People ignore design
that ignores people

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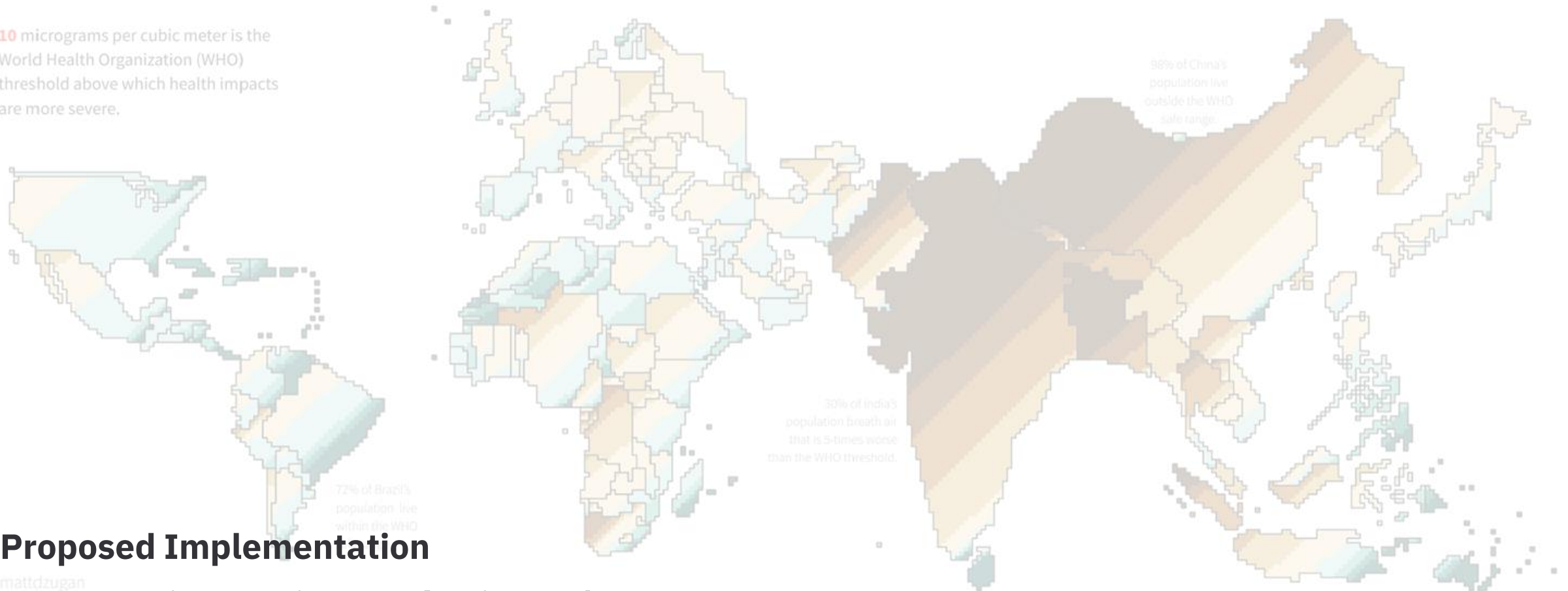
Countries are resized according to their population to represent **people** rather than **land**

Fine Particulate Matter (PM2.5) Concentration with Dust and Sea-Salt Removed

0   2.5 3.3 5   10   20   30   40   50

micrograms per cubic meter

10 micrograms per cubic meter is the
World Health Organization (WHO)
threshold above which health impacts
are more severe.

98% of China's
population live
outside the WHO
safe range.

