Visualizing data on geographical maps

DATA VISUALIZATION IN TABLEAU



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The digital cartography

> **Digital cartography:** construction and use of computer-based systems for the practice of cartography and its applications.



- From paper maps to digital mapping
- Beyond 2D pictures, into "virtual world"
- GPS navigation systems
- GIS: geographic information system
- New professions:
  - GIS developers
  - Location Intelligence experts

Basic (digital) geometries

- **Point:** an exact location on the space
  - Requires `X` , `Y` coordinates
  - (optional) `Z` coordinate indicates height
- **Line:** "polygonal chain", sequence of points
  - Requires a set of sequential points
- **Polygon:** a plane figure described by a finite number of line segments
  - Requires a set of lines (polygonal chains)
  - Starting and closing point

Point		{
		"type": "Point",
		"coordinates": [30, 10]
		}

LineString		{
		"type": "LineString",
		"coordinates": [
		[30, 10], [10, 30], [40, 40]
		]
		}

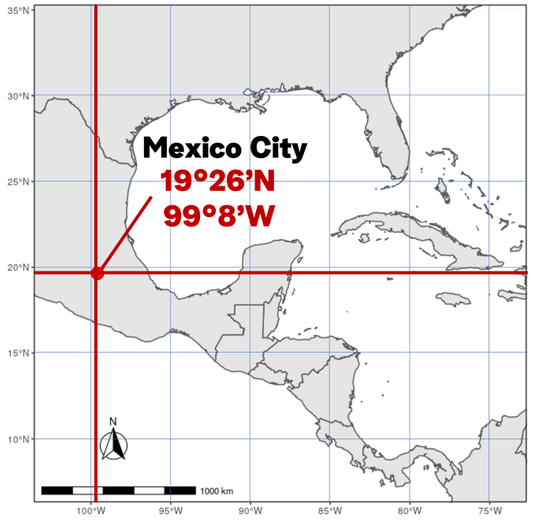
Polygon		{
		"type": "Polygon",
		"coordinates": [
		[[30, 10], [40, 40], [20, 40], [10, 20], [30, 10]]
		]
		}

		{
		"type": "Polygon",
		"coordinates": [
		[[35, 10], [45, 45], [15, 40], [10, 20], [35, 10]],
		[[20, 30], [35, 35], [30, 20], [20, 30]]
		]
		}

[1] Picture: https://en.wikipedia.org/wiki/GeoJSON

Various (geographical) spatial data types

Plain text/spreadsheet files:



- Latitude/Longitude e.g. 19.25 and 99.8
- Names and codes, e.g., *US, London* but also (airport) *LAX* or (NUTS[1]) *BE231* in Europe

