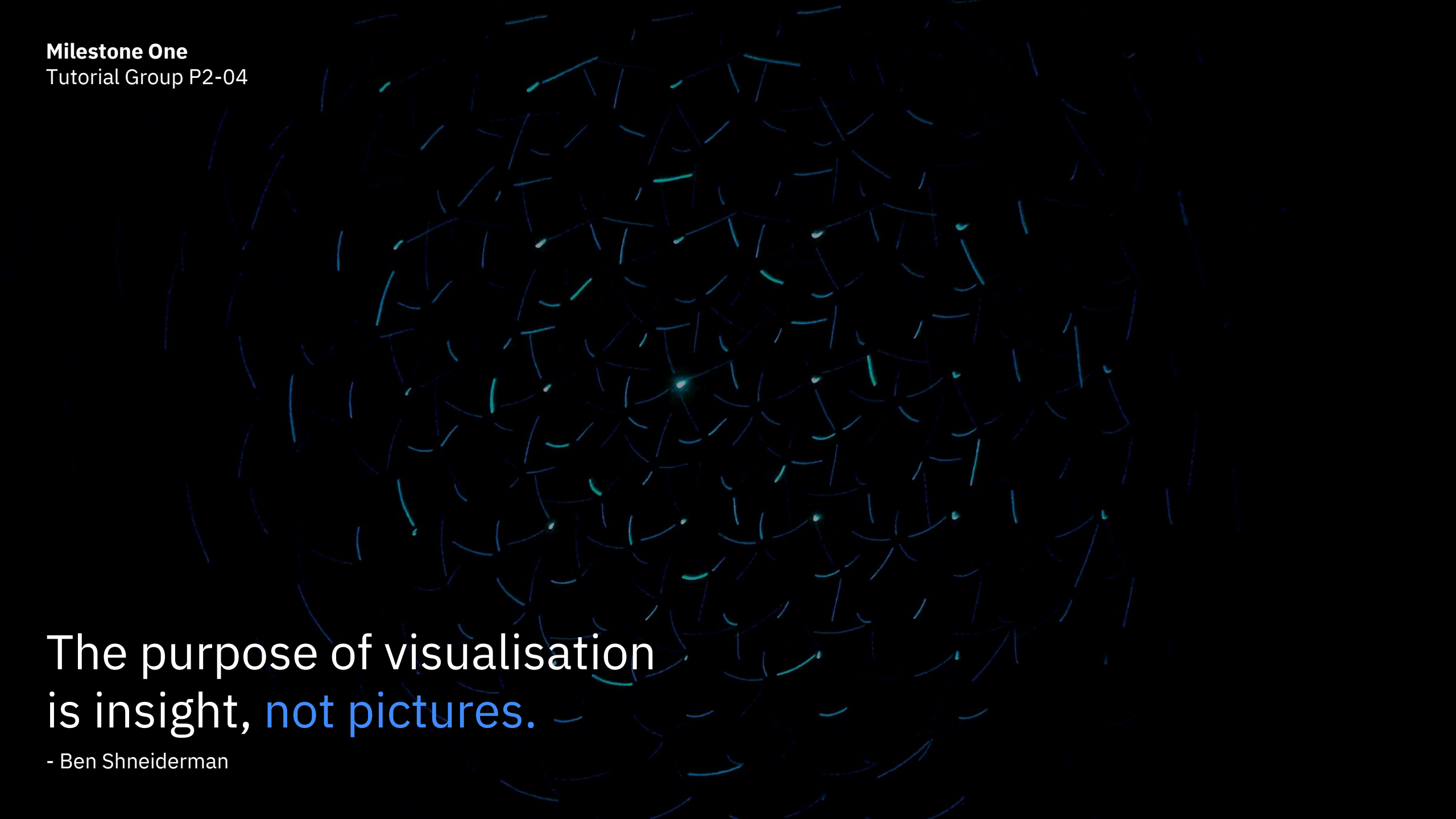
Milestone One
Tutorial Group P2-04



The purpose of visualisation is insight, not pictures.

- Ben Shneiderman

Milestone One
Tutorial Group P2-04

Visual #1

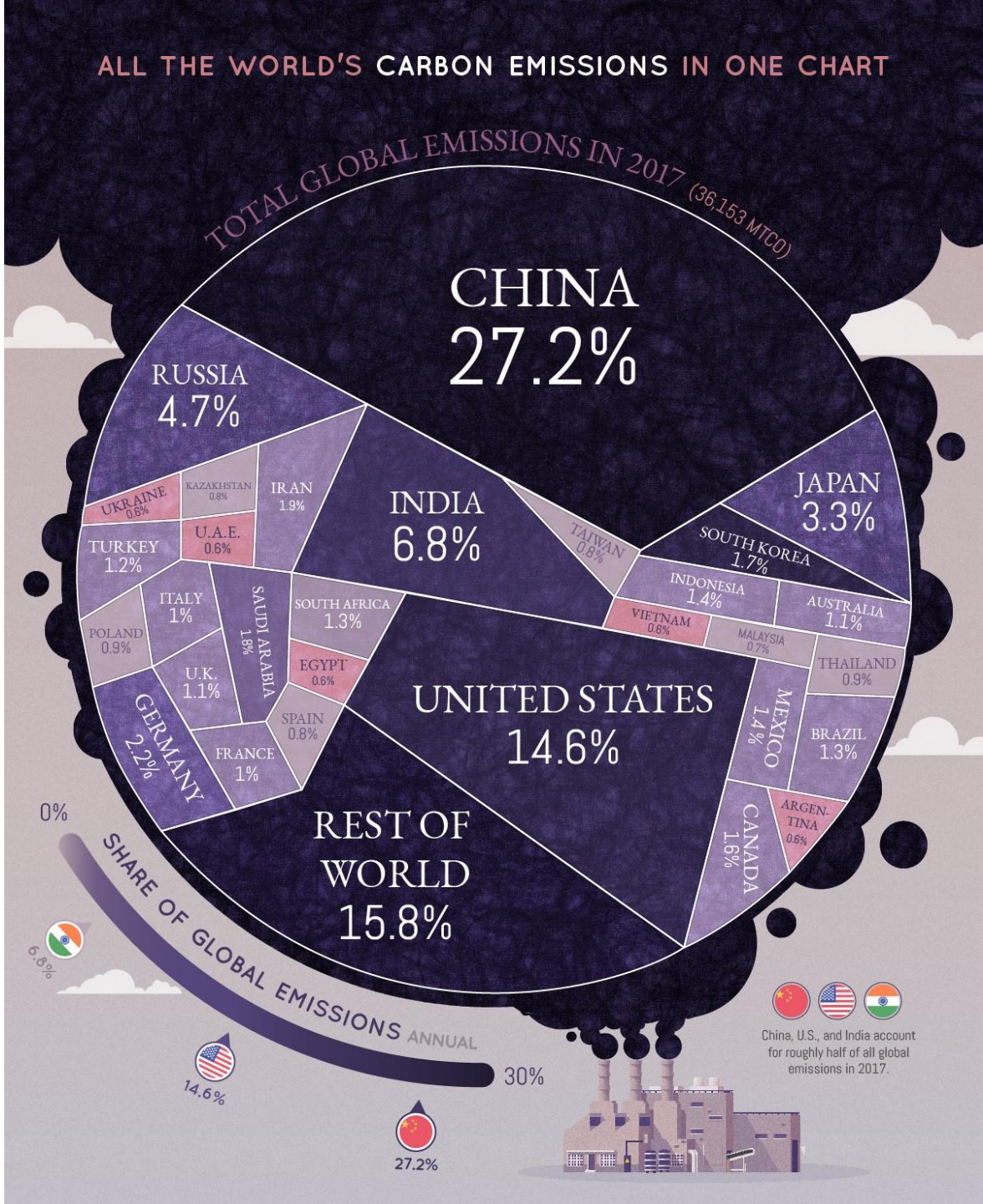
All the World’s Emission in One Chart

- Infographic by VisualCapitalist

Milestone One
Tutorial Group P2-04

Introduction

- Designed by VisualCapitalist for explanatory analysis
- Features a treemap shaped like a “globe”
- Highlights top "heavy hitters" countries
  (collectively contributes approx. 50%)

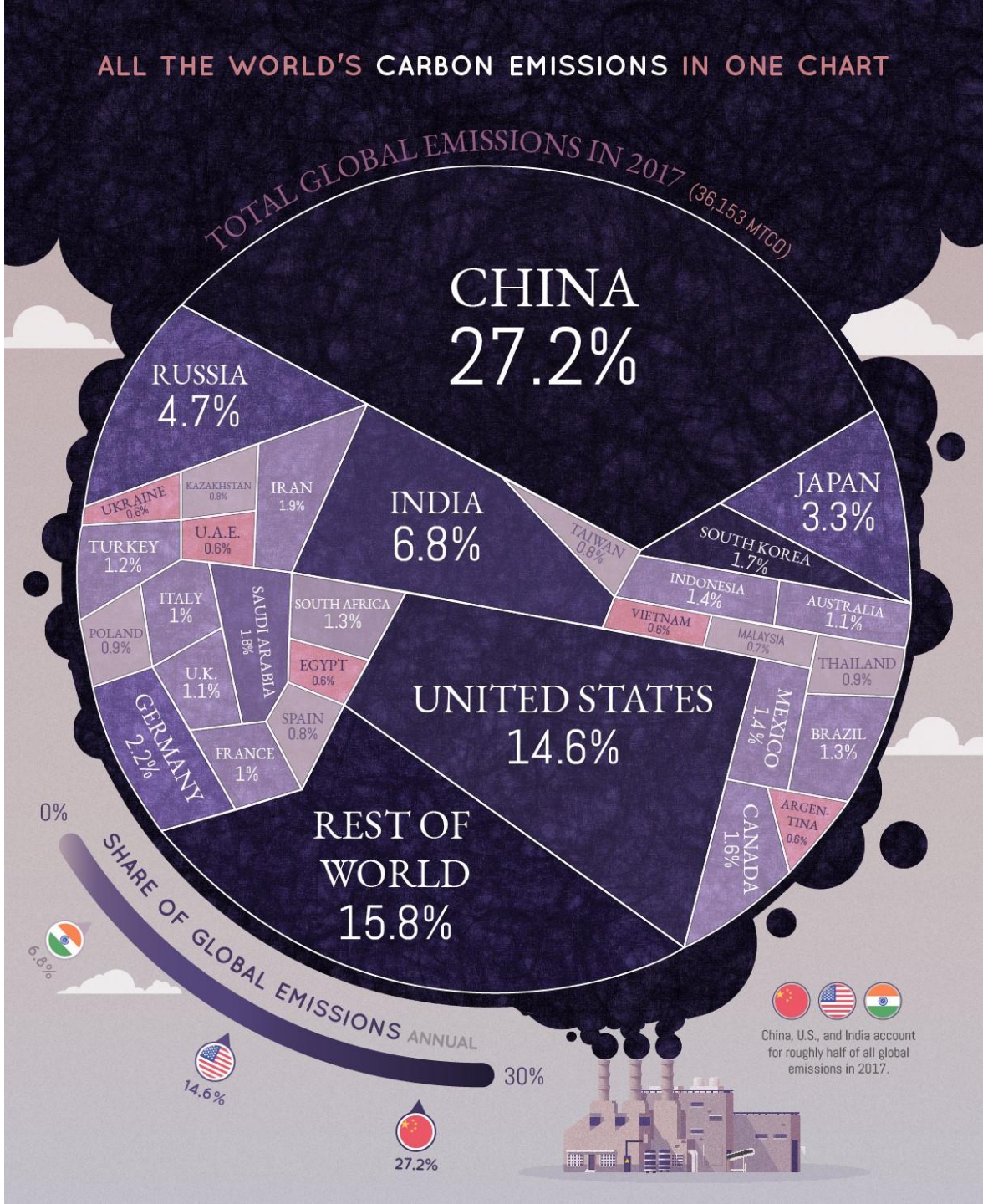


Milestone One
Tutorial Group P2-04

Data

- **Data Types:**
  - Country Name (Nominal)
  - Carbon Emissions in % (Ratio)

- Each segment represents one of the top 30 highest producers of carbon emissions