30% of India's
population breath air
that is 5-times worse
than the WHO threshold.
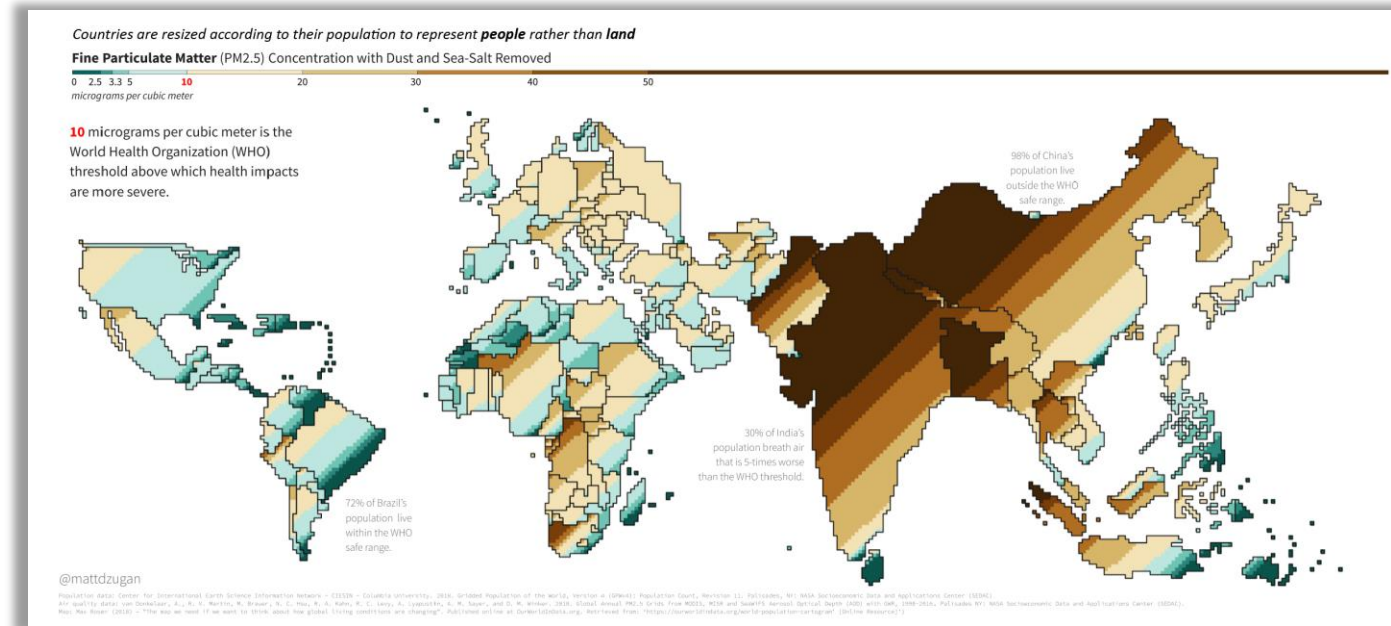
72% of Brazil's
population live
within the WHO

