Measure4Change

A PROGRAM OF THE WORLD BANK GROUP AND URBAN INSTITUTE

Using Small Area Data

MEASURE4CHANGE LEARNING CURRICULUM

REVISED DECEMBER 2016

Welcome and Icebreaker

Course objectives

At the end of this session participants will

- Understand the usefulness of small area data for social service providers trying to better address the needs of the populations they are serving
- Obtain a basic understanding of GIS/mapping
- Learn how to geocode and display client locations on a map overlaid with small area data

Introduction

Why look at small area data?

What are small area data?

Small area data are information that can be summarized and compared for places below a city or county level

Examples:

- Neighborhood poverty rates within a city
- Demand for health care services for towns within a county

Small area data can help you…

Understand the local context of where your clients live, work, or go to school

Dig deeper into why community conditions are changing (or not)

- City or countywide data can mask disparities among smaller places or populations

Why look at small area data?

Research shows that *community conditions* help shape outcomes for individuals and families

- *Where you were born or live matters*
  - But not as much as family characteristics
- Specifics of what conditions matter most and to whom is still being investigated

Does neighborhood matter? Assessing recent evidence, by Ingrid Gould Ellen and Margery Austin Turner

Small Area Geography

Types of commonly used small areas

Small area geography: Census tracts

Small subdivisions of a county (or equivalent) updated prior to each decennial census

Generally have between 1,200 and 8,000 people, with an optimum size of 4,000

For the 2010 census, Washington, DC, was divided into 179 census tracts, with an average population of 3,400 each

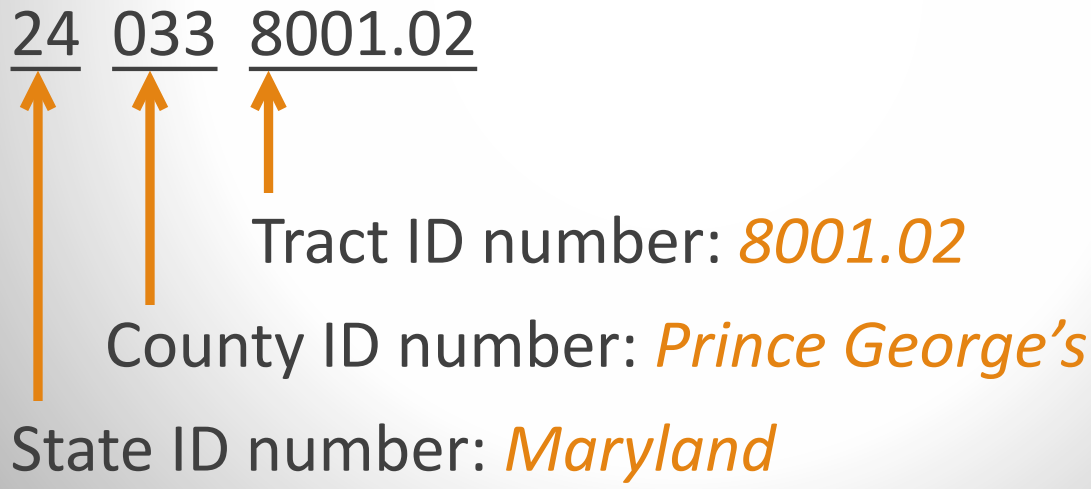
Land area can vary widely depending on population density

In cities, tracts are smaller; in rural areas, tracts are larger

Small area geography: Census tracts

Used in many US Census Bureau and other data products (ex, American Community Survey)