Milestone One
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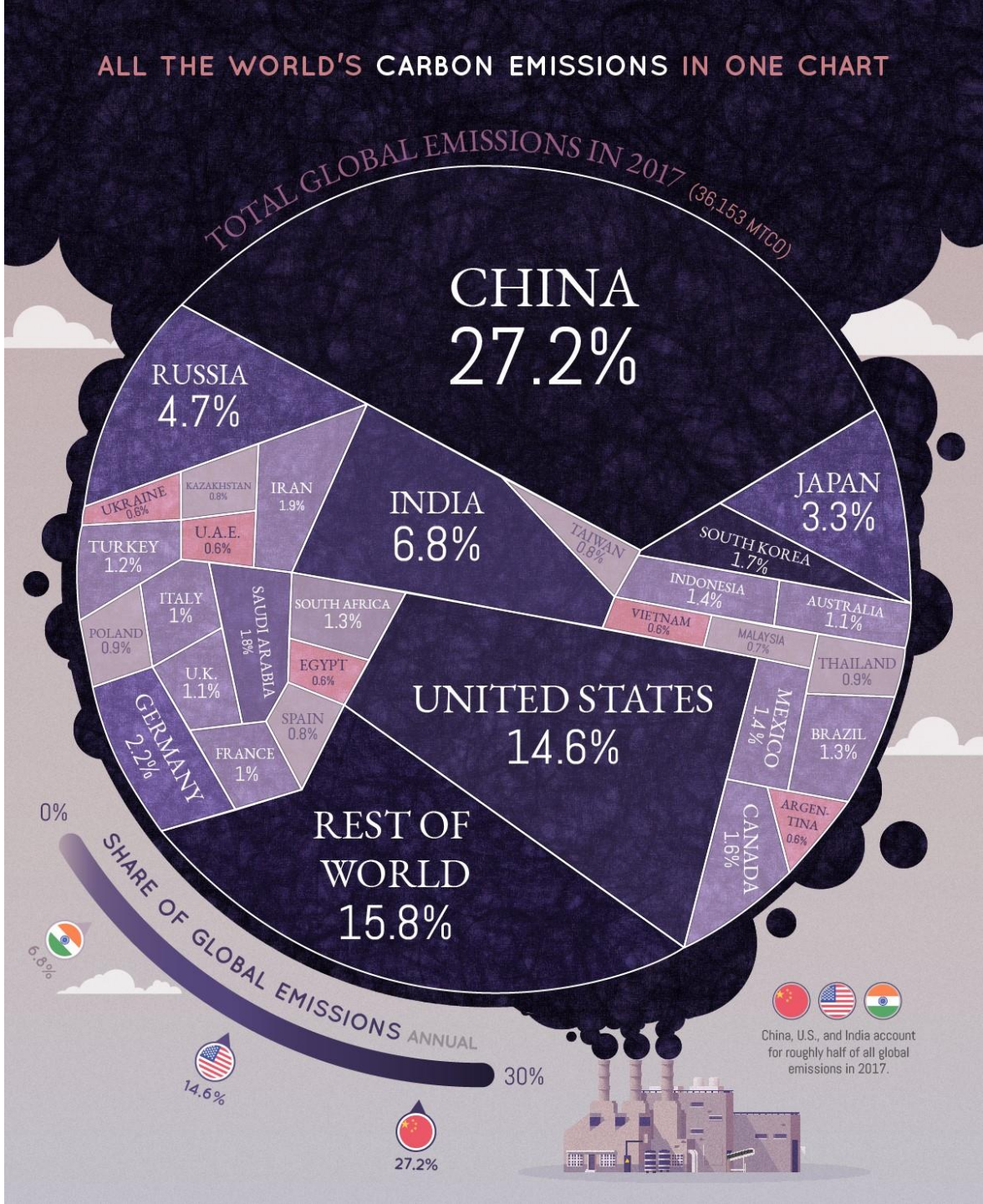
Task

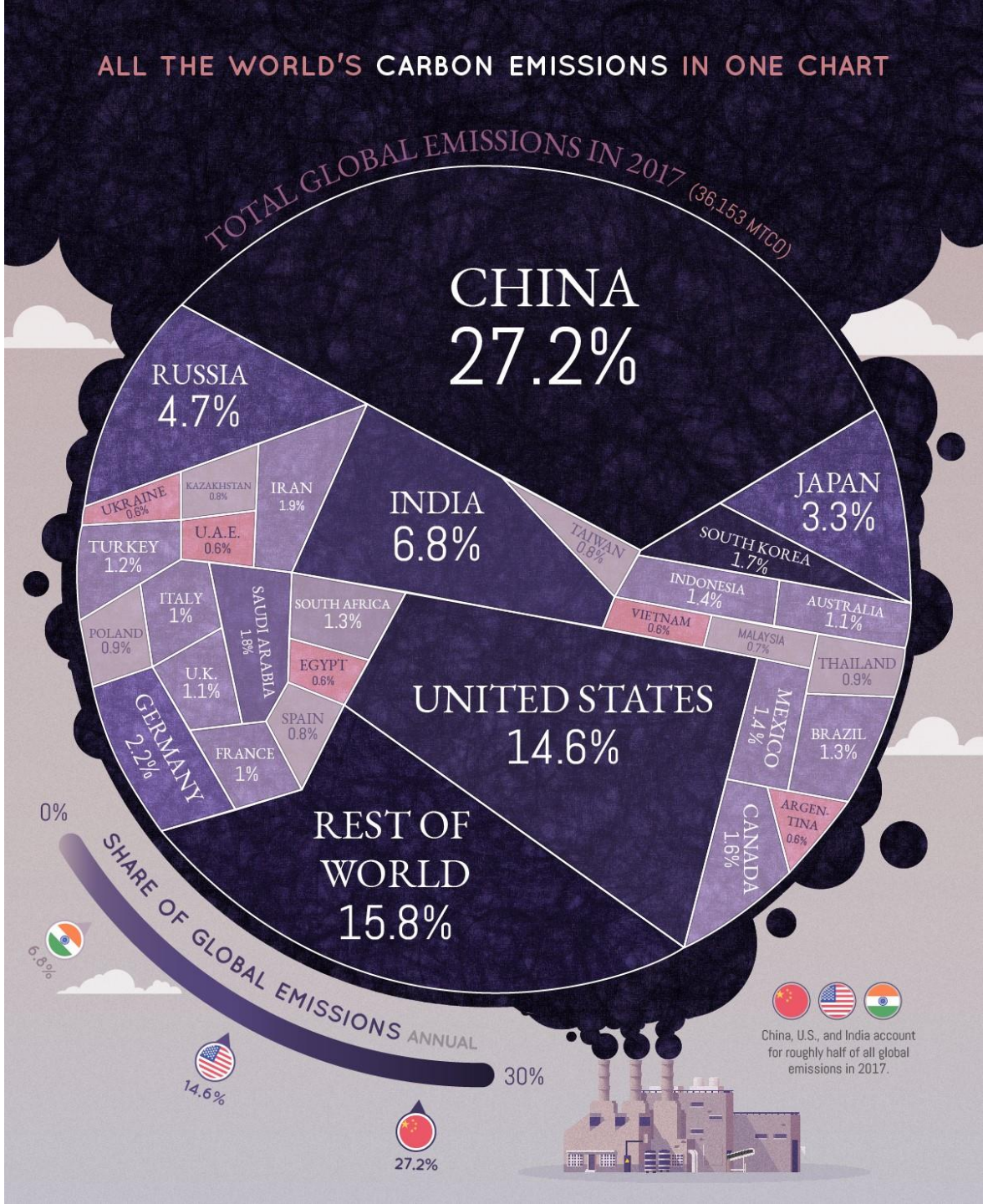
- Illustrate where most of the world's carbon emissions originate from
- Allow comparative viewing of the country's carbon emissions



Milestone One
Tutorial Group P2-04

Good idioms

- Country names are prominently displayed next to their % data
- Segment sizes are directly proportional to carbon emissions %
- Effectual use of the colour channels to denote shares of carbon emissions



Milestone One
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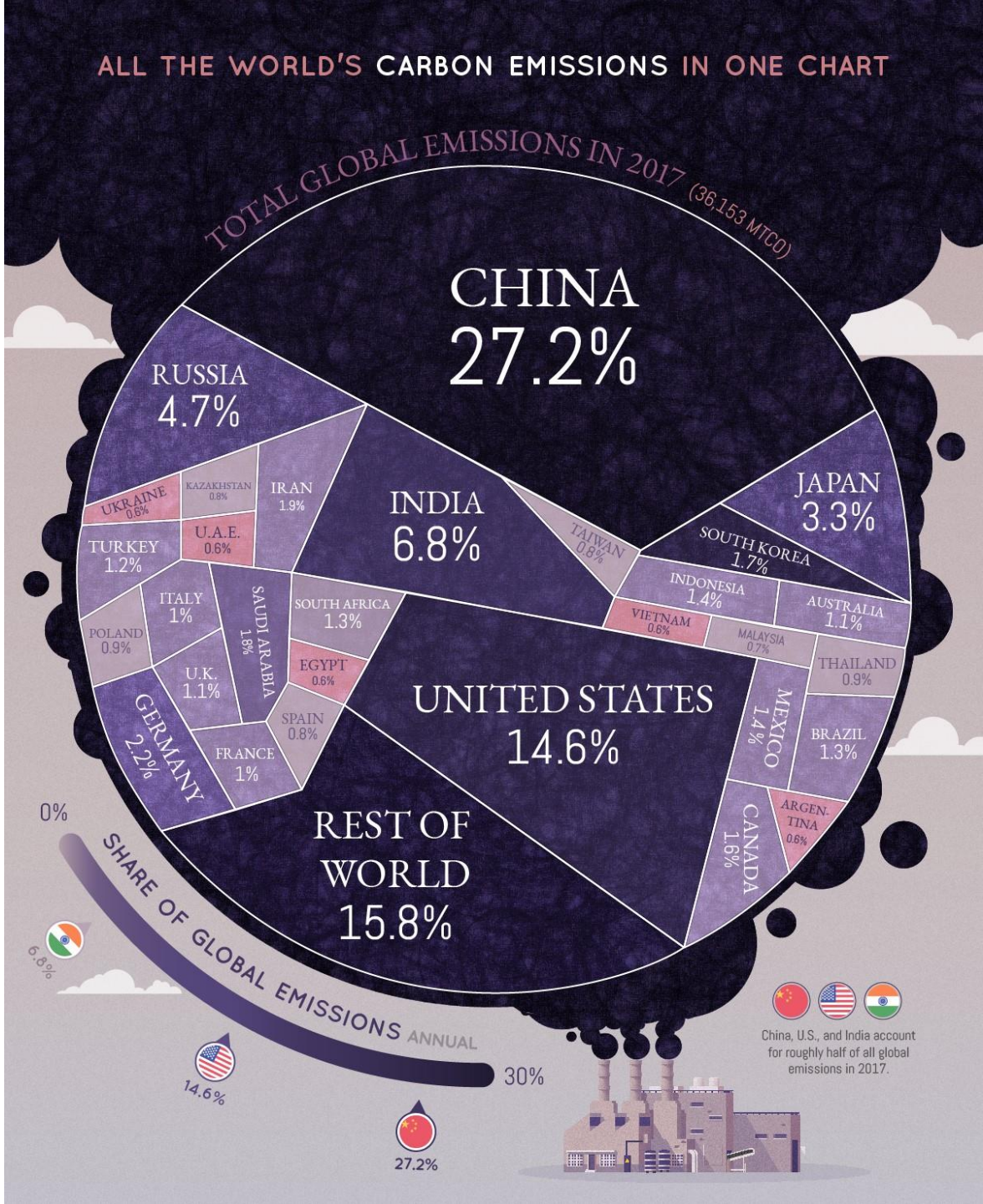
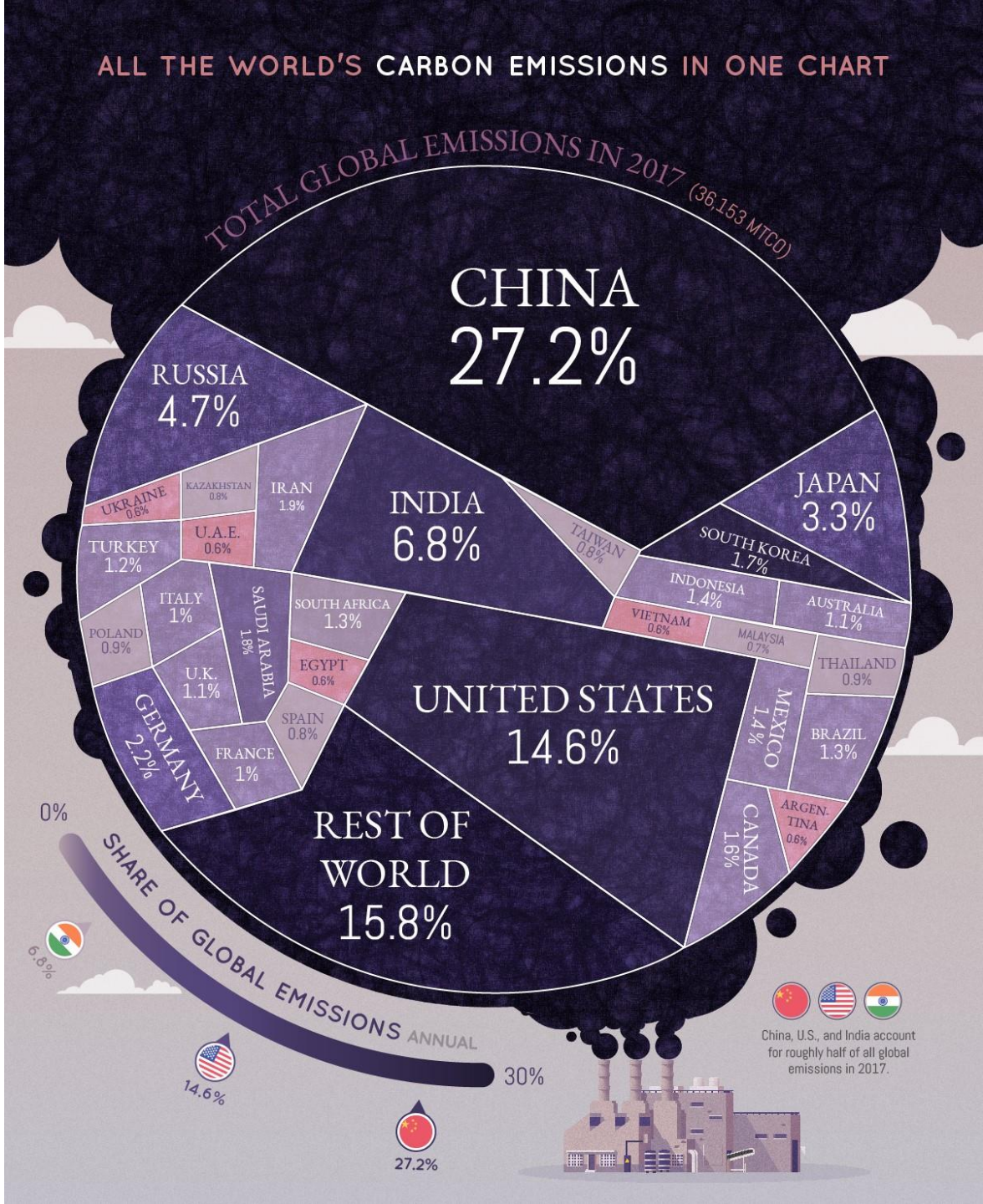
Bad idioms