@mattdzugan

Proposed Implementation
A Continuation of Visual #2
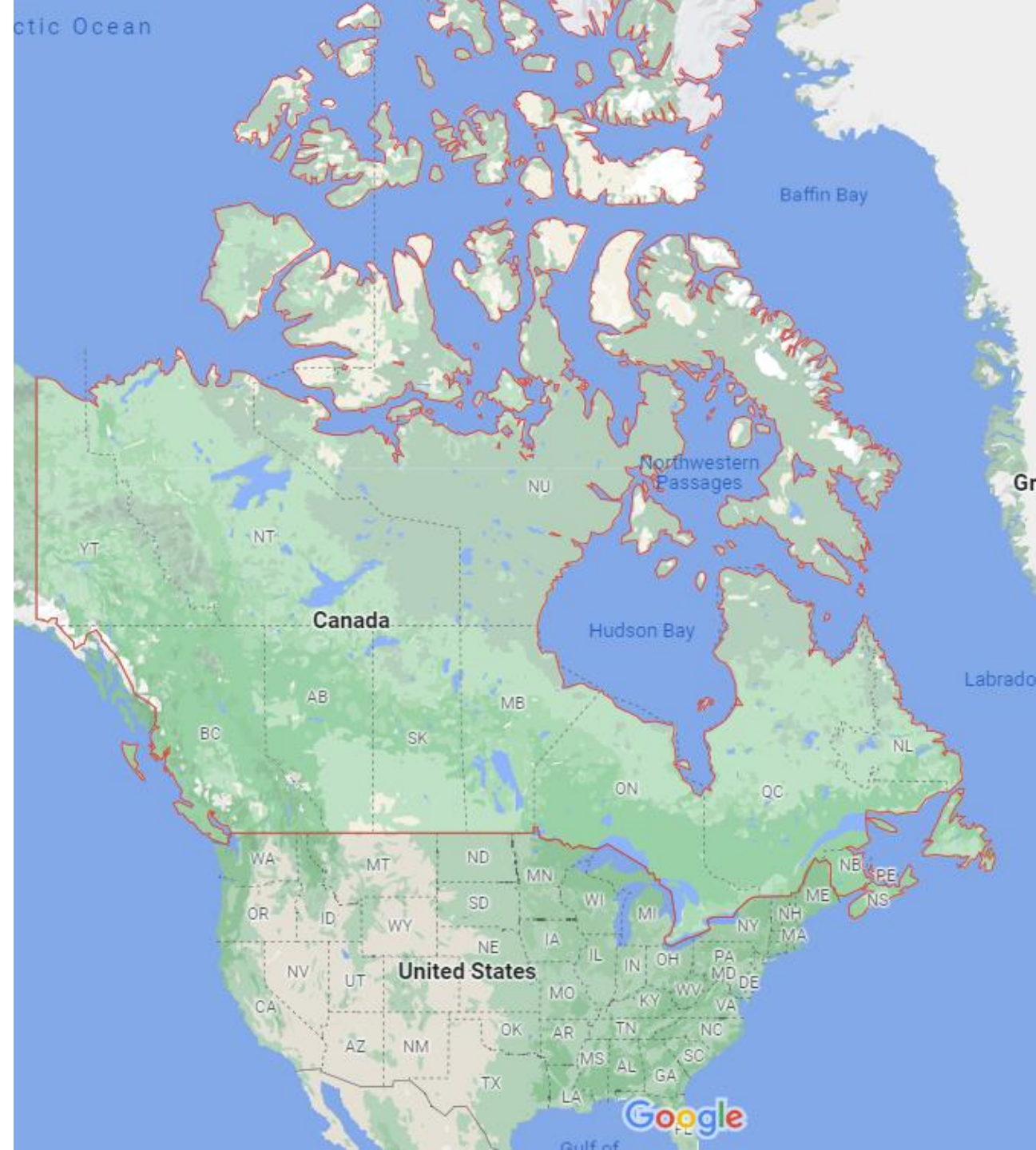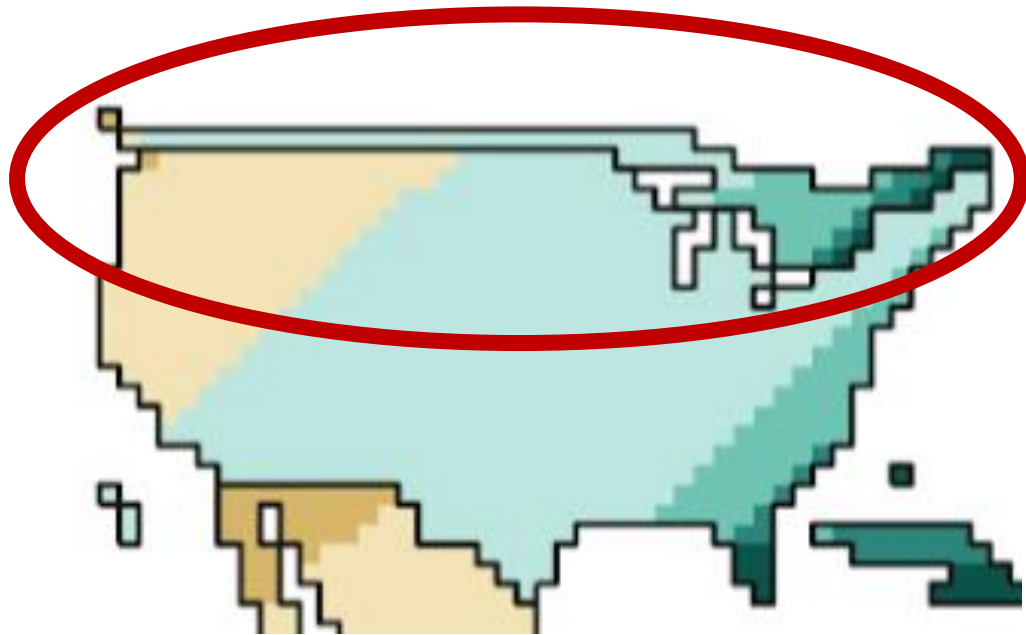
Recap on Visual #2

- **Created by Matt Dzugan**
  - For explanatory analysis
  - Uses a Cartograph to visualise PM2.5 concentration by country

