

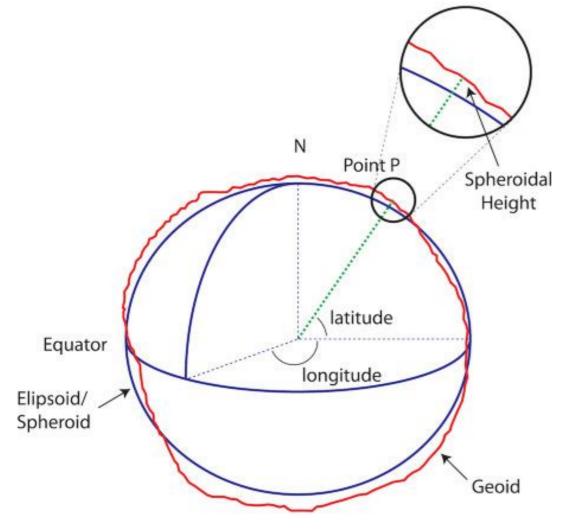
MASTER IN CITY & TECHNOLOGY DIGITAL TOOLS AND BIG DATA 2020/2021

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Spatial

More than pairs of coordinates

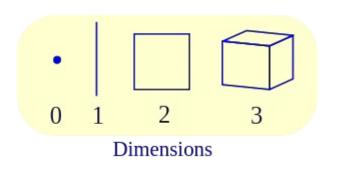




Spatial data implies a reference system (RS). This arrangement allows to determine coordinates.

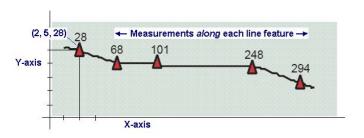
Space is, in some cases, a geographical space.

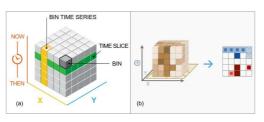
Analysts need to know the data's RS. A compatible RS is needed for any analysis (e.g. epsg:4236 / epsg:32631)

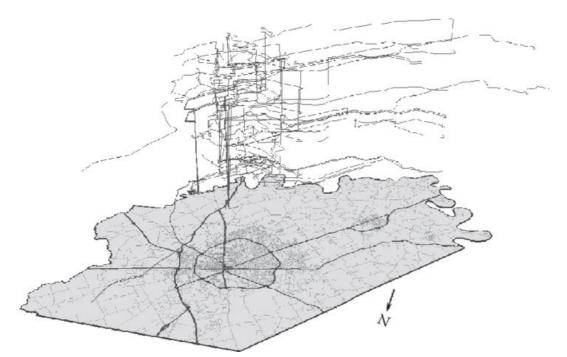


Depending on the nature of every object, the representation corresponds to a dimensional space.

Most objects in space can have a representation. However, they need to have a precise delimitation.







When adding additional spatial features, there are options for creating multiple dimensions

(e.g., distance-from, distance-to, epoc, time, t-time, etc.)

Source: https://www.researchgate.net/publication/261871322 Analysis of human space-time behavior Geovisualization and geocomputational approaches



Spatial Domain

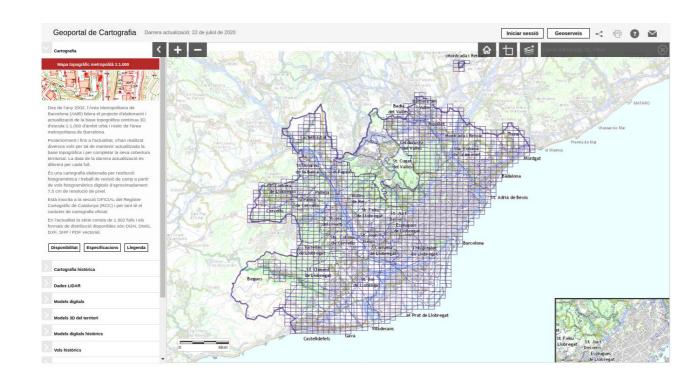
Defining Areas of Interest





Understanding environmental dimensions of Barcelona's environment

Source: http://www3.amb.cat/repositori/ESPAIPUBLIC/Pla_millora_biodiversitat.pdf



Barcelona Metropolitan Area



Large scale data, 1:10m



Cultural Physical Raster

The most detailed. Suitable for making zoomed-in maps of countries and regions. Show the world on a large wall poster.

