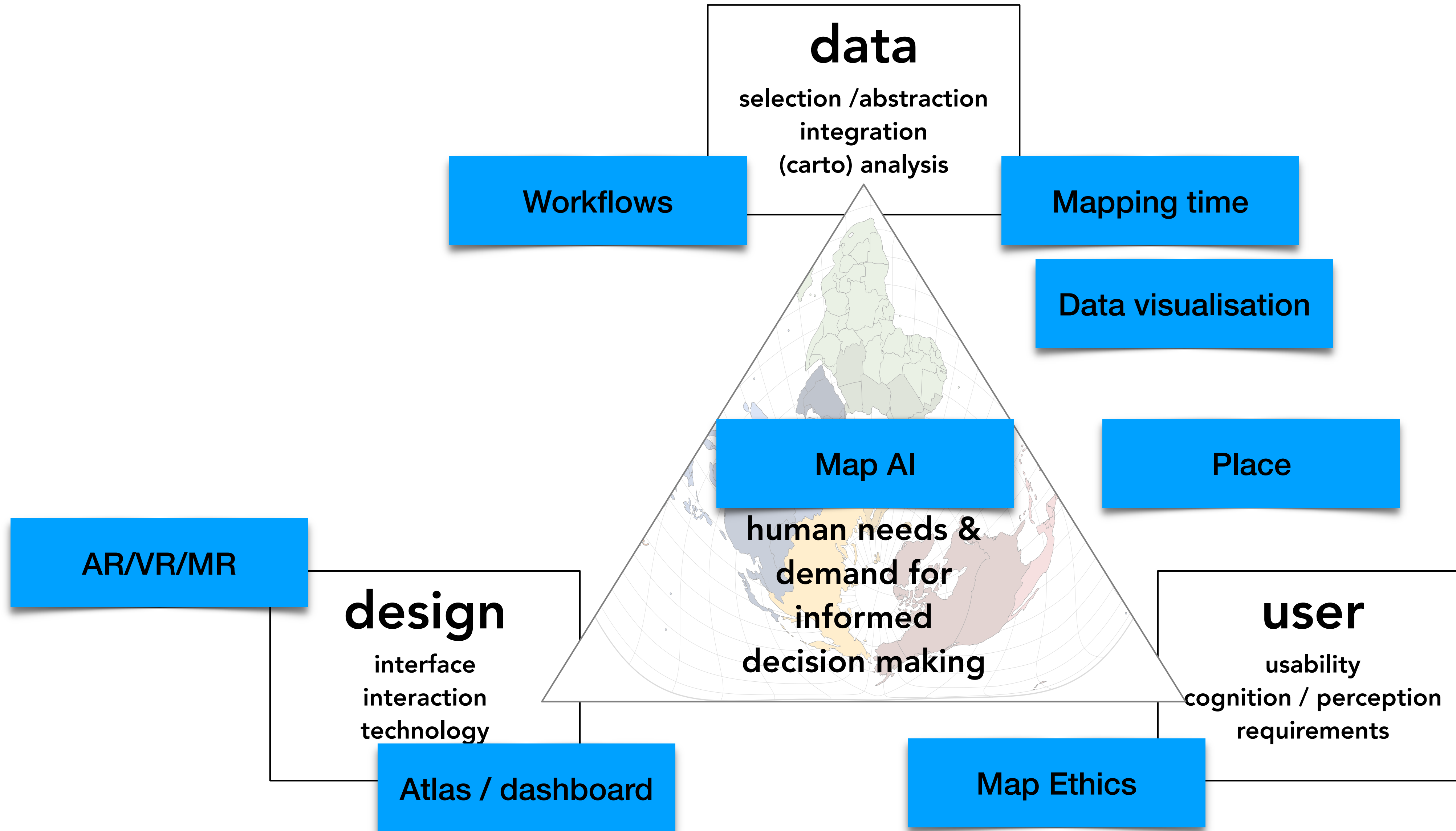


# CARTOGRAPHIC INTERESTS IN TWENTE



**MENNO-JAN KRAAK / BAREND KÖBBEN**  
(04-2023)

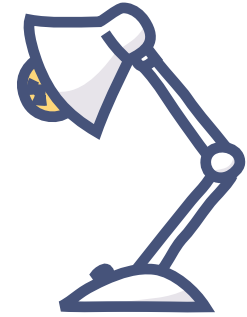
# MSc Carto's perspective



# Cartographic interests in Twente



**Atlases / Dashboards**



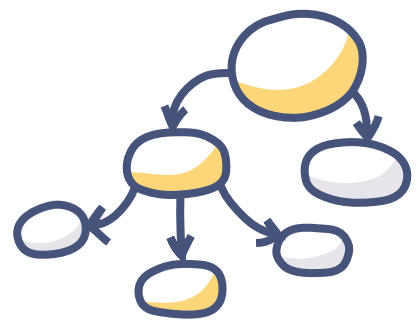
**Map AI & Map Ethics**



**Mapping time**



**Place & Space**



**Visualization of automated workflows**



**Data visualization**



# Atlases and dashboards

## Concept

**The Naivasha Region**

ITC has been active in the Lake Naivasha area since the mid eighties of last century. The focus area has been the management of water and natural resources. More than twenty integrated projects have been executed over the years. ITC staff and student have been working with local stakeholders such as national and local authorities as well as private organization and research institutes. Research questions have been formulated together with the local stakeholders. Many students have followed educational programs at ITC, participated in refresher courses or tailor made courses and participated in local fieldworks. From a scientific perspective the projects resulted in three PhD graduations studies, over 80 MSc theses and many publications. Ten software modules were delivered.