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

"Pixelated" Canada

"Pixelated" USA

Actual air pollution in USA (2014)
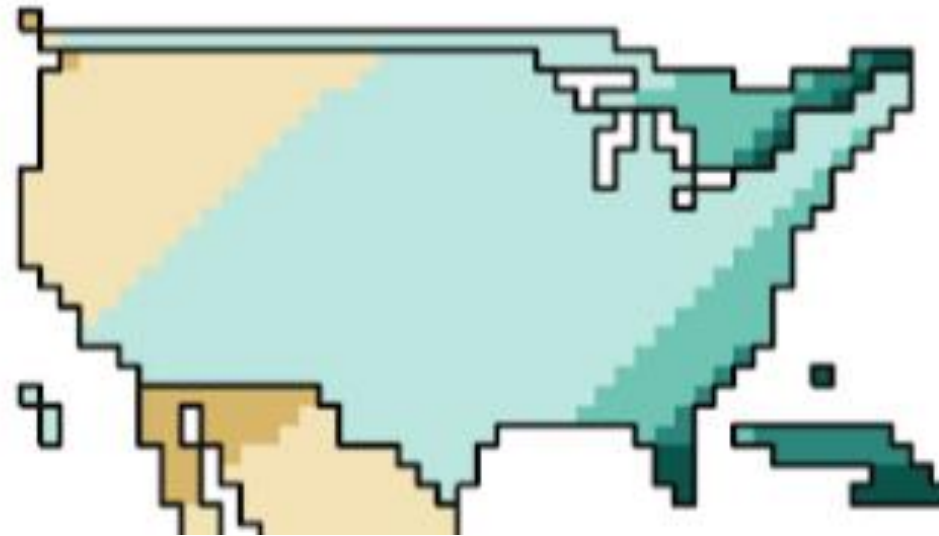
Difference between the "Pixelated" USA and the actual air pollution situation in the USA

The map of American air pollution

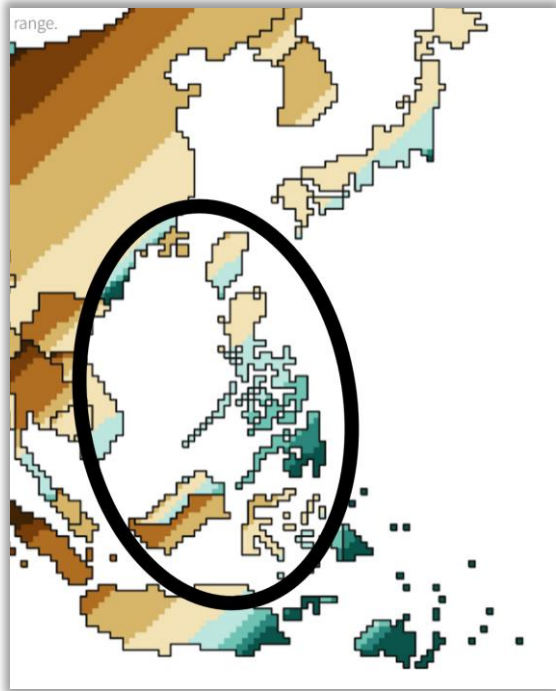Daily average small particulate matter (PM2.5) concentration in 2014