- "Incomplete" legend used (**Pink** is omitted / **Light Grey** (0%) have higher % than **Pink** segments)
- Inconsistent colour scale (e.g., South Korea)
- Size distortion (e.g., different sizes for Ukraine, U.A.E, Egypt, Argentina & Vietnam)
- Segments were neither grouped by region nor by their carbon emissions %



Bad idioms

- Information on the number (count) of countries represented is not available
- No standardisation of font style (e.g., Malaysia)
- No list of countries is provided to allow easy identification of all the countries represented
- Error in Unit of Measure of “Metric Tons of Carbon Dioxide” – the correct unit of measure is “MTCO2e”



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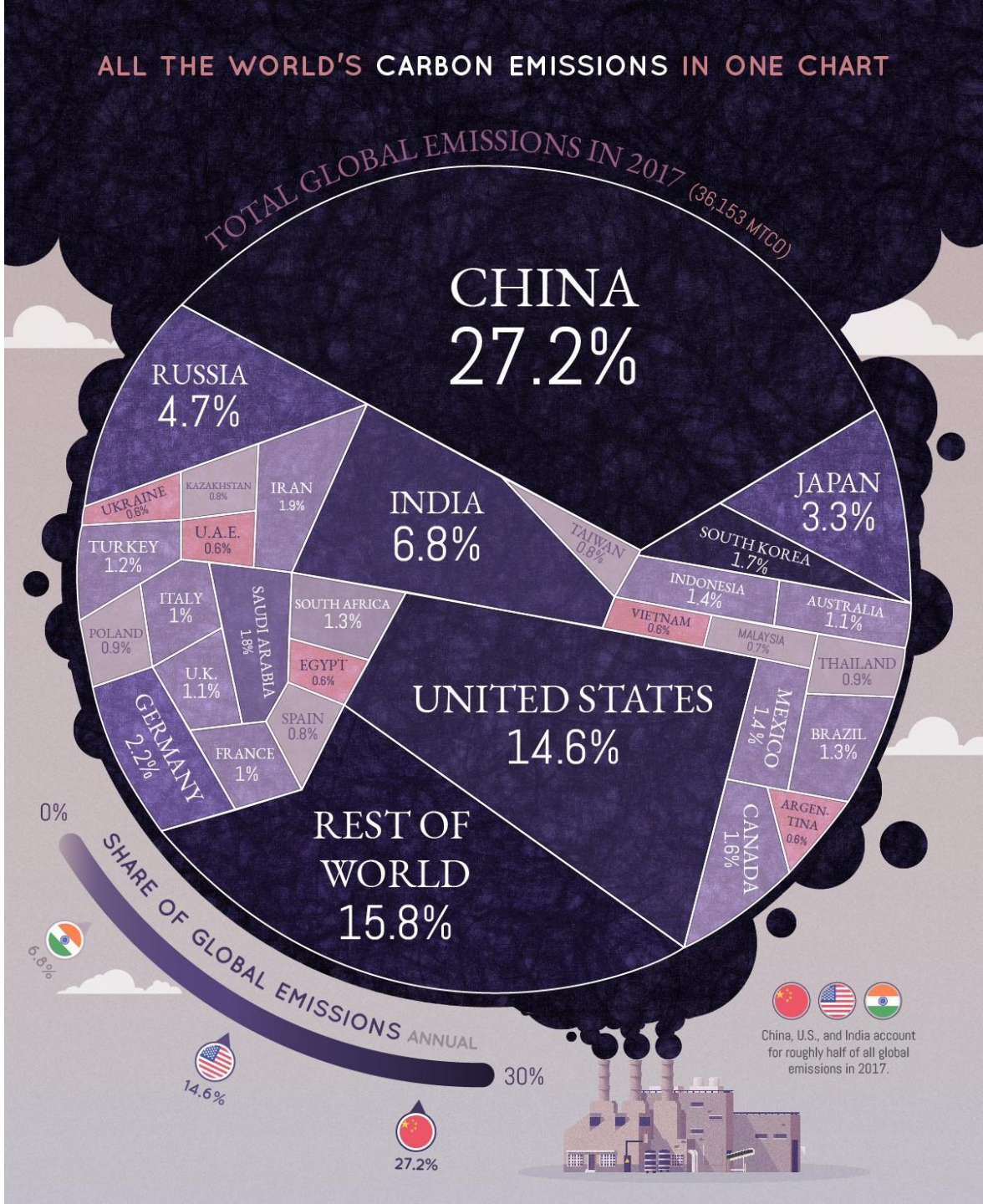
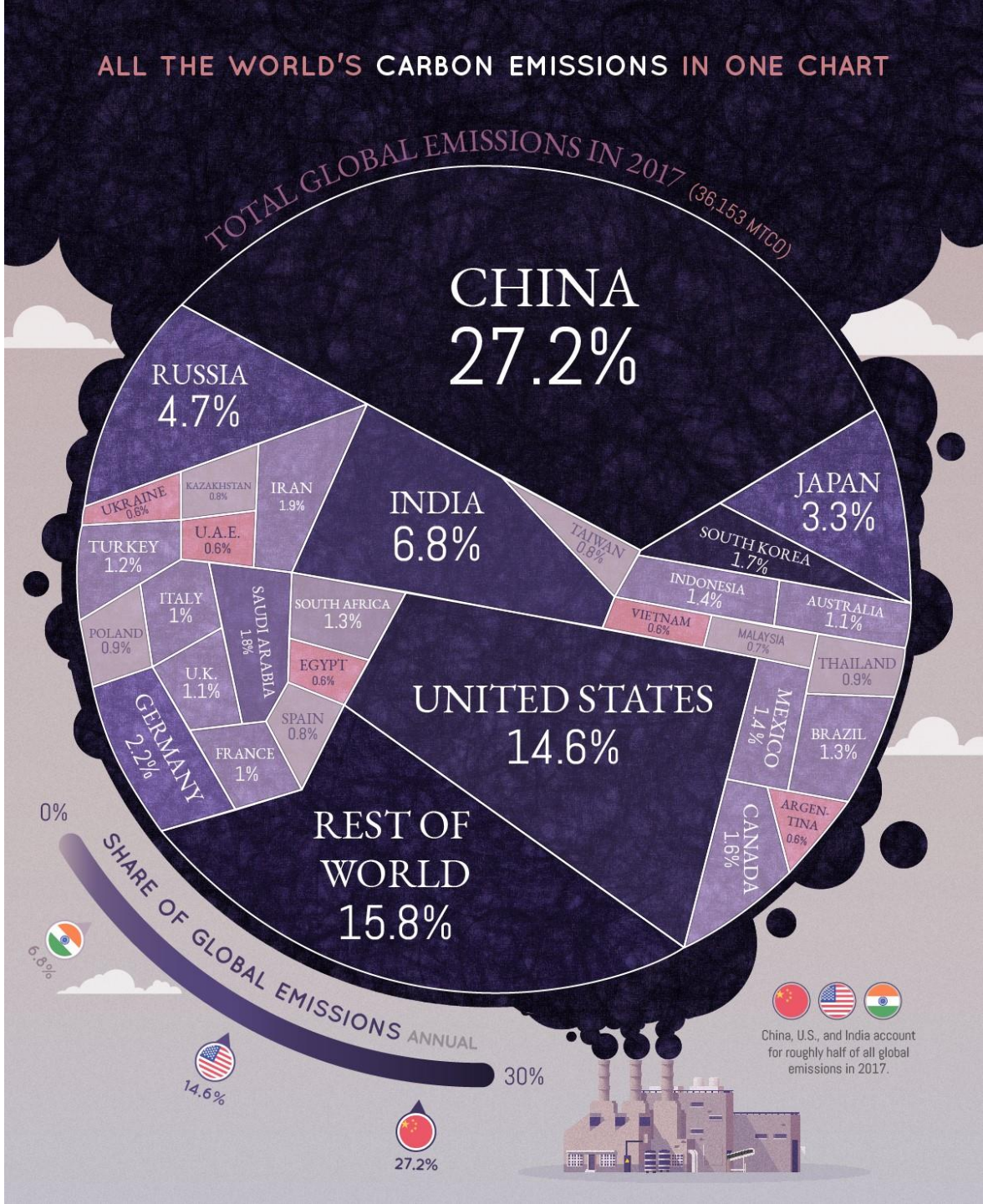


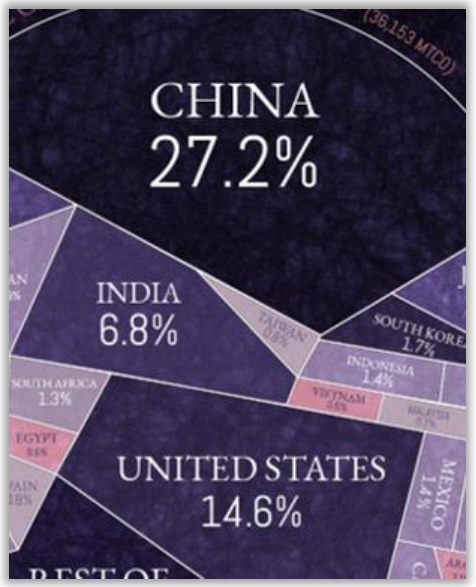
Milestone One
Tutorial Group P2-04

Design Violations

- Law of Proximity
- Law of Similarity
- Law of Common Region
- Law of Prägnanz (Simplicity Law)