Each census tract is identified by a unique combination of three numeric codes

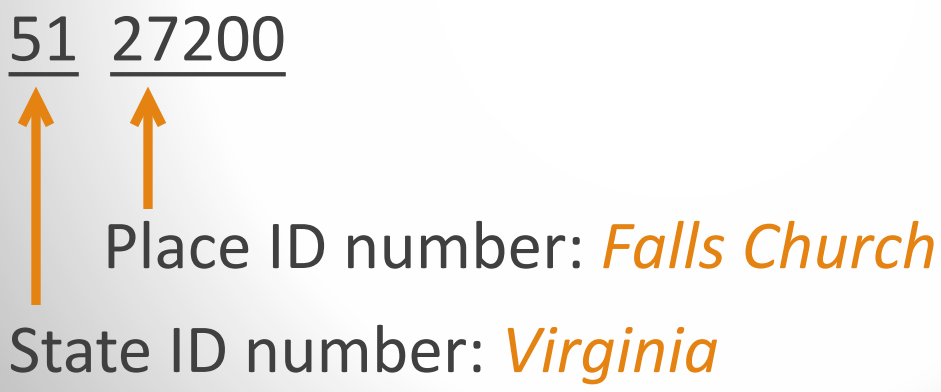


Small area geography: Places

Places include cities, towns, villages, and boroughs

Census Bureau recognizes both incorporated and "Census-designated" places

Places are identified by two numeric codes:

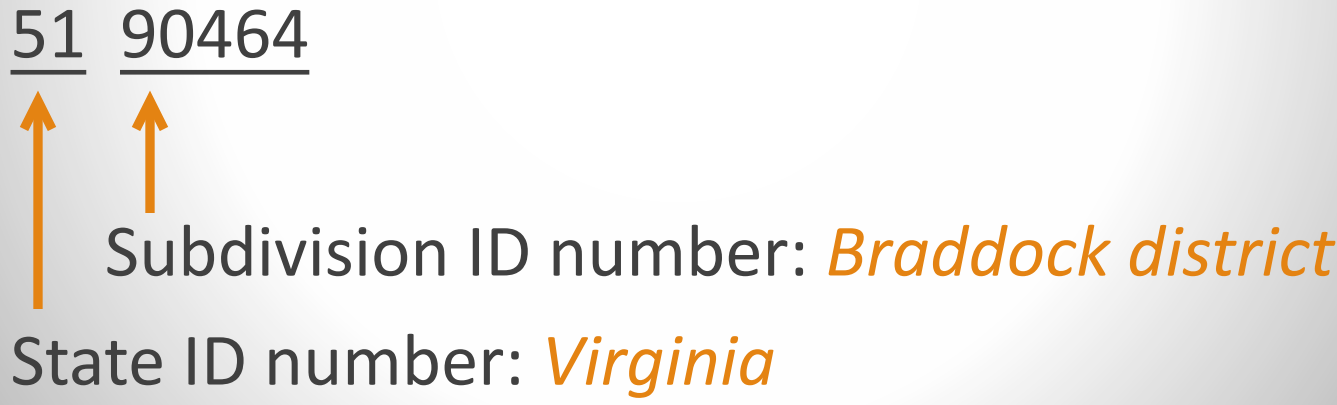


Small area geography: County subdivisions

Census-defined primary subdivisions of counties or county equivalents

- Example: Fairfax County, VA, has 9 subdivisions

Subdivisions are identified by two numeric codes:



Small area geography: ZIP codes

ZIP codes are defined by the US Postal Service to facilitate mail delivery

- Not designed for data collection or reporting

Do not necessarily represent geographic areas

- Some ZIP codes are post offices or addresses receiving a large amount of mail

Postal Service can change ZIP code boundaries as needed

Small area geography: Legislative districts

Includes both congressional districts and state legislative districts

Can be a useful political jurisdiction since it relates directly to elected representation in legislative bodies

Small area geography: Neighborhoods

No national standards for neighborhood definitions

- Not a geography used by the Census Bureau

Some cities and towns may have formally defined neighborhoods, but not always

- Example: District of Columbia Office of Planning has defined “neighborhood clusters,” areas of 3 to 5 neighborhoods, but not individual neighborhoods

May require transforming tract, address, or other data to neighborhoods

Small area geography: Resources

Census Bureau geography atlas,
https://www.census.gov/geo/reference/webatlas/

Missouri State Data Center, geographic codes lookup (entire US),
https://census.missouri.edu/geocodes/

Data Sources

National and local sources of small area data

Data sources: American Community Survey

National ongoing survey of US households

Collects a wide variety of socio-economic data

- Population characteristics (age, sex, race, ethnicity)
- Education
- Employment
- Income
- Disability status
- Language ability
- Housing