**History of the MSc MGEO**

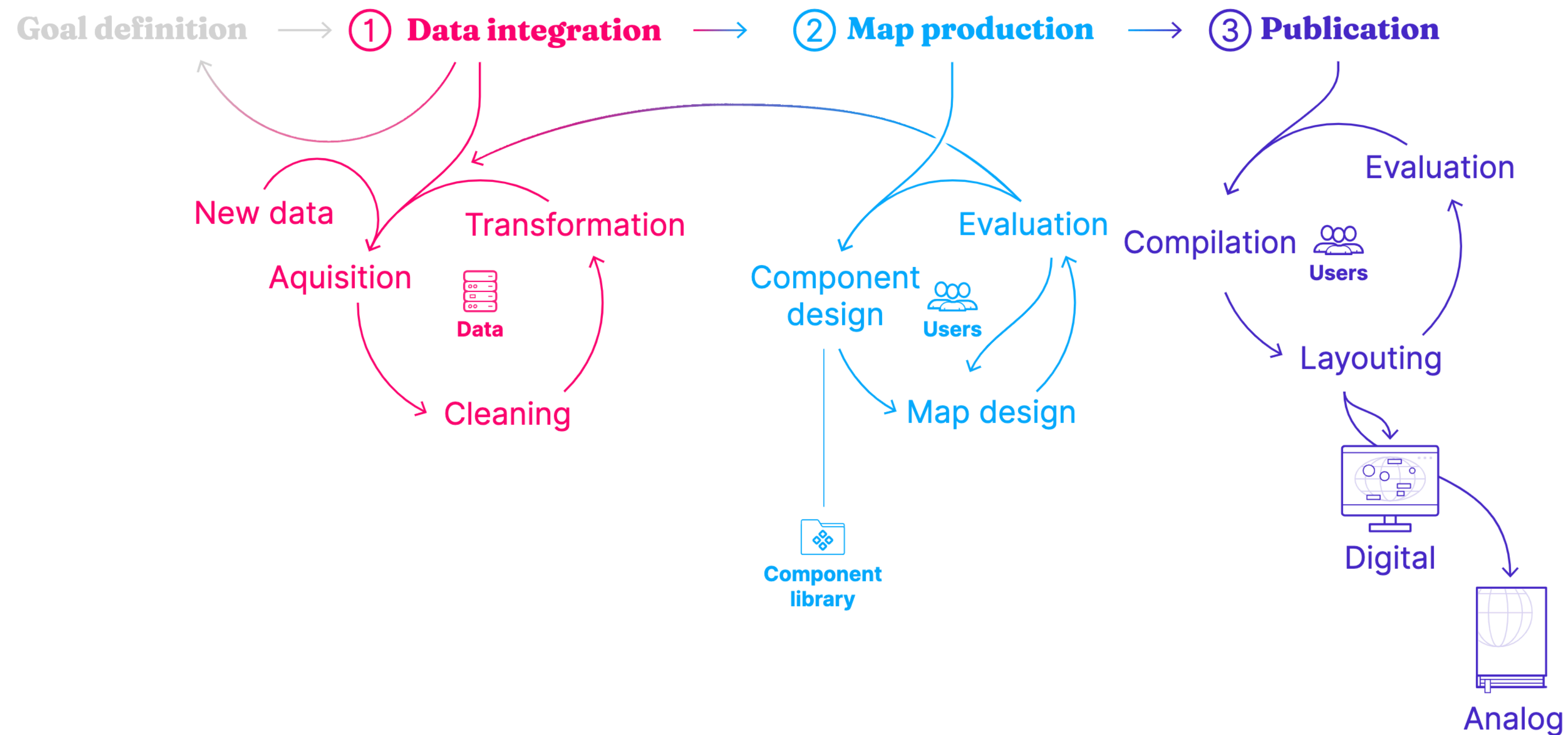
The stream graph shows how the different MSc programs have evolved over time, resulting in the program as we know it today. Both 1990 and 2000 have been significant years in which a whole overhaul over the program took place. The programs have always been linked to the changing departmental structure of ITC.

While reading the numbers one has to realize that we had to use different data sources, such as the alumni database, annual reports, and data stored in ITC's archive. These numbers did not always correspond. Also the notion of MSc might have been different during the early years of ITC. The map shows the origin of the MSc graduates by country.



