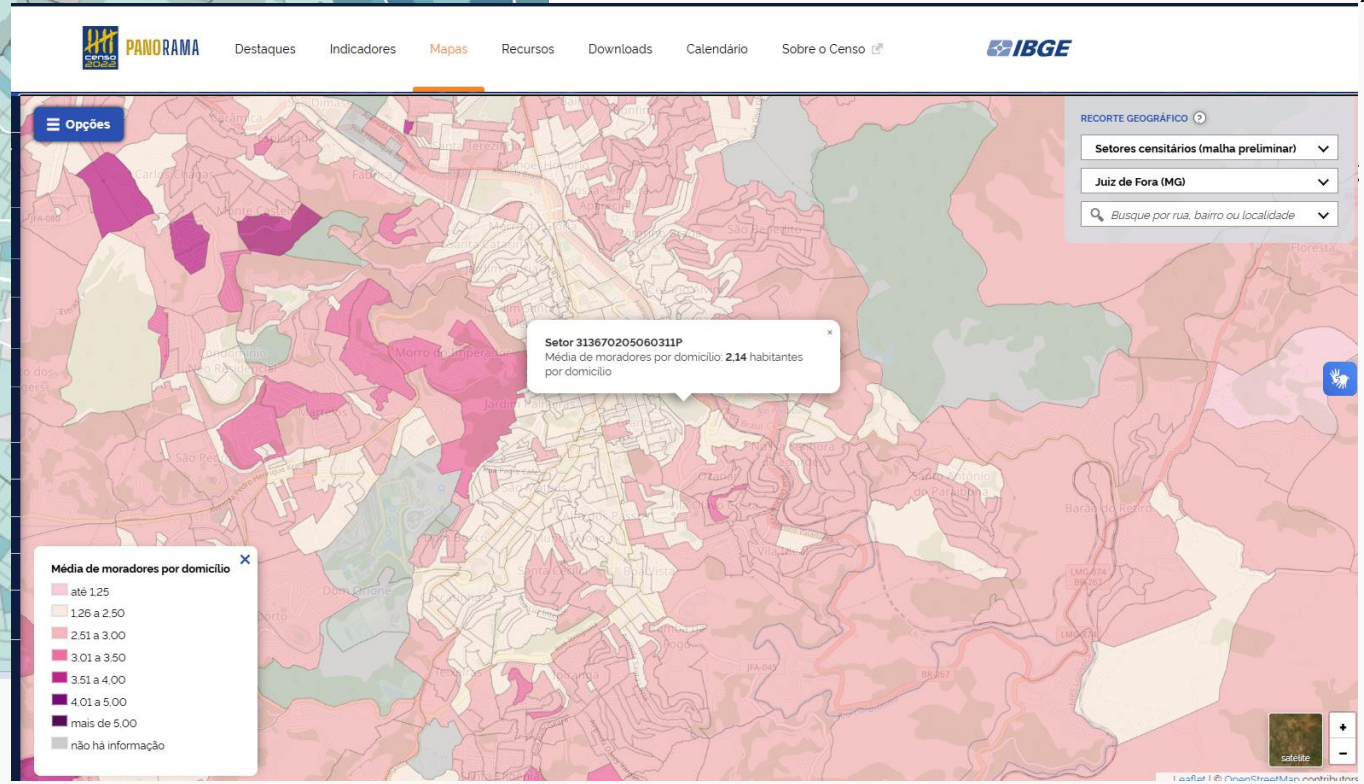
PRINCIPLE 3 – COMMON GEOGRAPHIES

Enables production of information for small areas



Source: US Census Bureau, USA

In order to leave no one behind,

