

# Implementing 2020 World Programme on Population and Housing Censuses

Linda Peters, Esri



# Shifting Role of GIS in Official Statistics

## Geographic and Statistical Data Are Foundation

An Integrated Data Model is Essential

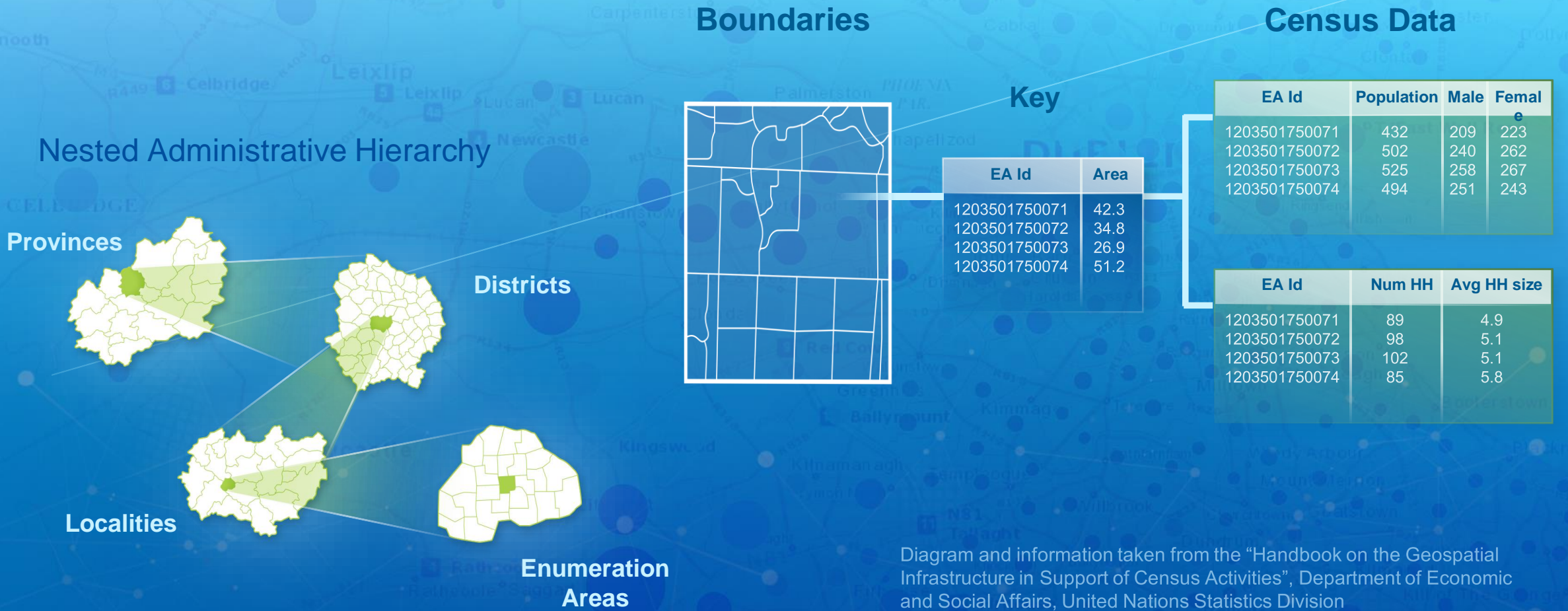


Diagram and information taken from the "Handbook on the Geospatial Infrastructure in Support of Census Activities", Department of Economic and Social Affairs, United Nations Statistics Division



# Integration of Statistical and Geospatial Data

Global  
Statistical  
Geospatial  
Framework  
(GSGF)

Usable

Interoperable

Common Geographies

Geocoded Units

Fundamental Geospatial Infrastructure



Statistical Process Model (GSBPM)

Planning/  
Pre Enumeration

Enumeration

Post Enumeration/  
Dissemination

Specify  
Needs

Design

Build

Collect

Process

Analyze

Disseminate

Evaluate

Quality / Metadata Management



# GIS Provides a Platform

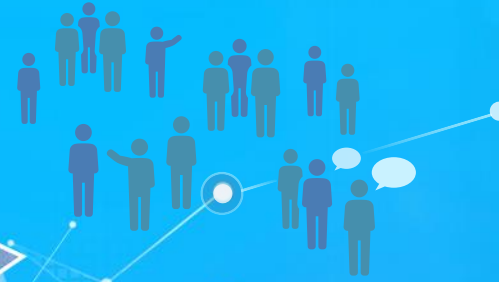
For Managing, Analyzing, and Applying  
Geographic, Statistical & Imagery Information