# Atlases and dashboards

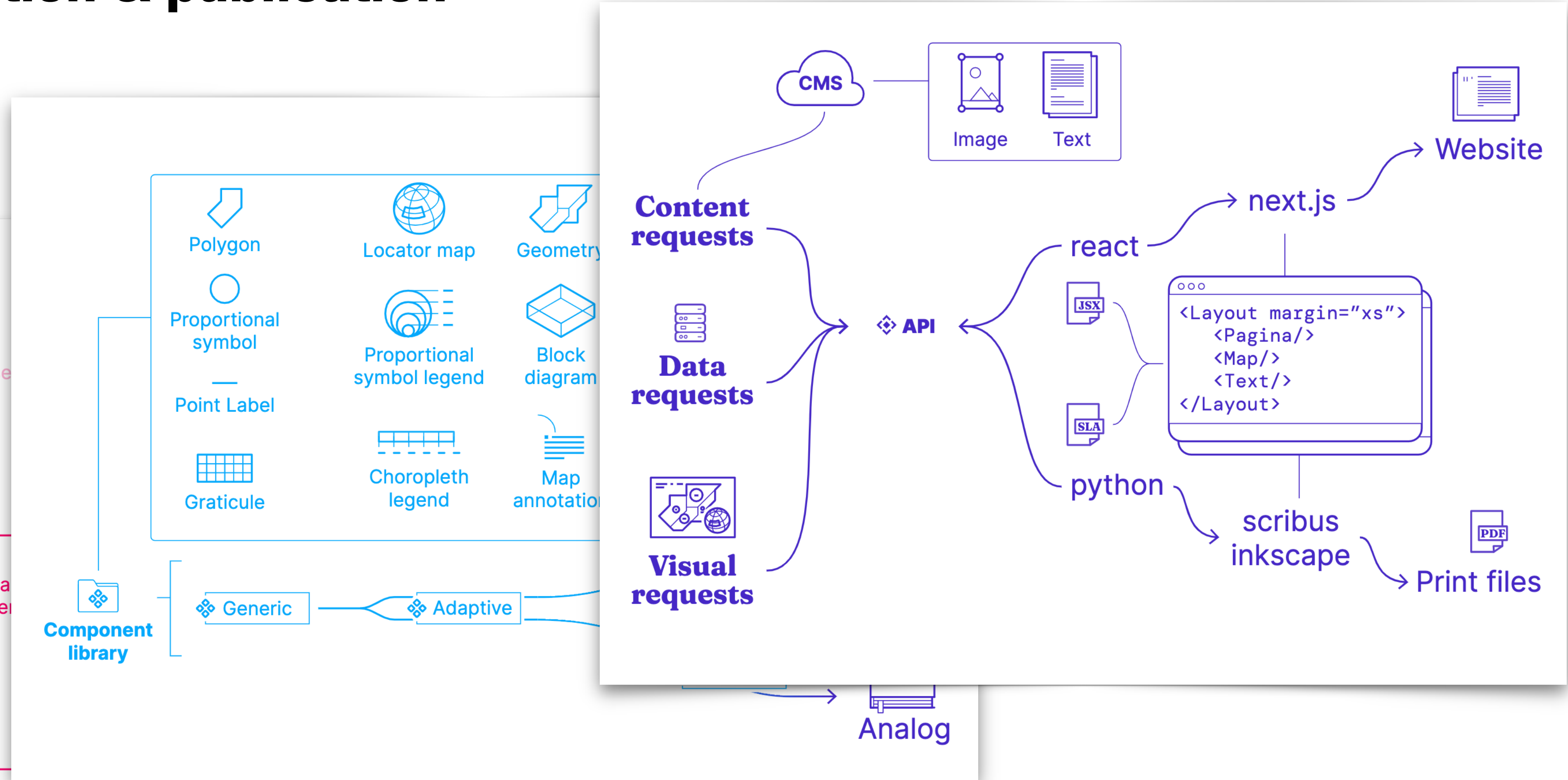
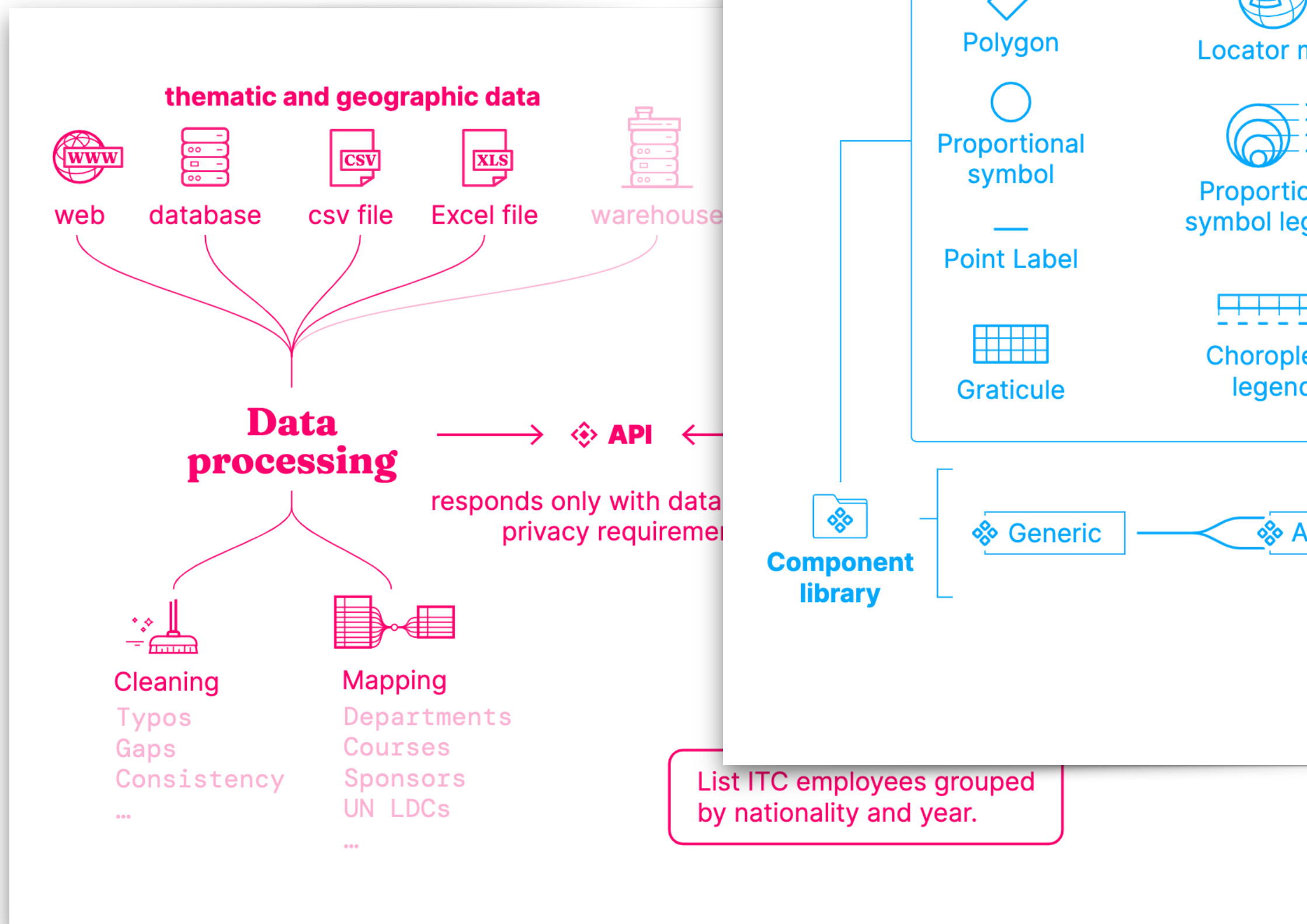
## Workflow