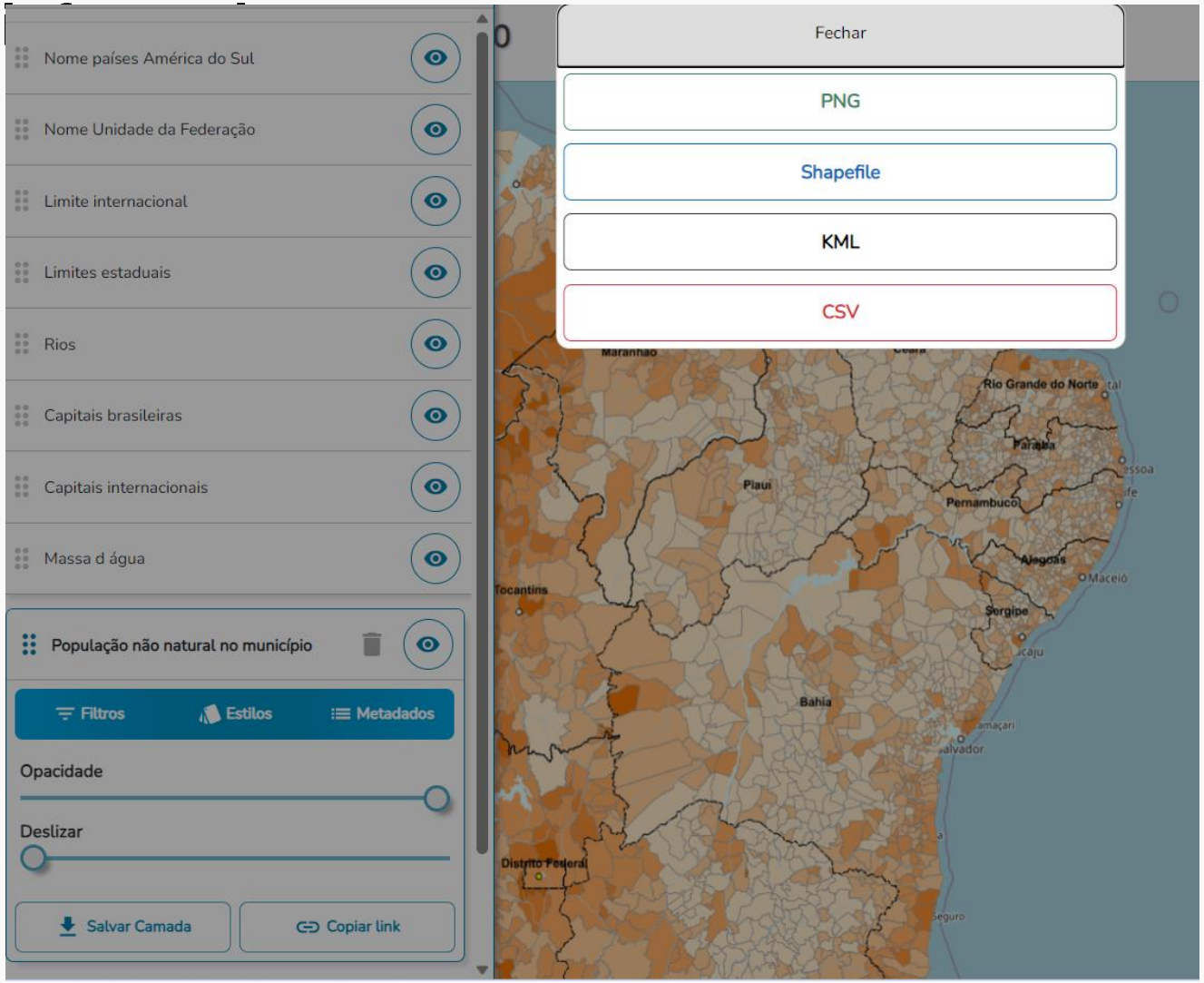


Source: IBGE, Brazil

PRINCIPLE 4 – INTEROPERABILITY

PRINCIPLE 4 – INTEROPERABILITY

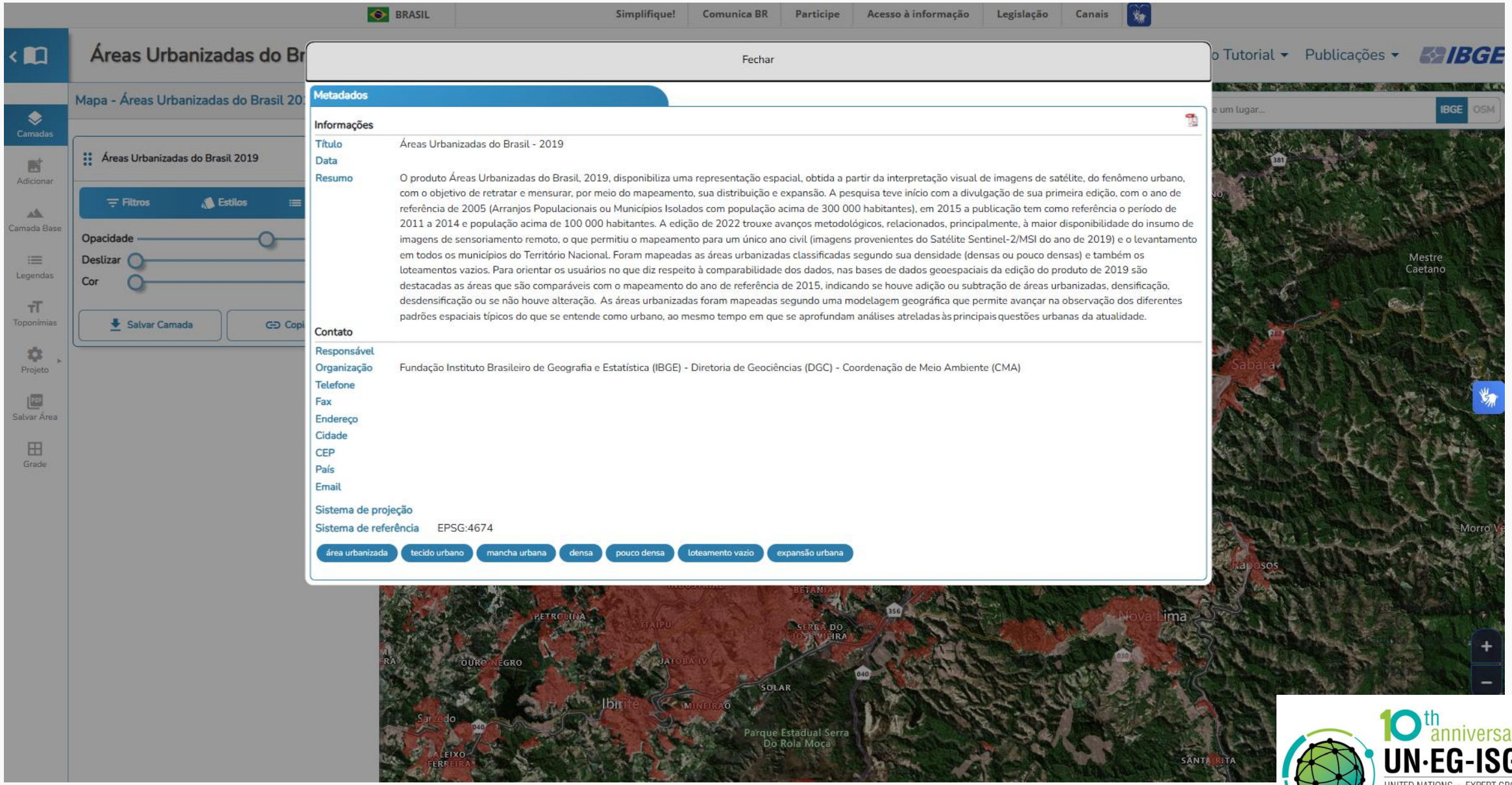
Provides interoperability, easy access and usability of integrated



Based on international standards, information can be made available in an accessible and in an interoperable way.