Data sources: American Community Survey

For most small areas need to use ACS 5-year data

- Combines 5 years of household surveys
- Census tracts, places under 20,000 population, legislative districts
- Margins of error for small areas can be large
  - A *margin of error* measures uncertainty for a survey estimate
  - Comparisons between numbers with large margins of error can be unreliable
- New 5-year data are released annually, but cannot reliably compare estimates with overlapping years
  - Ex: 2009-2013 ACS estimates cannot be compared to 2011-2015

Data sources: Resources

List of national data sets with small area data, http://www.neighborhoodindicators.org/library/catalog/list-national-data-sets-small-area-data

National Neighborhood Indicators Partnership (selected areas), http://www.neighborhoodindicators.org/partners/profiles

GIS

Geographic Information Systems

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What is GIS?

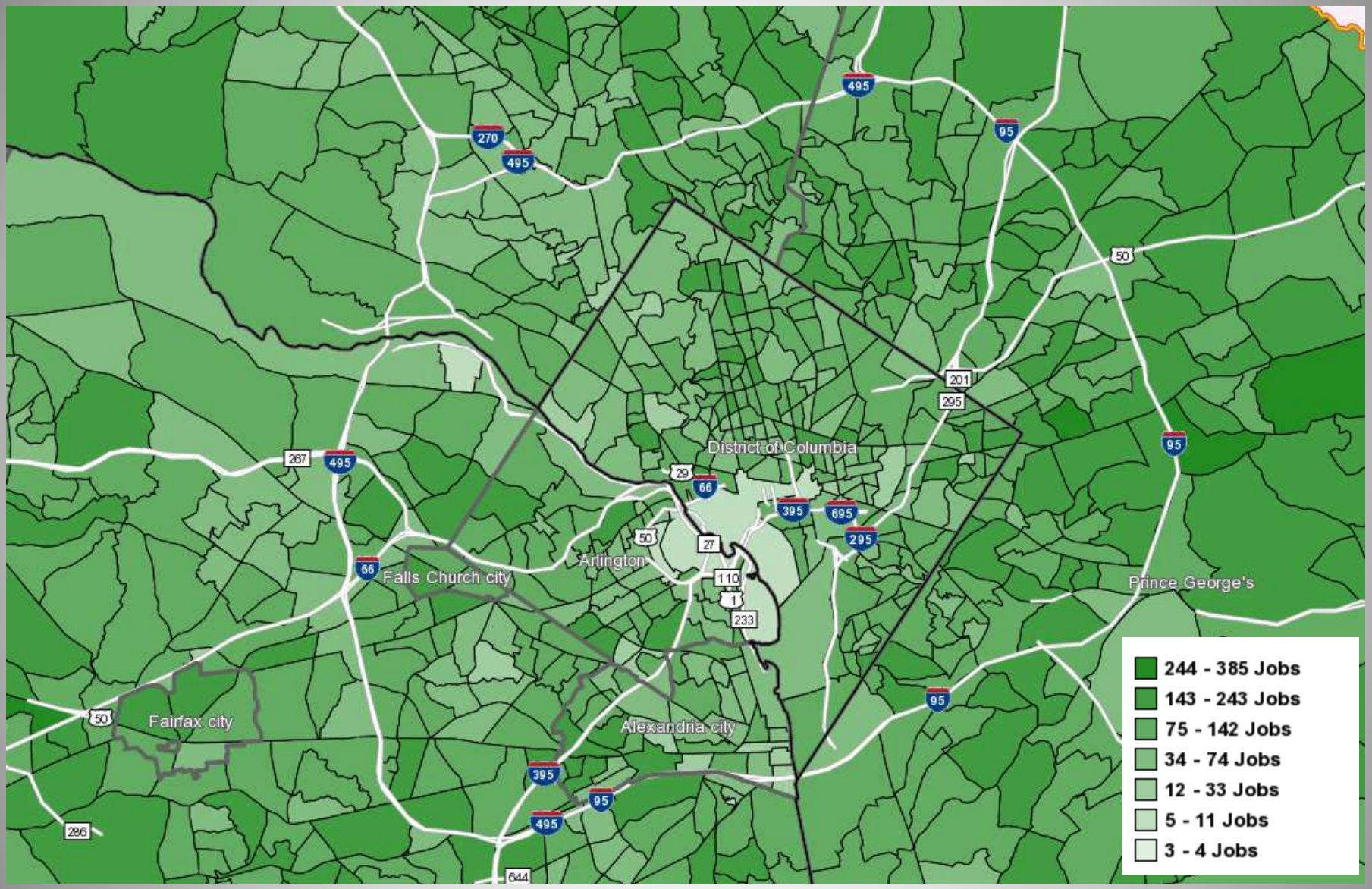
GIS stands for “Geographical Information System”