1:10,000,000 1" = 158 miles 1 cm = 100 km

Medium scale data, 1:50m



Cultural Physical Raster

Suitable for making zoomed-out maps of countries and regions. Show the world on a tabloid size page.

1:50,000,000 1" = 790 miles 1 cm = 500 km

Small scale data, 1:110m

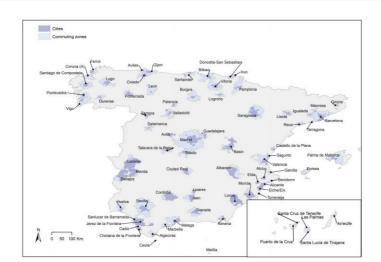


Cultural Physical

Suitable for schematic maps of the world on a postcard or as a small locator globe.

1:110,000,000 1" = 1,736 miles 1 cm = 1,100 km

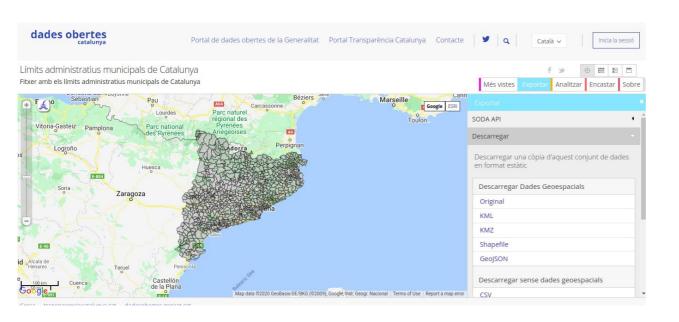
Barcelona Metropolitan Area





Natural Earth: https://www.naturalearthdata.com/downloads/
OECD: Functional Areas: https://www.naturalearthdata.com/downloads/
OECD: Functional Areas: https://www.naturalearthdata.com/downloads/
OECD: Functional Areas: https://www.oecd.org/regional/regional-statistics/functional-urban-areas.htm





Barcelona Metropolitan Area



- a) Build and Share a layer for AMB limits
- b) Search and share complementary layers: Rivers, roads, urban areas, water bodies, etc.
- c) Create a QGIS project with basemap and customised layer styles
- d) Explore a second city having a similar AOI to validate this process

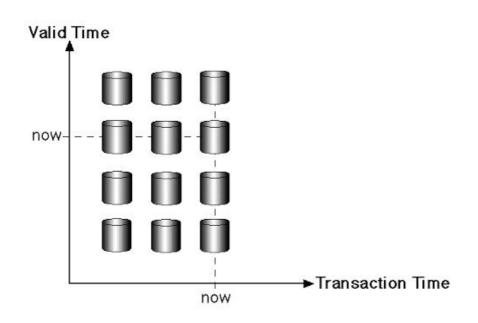


Data: Tasks

Temporal

How computer systems handle time?





When time "started" the Unix epoch at 1 January 1970 00:00:00 UT

Computational units Milliseconds, Seconds, Minutes, Hours, Day, Month, Year, Time Zone



Time instant: a particular point in time that can be associated to a particular event.