Source: IBGE, Brazil

PRINCIPLE 4 – INTEROPERABILITY



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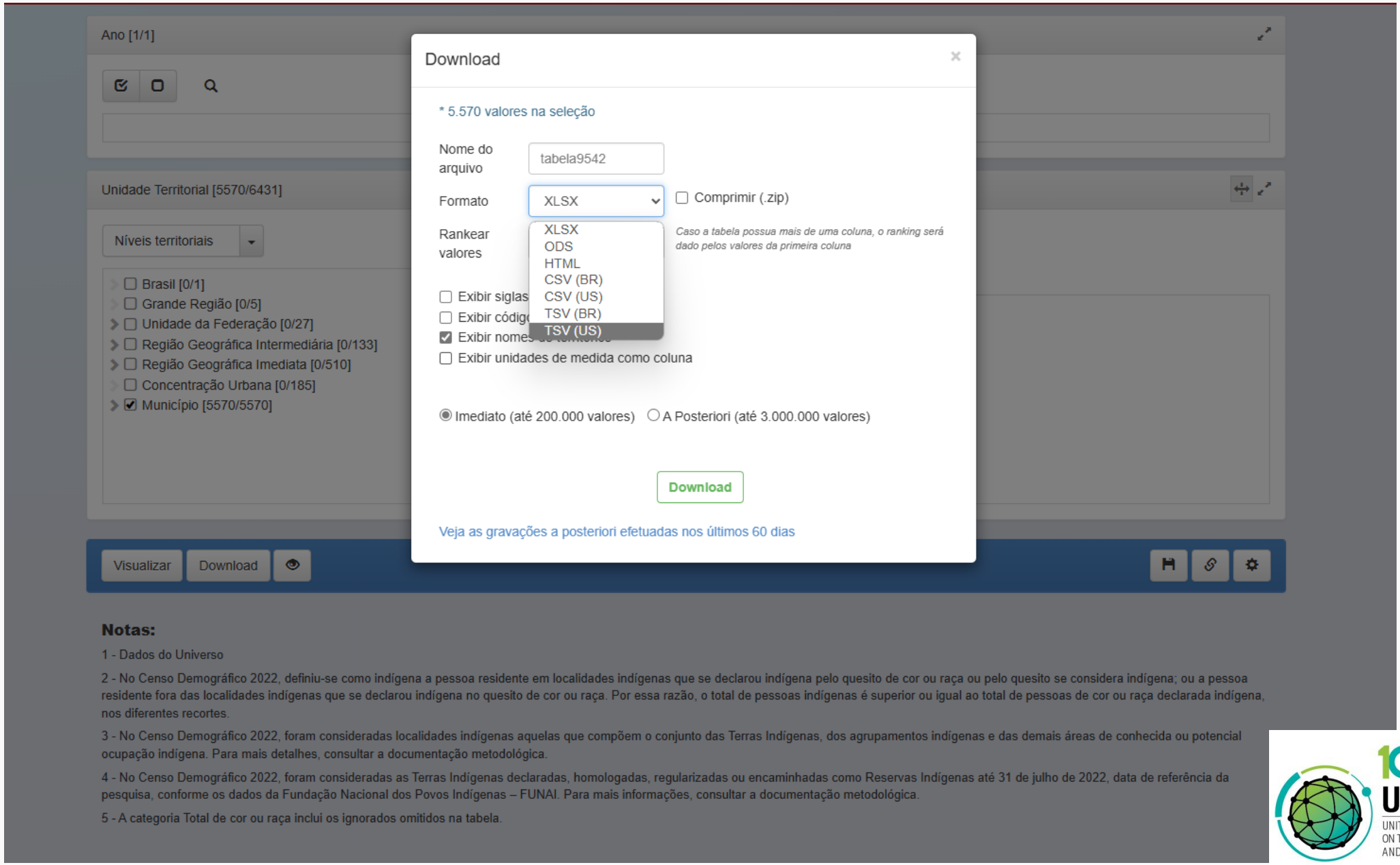

PRINCIPLE 5 – ACCESSIBLE AND USABLE

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https://censo2022.ibge.gov.br/apps/pgi