Integrating People,  
Processes, Things,  
and Data About Them

System of  
Record



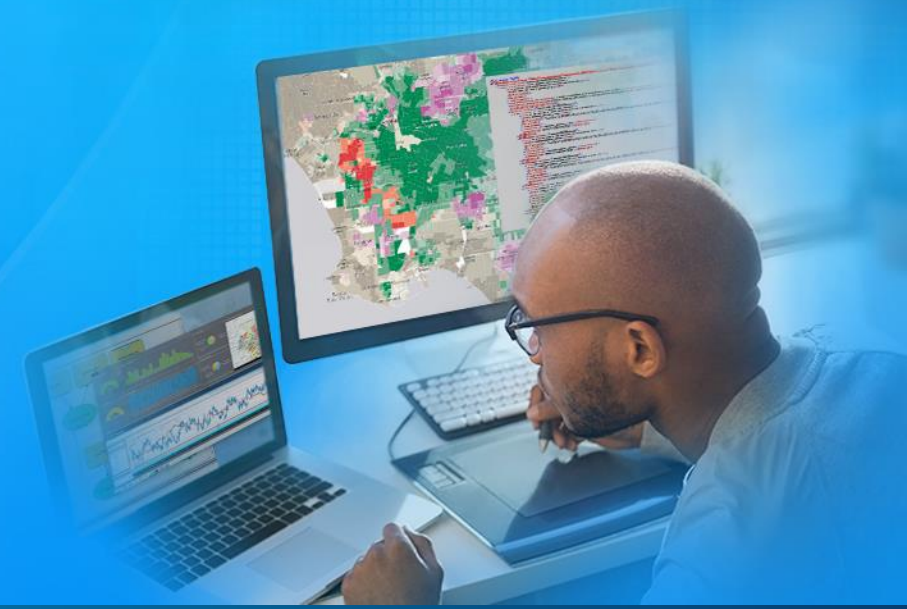
System of  
Engagement



System of  
Insight



Using the Power of Where  
to Integrate Everything



# ArcGIS | Common Patterns of Use

## Mapping & Visualization



Understand locations and relationships with maps and visual representations

## Data Management



Collect, organize, and maintain accurate locations and details about assets and resources

## Field Mobility



Manage and enable a mobile workforce to collect and access information in the field

## Monitoring



Track, manage, and monitor assets and resources in real-time

## Analytics



Discover, quantify, and predict trends and patterns to improve outcomes

## Design & Planning



Evaluate alternative solutions and create optimal designs

## Decision Support



Gain situational awareness, and enable information-driven decision making

## Constituent Engagement



Communicate and collaborate with citizens and external communities of interest

## Sharing & Collaboration



Empower everyone to easily discover, use, make, and share geographic information



# Providing the Integrating Framework and Processes

For Enabling a Smarter World



Data Collection  
and Development

Data Integration,  
Sharing and  
Management

Geo-Statistical  
Analytics  
and Modeling

Action and  
Outcomes

Stakeholder  
Engagement

Planning and  
Decision-Making

*Transforming How We Think and Act . . .  
. . . Creating a More Sustainable Future*

Delivering

Collaborating

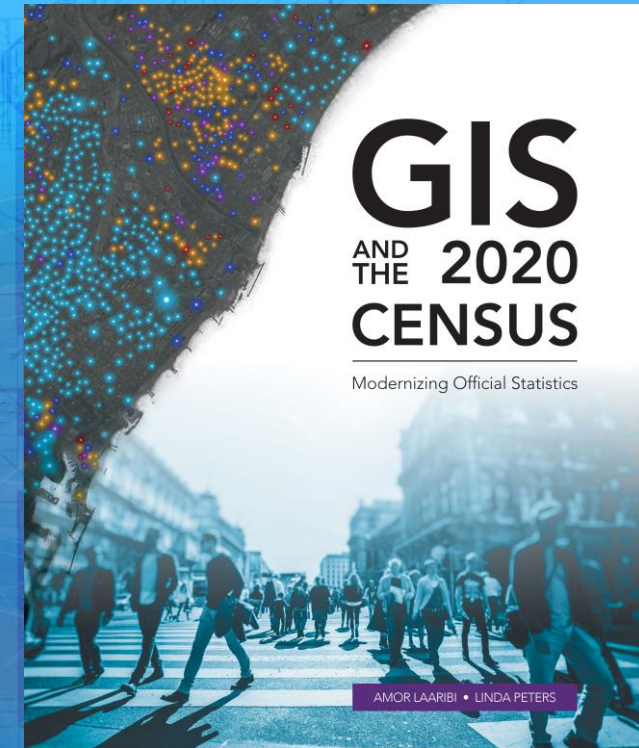
Informing

Understanding



# Esri's commitment to your success

- Method – new book by Esri Press
  - GIS and the 2020 Census: Modernizing Official Statistics
- Hands on
  - Learn.ArcGIS.com lessons to help you with capacity building
- Technology
  - Statistics Modernization Program