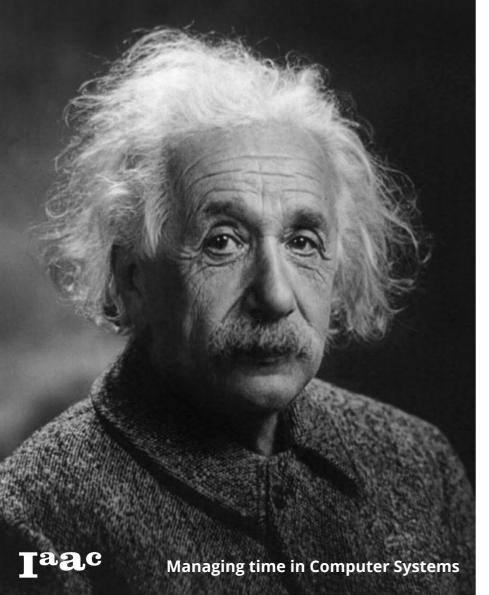
12h

12h:23m:05.35s

11/10/2020 12h:23m:05.35s

11/10/2020 12h:23m:05.35s GMT

Time period or time interval: the time between two instants (start - end) that can be associated to a specific event or series of events.



Although there is no limit:

Step 1: Setting versions

Step 2: building spatio-temporal models

Step 3: dealing with real time data

Spatial Analysis

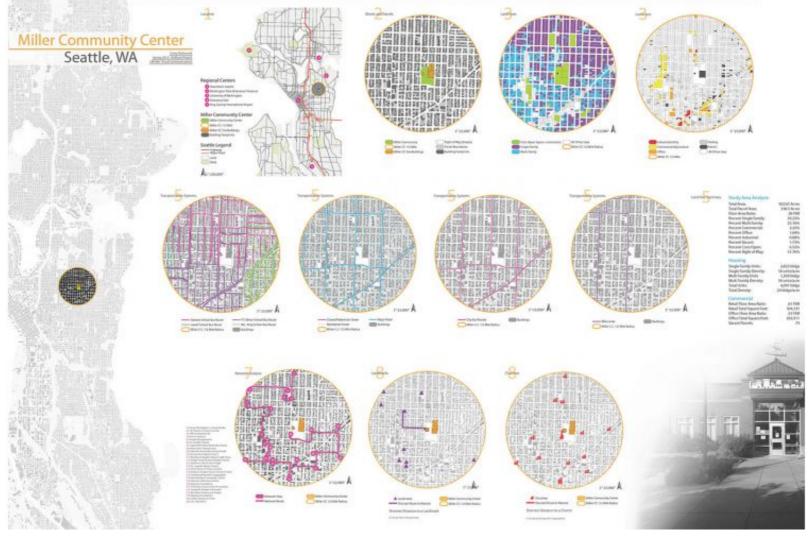
How to make spatial data more useful?



Continuous
Discrete
Categorical
Ordinal
Nominal
Reference/key *

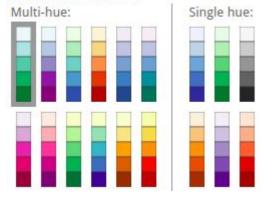
Sequential Diverging Qualitative

Always check if **0** / **cero** / **NaN** / **No value** mean something for the analysis

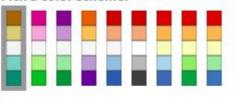




Pick a color scheme:



Pick a color scheme:



Pick a color scheme:



Secuencial:

0-10 units 10-20 units 20-30 units >30 units

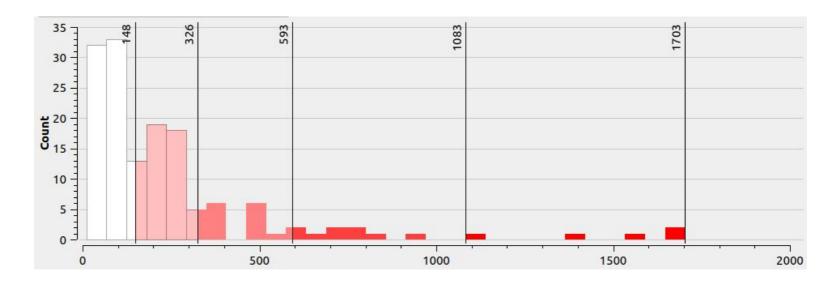
Divergent:

> +10	very good
-3 - +10	good
-3 - +3	neutral
-103	bad
< -10	very bad

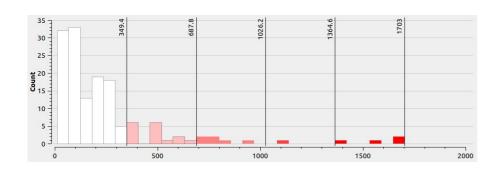
Qualitative:

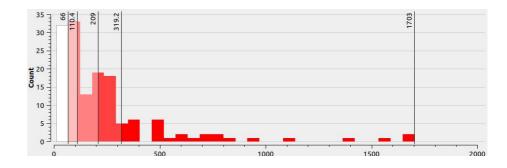
Category X Category J Category U Category L Category E





Natural breaks / Equal intervals / Quantiles







Source: https://en.wikipedia.org/wiki/Jenks natural breaks optimization

Illustration (general)

Map (Cartography)

Background

Fill

Shape / icon

Size

Border

Transparency

Color blending

Orientation

Projection

Orientation

Projection

Guidelines and Tics

Axis

Axis labels

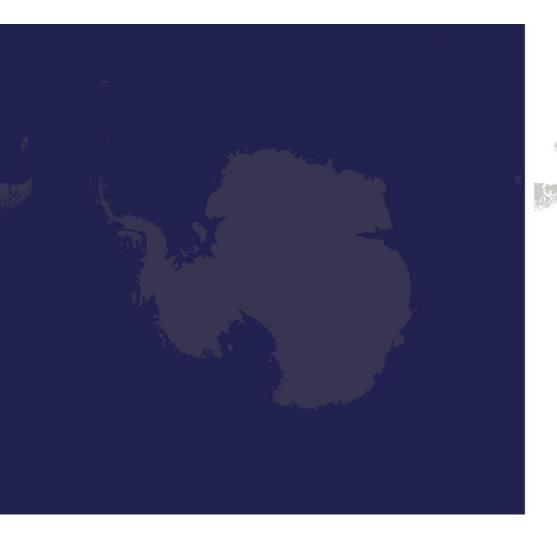
Title

Legend

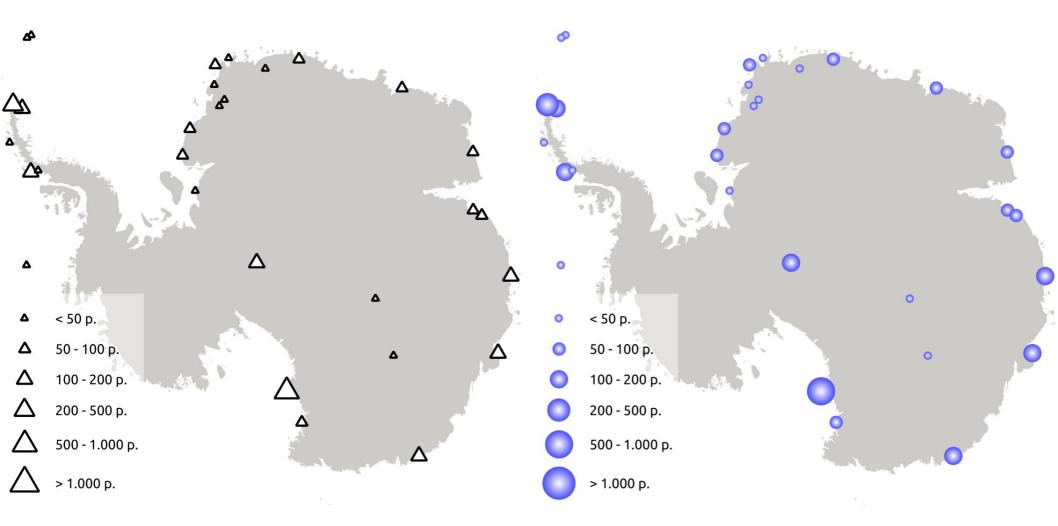
Sources

