# Relevants on the integration of statistical and geospatial information

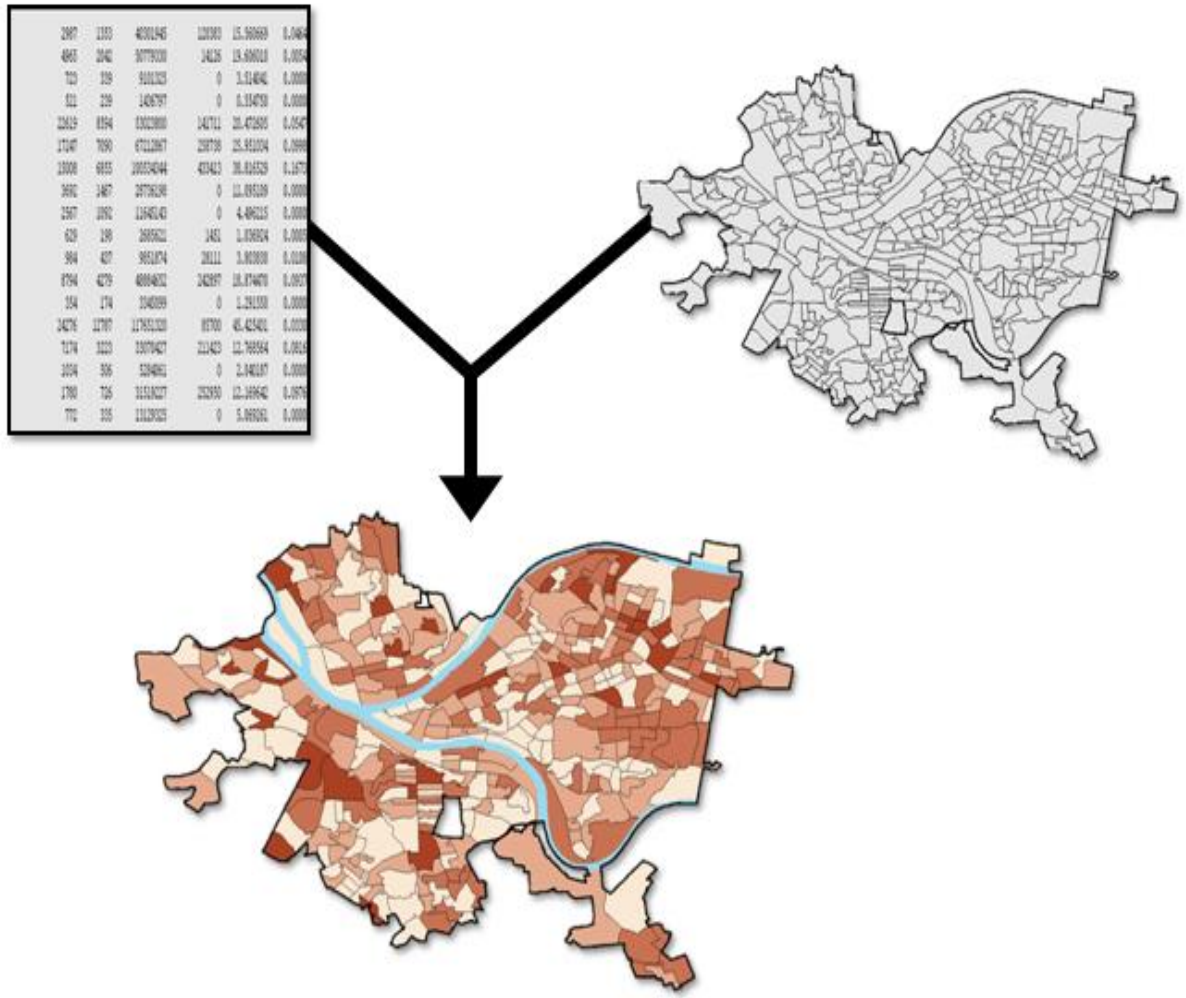
Technical Assistance of ECLAC to the Management Institute for Land Registration and Land Information System - MI-GLIS

Paramaribo, Suriname, 04 to 07 December, 2018

# Outline

- ✓ Background
  - Bringing statistical data to geography
  - Why to integrate statistical and geospatial information
- ✓ The Global Statistical Geospatial Framework
- ✓ The five principles of the Global Statistical Geospatial Framework
  - Use of fundamental geospatial infrastructure
  - Geocoded unit record data in a data management environment
  - Common geographies for dissemination of statistics
  - Statistical and geospatial interoperability: data, norms and processes
  - Accessible and usable geospatial statistics
- ✓ Regional perspective

# Bringing statistical data to geography



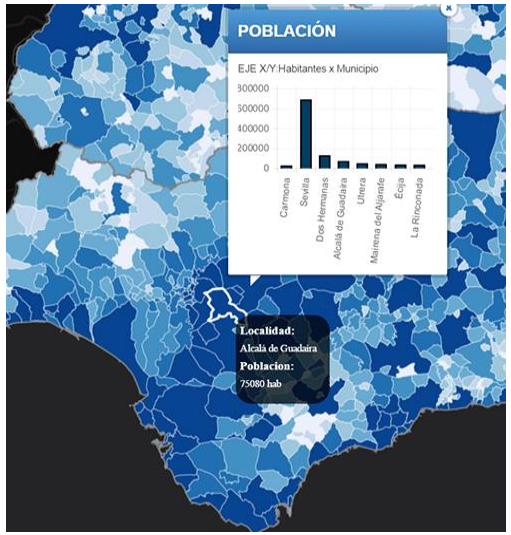
# Why to integrate statistical and geospatial information

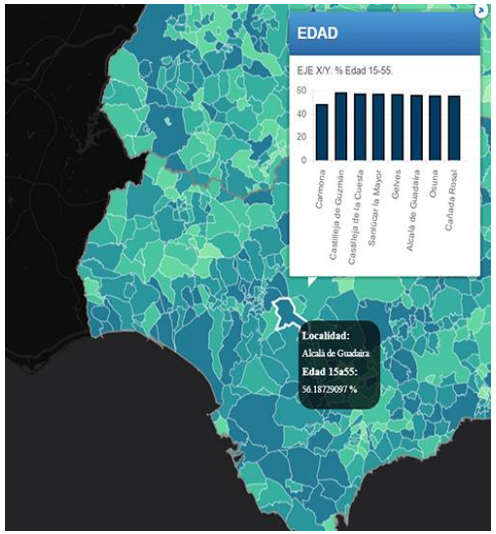
- ✓ **New knowledge and data relationships** that would not have been possible through the analysis of social, economic or environmental data in isolation from each other.
- ✓ Support for local, subnational, national, regional and global **decision-making processes**.
- ✓ Support to the **measurement and monitoring** of the goals and the global indicators framework (ODS).
- ✓ **Support the exchange of data between institutions** and improve the interoperability of geospatial and statistical information.

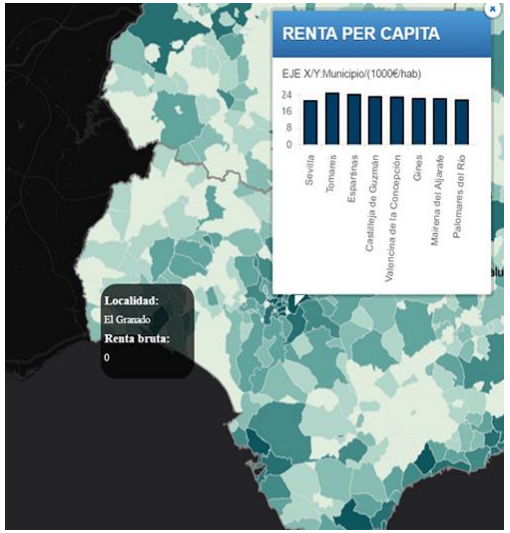
# Why to integrate statistical and geospatial information

- ✓ **New, better and more integrated information** for analysis and decision-making processes.
- ✓ **Comparisons** within and between countries in a more harmonized way.
- ✓ More information about **smaller geographical areas**.
- ✓ Development of common tools / applications to support the integration and exchange of data.
- ✓ Production of information generally **more efficient**.