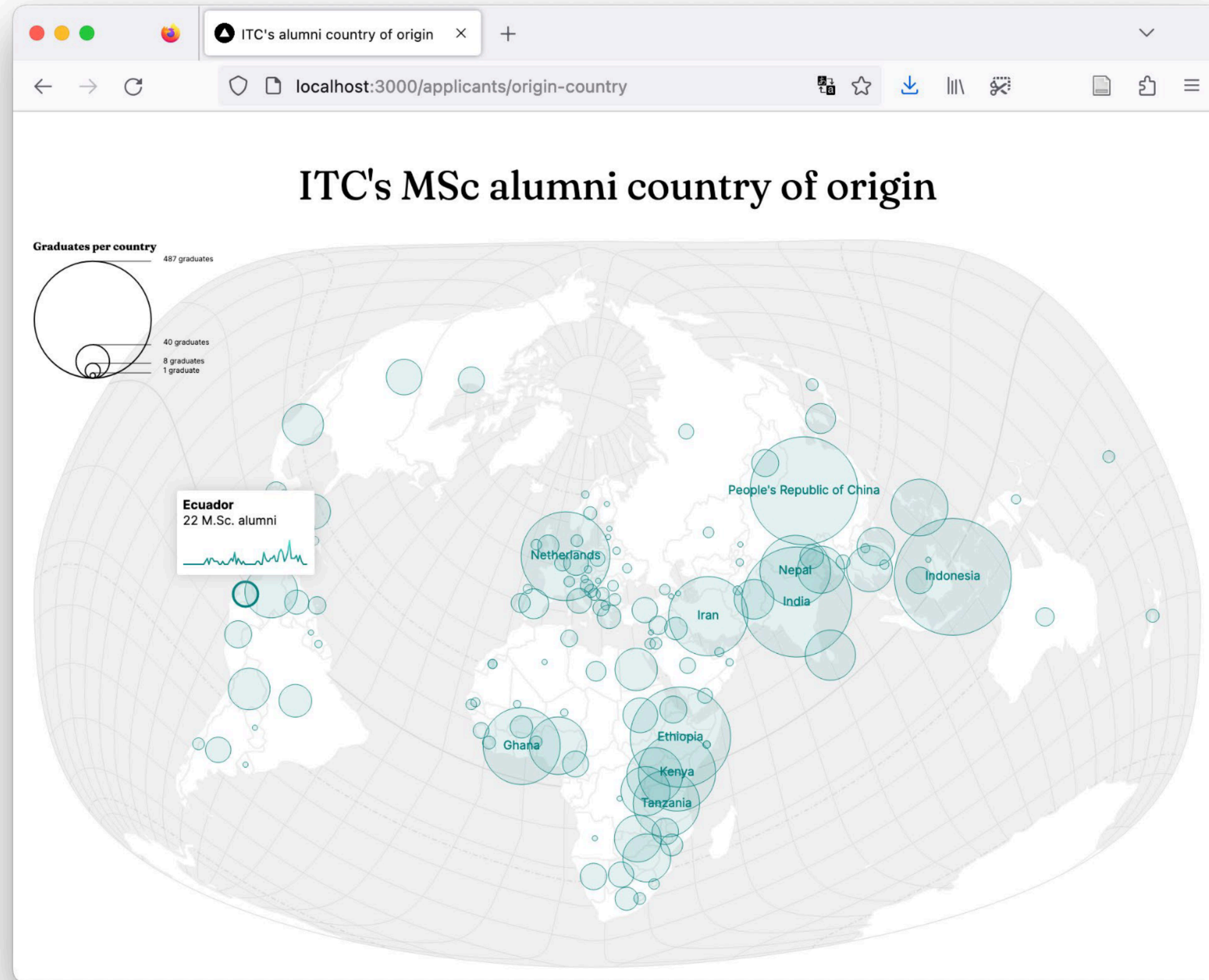
# Atlases and dashboards

## Integration, production & publication



# Atlases and dashboards

## Paper & on-line



More than 20.000 alumni  
from all over the world

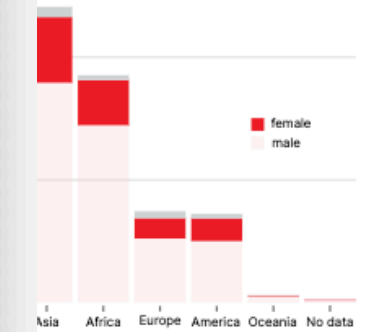
A combination of geo-information science, remote sensing in postgraduate education and unique in the world.

In the Netherlands, the Faculty of the University of Twente (UT) offers a wide range of high-quality international oriented (online) courses and Master's in the field of information science and earth observation. ITC's combination of information science and remote sensing in postgraduate education in different domains is unique in the world.

Education is based on knowledge exchange between organizations in less developed countries on the one hand and the Western world on the other, by ITC acts as a two-directional platform for knowledge exchange.

The map shows a scaled circle for every city with more than 500 inhabitants. Cities with less than 500 inhabitants or from places with less than 500 inhabitants are not shown in this map. The area of each circle corresponds to the number of alumni from this city.