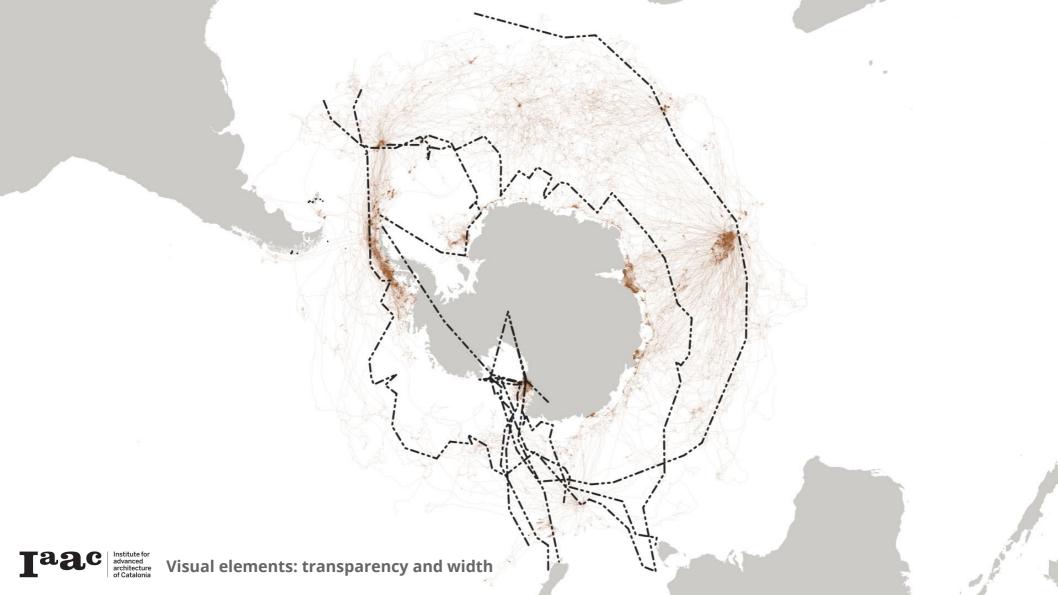
And lots of rules











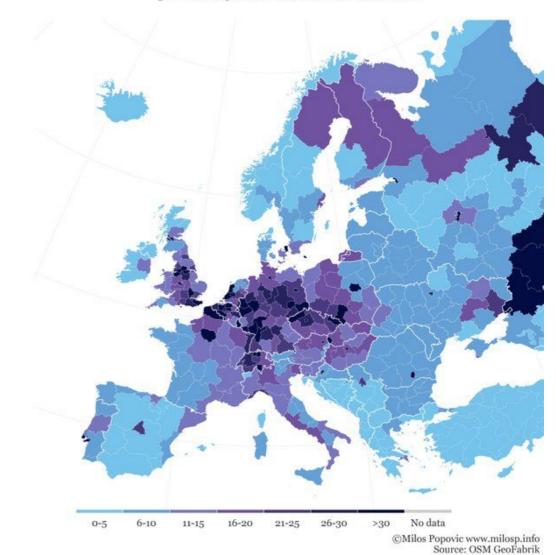
0 2 4

Example from: https://twitter.com/milos_agathon/status/1310879353933357059
Points in polygon: https://en.wikipedia.org/wiki/Point_in_polygon



Points in Polygons

Railway length (in km) per 100 square kilometers of land area







- a) Find point, line and polygon layers for your AIO(s)
- b) Create views overlaying different layers and share them with your peers
- c) Plan a point-in-polygon analysis and represent it through a corophlet map



Space-time

Are you sure you want to use the two of them?





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