# Why to integrate statistical and geospatial information



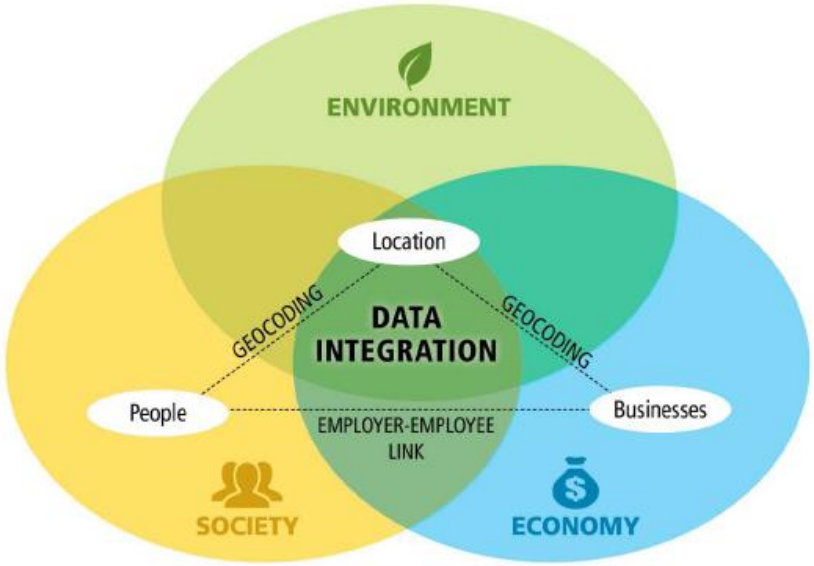

Source: Portal Web Grupo afronta

There is a growing need to develop statistics with increasing geographical detail to support national and regional policy making

*Eurostat, European Union*

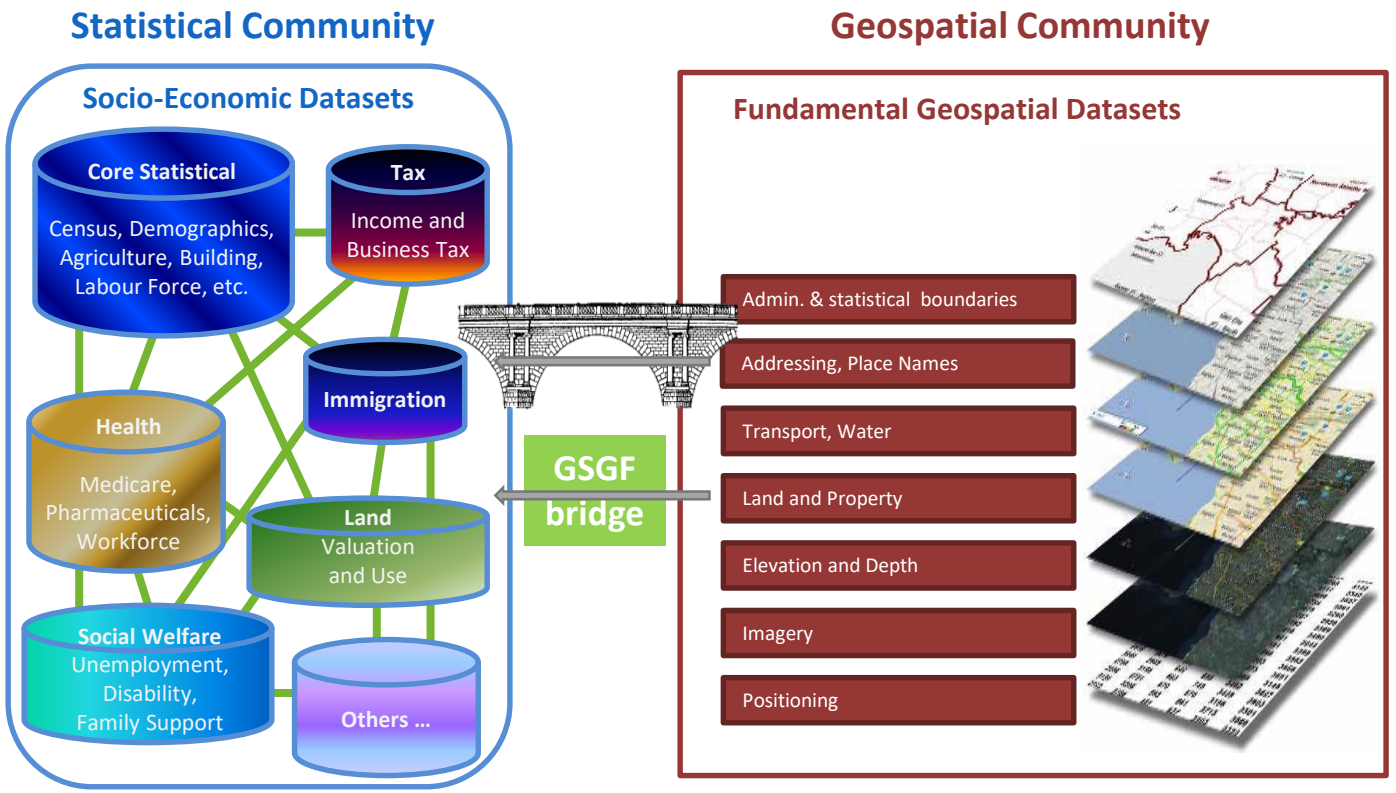
# The Global Statistical Geospatial Framework

The Global Framework provides the international community with a **common approach** that connects people-centered information with a place (socio-economic and environmental data), improving the accessibility and usability of these geospatially-enabled data.




Source: UN-GGIM Global Statistical Geospatial Framework

# The Global Statistical Geospatial Framework

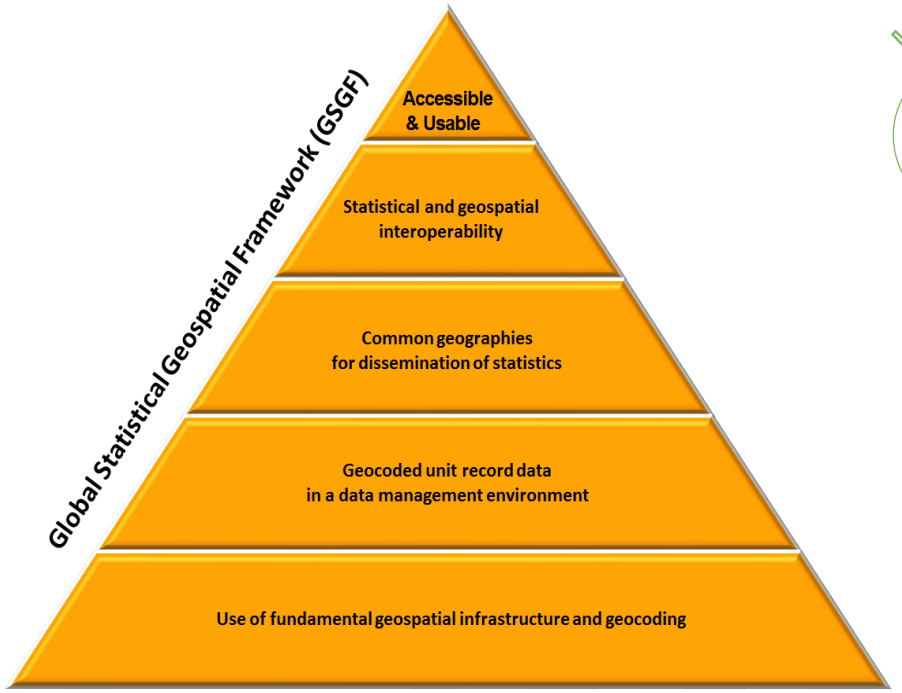



"The Global Statistical Geospatial Framework will provide:

- A common method for geospatially enabling statistical and administrative data,
- ensure that this data can be integrated with geospatial information."