PRINCIPLE 5 – ACCESSIBLE AND USABLE

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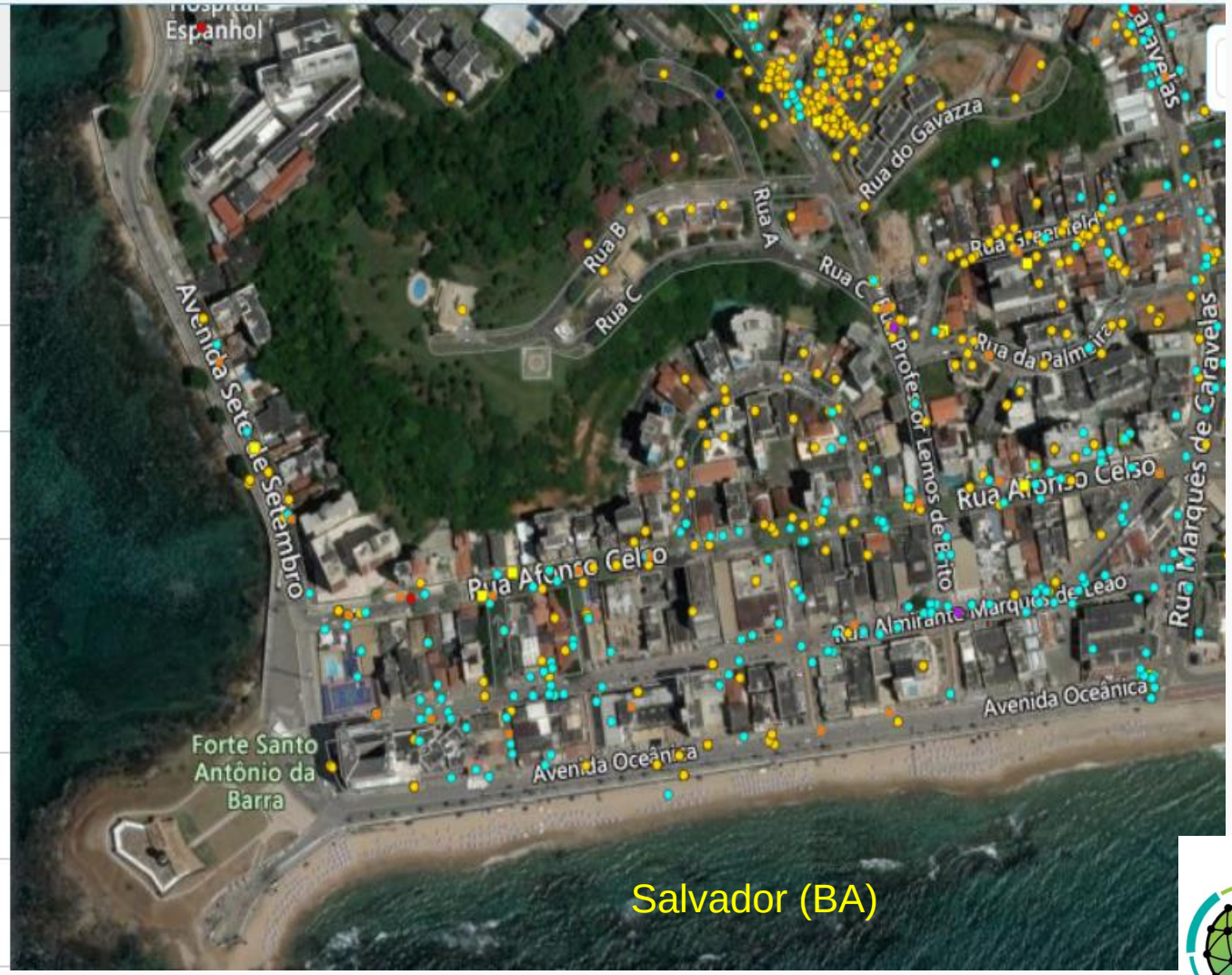
Censo Demográfico 2022

Edificação em construção
Building under construction Estabelecimento de outras finalidades
Establishment for other purposes Estabelecimento religioso
Religious establishment Estabelecimento de saúde
Health establishment Estabelecimento de ensino
Education establishment Estabelecimento agropecuário
Agricultural establishment Domicílio particular
Private household Domicílio coletivo
Collective household