[1] NUTS = Nomenclature of territorial units for statistics

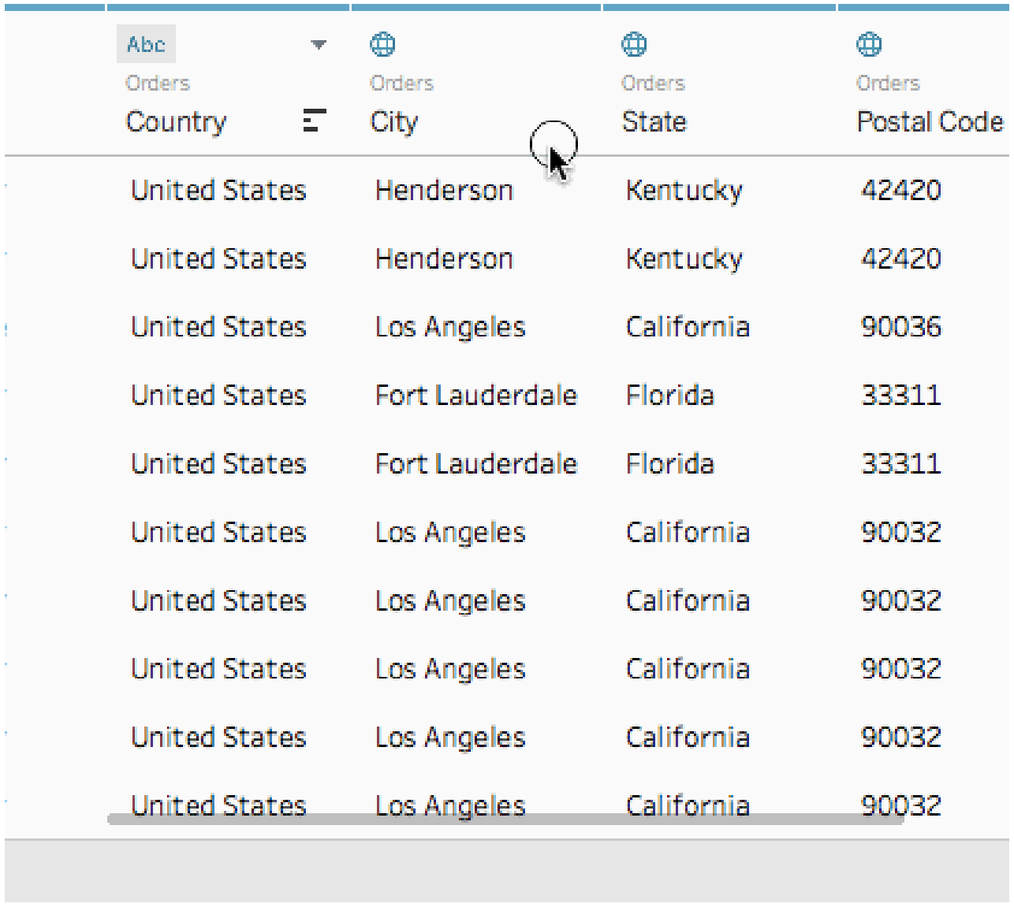
Spatial files (e.g. Shapefile or GeoJSON)

```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "properties": {},
      "geometry": {
        "type": "Polygon",
        "coordinates": [
          [
            [
              -123.70605468750001,
              33.100745405144245
            ],
            [
              -109.5556640625,
              33.100745405144245
            ],
```

- An object containing information about the specific geometry (e.g., point, line, polygon, etc.) along with optional metadata