Source: UN-GGIM Secretariat

# The Global Statistical Geospatial Framework




**Accessible and useable geospatially enabled statistics**
Identification and development of policies, standards and guidelines to support the release and use of geospatially enabled information.

**Statistical and geospatial interoperability**
Greater interoperability to enhance the efficiency of creation, discovery, access and use of data

**Common geographies for dissemination of statistics**
A common set of geographies for the display, reporting and analysis of statistics to enable comparisons across datasets – statistical and geospatial.

**Geocoded unit record data in a data management environment**
Storage of the unit record statistical data linked to a geocode within a data management environment will ensure flexibility over time and protect privacy and confidentiality.

**Use of fundamental geospatial infrastructure and geocoding**
A common and consistent approach to establishing a location and temporal description of each unit in a dataset, using national fundamental datasets.

THE 5 PRINCIPLES OF THE **GSGF** SET A FOUNDATION FROM WHICH WE CAN WORK TO PUT IN PLACE COMMON LANGUAGE, PROCESSES, STANDARDS AND METHODS ACROSS BOTH STATISTICAL AND GEOSPATIAL COMMUNITIES.

Source: UN-GGIM Global Statistical Geospatial Framework

# **Principle 1**: Use of fundamental geospatial infrastructure

**Goals and objectives**

Obtaining a **high quality, standardised physical address, a property or building identifier**, (or any other location element) which allows the assignment of precise coordinates is the main goal of principle 1.

Referencing of data **to small geographic areas or standard grid references** will then allow the aggregation of data for statistical units for dissemination.

An alternative approach is to use **direct or indirect coordinate capture** (for example, using GNSS and maps, respectively) from fieldwork.

Source: UN-GGIM Global Statistical Geospatial Framework

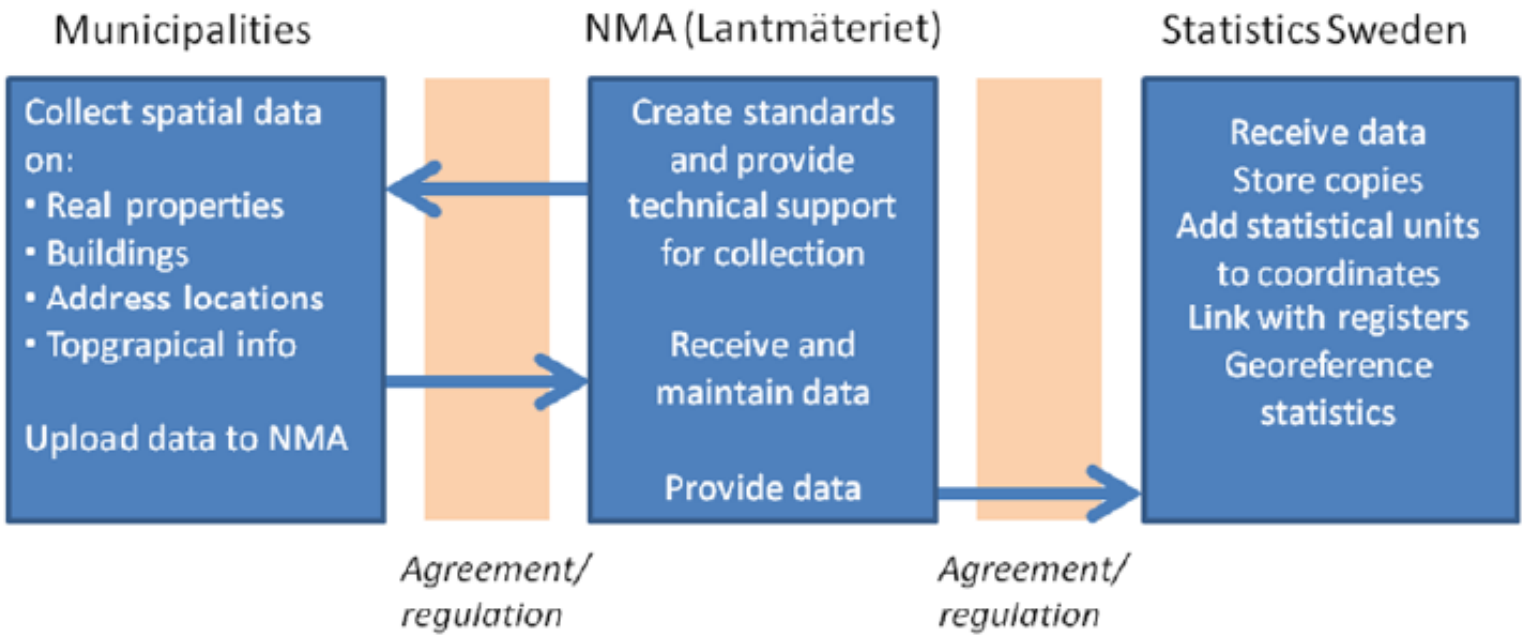
# **Principle 1**: Use of fundamental geospatial infrastructure

**INPUTS**

| Statistical data | Core/fundamental geospatial data | Other geospatial data |
|---|---|---|
| ▪Units or geographies<br>▪Social statistics<br>▪Economic statistics<br>▪Demography<br>▪Censuses<br>▪Agricultural statistics<br>▪Environmental statistics<br>▪Other statistical and administrative datasets | ▪Administrative and non-administrative units<br>▪Physical addresses,<br>▪Properties<br>▪Building identifiers<br>▪Transport/water network<br>▪Topographic maps<br>▪Elevation and depth data | ▪Environmental measurements from other agencies<br>▪Sensor data<br>▪Remote sensing data (satellite images)<br>▪Postal code areas |

Source: UN-GGIM Global Statistical Geospatial Framework

# **Principle 1**: Use of fundamental geospatial infrastructure




Data-flow for spatial data on address locations, buildings and real properties

Source: Statistics Sweden, Marie Haldorson, Jerker Moström

# **Principle 1**: Use of fundamental geospatial infrastructure

## COMMUNITY ROLES

✓National Statistical and Geospatial Communities need to work in a good, solid but also flexible collaboration.

✓A **frequent communication** is essential to enhance decision making and the design of public policies from the central national authorities.

✓The roles of different communities responsible for production of information need to be well defined by Legal statutes, **Memoranda of Understanding (MoU)** or collective agreements for example.

✓Furthermore, a consistent management and monitoring of status quos, task and progresses is recommended.

Source: UN-GGIM Global Statistical Geospatial Framework

# **Principle 2:** Geocoded unit record data in a data management environment

**Goals and objectives**

**All statistical unit records** should include or be **linked to a geocode** (i.e. a coordinate or small geographic area), wherever it is possible to do so

Ensure the **effective implementation of fundamental or national geospatial and geocoding infrastructure** and demonstrate its broader value.

This means working in partnership with National Mapping Agencies and other providers of fundamental data infrastructure to ensure requirements are understood and the data and infrastructure are used appropriately.

**Implement effective data management** of statistical and geospatial data

This requires good technical data and metadata management practices, in accordance with national and international standards.

Source: UN-GGIM Global Statistical Geospatial Framework

# **Principle 2:** Geocoded unit record data in a data management environment

**Goals and objectives**

Ensure **appropriate protection of privacy and secrecy** of unit record or microdata level datasets

Storage of **consistent and interpretable geocodes**, preferably **linked from a "point-of–truth"** (e.g. linked to a centrally managed address register).