https://censo2022.ibge.gov.br/apps/pgi/#/home/

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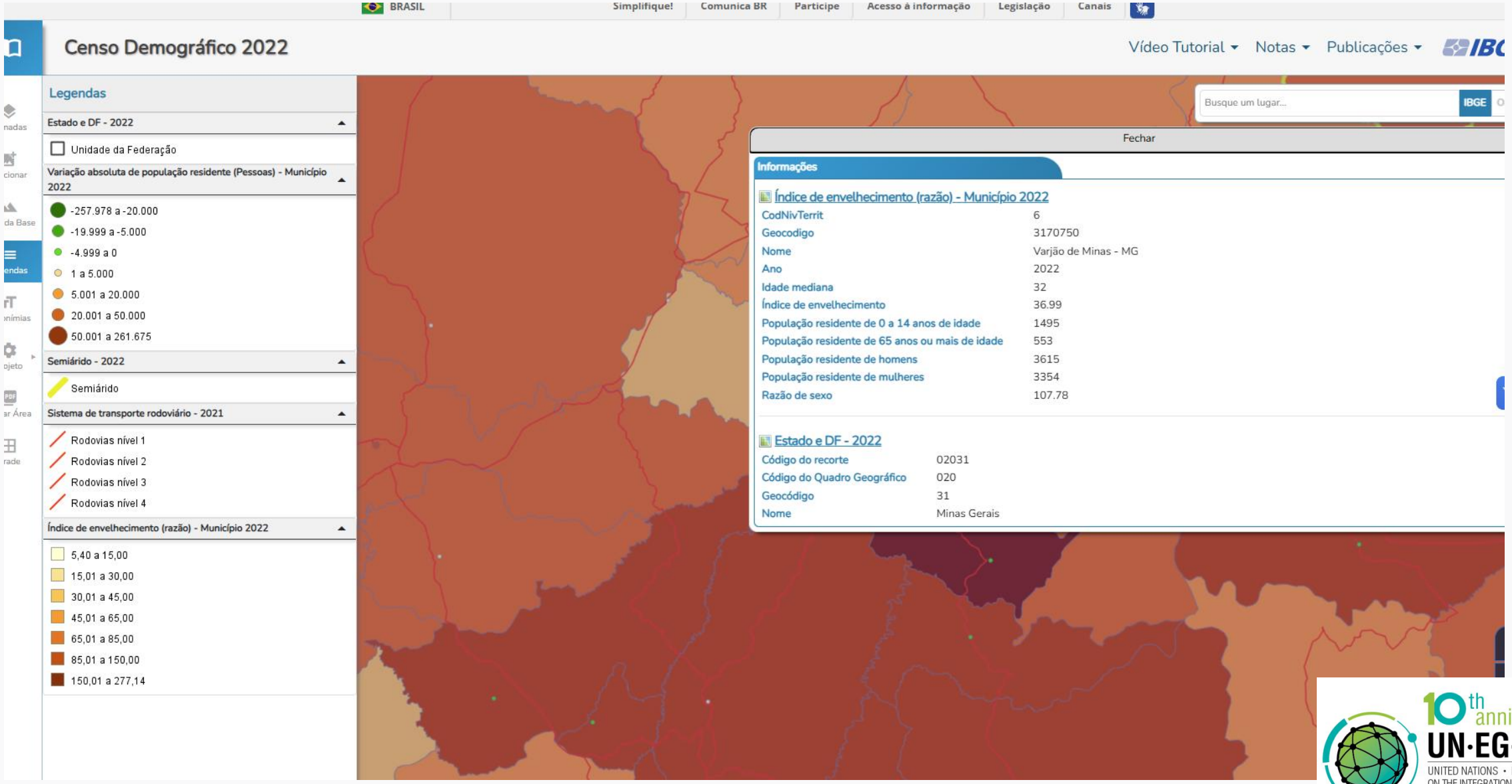
PRINCIPLE 5 – ACCESSIBLE AND USABLE



https://censo2022.ibge.gov.br/apps/pgi/#/home/

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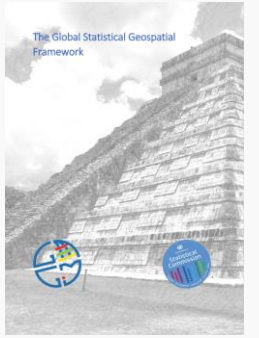
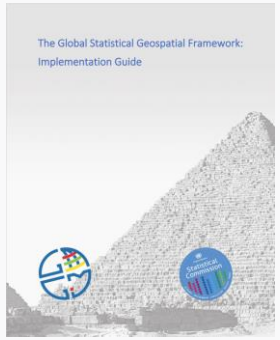
Resources

UN EG-ISGI - https://ggim.un.org/UNGGIM-Expert-Group-ISGI/

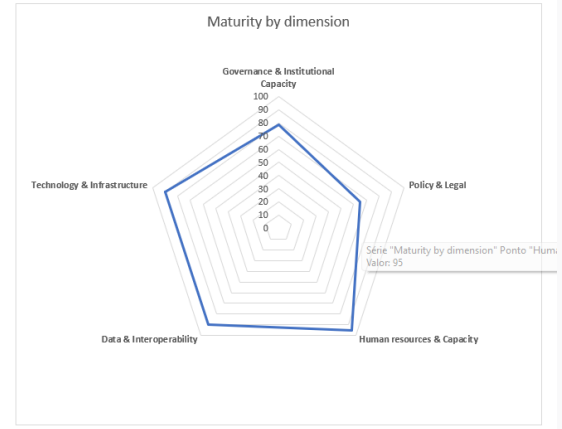
- GSGF in six languanges (English, Spanish, French, Portuguese, Arabic, Chinese)





- The Global Statistical Geospatial Framework: Implementation Guide (English)

- The Global Statistical Geospatial Framework assessment tools



Thank you!

claudio.stenner@ibge.gov.br

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