3.0 6.3 7.6 **8.6** 9.3 9.9 10.4 11.1 19.7
(national average in 2014)
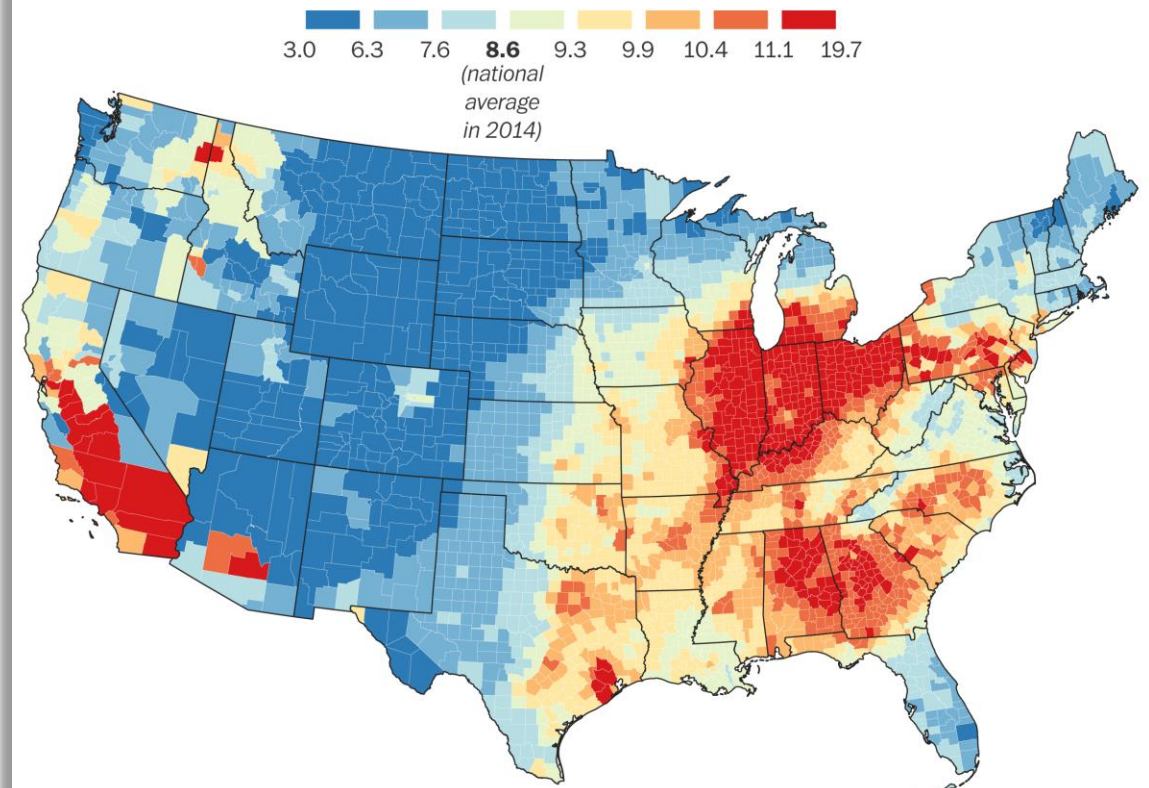
Source: Robert Wood Johnson Foundation County Health Rankings   THE WASHINGTON POST
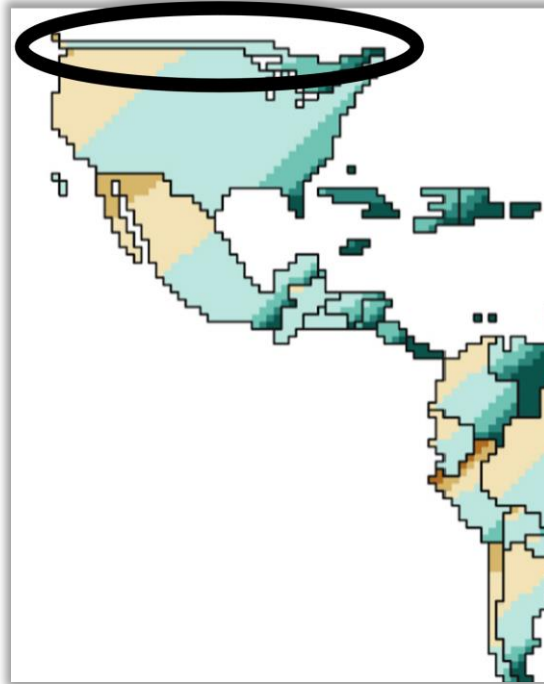
Law of Prägnanz