Recognizing the fields as geographical data

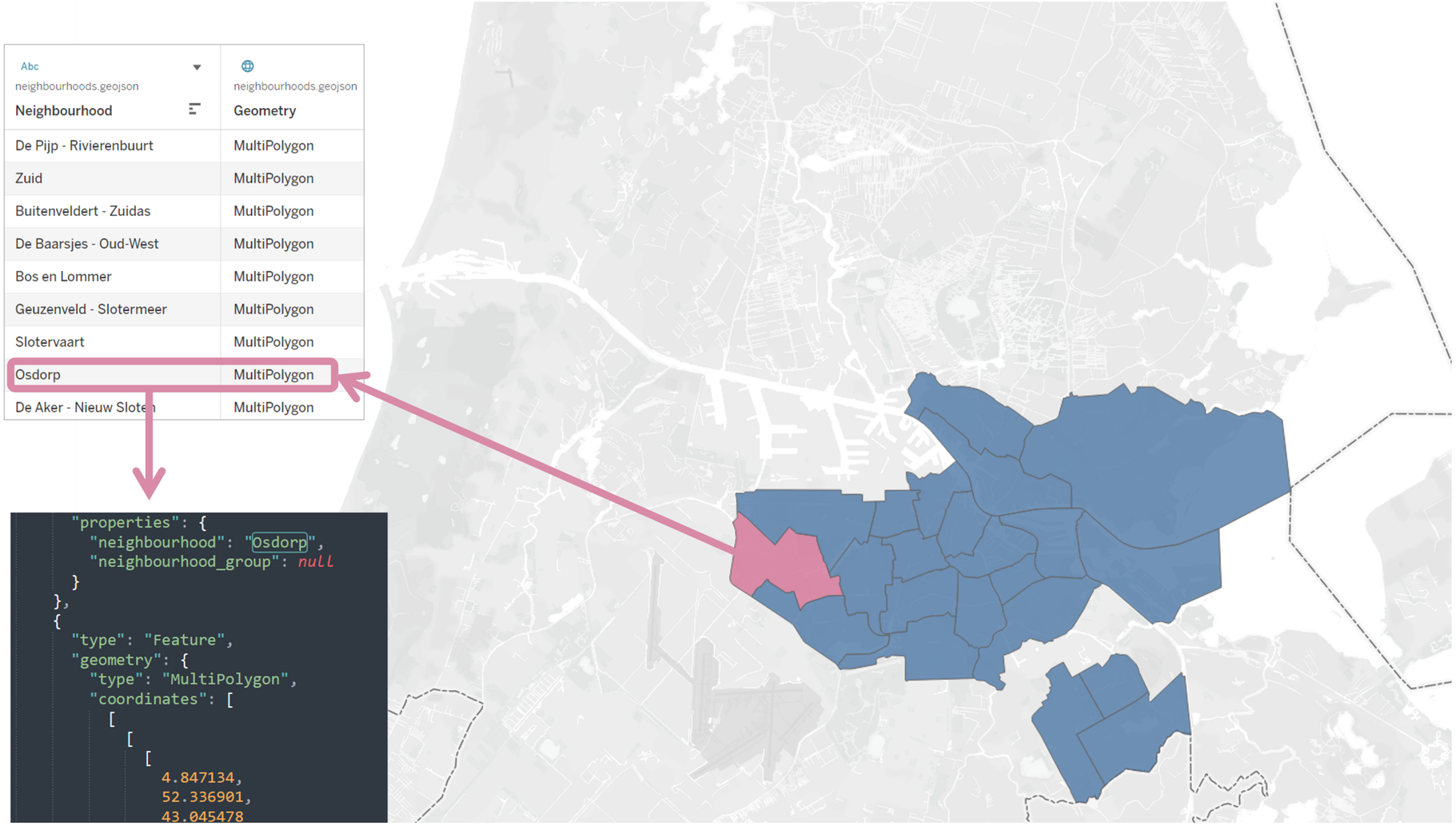
- Assigning a correct geographic role to fields
- Tableau map server auto generates latitude/longitude information
- Double-check the spelling, and number formatting:
  - Lat/Long require numeric, decimal data
  - Correcting typos/ alternative spelling
  - Upload custom geocoding file, if needed



Abc Orders Country	Orders City	Orders State	Orders Postal Code
United States	Henderson	Kentucky	42420
United States	Henderson	Kentucky	42420
United States	Los Angeles	California	90036
United States	Fort Lauderdale	Florida	33311
United States	Fort Lauderdale	Florida	33311
United States	Los Angeles	California	90032
United States	Los Angeles	California	90032
United States	Los Angeles	California	90032
United States	Los Angeles	California	90032
United States	Los Angeles	California	90032