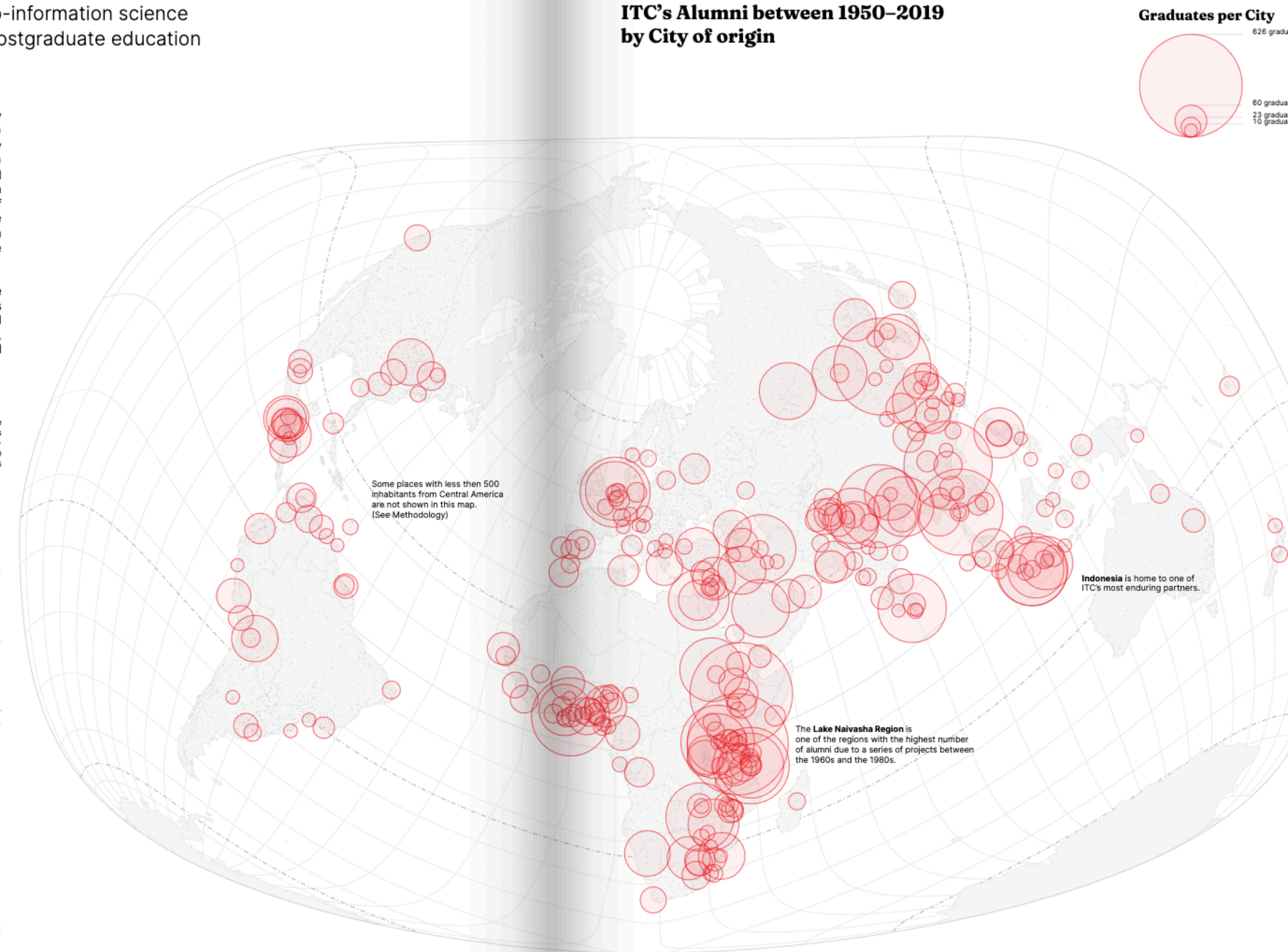
### Alumni per Continent



### Alumni over Time



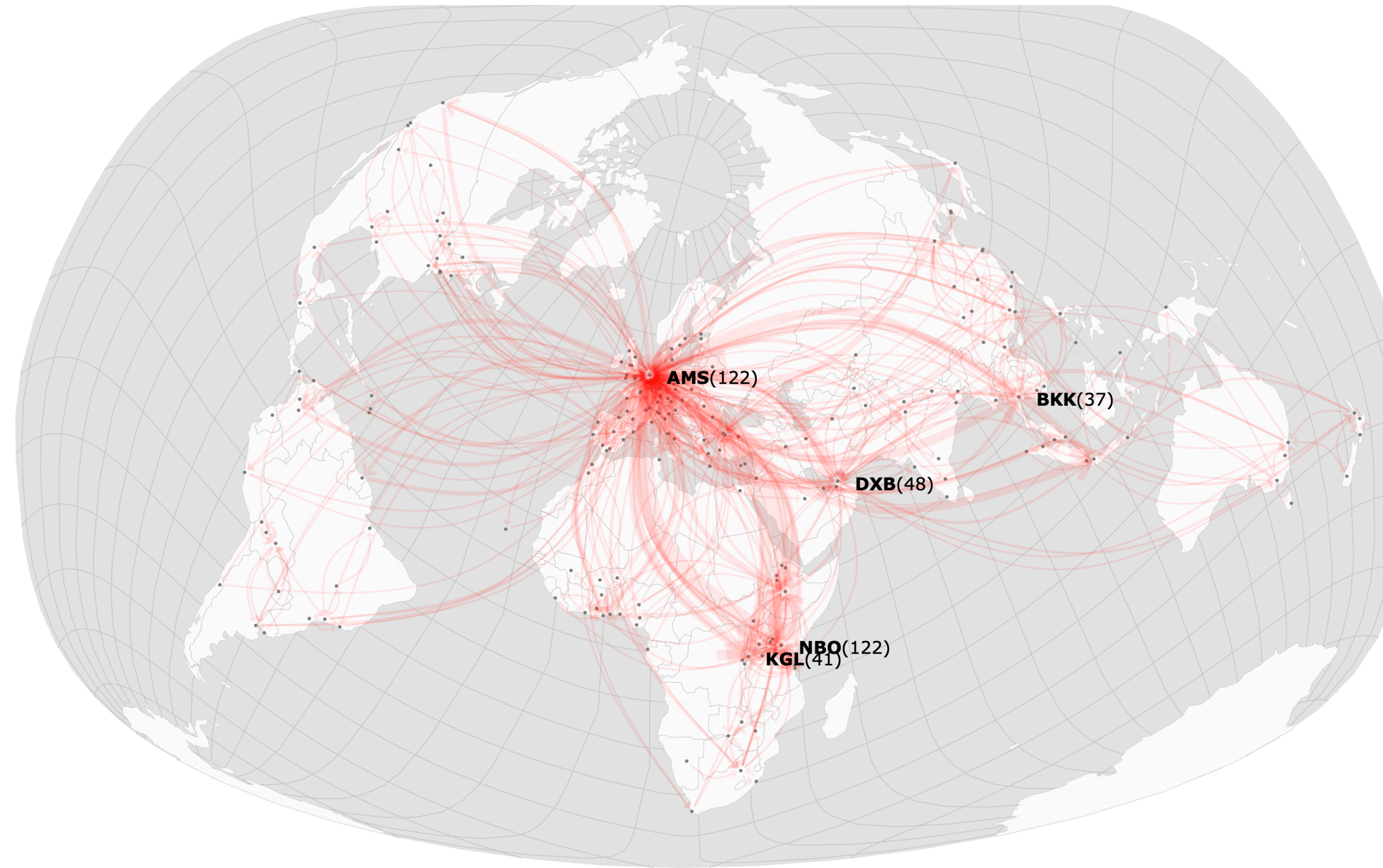
### ITC's Alumni between 1950-2019 by City of origin