This requires the establishment and implementation of data and metadata standards to ensure that geocodes are well documented and consistent across datasets, allowing them to be used effectively over time in different applications.

Establish tools and methods to enable **simplified geographic aggregation** of data

This will include implementing standard code lists, or allocation tables, that enable statistical tools and applications to consistently aggregate and display or map geographic aggregations of data.

Source: UN-GGIM Global Statistical Geospatial Framework

# **Principle 2:** Geocoded unit record data in a data management environment

**INPUTS**

- Agreed **statistical** and **geospatial** data management frameworks (geospatial and statistical communities).
- **Addressing and/or location** reporting standards and infrastructure.
- **Geocoding infrastructure tools** and **metadata standards**, including batch and point of contact address validation and geocoding.
- Promotion of **point-of-entry address** validation and geocoding.
- **National privacy laws** and/or **agreed national and international privacy protocols**. Agreed geographic regions, etc. and associated data and metadata infrastructure
- Global or national/regional Geodetic Reference Frames (UN-GGIM)

Source: UN-GGIM Global Statistical Geospatial Framework

# **Principle 2:** Geocoded unit record data in a data management environment

## COMMUNITY ROLES

### Geospatial Community

- Provision of **fundamental geospatial data and infrastructure**, and geocoding capabilities
- Global or national/regional **Geodetic Reference Frames** and implementations
- Geospatial data management **frameworks**
- **Geospatial data standards**, particularly geocoding metadata specifications
- Supporting **common geographic boundaries**

### Statistical Community

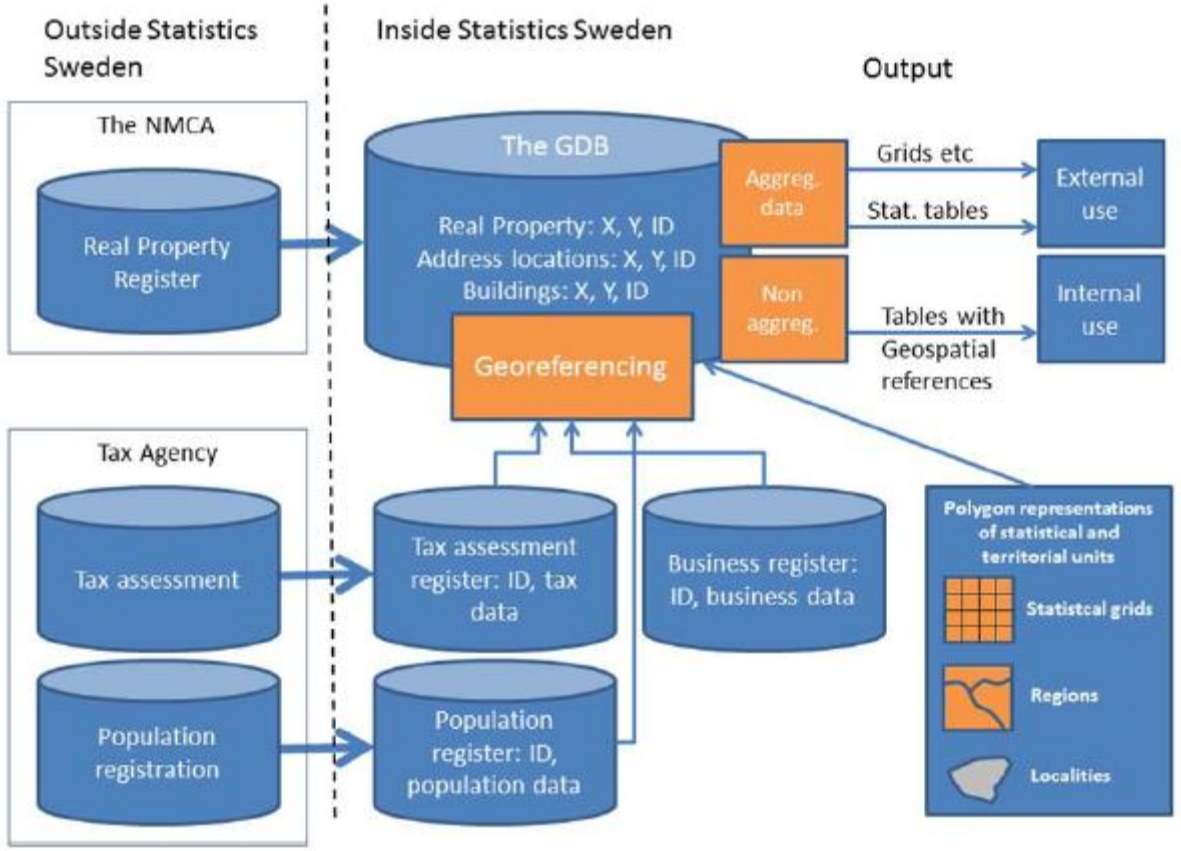
- National and international privacy protocols (e.g. UN Fundamental Principles of Official Statistics)
- Statistical data management frameworks
- Supporting common geographic boundaries
- Implementation of principles to statistical and administrative unit record data and their storage and management

### Administrative Data Community

- Implementation of principles to administrative unit record data and their storage and management

Source: UN-GGIM Global Statistical Geospatial Framework

# **Principle 2:** Geocoded unit record data in a data management environment




The Geography Database (GDB) and its relations to unit record data and other data sources

Source: Statistics Sweden, Marie Haldorson, Jerker Moström

# **Principle 3**: Common geographies for dissemination of statistics

## Goals and objectives

The goal is to enable the **consistency and comparability** of integrated statistical and geospatial data

That **common dissemination geography** be collaboratively assessed and acknowledged by interested stakeholders prior to the adoption
(by NSOs, NMAs, NGIAs, international and regional organizations and other important and key institutions, e.g. NGO-VGI, Open Geospatial Consortium, private sector).

That participating NSOs, NMAs, NGIAs, international, regional and NGOs endeavour to **integrate acknowledged common dissemination geographies** (objects) within existing and emergent statistical geospatial infrastructures.

NSOs, NMAs and NGIAs that adopt a common dissemination geography are encouraged to move forward and **begin producing comparable and integrated social, economic and environmental data**, indicators and other information from the integrated statistical geospatial infrastructure

Source: UN-GGIM Global Statistical Geospatial Framework

# **Principle 3**: Common geographies for dissemination of statistics

## Goals and objectives

To acknowledge the **continuing need for relevant country-specific dissemination geographies.** Proposed and adopted common dissemination geographies should be viewed as congruent and adjuncts to the existing administrative and statistical geographies maintained by NSOs, NMAs and NGIAs.

That common dissemination geography be collaboratively assessed and acknowledged by interested stakeholders prior to the adoption
(by NSOs, NMAs, NGIAs, international and regional organizations and other important and key institutions, e.g. NGO-VGI, Open Geospatial Consortium, private sector).

To enable the **concordance**, where applicable, **between common dissemination geographies and established national administrative and statistical geographies** (further enabling both comparative statistics and geospatial analysis).

To ensure that the evolving national and international data privacy and data quality principles, frameworks and practices are considered and respected in the design of common geographic areas, their adoption and subsequent implementation

Source: UN-GGIM Global Statistical Geospatial Framework

# **Principle 3**: Common geographies for dissemination of statistics

**INPUTS**

According to the GEOSTAT 2 project, geospatial data on **address locations**, **buildings/dwellings** and/or **cadastral parcels** form the complete basis for a point-based geocoding framework for statistics.

The Global Statistical Geospatial Framework advocates the recognition of **fundamental and authoritative geospatial data from the National Spatial Data Infrastructures** or other nationally agreed upon sources.