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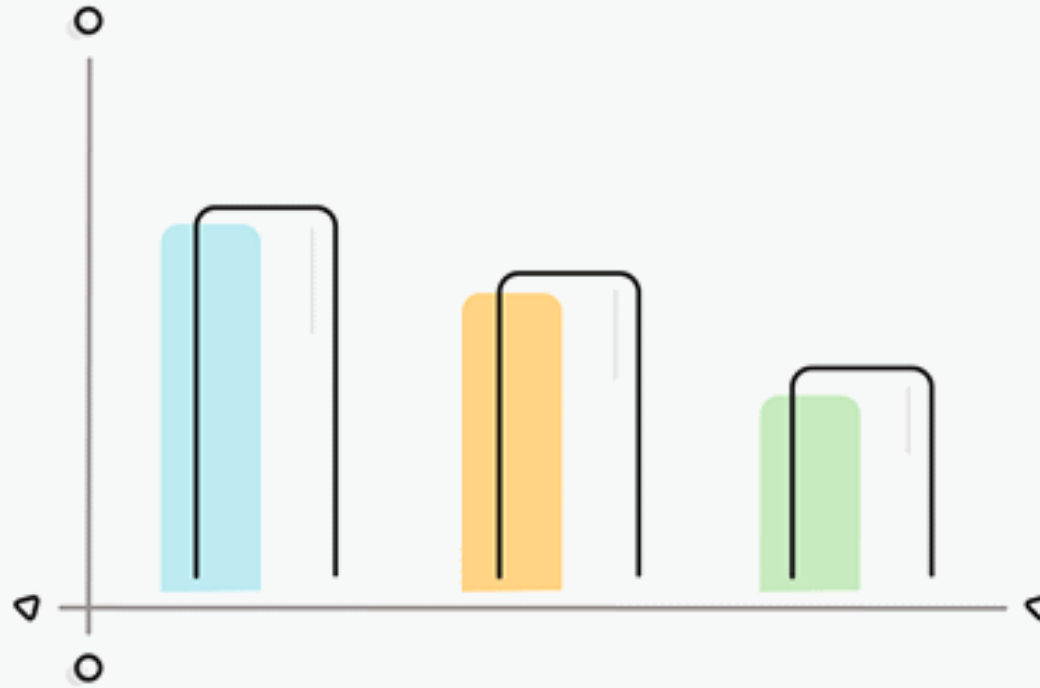

Jakob's Law

Many countries were shrunk/enlarged and re-positioned to fit the diagram
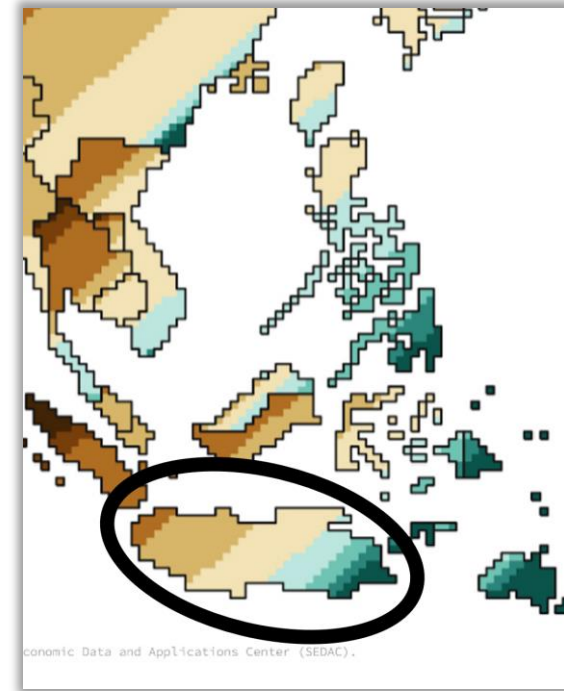
Krug's 1st Law of Usability

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

Research on Visualisation Charts

Possible Charts (Considered, but not used)

Pie Charts

Circular Charts
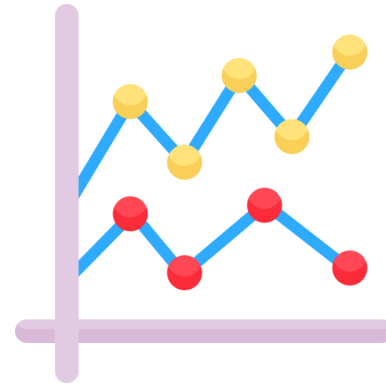
Line Charts

Stacked Bar Charts

Possible Charts (Considered, but not used)

Pie Charts

- **Not all countries can be visualised**
- Too many data to visualise (176 countries)
- Hard to visualise countries with low PM 2.5 emissions

Circular Charts

- **Difficult to locate each country**
- Too many data to visualise (176 countries)
- Hard to visualise countries with low PM 2.5 emissions

Possible Charts (Considered, but not used)

Line Charts

- **Not about visualising trends**
- Too many data to visualise (176 countries)
- Hard to visualise countries with low PM 2.5 emissions
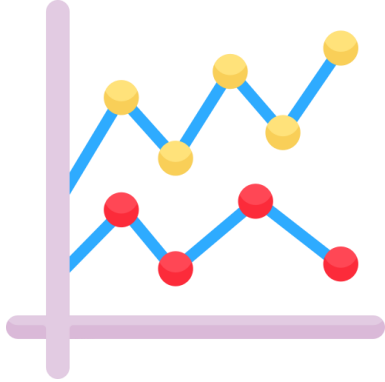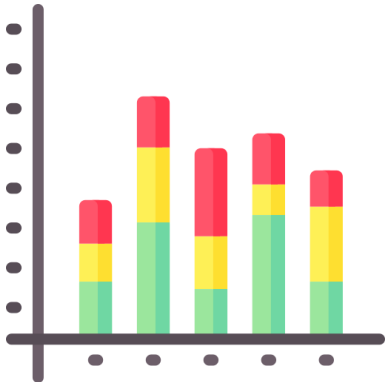
Stacked Bar Charts