# Map AI & Map Ethics

## 'MapGTP'

Methodology



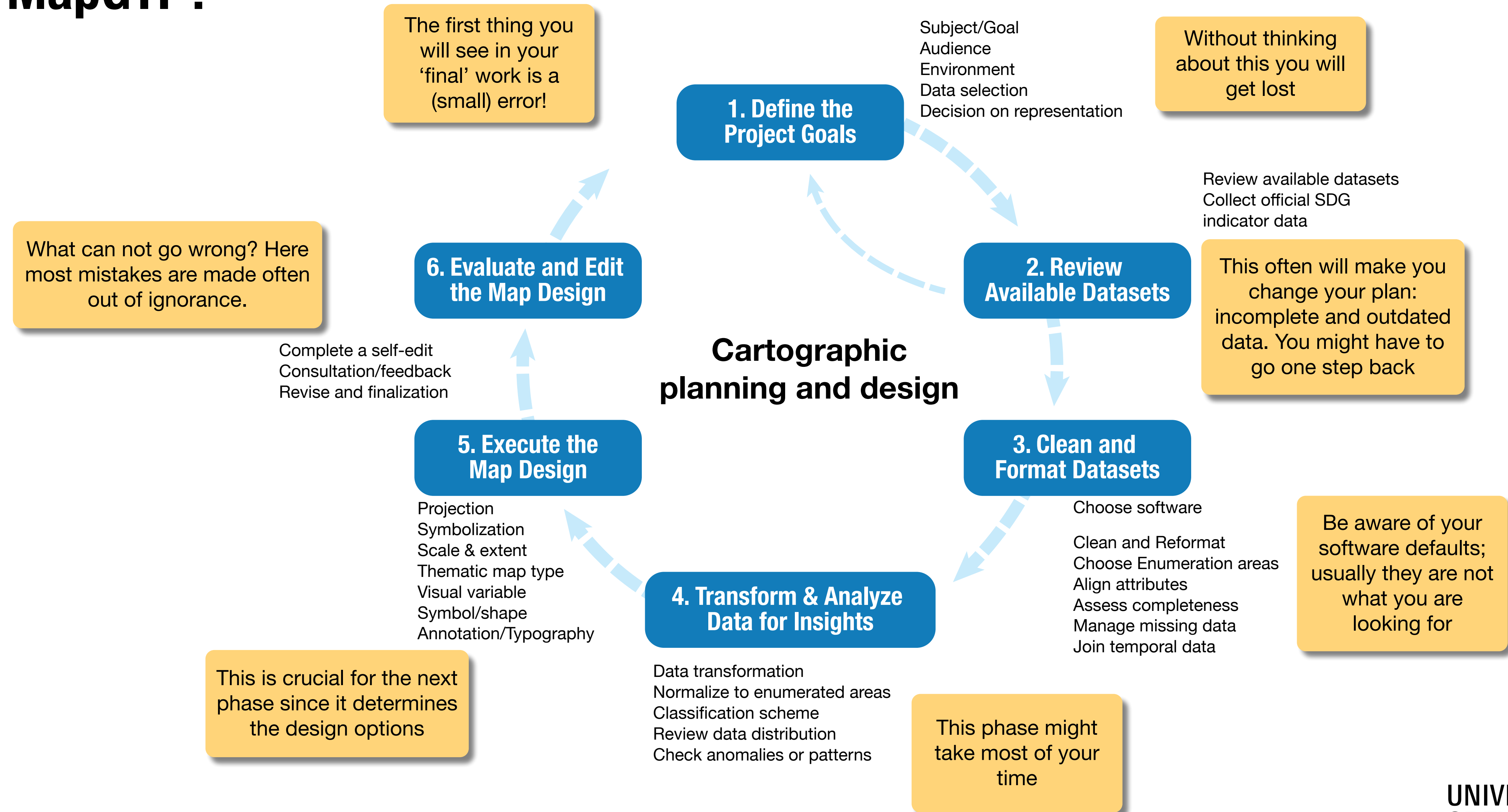
Use

transparency / explainable



# Map AI & Map Ethics

## Input MapGTP?



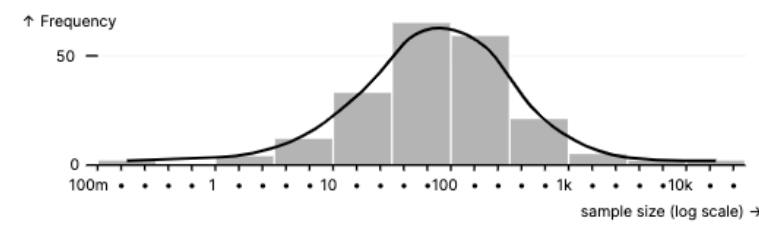
# Map AI & Map Ethics

## But .....

How to read

### Choropleth Maps

Population density is the number of people per unit of area, usually quoted per square kilometre or square mile, and which may include or exclude for example areas of water or glaciers. Commonly this may be calculated for a county, city, country, another territory or the entire world.



#### Skewed Distributions

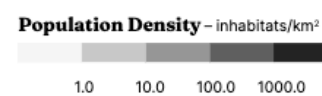
For population related data, realize their distribution is not homogeneous

#### Pitfall N° 1

### Inhomogeneous Distribution

For population related data, realize their distribution is not homogeneous

Canada's population density on census division level



Canada's population density average on the national level



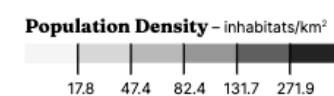
Sources 2021 and 2016 censuses Canada Statistics Canada, <https://www150.statcan.gc.ca>

#### Pitfall N° 2

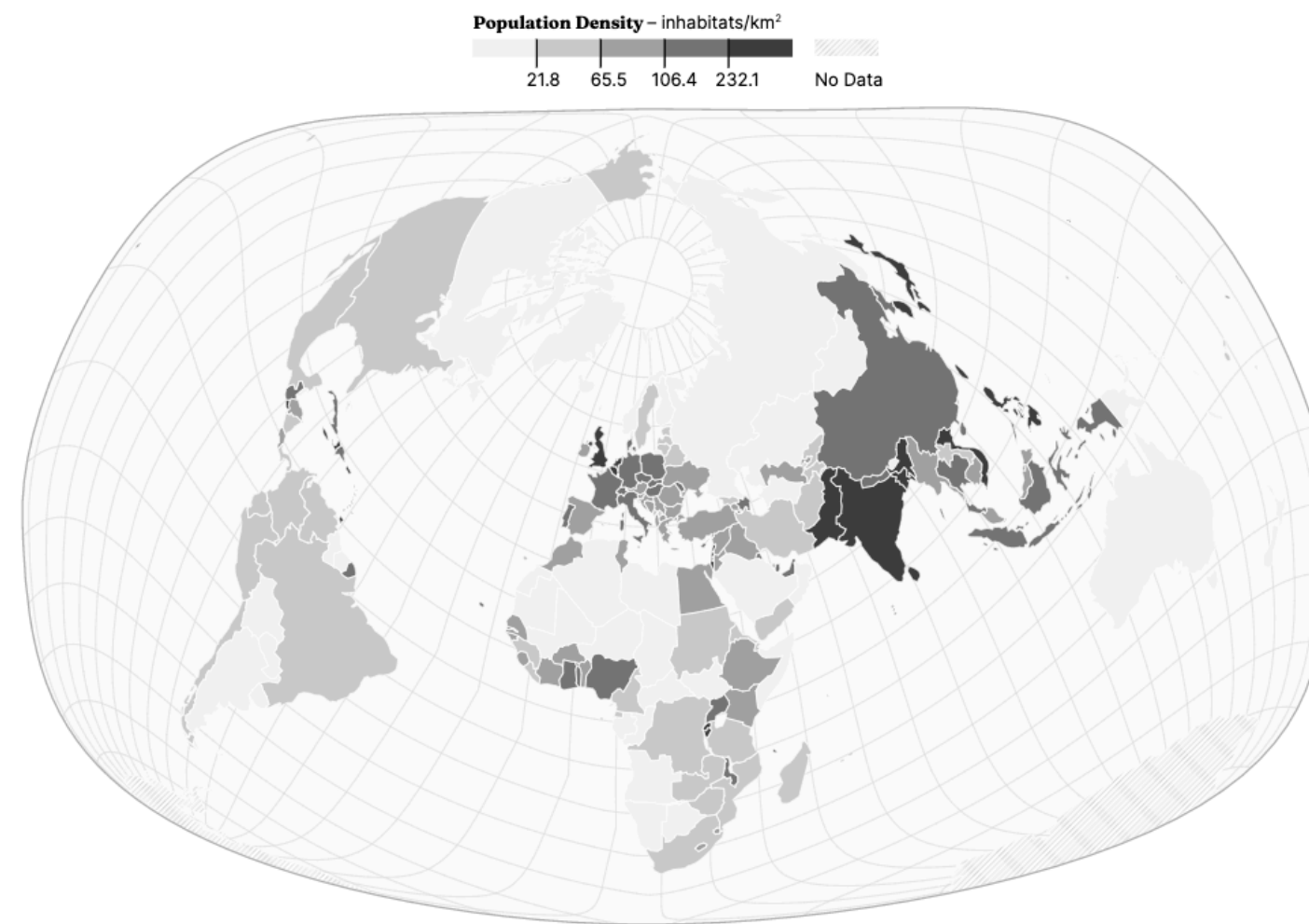
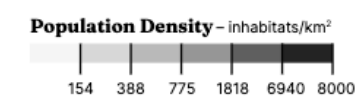
### Different classification Methods

Note the effect of different classification methods on how the map can be interpreted.

Africa's population density using quantile classification.



Africa's population density using natural breaks classification.