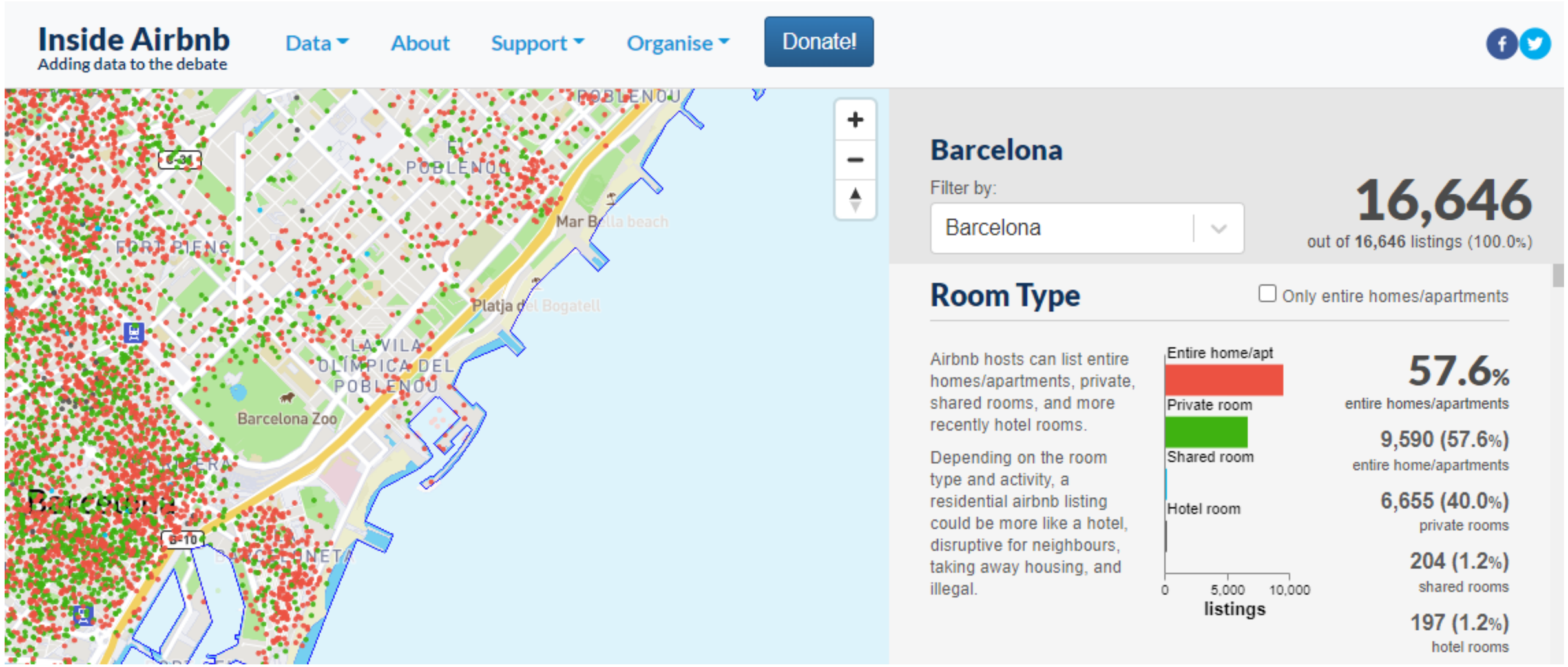
Working with GeoJSONs

Abc neighbourhoods.geojson Neighbourhood	neighbourhoods.geojson Geometry
De Pijp - Rivierenbuurt	MultiPolygon
Zuid	MultiPolygon
Buitenveldert - Zuidas	MultiPolygon
De Baarsjes - Oud-West	MultiPolygon
Bos en Lommer	MultiPolygon
Geuzenveld - Slotermeer	MultiPolygon
Slotervaart	MultiPolygon
Osdorp	MultiPolygon
De Aker - Nieuw Slote	MultiPolygon



[1] https://geojson.io/

Airbnb dataset



[1] http://insideairbnb.com/barcelona

Let's practice!

DATA VISUALIZATION IN TABLEAU

Discovering the world through Tableau maps

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DATA VISUALIZATION IN TABLEAU