- Sometimes also called “mapping software”

Software that is capable of displaying and manipulating spatial data

With GIS you can

- Make maps displaying geographic features (points, lines, areas) and data associated with those features
- Combine data sources based on locations (spatial join)
- Calculate spatial measures, like distance and area


District of Columbia
Arlington
Falls Church city
Fairfax city
Alexandria city
Prince George's
244 - 385 Jobs
143 - 243 Jobs
75 - 142 Jobs
34 - 74 Jobs
12 - 33 Jobs
5 - 11 Jobs
3 - 4 Jobs

GIS basics: Geographic feature types

Points

- Display precise locations, such as building street address
- Point symbols can vary by shape, size, and color

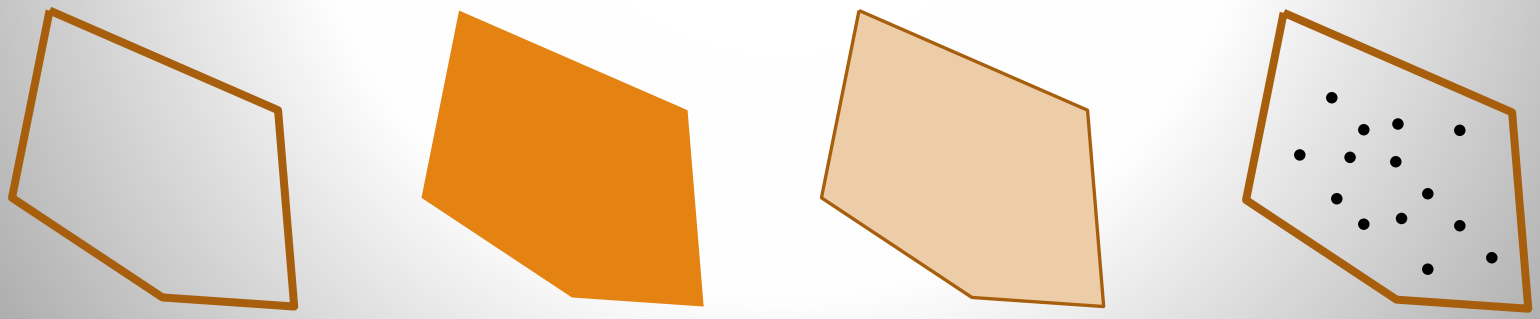
Lines

- Display roads, train tracks, bus routes
- Lines can vary by thickness, color, and style

GIS basics: Geographic feature types

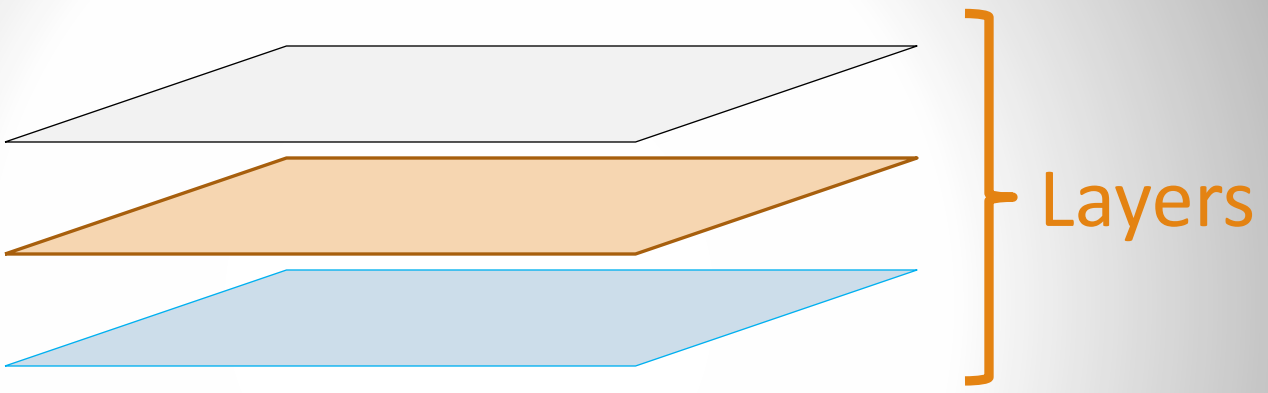
Areas (also called polygons)