Statistics should consider the possibility of **harmonizing statistical division** (statistical regions and census enumeration areas) with the **cadastral division** (cadastral units), taking into account the needs of official statistics.

Source: UN-GGIM Global Statistical Geospatial Framework

# **Principle 3**: Common geographies for dissemination of statistics

## COMMUNITY ROLES

**Fundamental and authoritative geospatial data** from the **National Spatial Data Infrastructures** is typically maintained under the authority or supervision of NMCAs.

**Local and regional administrations may also be involved** in data collection, but in most cases the NMCAs gather and store data from municipalities in centralised repositories.

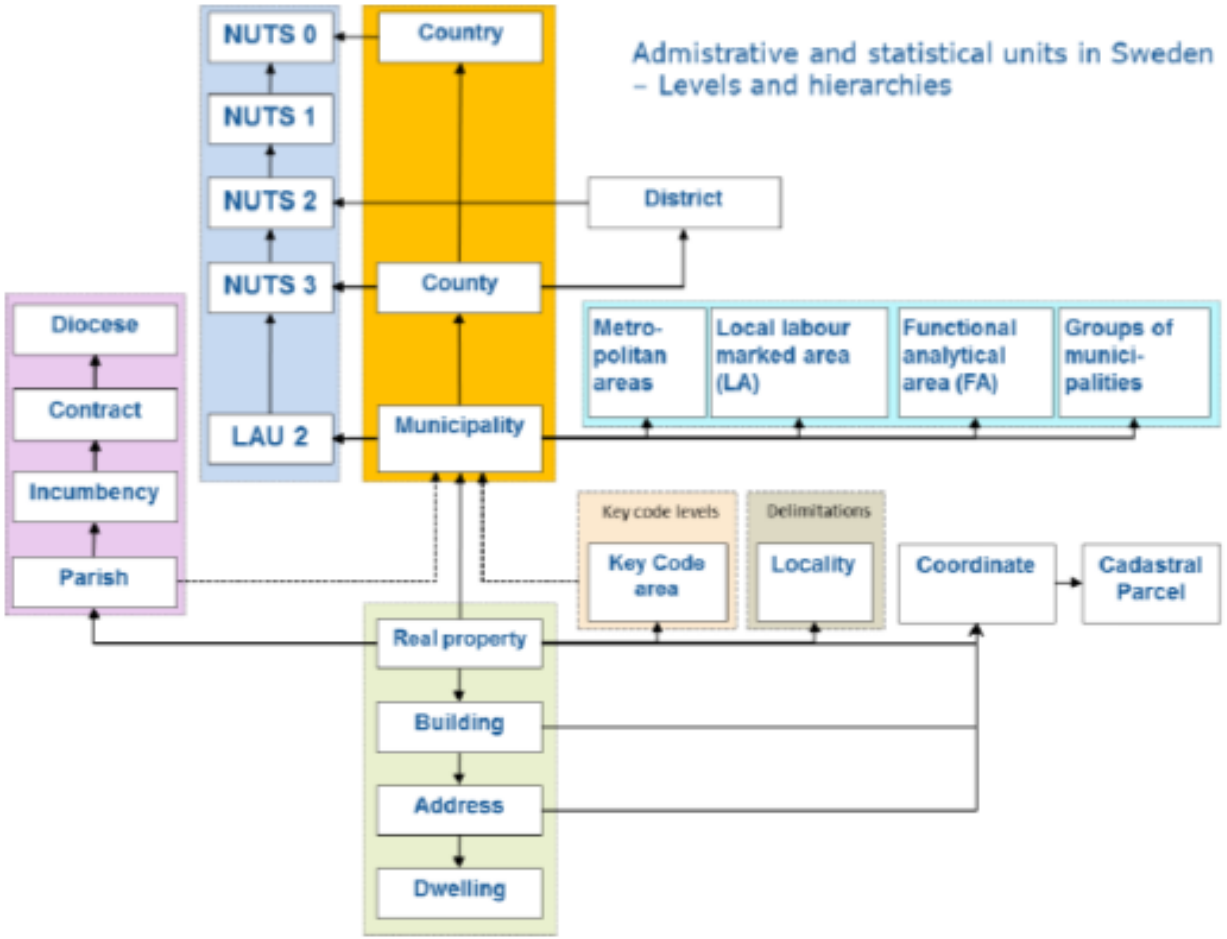
In some countries, NSIs have established a direct collaboration with the municipalities providing location data to statistical offices.

Typically, **geospatial data is of good quality if it is regularly used**, e.g., for administrative purposes or business activities.

Citizens usually have an incentive to provide correct and up-to-date addresses to administrations as they can expect benefits and services in return, such as health care, tax refunds or social benefits. Hence, address registers or other geocodes used for statistics should ideally be the same as for the administration, i.e. one single unique address register for all applications.

Source: UN-GGIM Global Statistical Geospatial Framework

# Principle 3: Common geographies for the dissemination of statistics.




Regional divisions and administrative and statistical geographies in Sweden

Source: Statistics Sweden, Marie Haldorson, Jerker Moström

# Principle 4: Statistical and geospatial interoperability: data, norms and processes

**Goals and objectives**

Need to incorporate **geospatial processes and standards** in statistical processes in a more consistent manner.

Top-down approach that more explicitly incorporates geospatial frameworks, standards and processes in the Common Statistical Production Architecture and its components