Doing more with maps - custom backgrounds

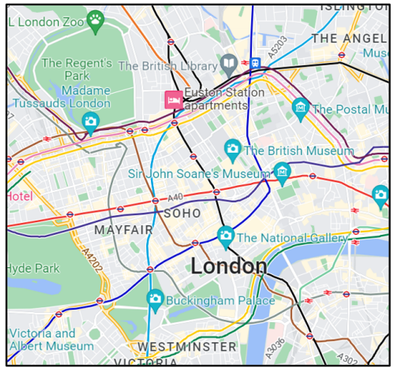
DATA VISUALIZATION IN TABLEAU

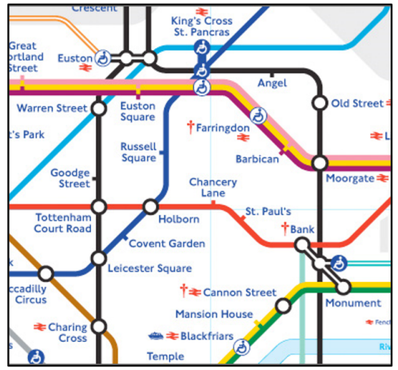


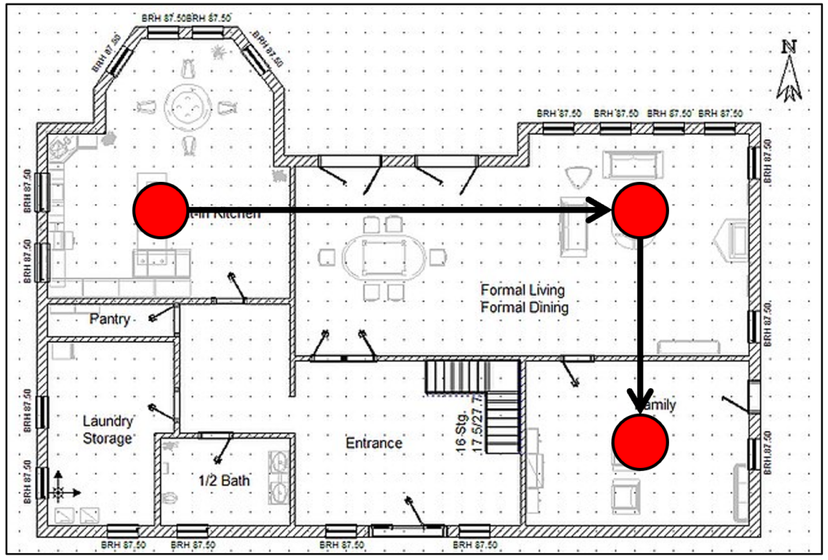
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Spatial visualization - not only geographical maps





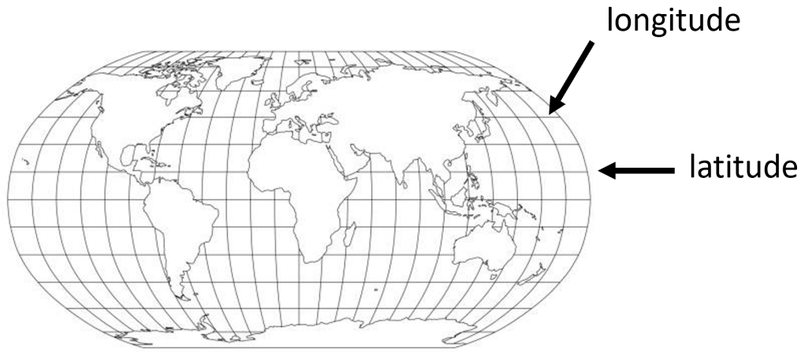


- Custom / simplified maps
  - E.g., metro maps with traffic intensity
- Process analytics
  - E.g., product path on the production lines
- Building schematics
  - E.g., in-home electricity plan
- Point-to-point mapping
  - E.g., road trip plan on a custom map

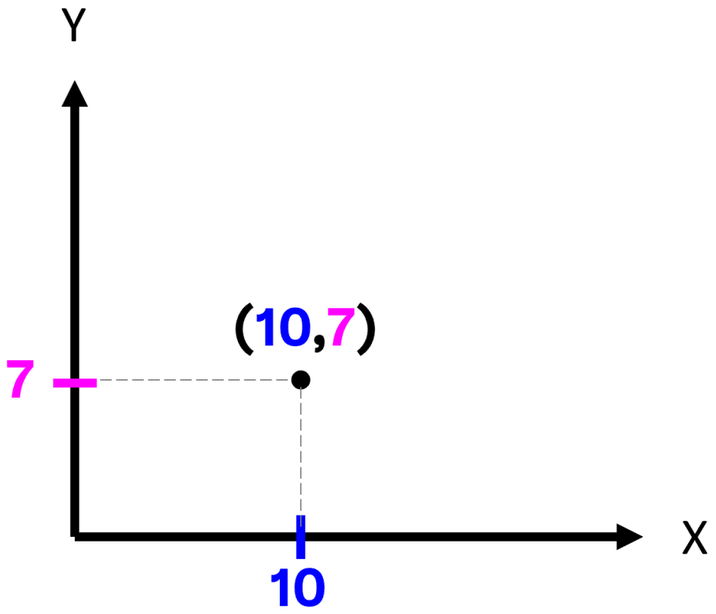
Latitude, longitude, X, Y = coordinates

Coordinates:

- Geographic grid: latitude & longitude:

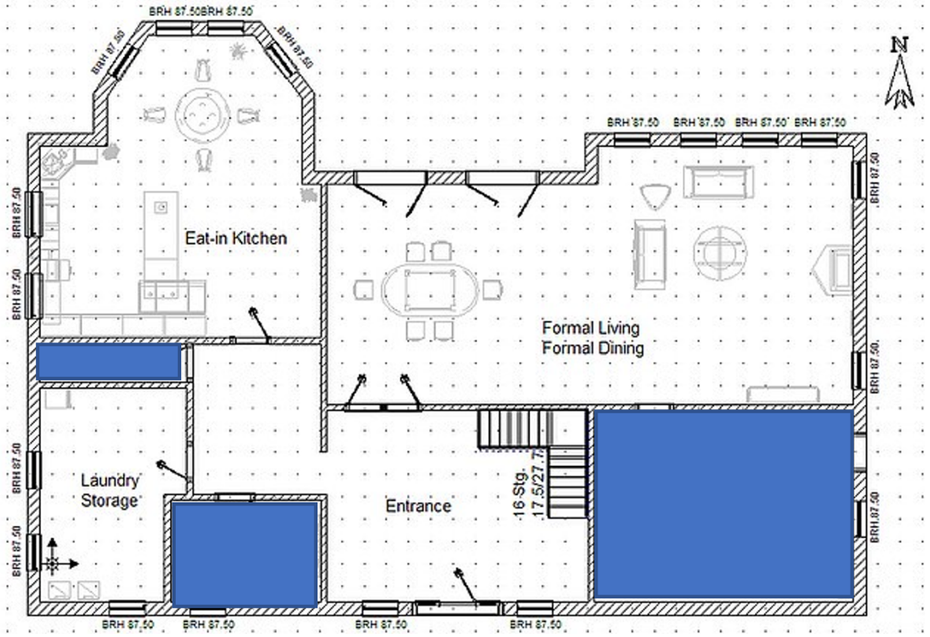


- Any grid (2D): `X` , `Y`



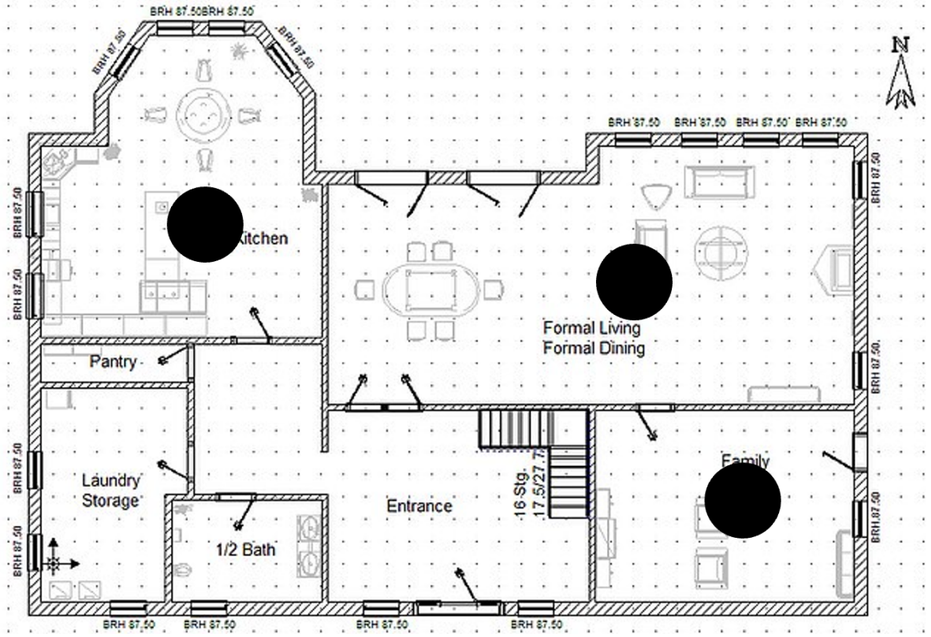
Point and polygons custom maps

Polygon maps:



- Representation of an area
  - More data needed

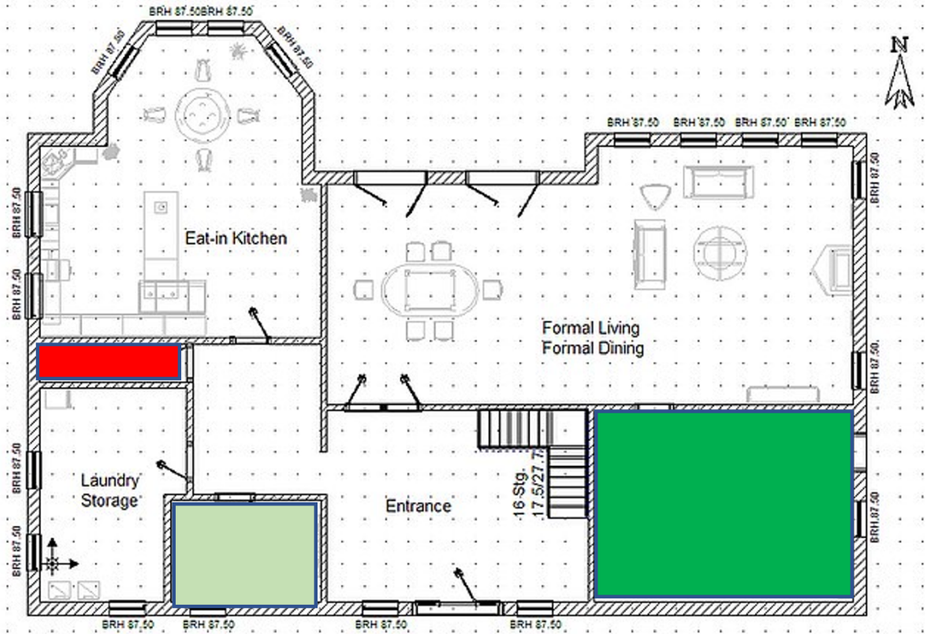
Point maps:



- A specific place or a symbol of an area
  - Less data needed

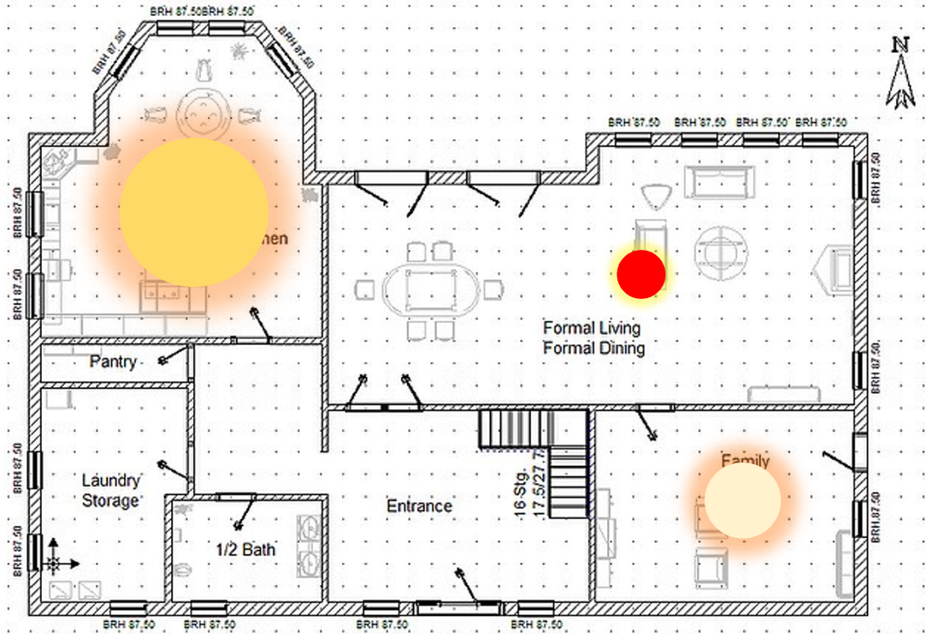
Point and polygons custom maps

Polygon maps:



- E.g., occupied (hours per day)

Point maps:



- E.g., luminous intensity and frequency of usage (hours ON per day)

Steps in visualizing custom map data

Step 1: Load the desired background image.

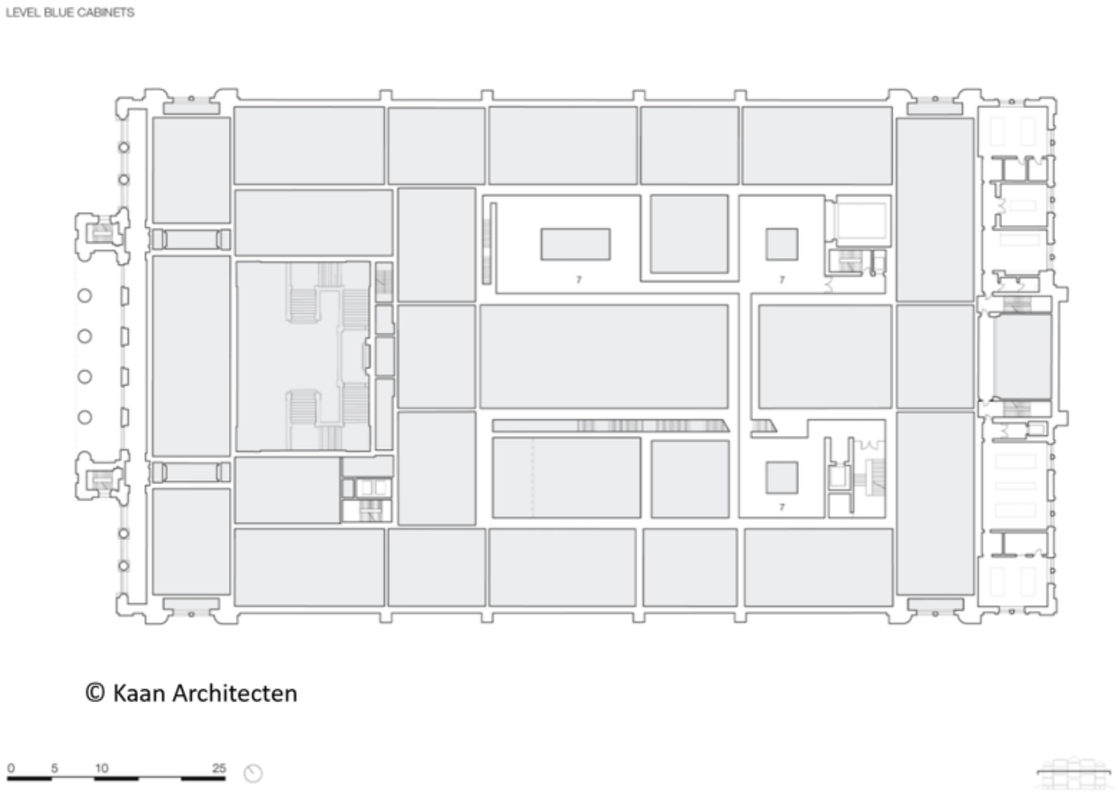
Step 2: Identify points/areas of interest and note down the coordinates in X-Y format, and create a location dataset

Step 3: Combine the coordinate data with extra data with dimensions and facts.

Step 4: Visualize the combined data, using color, highlights, annotations, animation, etc.

Museum visits visualized

- Setting up custom background map
- Visualizing the traffic in various museum areas
- How traffic evolves during the day
- Visualizing main traffic pathways in the building



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A quick visit to Treasure Island

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