- Display regions, such as counties, neighborhoods, bodies of water
- Must be an *enclosed space* (no openings or gaps)
- Interior can be hollow (show boundary only) or filled with color, shading, or symbols

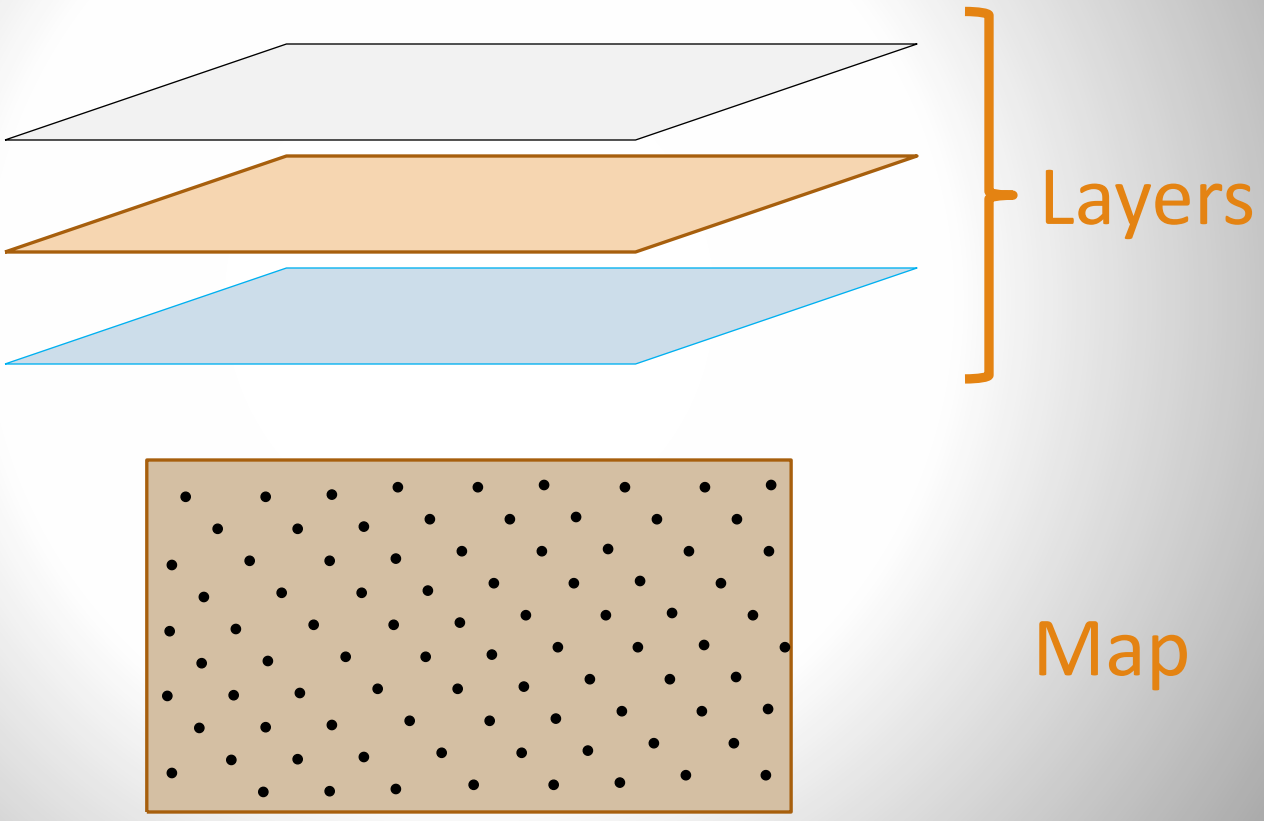