# An ArcGIS® Census Data Model

This diagram illustrates a geodatabase data model that can be leveraged by census organizations across the globe. A key feature of this design is the creation and maintenance of topologically nested polygon feature classes from line feature classes containing common boundaries. Census organizations can easily modify the design to reflect the nested feature classes that are pertinent to their country. Also, specific census demographic information can be readily added.

## Census Feature Dataset

- Province - Feature Class
- District - Feature Class
- Municipality - Feature Class
- Enumeration\_Area - Feature Class
- GeoLocation - Feature Class
- Electoral\_District - Feature Class
- Census\_Topology - Topology

## Stand-Alone Feature Classes

- Facility - Feature Class
- Landform - Feature Class
- Railroad - Feature Class
- Road - Feature Class
- Site - Feature Class
- Waterbody - Feature Class
- Waterline - Feature Class

## Shape Type

- Polygon
- Point
- Line

### Province - Feature Class

Shape Type	Polygon	Alias Name	Province	
Field	Alias	Type	Length	Nullable
GlobalID	Global ID	Global ID		false
ProvinceID	Province ID/Code	String	25	true
ProvinceName	Province Name	String	50	true

### District - Feature Class

Shape Type	Polygon	Alias Name	District	
Field	Alias	Type	Length	Nullable
GlobalID	Global ID	Global ID		false
DistrictID	District ID/Code	String	25	true
DistrictName	District Name	String	50	true
ProvinceID	Province ID/Code	String	25	true

### Municipality - Feature Class

Shape Type	Polygon	Alias Name	Municipality	
Field	Alias	Type	Length	Nullable
GlobalID	Global ID	Global ID		false
MunicipalityID	Municipality ID/Code	String	25	true
MunicipalityName	Municipality Name	String	50	true
DistrictID	District ID/Code	String	25	true

### Enumeration\_Area - Feature Class

Shape Type	Polygon	Alias Name	Enumeration Area	
Field	Alias	Type	Length	Nullable
GlobalID	Global ID	Global ID		false
EnumerationAreaID	Enumeration Area ID/Code	String	25	true
EnumerationAreaName	Enumeration Area Name	String	50	true
MunicipalityID	Municipality ID/Code	String	25	true

### GeoLocation - Feature Class

Shape Type	Point	Alias Name	GeoLocation	
Field	Alias	Type	Length	Nullable
GlobalID	Global ID	Global ID		false
Latitude	Latitude	Double		true
Longitude	Longitude	Double		true
EnumerationAreaGlobalID	Enumeration Area Global ID	GUID		true

### Electoral\_District - Feature Class

Shape Type	Polygon	Alias Name	Electoral District	
Field	Alias	Type	Length	Nullable
GlobalID	Global ID	Global ID		false
ElectoralDistrictID	Electoral District ID/Code	String	25	true
ElectoralDistrictName	Electoral District Name	String	50	true

The Electoral\_District feature class is included in the feature dataset because electoral districts are often relevant in the context of a census. Although it is not part of the administrative division hierarchy that appears to the left, it does participate in the feature dataset's topology due to its spatial relationship with District.

### Census\_Topology - Topology

Origin Class	Rule	Destination Class
District	Must Not Overlap	District
Enumeration Area	Must Not Overlap	Enumeration Area
Municipality	Must Not Overlap	Municipality
Province	Must Not Overlap	Province
Enumeration Area	Must Be Covered By	Municipality
Municipality	Must Be Covered By	District
District	Must Be Covered By	Province
Enumeration Area	Must Cover Each Other	Municipality
Municipality	Must Cover Each Other	District
District	Must Cover Each Other	Province
GeoLocation	Must Be Properly Inside	Enumeration Area
Electoral District	Must Not Overlap	Electoral District
Electoral District	Must Be Covered By	District
Electoral District	Must Cover Each Other	District