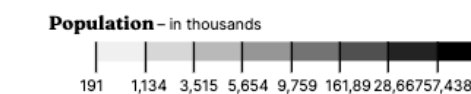
#### Pitfall N° 4

### Non-normalized Data

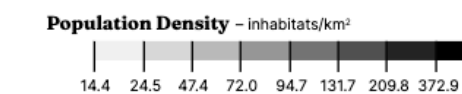
Be aware of issues with non-normalized data.



Oceania's total population



Oceania's population density

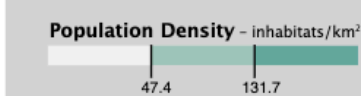


#### Pitfall N° 3

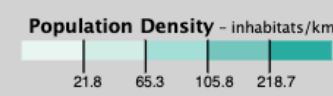
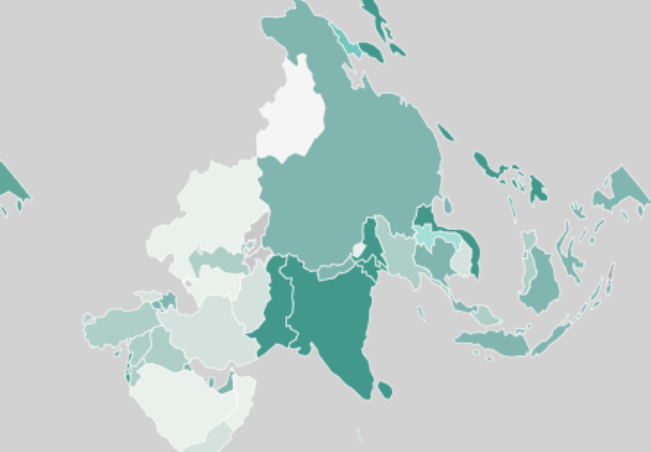
### Number of classes