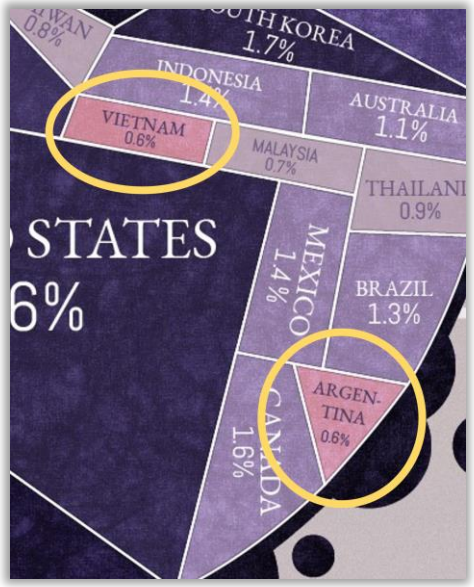


Milestone One
Tutorial Group P2-04



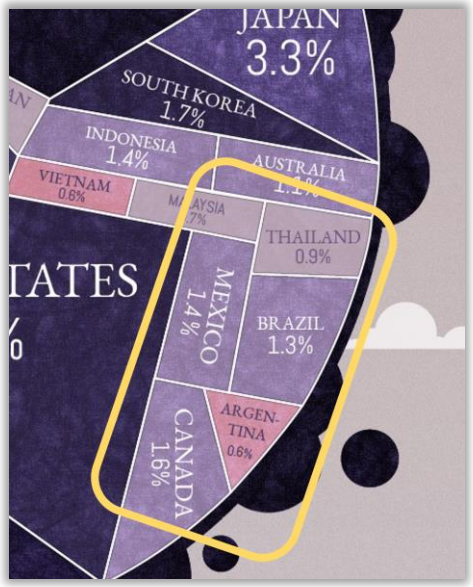
Law of Proximity

Skewed representation. Adjacent segments do not correlate with each other



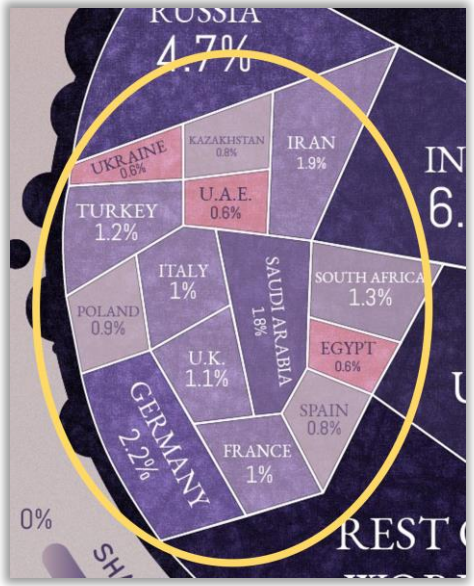
Law of Similarity

Segments with identical percentages look completely different from each other



Law of Common Region

Segments are neither grouped by volume nor by their geographical location



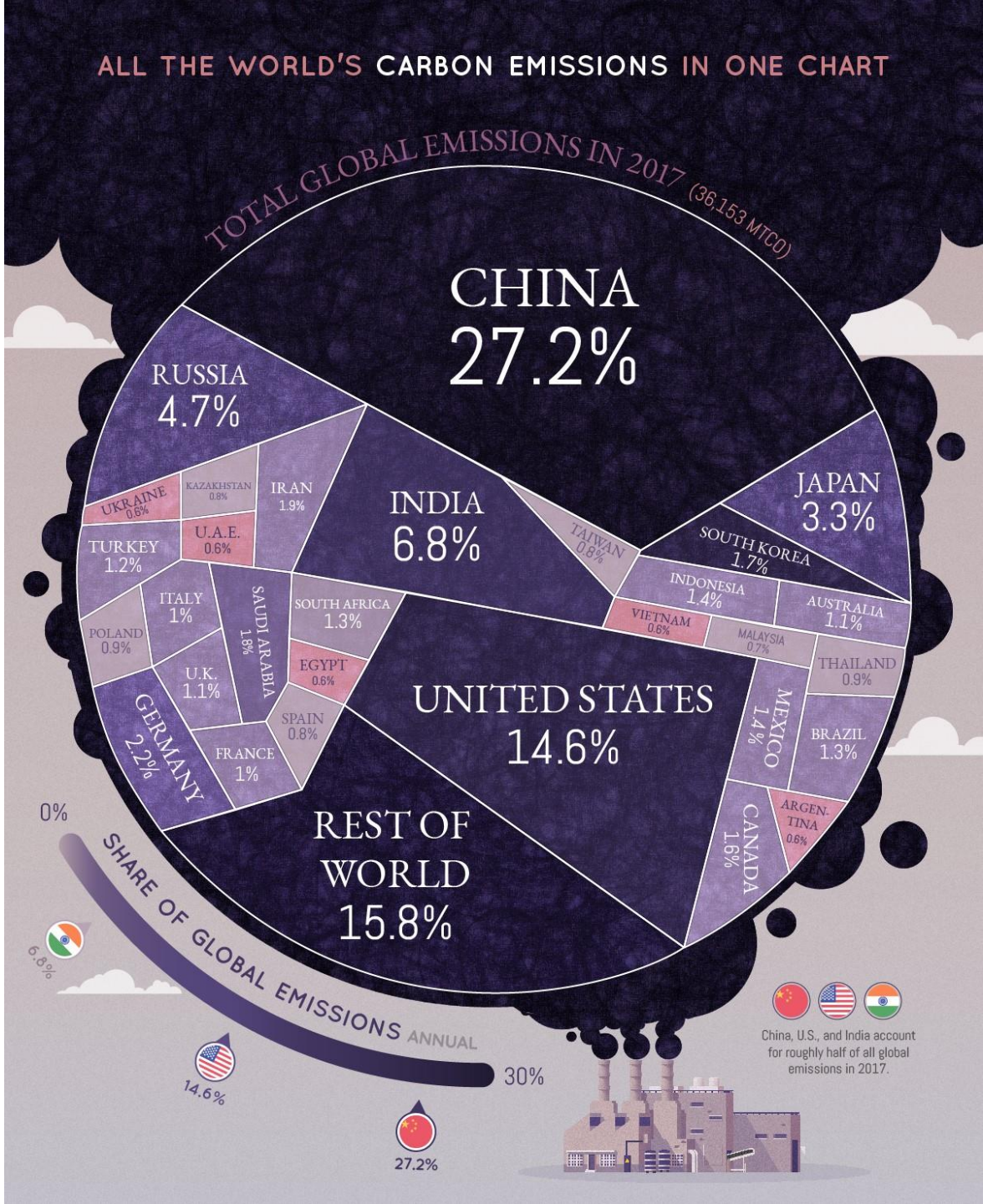
Law of Prägnanz

Complex shapes and sizes make it difficult to interpret the percentages.

Milestone One
Tutorial Group P2-04

Proposed Improvements

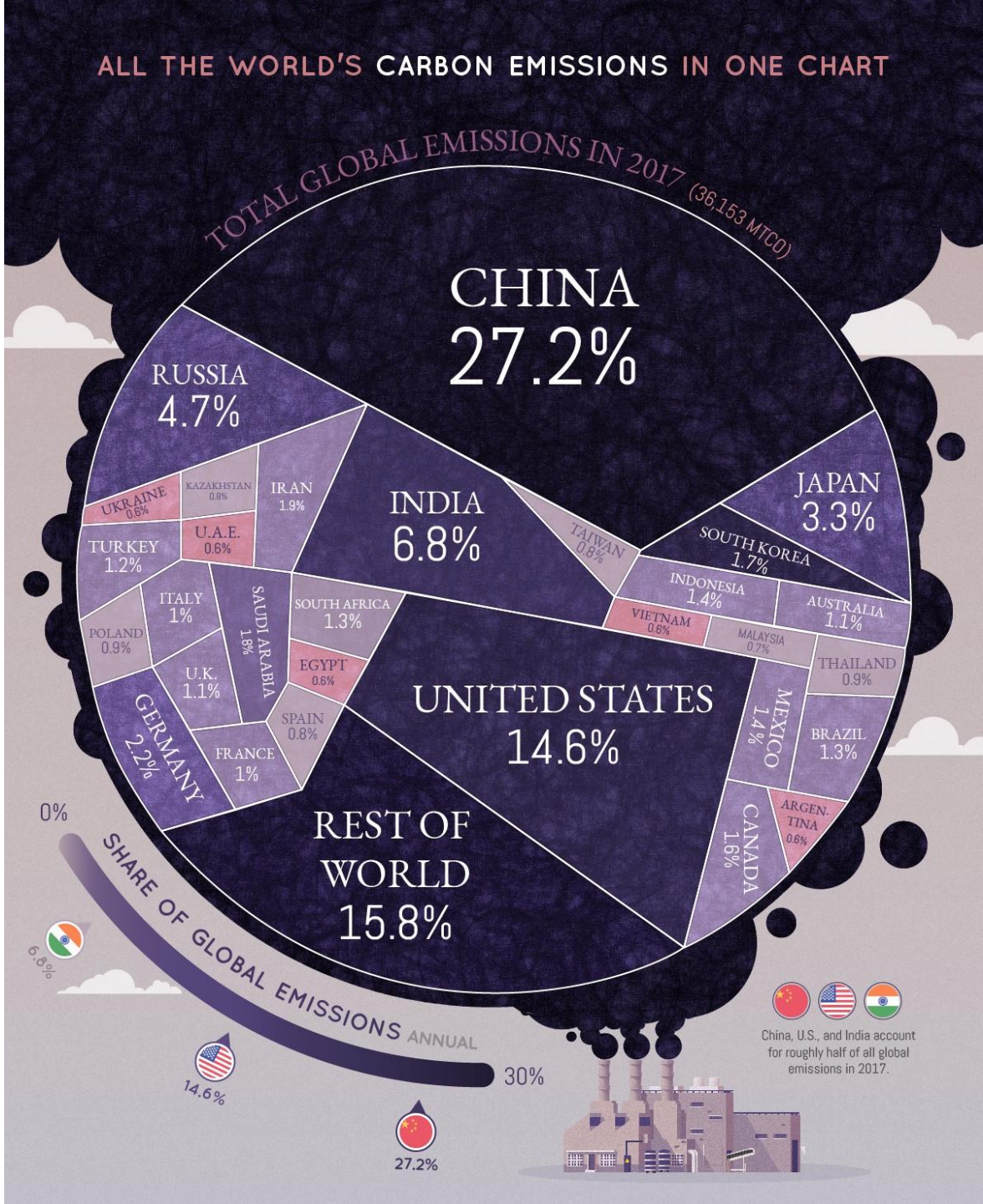
- Use bar graphs or pie charts to better accentuate the differences
- Standardise the font styles and country name representations (United States vs U.K. & U.A.E.)
- Position the names of the countries upwards
- Include all colours utilised in the chart legend



Milestone One
Tutorial Group P2-04

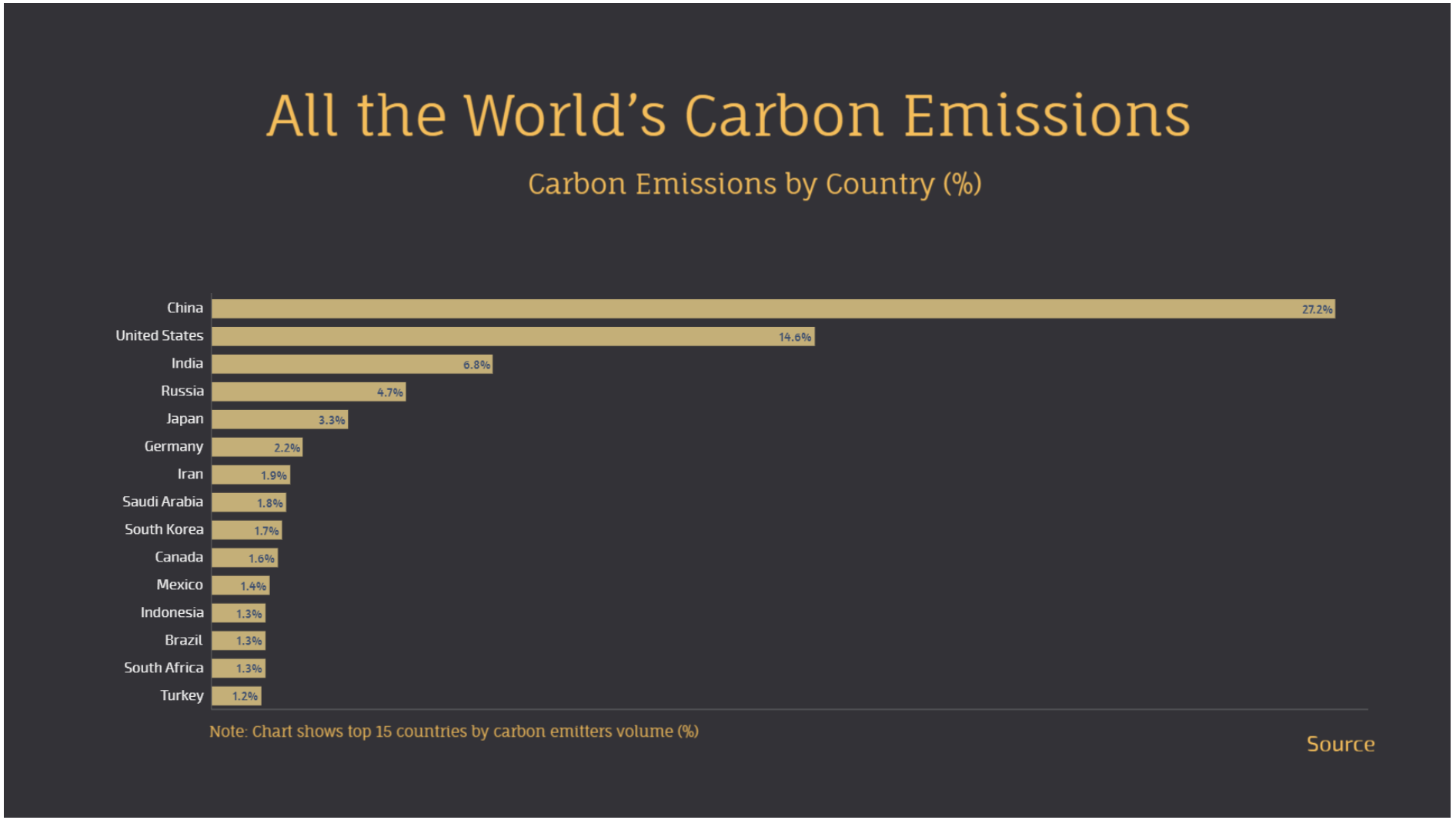
Proposed Improvements

- Group the countries by their similarities. (e.g., by region, by carbon emissions (%), etc.)
- Indicate the total number of countries represented in the infographic
- Removal of the "Rest of World" to further highlight top countries with carbon emission



Milestone One
Tutorial Group P2-04

Proposed Revised Graph



Milestone One
Tutorial Group P2-04

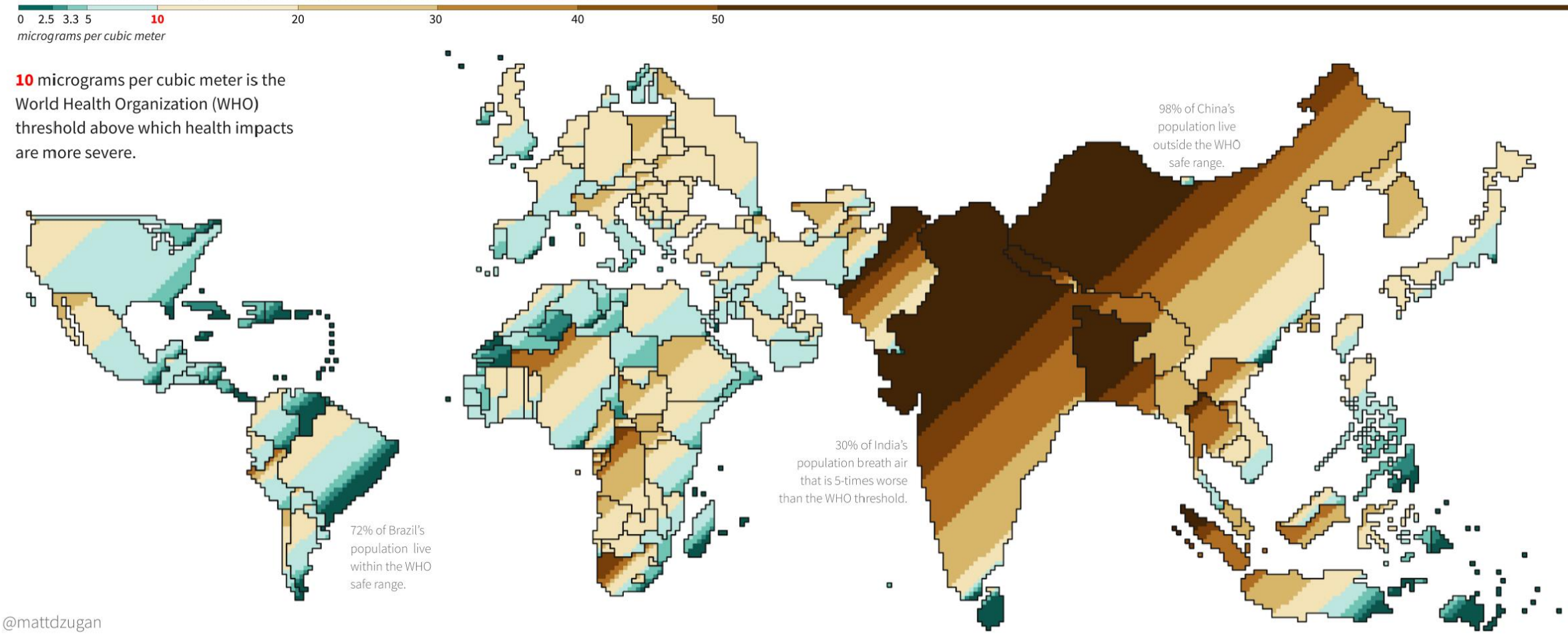
Visual #2

Which Countries Have the Worst Air Pollution?