1 dot = 50 people

Combine layers with different feature types on same map



Combine layers with different feature types on same map



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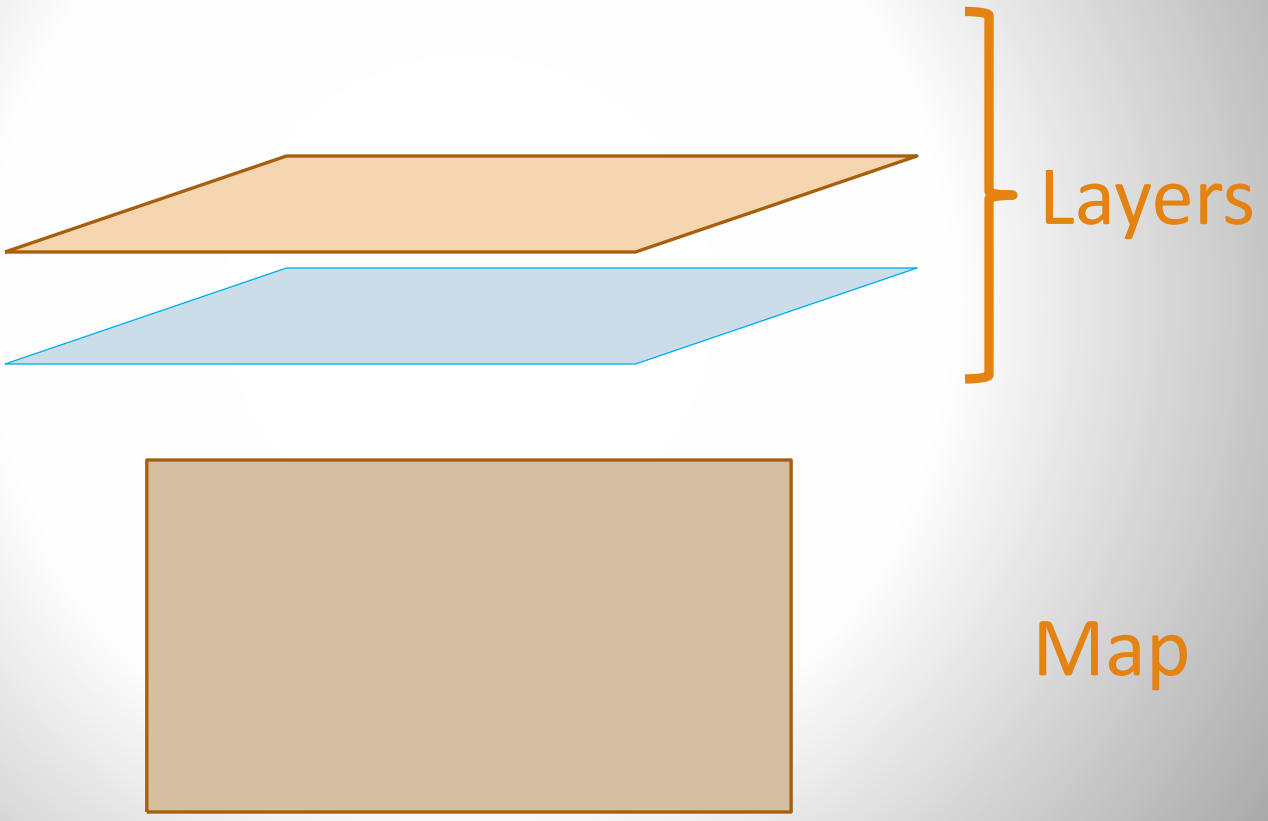