#### Pitfall N° 3 Number of classes

Asia's population density classified in 3 Classes

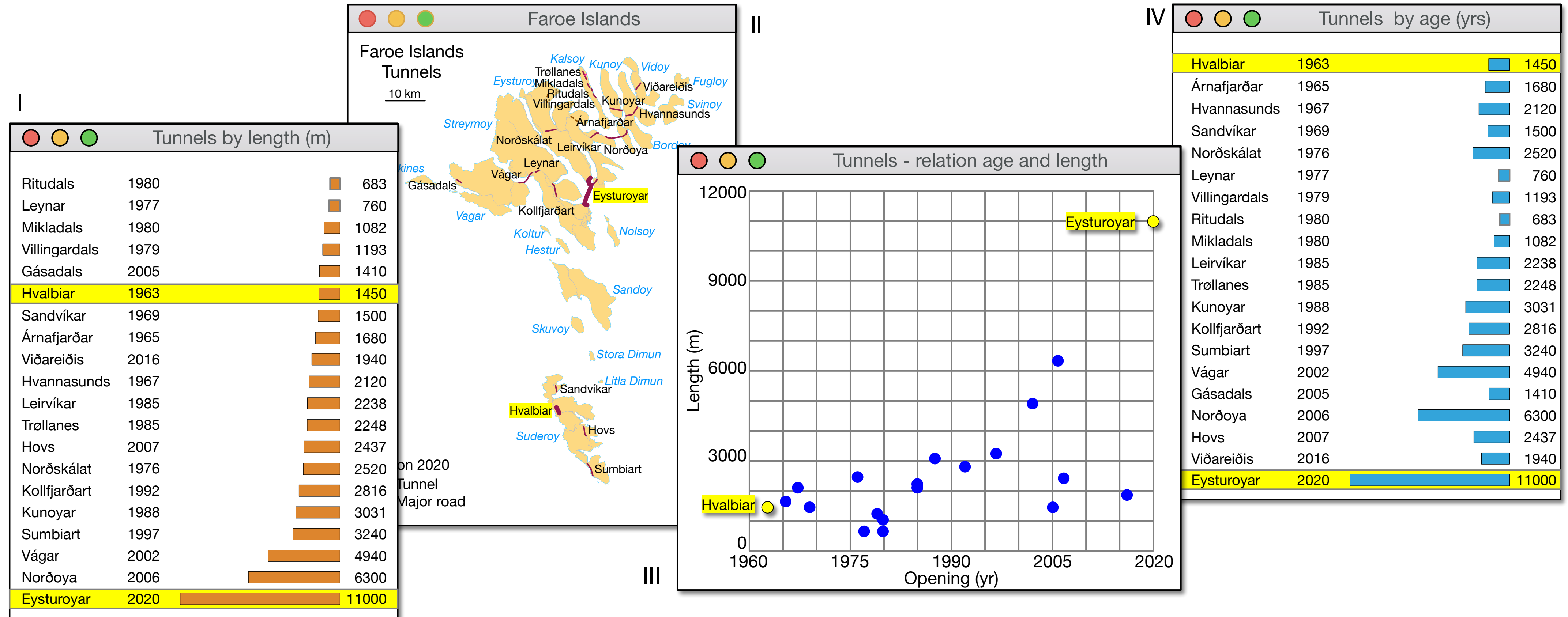


Asia's population density classified in 5 classes



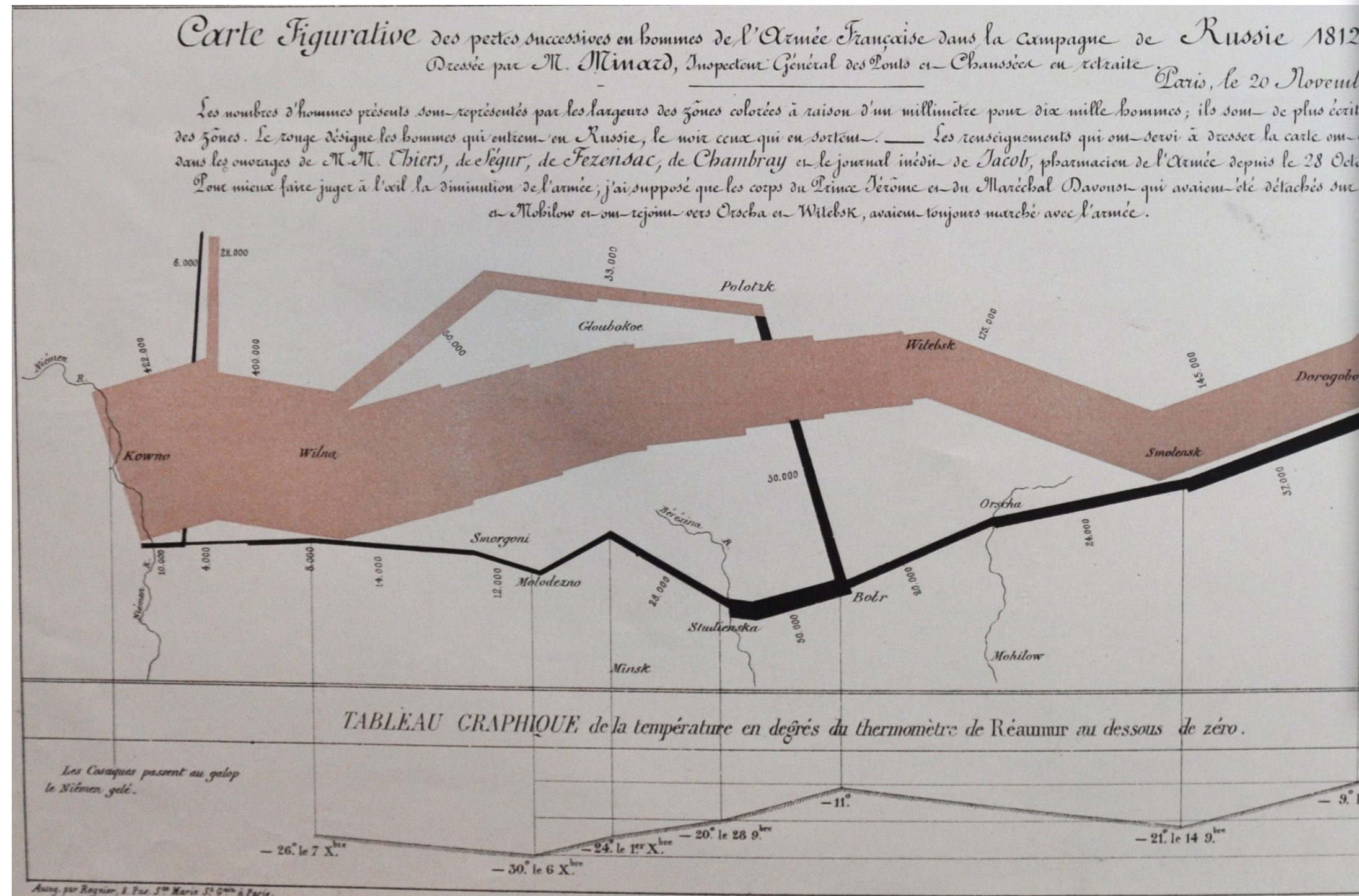
# Mapping time

But .....



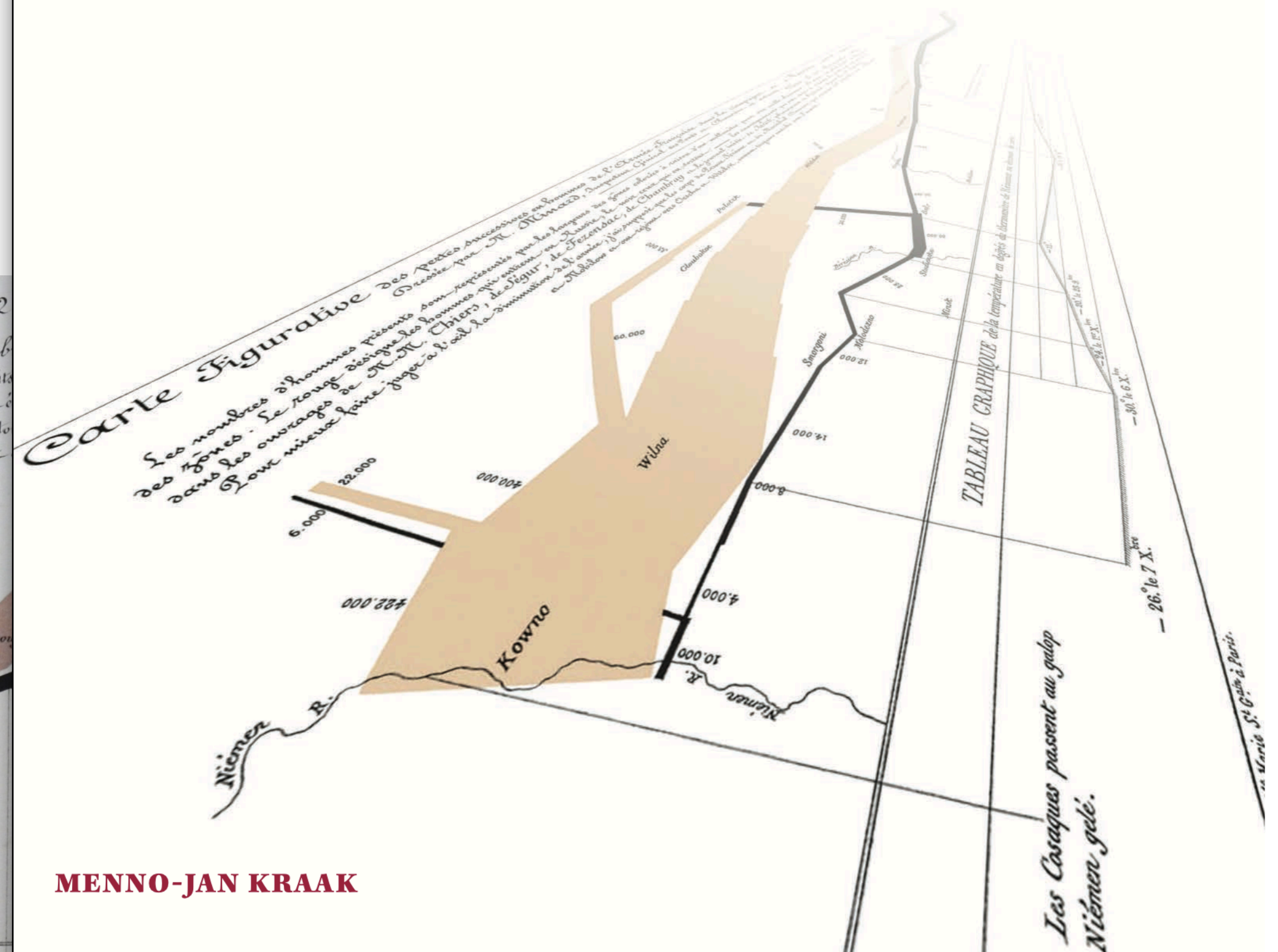
# Mapping time

## But .....

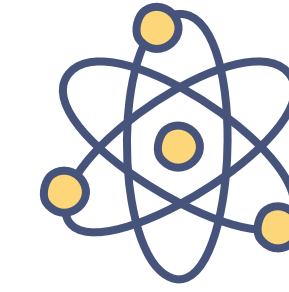


# Mapping Time

ILLUSTRATED BY MINARD'S MAP OF NAPOLEON'S RUSSIAN CAMPAIGN OF 1812



# Cartographic facilities Twente: VISUSE Lab



**AR - VR - MR**



**Usability research (eye-tracking etc)**