Source: UN-GGIM Global Statistical Geospatial Framework

# Principle 5: accessible and usable geospatial statistics

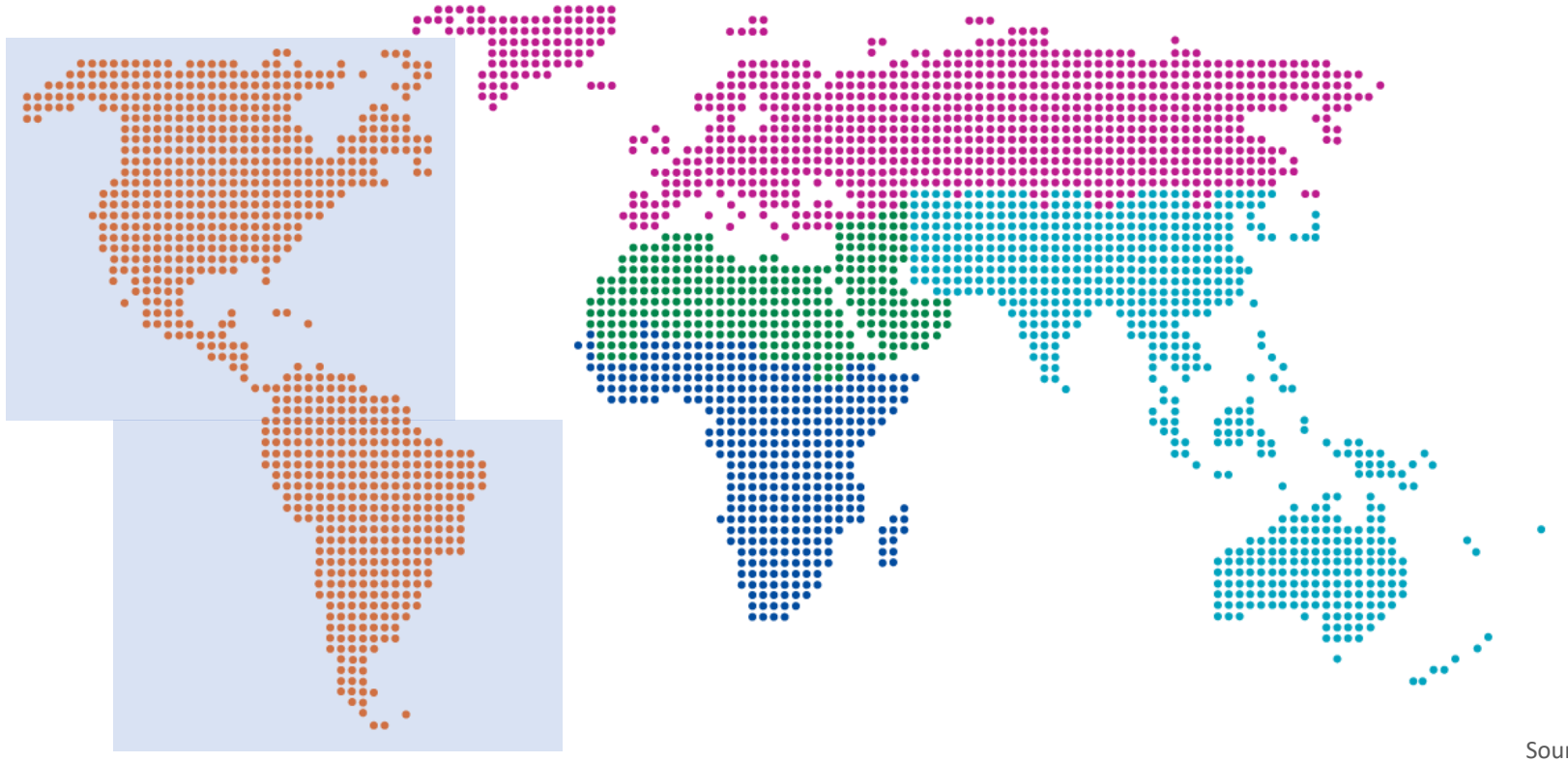
**Goals and objectives**

**N**eed to identify or, when necessary, develop **policies, standards and guidelines** that support the **publication, access, analysis and visualization** of geospatially enabled information.

**Guarantee access to data** using secure mechanisms that protect privacy and confidentiality

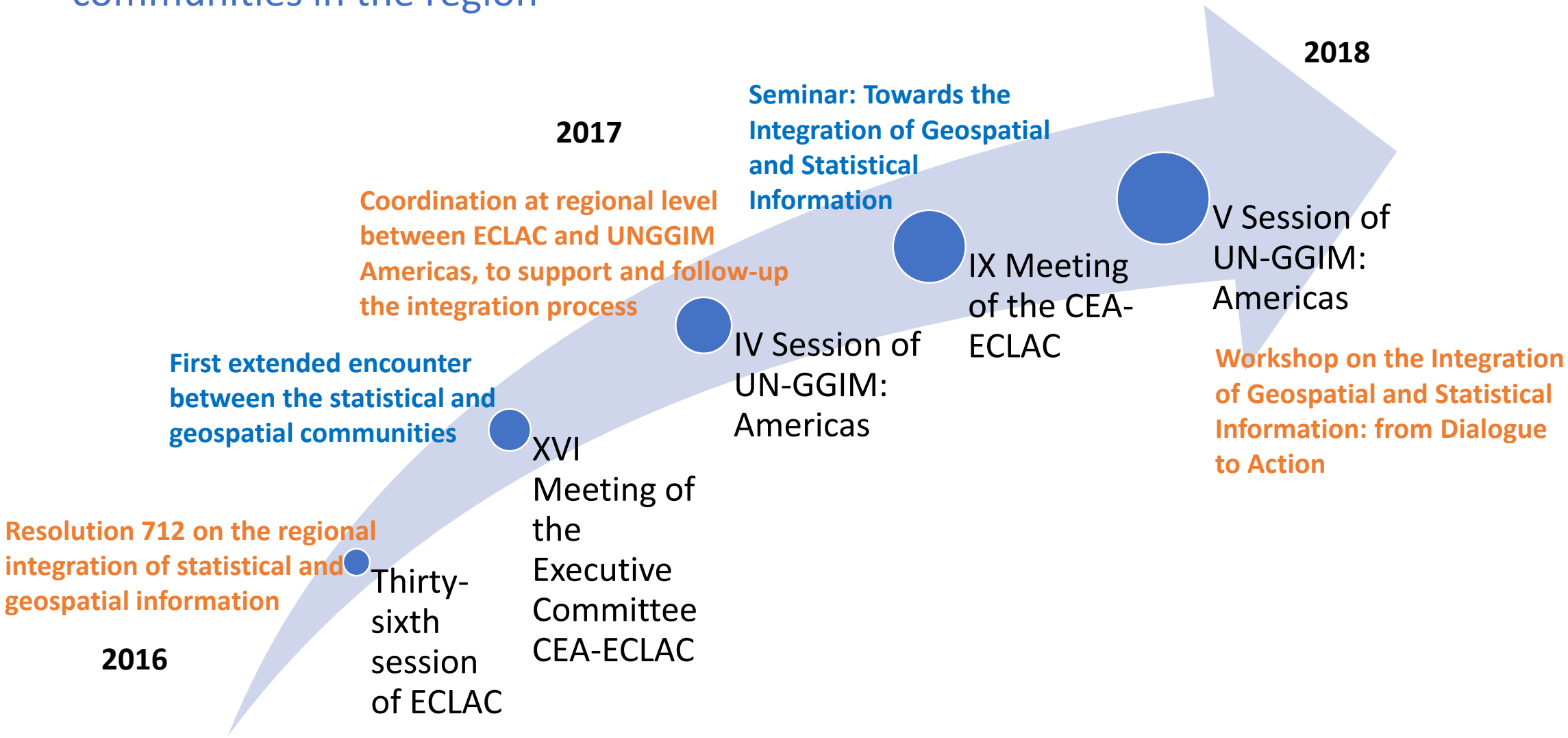
Source: UN-GGIM Global Statistical Geospatial Framework