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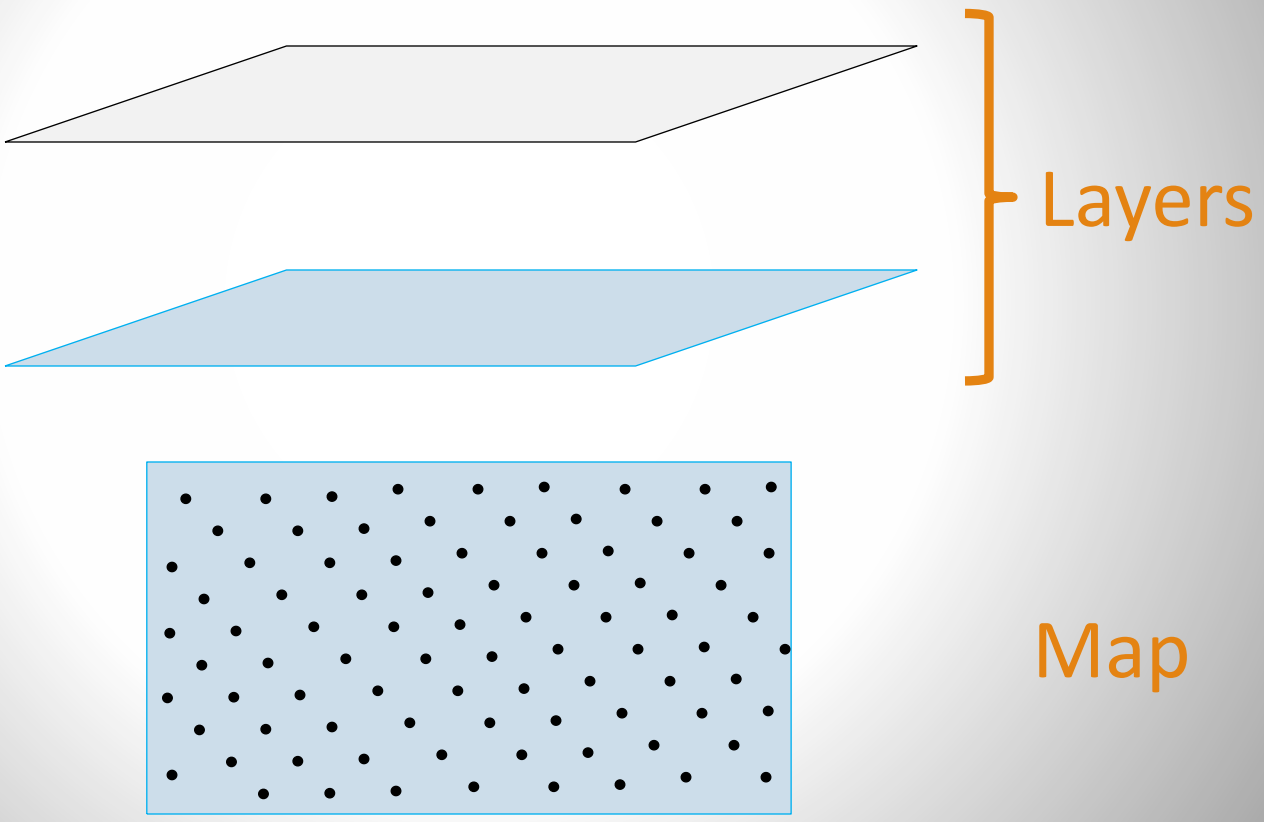


GIS basics: Terminology

Coordinate system - A recognized reference frame for locating points in a particular place.

- The latitude and longitude of a point are defined in terms of a specific coordinate system
  - Examples of coordinate systems include *North American datum of 1983* and *Maryland state plane coordinate system*

Geocoding - Process of identifying the coordinates of a location given its address.

GIS basics: Terminology

Shapefile (also coverage file) – Digital data for displaying particular map features (points, lines, areas)

- A shapefile for 2010 census tracts is needed to display these tract boundaries on a map

GIS basics: Terminology

Table - A file containing rows (records) and columns (variables) of data.

Thematic map – A map using different shades or colors to categorize areas according to specified groupings.

- Example: A thematic map of census tracts colored according to poverty rate ranges

GIS resources

ESRI GIS Dictionary,
http://support.esri.com/other-resources/gis-dictionary

MIT OpenCourseWare: Introduction to GIS (w/ArcMap and QGIS exercises),
https://ocw.mit.edu/resources/res-str-001-geographic-information-system-gis-tutorial-january-iap-2016/introduction-to-gis/