- Infographic by Matt Dzugan

Milestone One
Tutorial Group P2-04

*Countries are resized according to their population to represent **people** rather than **land***

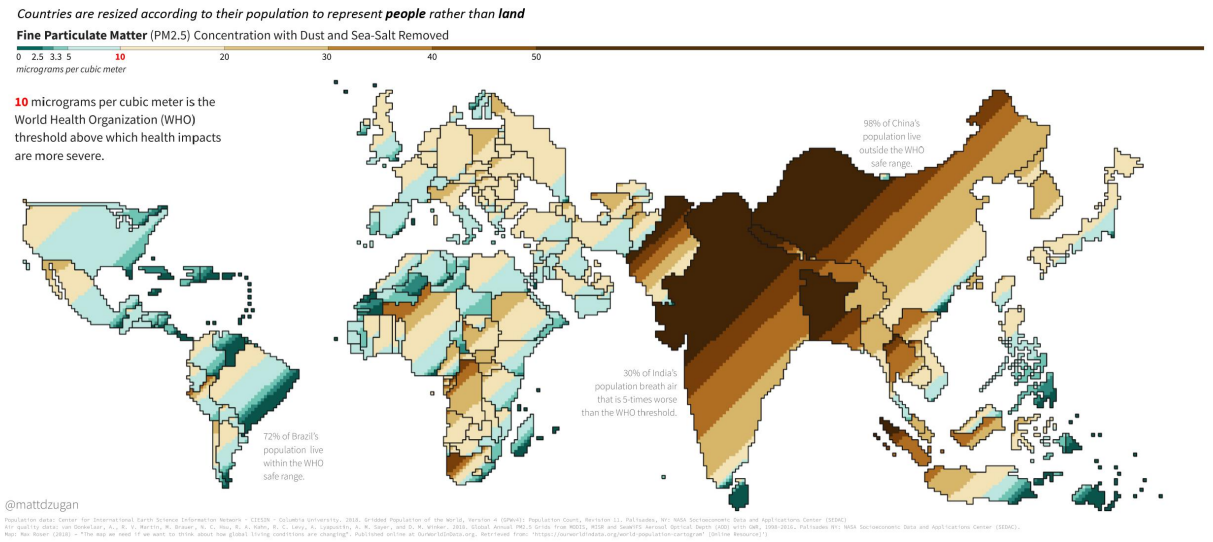


Population data: Center for International Earth Science Information Network - CIESIN - Columbia University. 2018. Gridded Population of the World, Version 4 (GPWv4): Population Count, Revision 11. Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC)
Air quality data: van Donkelaar, A., R. V. Martin, M. Brauer, N. C. Hsu, R. A. Kahn, R. C. Levy, A. Lyapustin, A. M. Sayer, and D. M. Winker. 2018. Global Annual PM2.5 Grids from MODIS, MISR and SeaWIFS Aerosol Optical Depth (AOD) with GWR, 1998-2016. Palisades NY: NASA Socioeconomic Data and Applications Center (SEDAC).
Map: Max Roser (2018) - "The map we need if we want to think about how global living conditions are changing". Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/world-population-cartogram' [Online Resource]')

Milestone One
Tutorial Group P2-04

Introduction

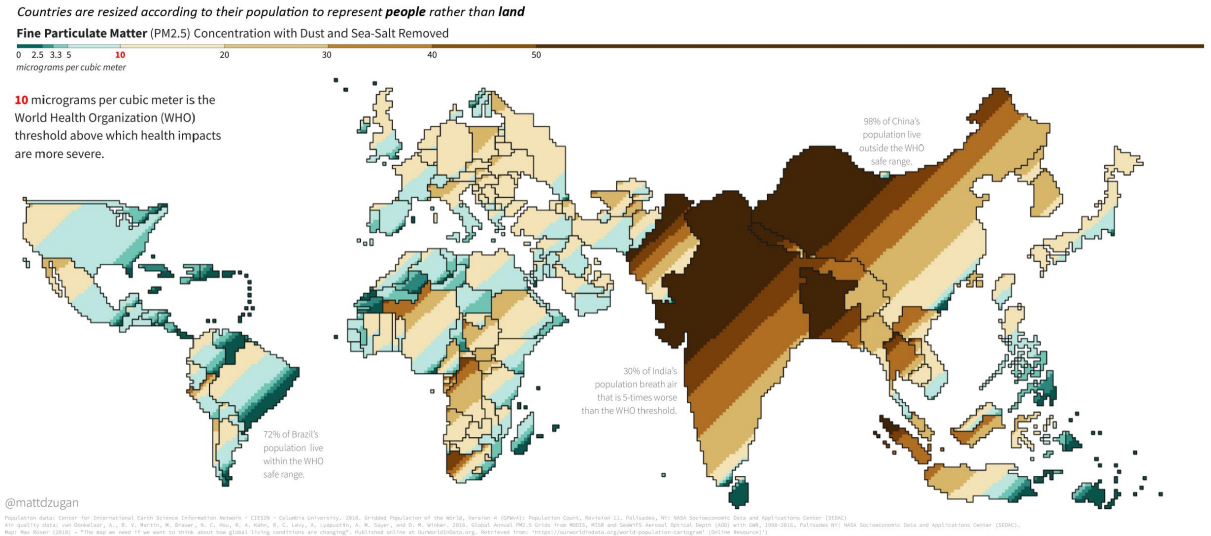
- Created by Matt Dzugan for explanatory analysis
- Features a world map view of the PM2.5 concentration
- Countries with high PM2.5 concentrations levels will have a darker shade of **brown**
- Countries with low PM2.5 concentrations levels will have a darker shade of **blue**



Data

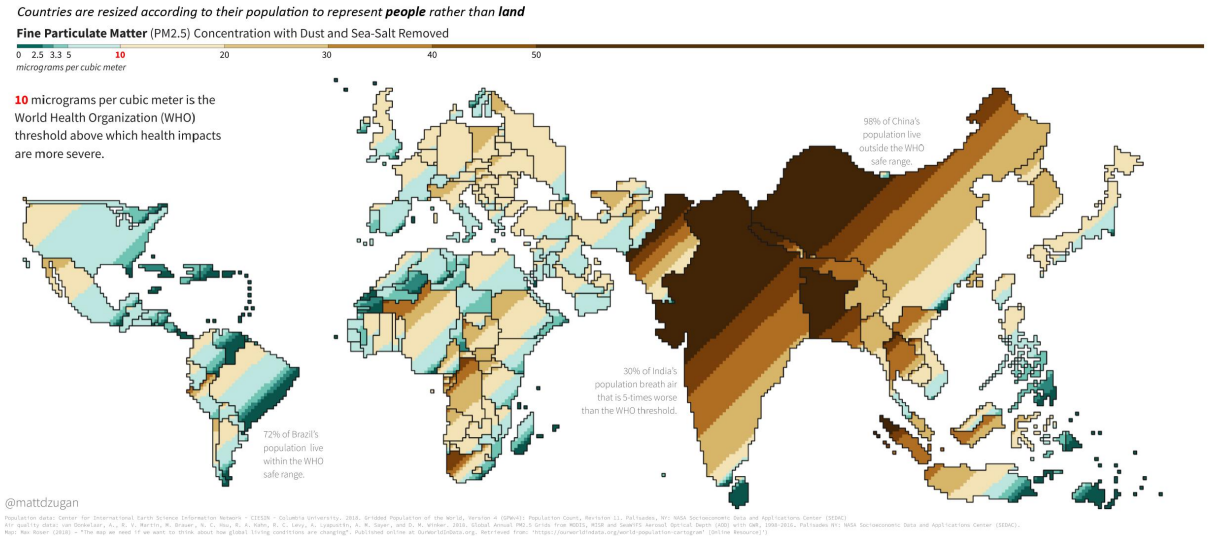
- **Data Types:**
  - Country Name (Nominal)
  - PM2.5 level (Ratio) – Data not illustrated

- Countries were resized according to the population size – Data not illustrated



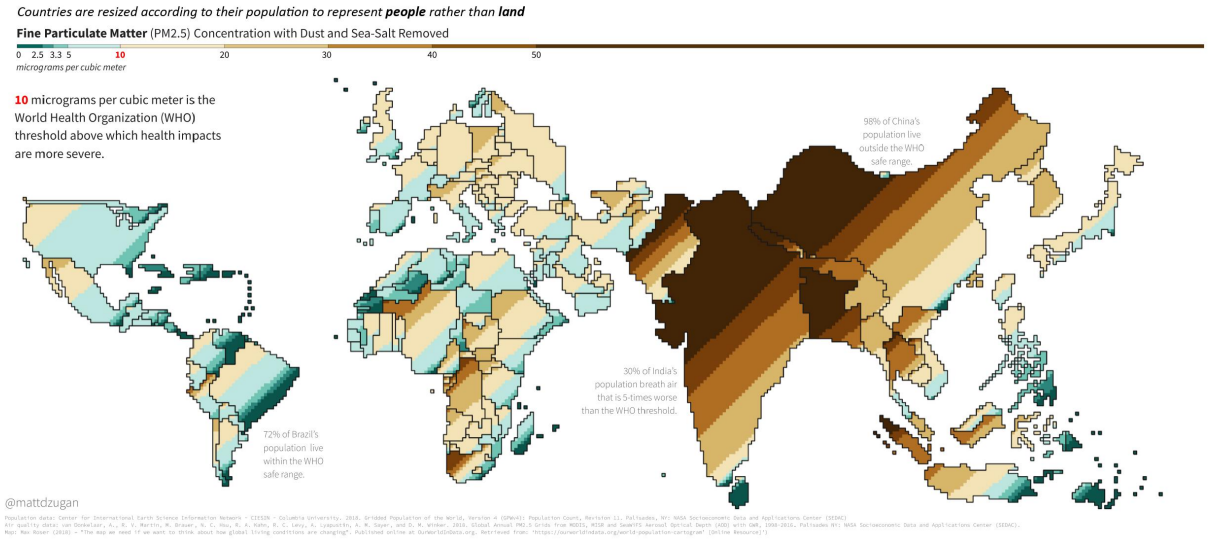
Task

- Provide a “bird-eyes” view of the global air pollution & PM2.5 concentrations
- Highlight the correlation between the air pollution volume & population size



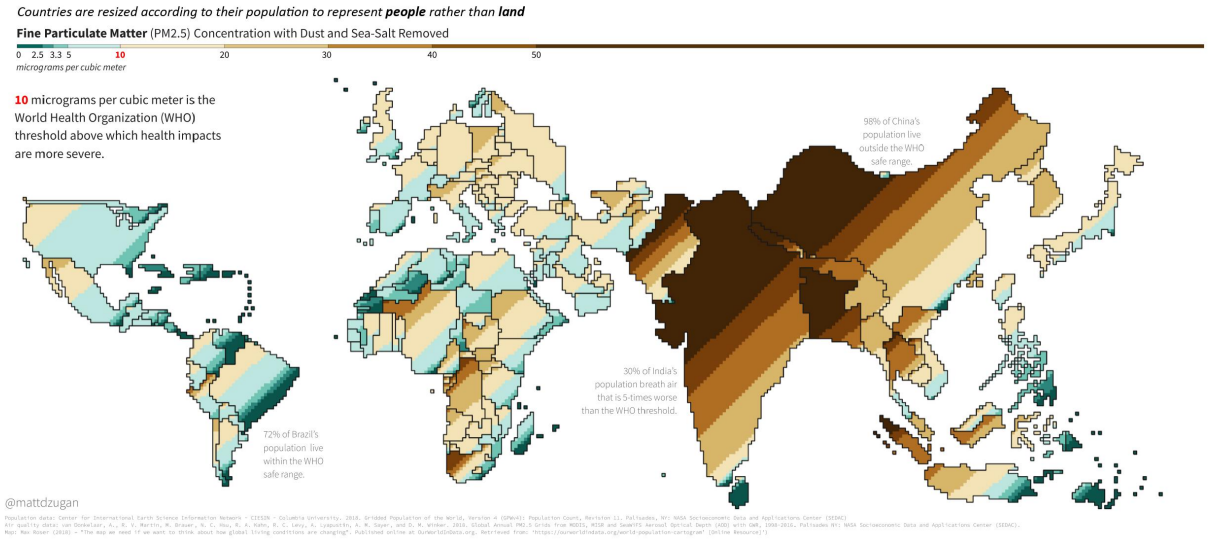
Good idioms

- Draws viewers' attention to high contributors (countries) of air pollution
- Clear annotations to guide viewers
- Good use of familiar colours to represent air pollution (Memory Colour Effect)
- Countries with high PM2.5 stands out on the map – dark brown colour (Von Restorff Effect)