# The regional perspective

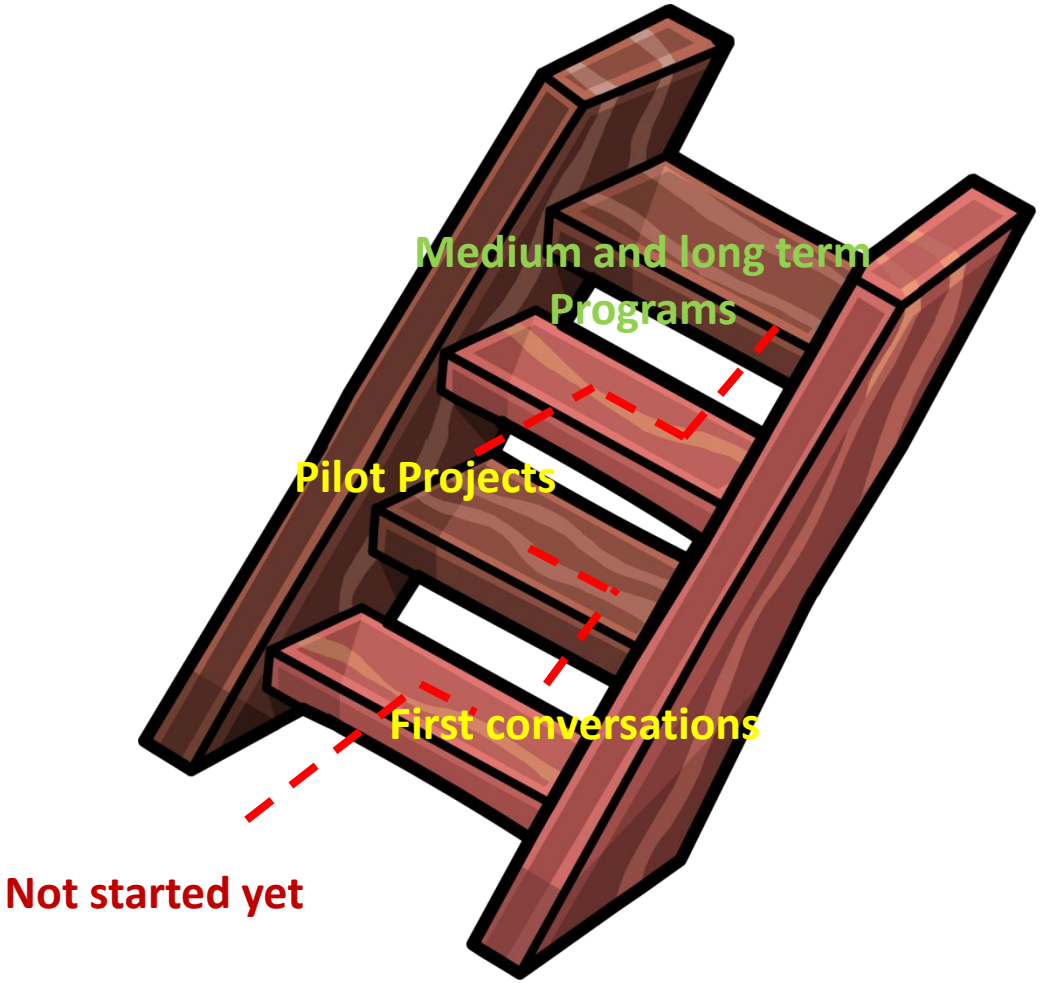


Source: US Census Bureau

# Contributing to the encounter of the regional statistical and geospatial communities in the region



# Promoting the progress of the national processes of integration of statistical and geospatial information

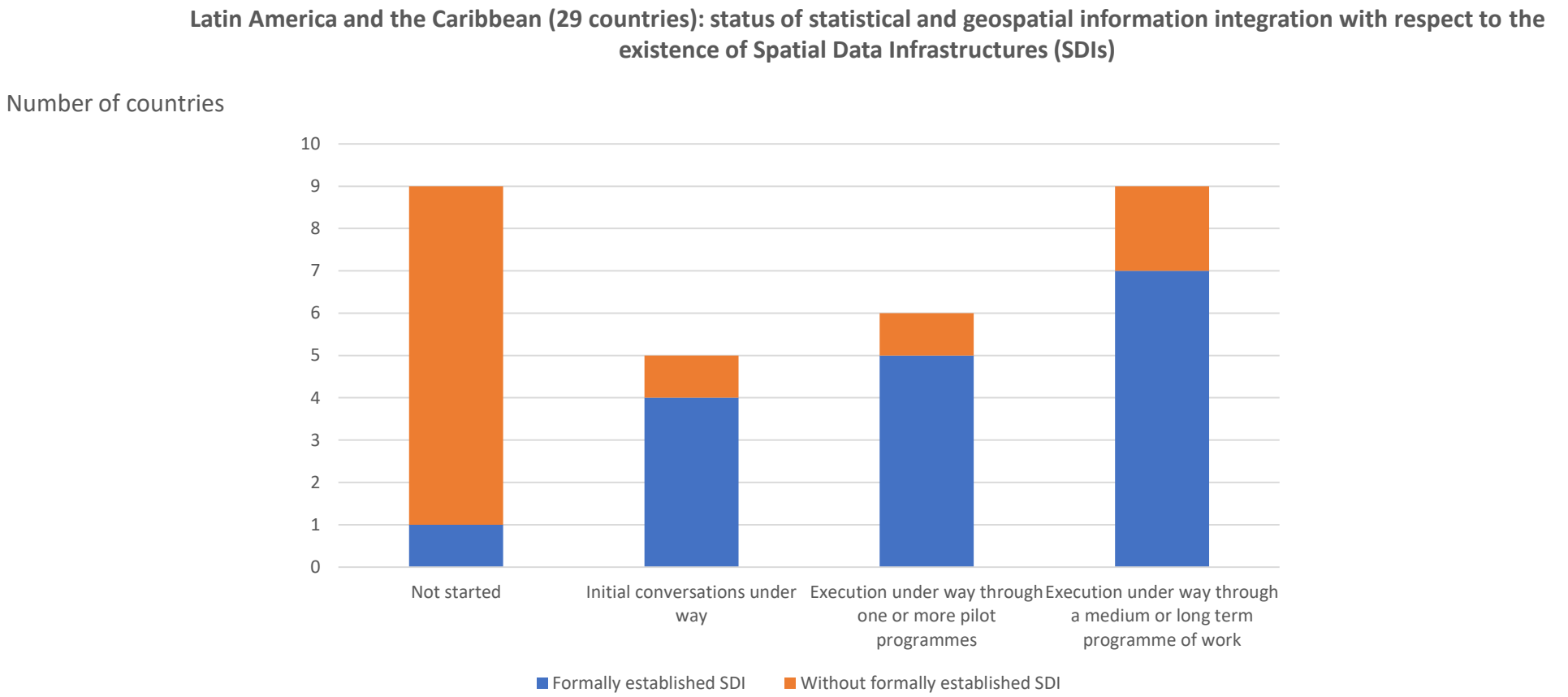



Technical assistance

Horizontal cooperation

Collection and dissemination of use cases

# SDIs are relevant to support geospatial and statistics integration



# Towards the integration: the process of integration has not started yet (Step I)

**NOT YET STARTED**

Conformation of the **Spatial Data Infrastructure (SDI)** still at the **project level**.

**There is no coordination** between the National Statistics Office and the National Cartographic Agency.

The production of cartography is analog and is in the process of digitalization. **Agreements for the dissemination** of digital geospatial information are required before starting the integration.

**Limited use of geospatial technologies** in the National Statistics Office.

# Towards the integration: initial conversations under way (Step II)

FIRST ARRANGEMENTS

**Conversations and initial** approach between the National Statistics Office and the National Cartographic Agency.

**National geospatial** information policy **in process,** including the National Statistical Office as stakeholder

**Conformation of a working group** to address the challenge in an inter-sectoral manner, under the leadership of the National Statistics Office and the National Cartographic Agency.

**Delivery of geospatial information** from the National Cartographic Agency to the National Statistical Office, but **without a formal process or a specific project**.

**Projects in the planning phase,** for example use of geostatistical information to support the implementation of the 2030 agenda.

# Towards the integration: Execution under way through one or more pilot projects (Step III)


In most cases, as a result of **inter-institutional coordination**.

Based on **Geographic Information Systems** tools, with map visualization services.

Application of **methods for the homologation** of census units and administrative geographies.

**Geocoding** of statistical databases, using **unique fundamental geospatial data.**

Elaboration of **Statistical Atlas** related to a wide range of topics.

# Towards the integration: Execution under way through a medium or long term work programme


Most of the cases are denominated as **National Geostatistical Framework**.