### Relationship Classes

Relationship Class	Cardinality	Origin Class	Origin Primary Key	Destination Class	Destination Foreign Key
ProvinceToDistrict	1 - M	Province	ProvinceID	District	ProvinceID
DistrictToMunicipality	1 - M	District	DistrictID	Municipality	DistrictID
MunicipalityToEnumerationArea	1 - M	Municipality	MunicipalityID	EnumerationArea	MunicipalityID
EnumerationAreaToGeoLocation	1 - M	EnumerationArea	GlobalID	GeoLocation	EnumerationAreaGlobalID

### Facility - Feature Class

Shape Type	Point	Alias Name	Facility		
Field	Alias	Type	Length	Default Value	Nullable
FacilityID	Facility ID/Code	String	25		true
FacilityName	Facility Name	String	50		true
FacilityDescription	Facility Description	String	250		true
FacilityCategory	Facility Category	Small Integer	1		true
FacilityType	Facility Type	Small Integer			true

Subtype Code	Subtype Name	Default Domain for FacilityType
1	Residential	ResidentialFacilityType
2	Commercial	CommercialFacilityType
3	Educational	EducationalFacilityType
4	Landmark	LandmarkFacilityType
5	Medical	MedicalFacilityType
6	Transportation	TransportationFacilityType

### Landform - Feature Class

Shape Type	Polygon	Alias Name	Landform		
Field	Alias	Type	Length	Domain	Nullable
LandformName	Landform Name	String	50		true
LandformType	Landform Type	Small Integer		LandformType	true

### Railroad - Feature Class

Shape Type	Line	Alias Name	Railroad		
Field	Alias	Type	Length	Domain	Nullable
RailroadID	Railroad ID/Code	String	25		true
RailroadName	Railroad Name	String	50		true
RailroadNumber	Railroad Number/Code	String	25		true
RailroadType	Railroad Type	Small Integer		RailroadType	true

### Road - Feature Class

Shape Type	Line	Alias Name	Road		
Field	Alias	Type	Length	Domain	Nullable
RoadID	Road ID/Code	String	25		true
RoadName	Road Name	String	50		true
RoadNumber	Road Number/Code	String	25		true
RoadClass	Road Class	Small Integer		RoadClass	true

### Site - Feature Class

Shape Type	Polygon	Alias Name	Site Category		
Field	Alias	Type	Length	Default Value	Nullable
SiteID	Site ID/Code	String	25		true
SiteName	Site Name	String	50		true
SiteDescription	Site Description	String	250		true
SiteCategory	Site Category	Small Integer	1		true
SiteType	Site Type	Small Integer			true

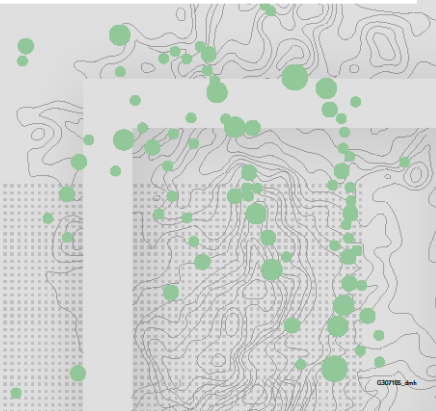
Subtype Code	Subtype Name	Default Domain for SiteType
1	Residential	ResidentialFacilityType
2	Commercial	CommercialFacilityType
3	Educational	EducationalFacilityType
4	Landmark	LandmarkFacilityType
5	Medical	MedicalFacilityType
6	Transportation	TransportationFacilityType

### Waterbody - Feature Class

Shape Type	Polygon	Alias Name	Waterbody		
Field	Alias	Type	Length	Domain	Nullable
WaterbodyID	Waterbody ID/Code	String	25		true
WaterbodyName	Waterbody Name	String	50		true
WaterbodyType	Waterbody Type	Small Integer		WaterbodyType	true

### Waterline - Feature Class

Shape Type	Line	Alias Name	Waterline		
Field	Alias	Type	Length	Domain	Nullable
WaterlineID	Waterline ID/Code	String	25		true
WaterlineName	Waterline Name	String	50		true
WaterlineType	Waterline Type	Small Integer		WaterlineType	true





**Ms. Rosalinda Bautista, Deputy National Statistician,  
Philippine Statistics Authority (PSA)**

**Geo-enablement of Statistics in the 2020 Round and Beyond**

**Mr. Michael Ratcliffe, Assistant Division Chief for Geographic  
Standards, Criteria, Research, and Quality, Geography Division,  
US Census Bureau**

**The Role of Geospatial Data and Geographic Information Systems in a  
Reengineered Decennial Census**





**esri**

**THE  
SCIENCE  
OF  
WHERE**