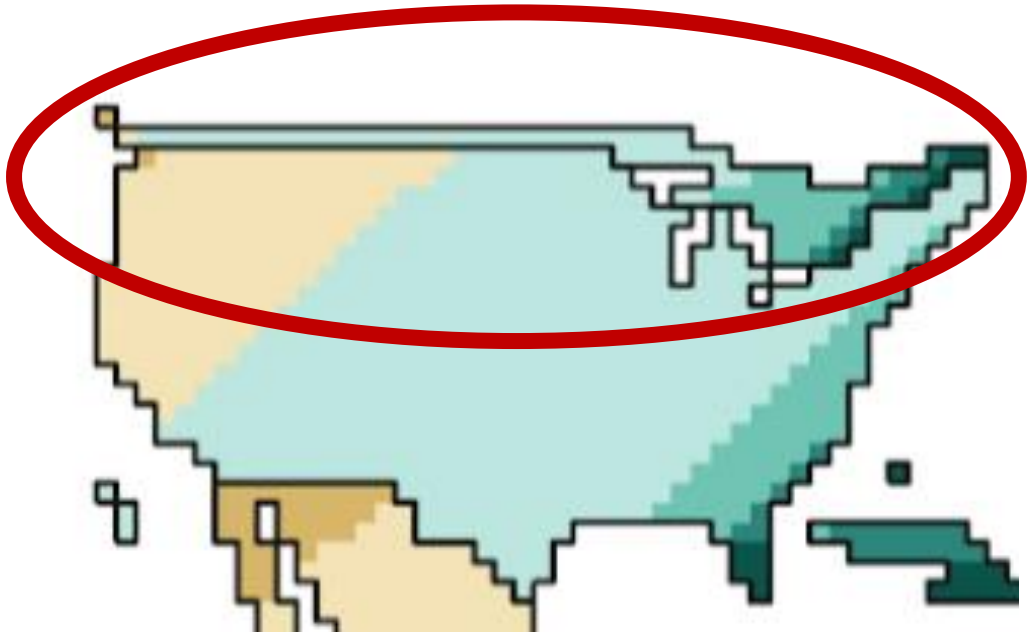
Bad idioms

- Countries were drastically resized (to the point that they became unrecognizable)
- Multiple colours were used to represent each country
- No explanation on why the countries were “pixelated” (In reality, one “pixel” = 500,00 people)
- No correlation between the visualization and the actual air pollution situation



Milestone One
Tutorial Group P2-04

“Pixelated” Canada



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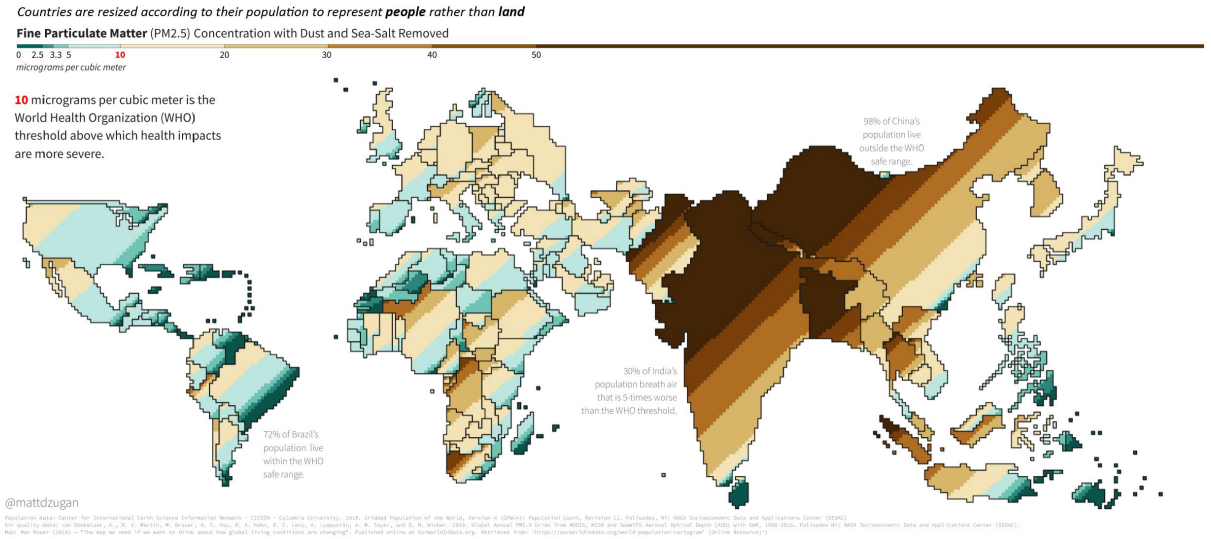
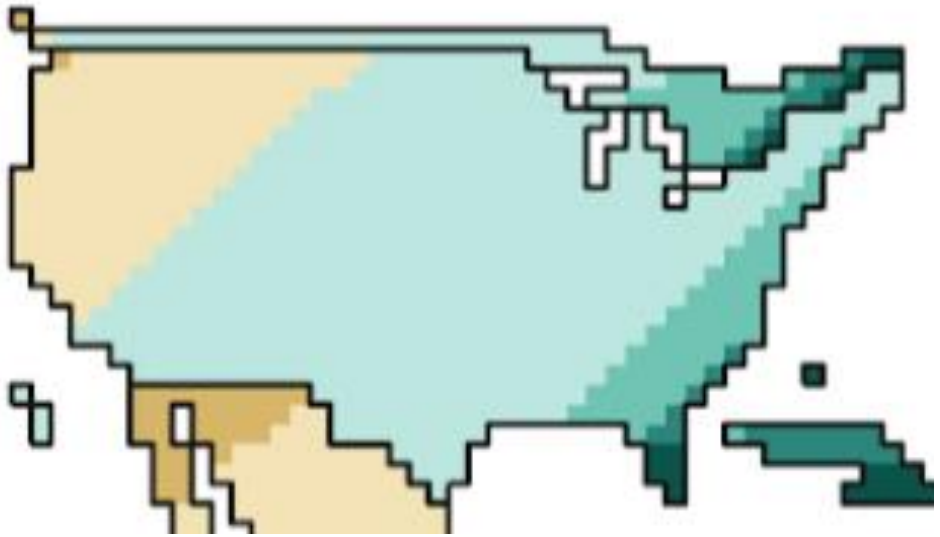
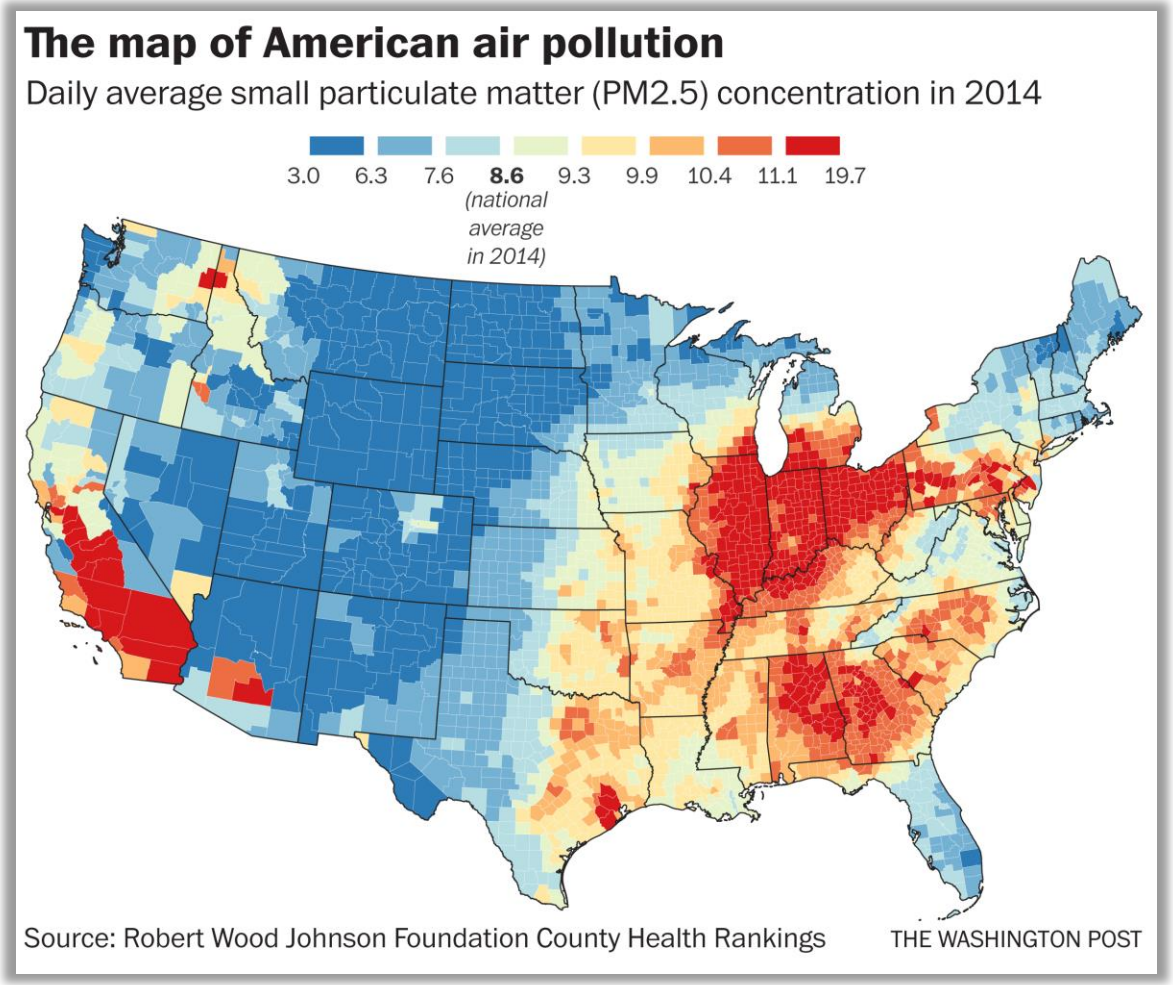


Milestone One
Tutorial Group P2-04

“Pixelated” USA



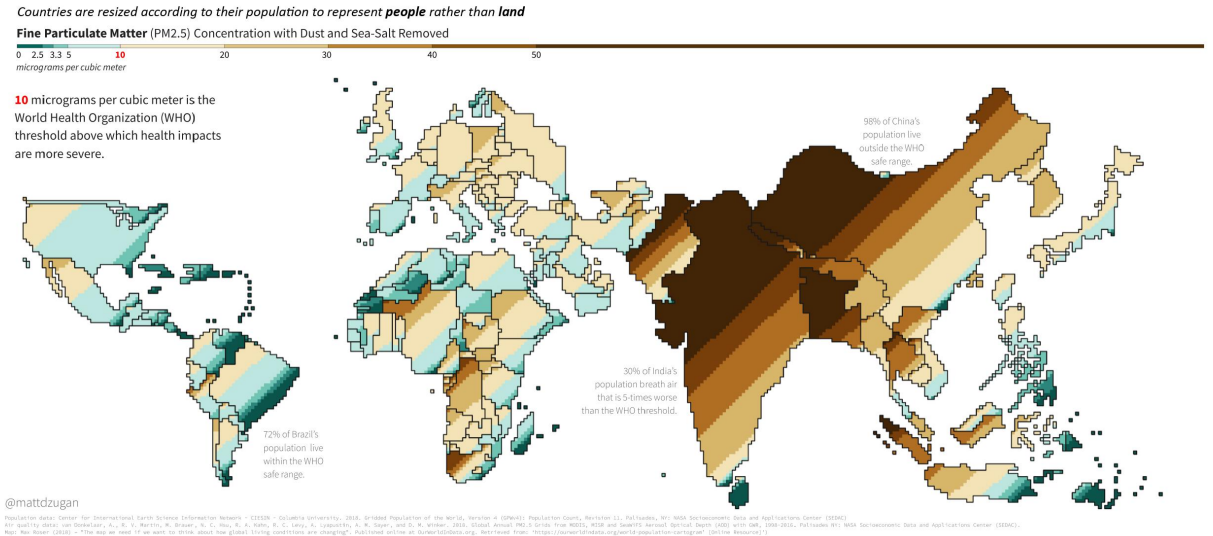
Actual air pollution in USA (2014)



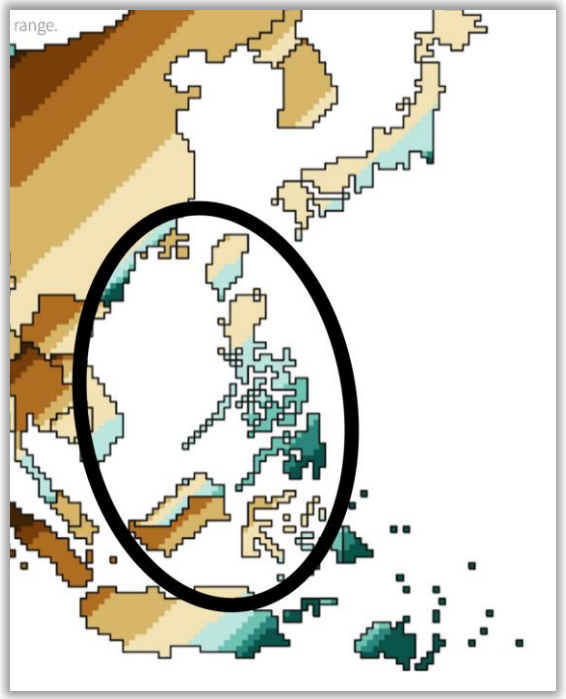
Difference between the “Pixelated” USA and the actual air pollution situation in the USA

Design Violations

- Law of Prägnanz (Simplicity Law)
- Jakob’s Law (Familiarity Law)
- Krug’s 1st Law of Usability