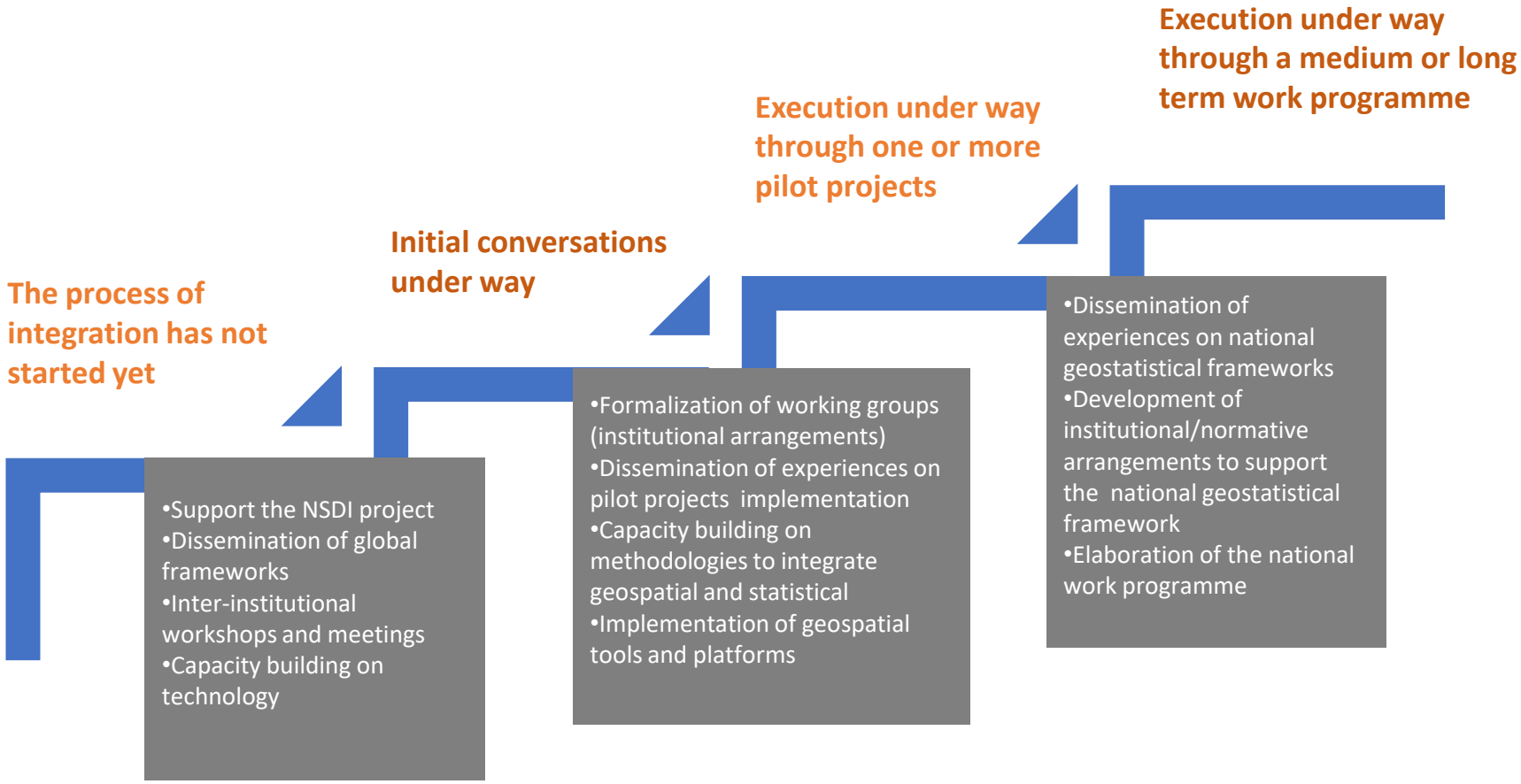
They are coordinated by the **National Statistical Offices** or the organizations that lead the **National Geospatial Data Infrastructures**.

They are supported by **institutional regulations** (NSO) and **inter-institutional agreements**.

They have **services for viewing and downloading** (in some cases) geostatistical data.

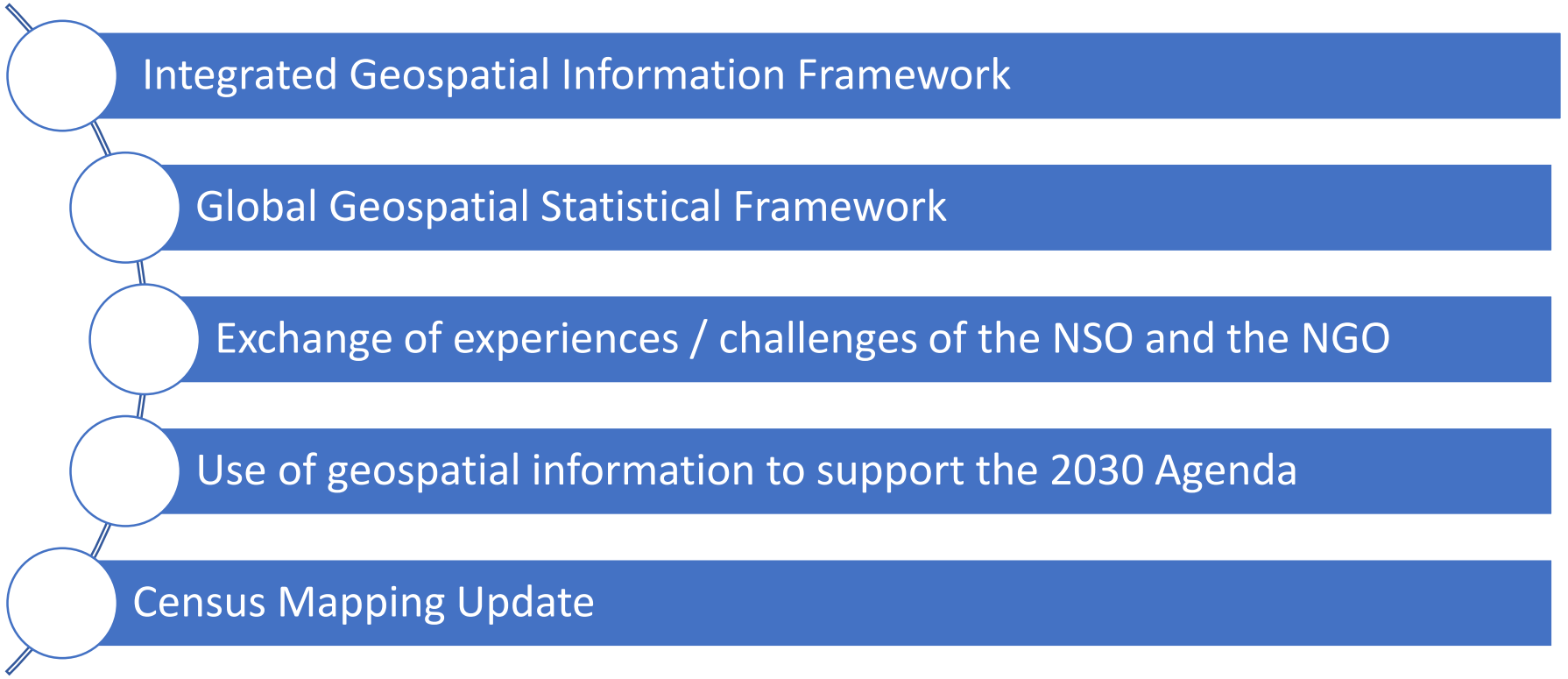
They are focused on the implementation of the five components of the **Global Statistical Geospatial Framework**.

# Road map to advance in the integration process



# Strengthening geospatial information management

**Contents of the assistance**



# Strengthening geospatial information management

GLSC

Guyana

Paraguay

DGEEC

DISER GEMIL

LSD

Dominica

Ecuador

INEC

IGM

INEC

Costa Rica

Surinam

MI-GLIS

IGN

Rep. Dominicana

# Moving forward

- ✓ **Follow up** and **support** in the **countries** where ECLAC technical assistance began during this year
- ✓ Open and carry out a **new cycle of technical assistance** for the countries to apply (focus on the implementation of the Global Statistical Geospatial Framework and the Integrated Geospatial Information Framework)
- ✓ Promote **horizontal cooperation activities**, leveraging the experience and learning of the countries
- ✓ Research on the **national implementation/assessment** of the Global Statistical Geospatial Framework
- ✓ Collect and **disseminate experiences** in the integration of statistical and geospatial information
- ✓ Elaborate  a regional policy for the geospatial information development in the region

# Relevants on the integration of statistical and geospatial information

Technical Assistance of ECLAC to the Management Institute for Land Registration and Land Information System - MI-GLIS

Paramaribo, Suriname, 04 to 07 December, 2018