Exercise

Geocoding client addresses and displaying on a map overlaid with small area data

Exercise

1. Geocode client address
2. Prepare small area data
3. Display client address and small area data on same map

QGIS project

Free, open source GIS software

Download and documentation,
http://www.qgis.org/en/site/

Tutorials and tips,
http://www.qgistutorials.com/en/

Geocoding tools

Convert addresses to geographic points

DC MAR geocoder (works on DC addresses only),
http://octo.dc.gov/service/master-address-repository

Texas A&M geocoding services,
http://geoservices.tamu.edu/Services/Geocode/Default.aspx

Shapefiles

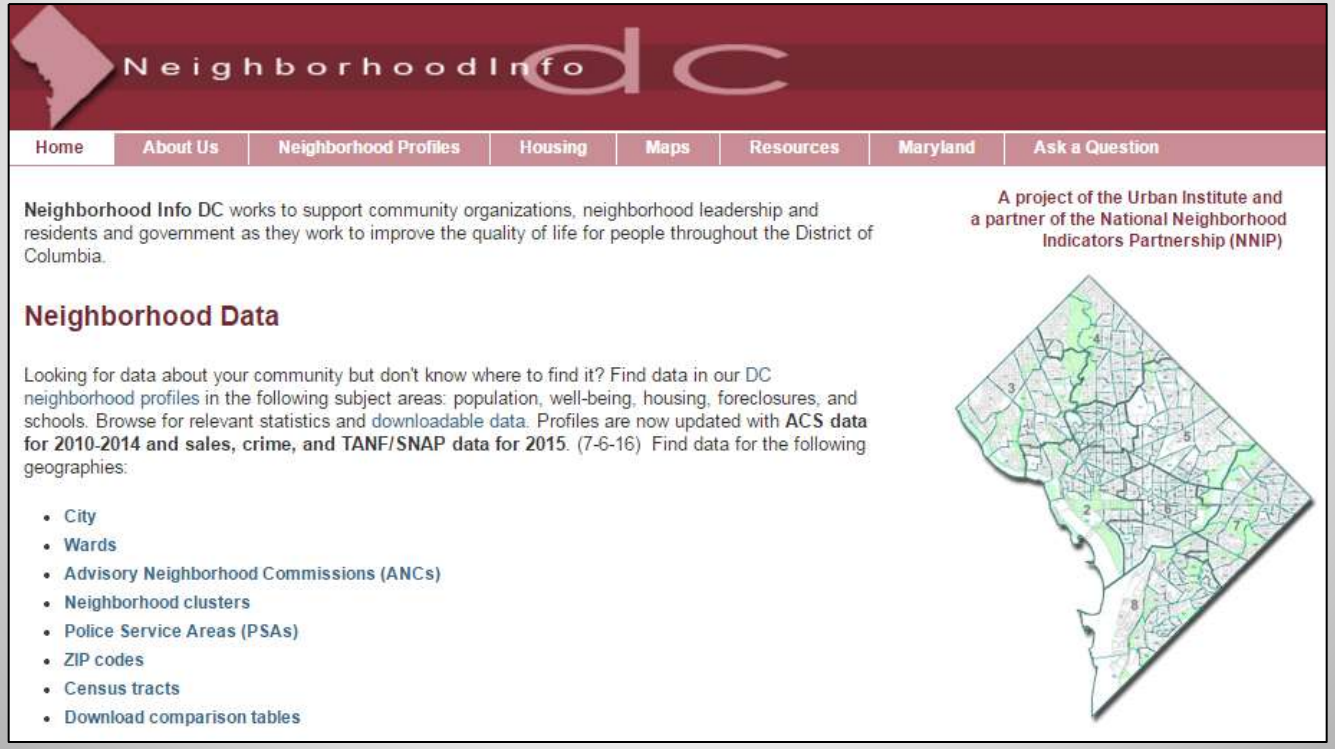
Needed to display geographic features on a map

DC open data (DC maps only),
http://opendata.dc.gov/

US Census, TIGER/Line shapefiles,
http://www.census.gov/geo/maps-data/data/tiger-line.html

Small area data

NeighborhoodInfo DC downloadable data (DC data only), http://www.neighborhoodinfodc.org



Small area data

NeighborhoodInfo DC downloadable data (DC data only), http://www.neighborhoodinfodc.org

Live demonstration

Follow along:

Measure4Change learning curriculum:
Geocoding and mapping client and small area data

Thank you!