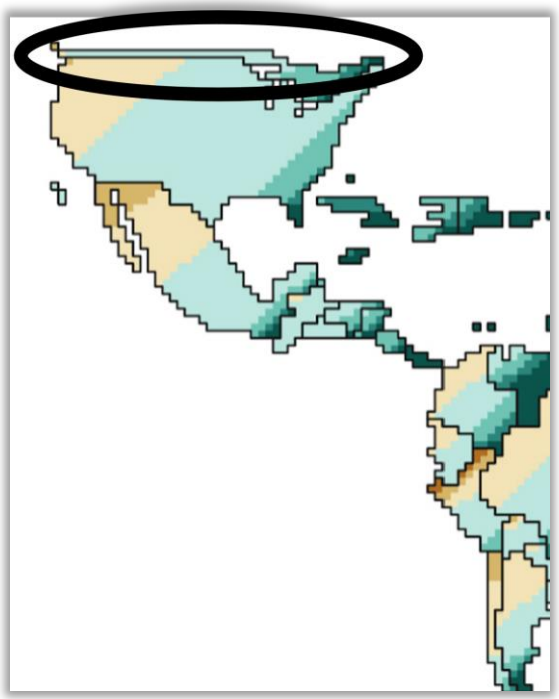


Milestone One
Tutorial Group P2-04



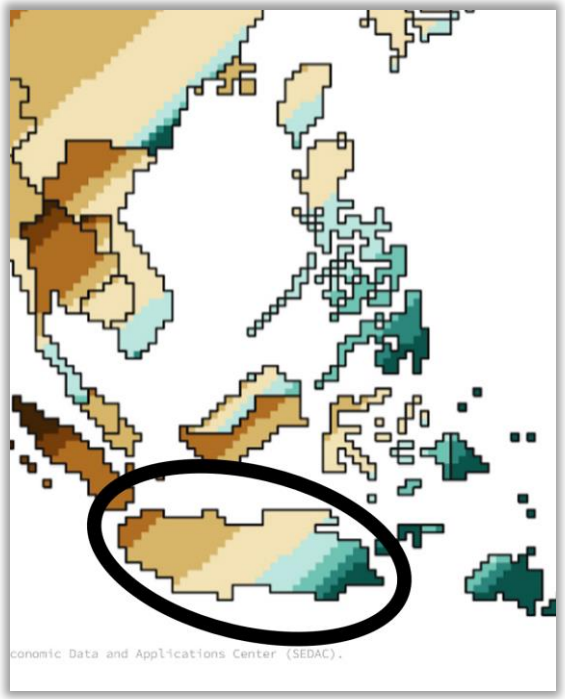
Law of Prägnanz

Different shapes and sizes were utilised to fit the countries on the density map



Jakob’s Law

Many countries were shrunk/enlarged and re-positioned to fit the diagram

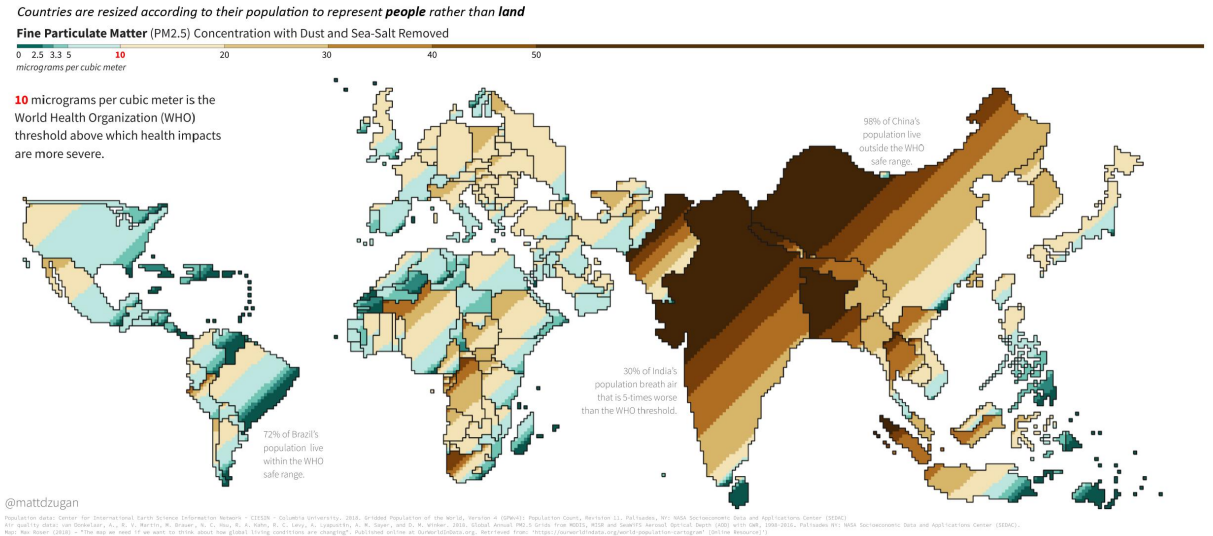


Krug's 1st Law of Usability

Different colours across the scale are used. What do the colours mean?

Proposed Improvements

- Use a traditional choropleth map
- Use a bar graph to illustrate the air pollution levels for each country
- Use a fixed colour for each of the countries
- Use text labels or tooltips to label the different countries



Milestone One
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Proposed Revised Graph

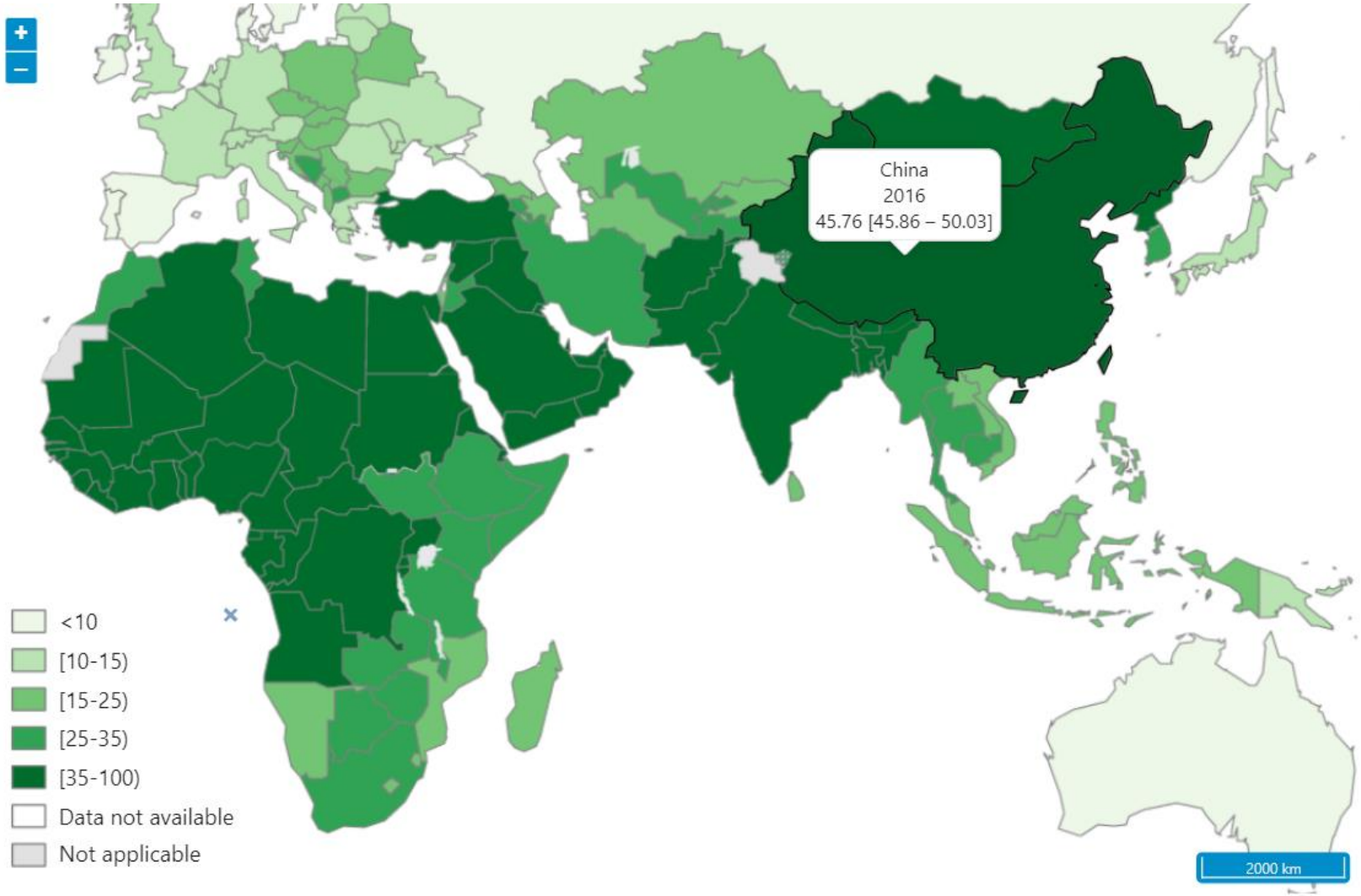
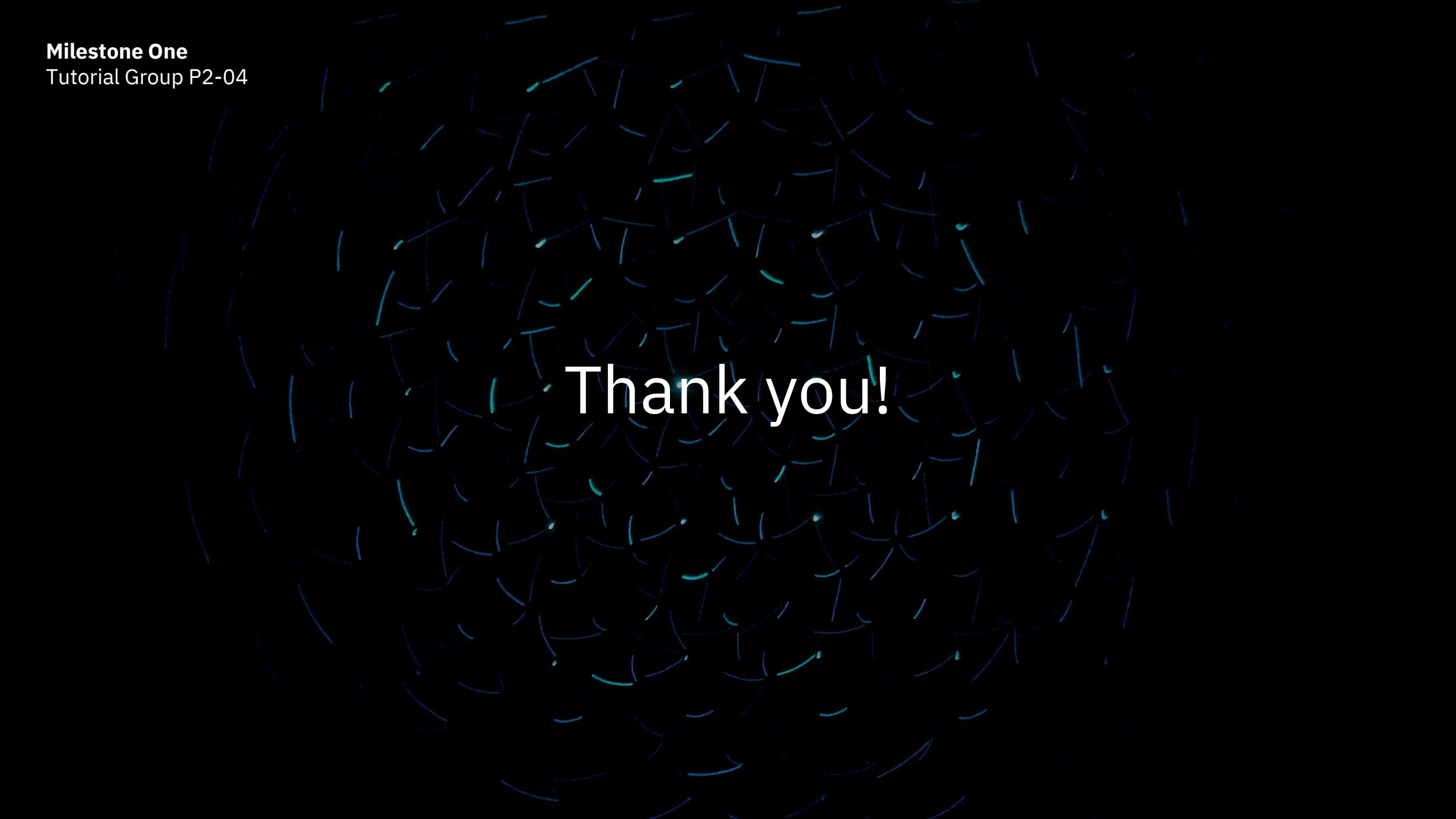


Image from https://www.who.int/data/gho/data/indicators/indicator-details/GHO/concentrations-of-fine-particulate-matter-(pm2-5)

Milestone One
Tutorial Group P2-04



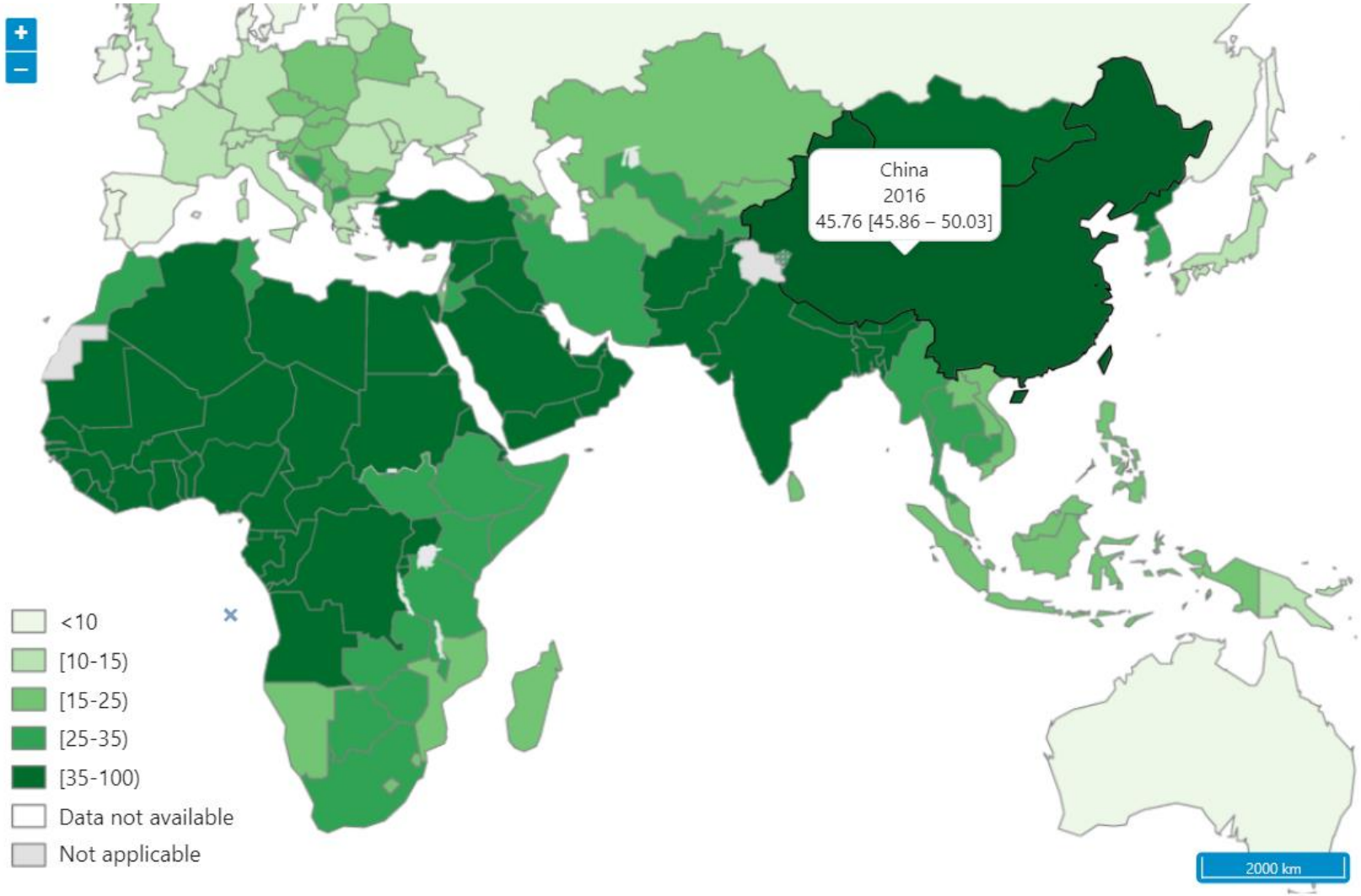
Milestone Two
Tutorial Group P2-04

Proposed Implementation

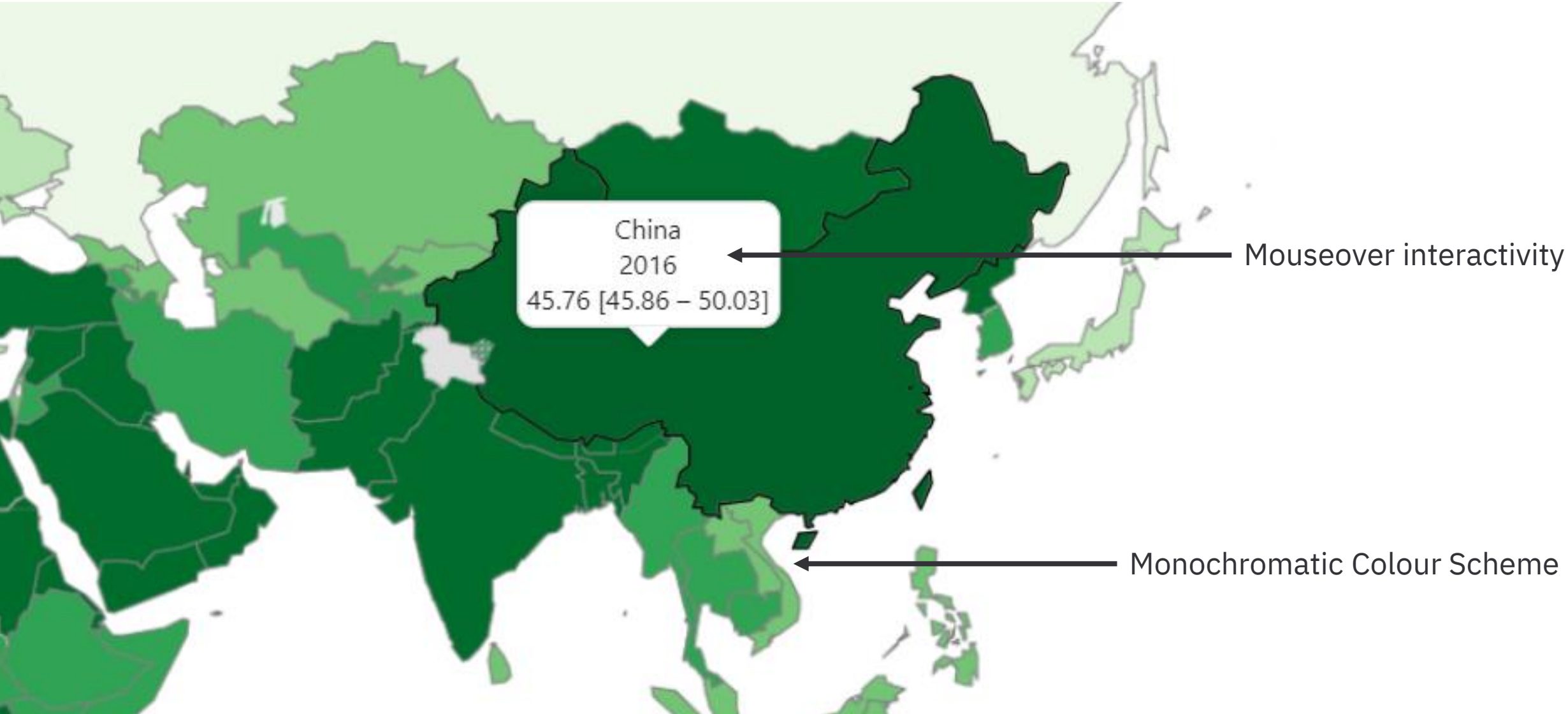
A Continuation of Visual #2

Milestone Two
Tutorial Group P2-04

Proposed Implementation for Milestone 2



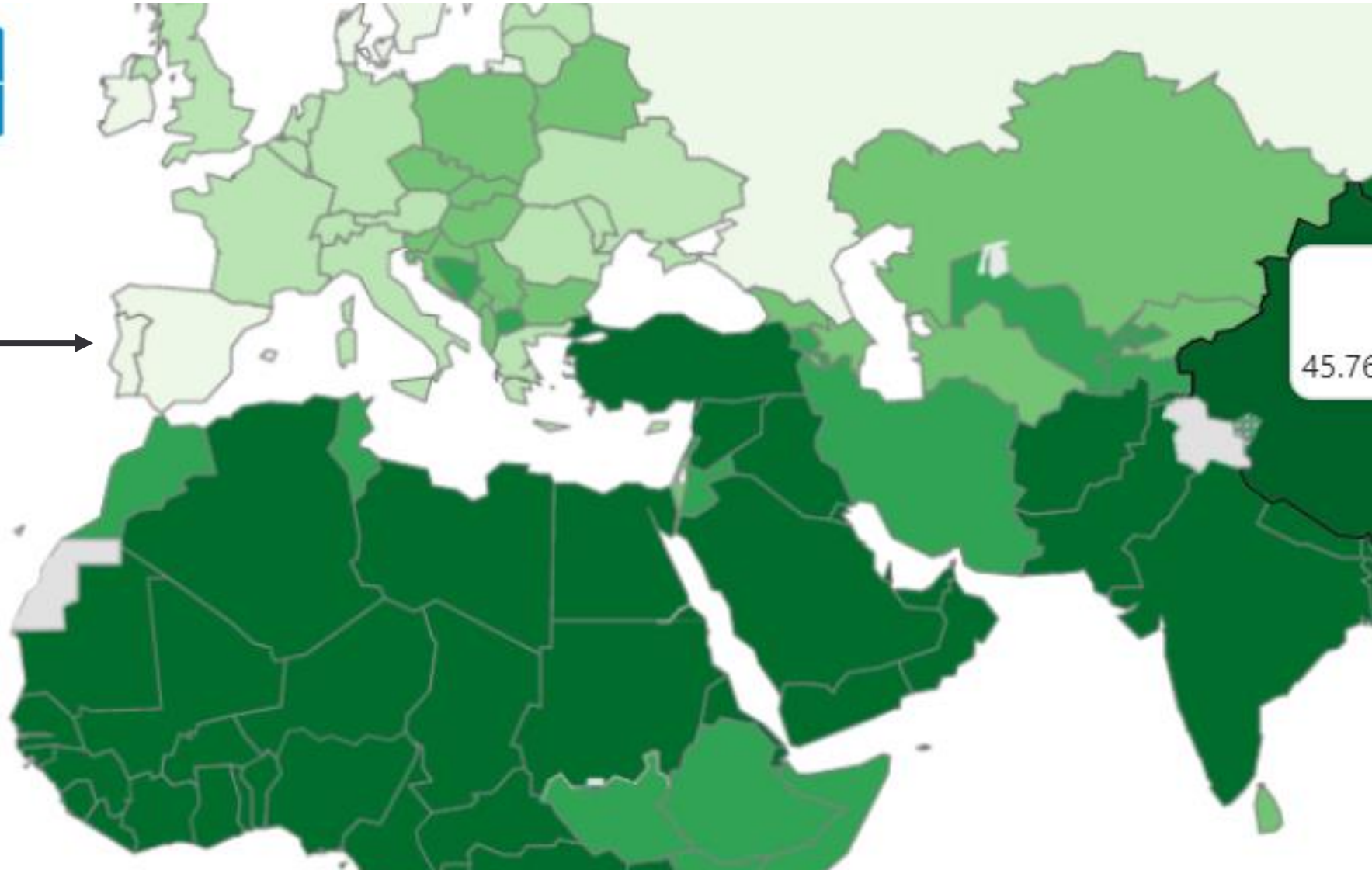
Proposed Implementation for Milestone 2

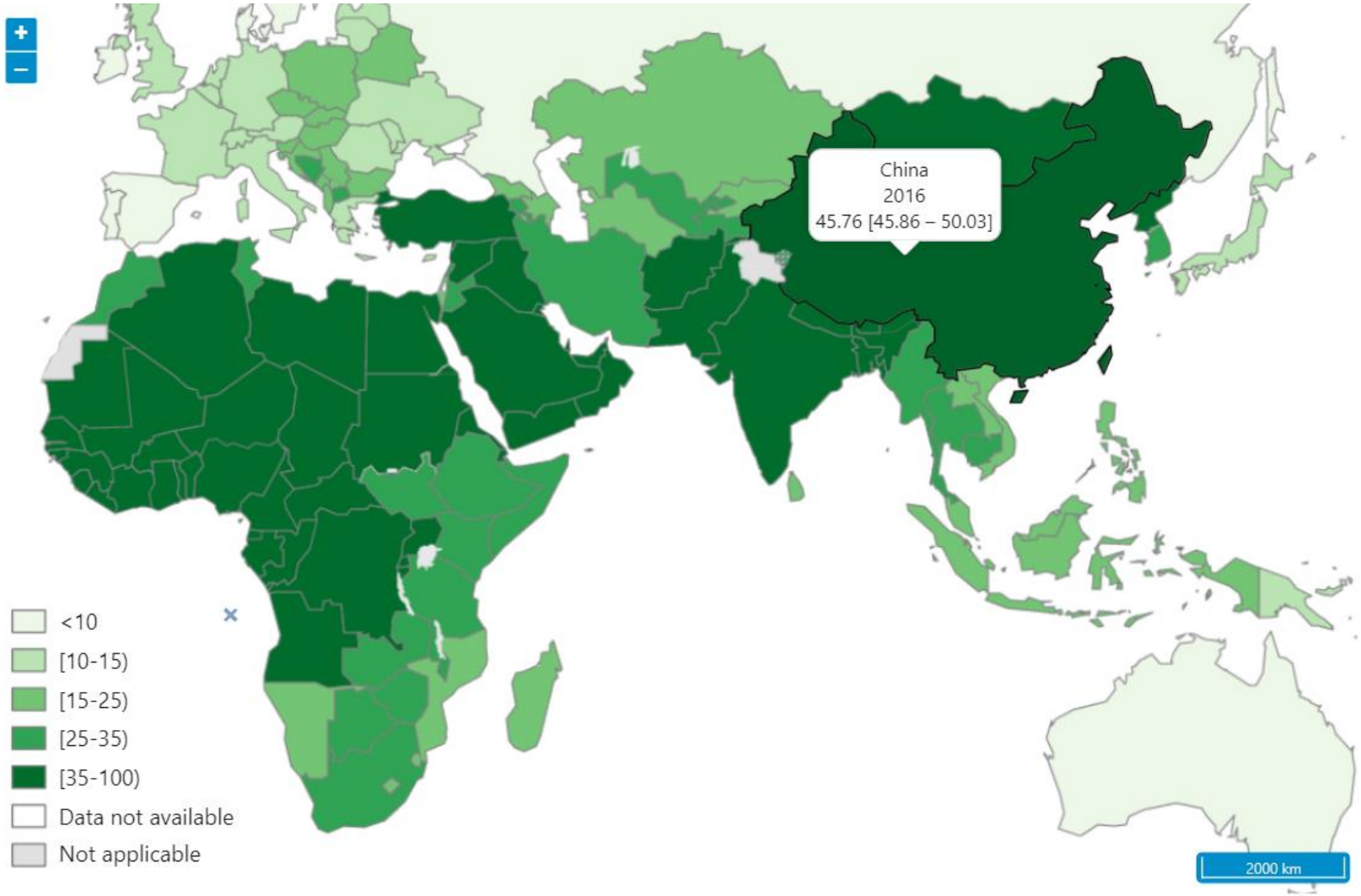


Proposed Implementation for Milestone 2

Zoom functions →

Familiar geographical representation of countries →



Milestone Two
Tutorial Group P2-04

Proposed Implementation for Milestone 2