- **Not about showing comparison between categories**
- Too many data to visualise (176 countries)
- Hard to visualise countries with low PM 2.5 emissions

Why use Choropleth Maps?

- Data Representing: **Country Name (Nominal)**

- Familiar geographical layout (Law of Familiarity)

- Countries with high PM 2.5 values can be identified easily (Von Restorff Effect)

- Provides a concise view of the regions

https://r-graph-gallery.com/a-smooth-transition-between-chloropleth-and-cartogram.html
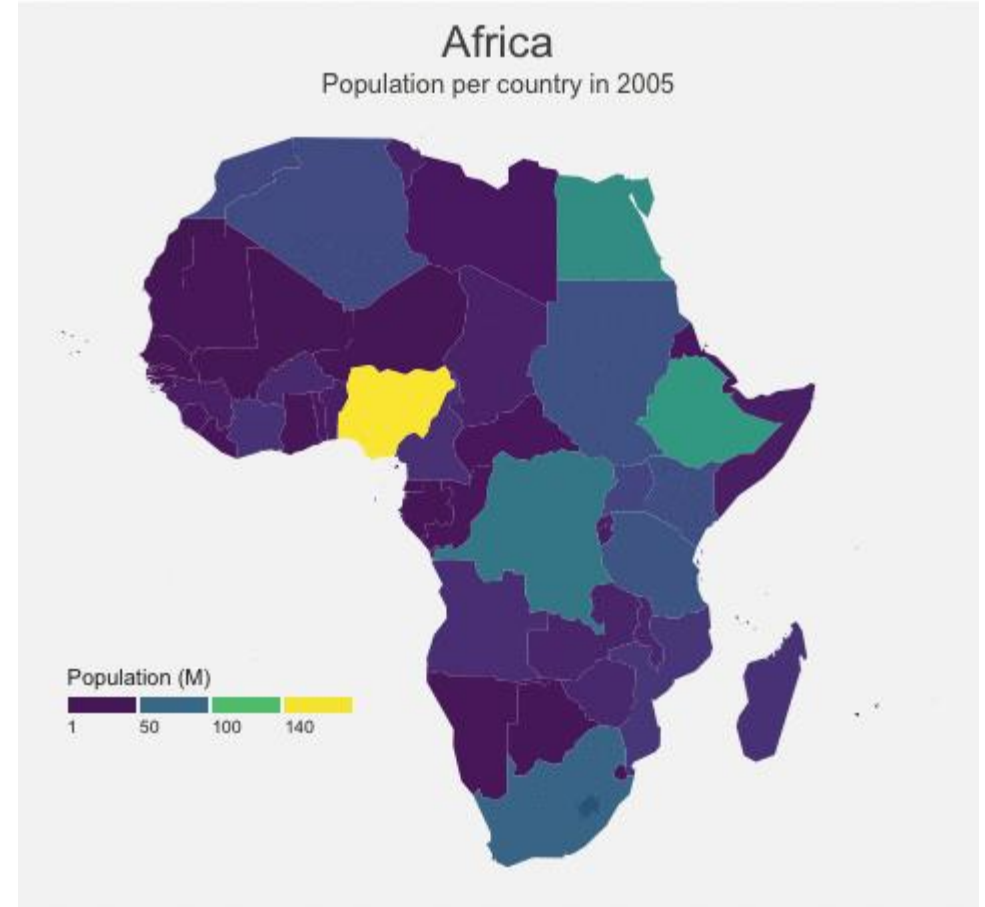
Why use Bar Charts?

- Data Representing: **PM 2.5 Data (Ratio)**

- Summarize a large data set in visual form

- Can be used for ranking of countries by PM 2.5 values

- Clarify trends in data better than table

DATA **Components**

20M
15M
10M
5M

2014   2015   2016

Q1   Q2   Q3

Vertical Bar Graph

https://www.pinterest.com/pin/799177896356317798/
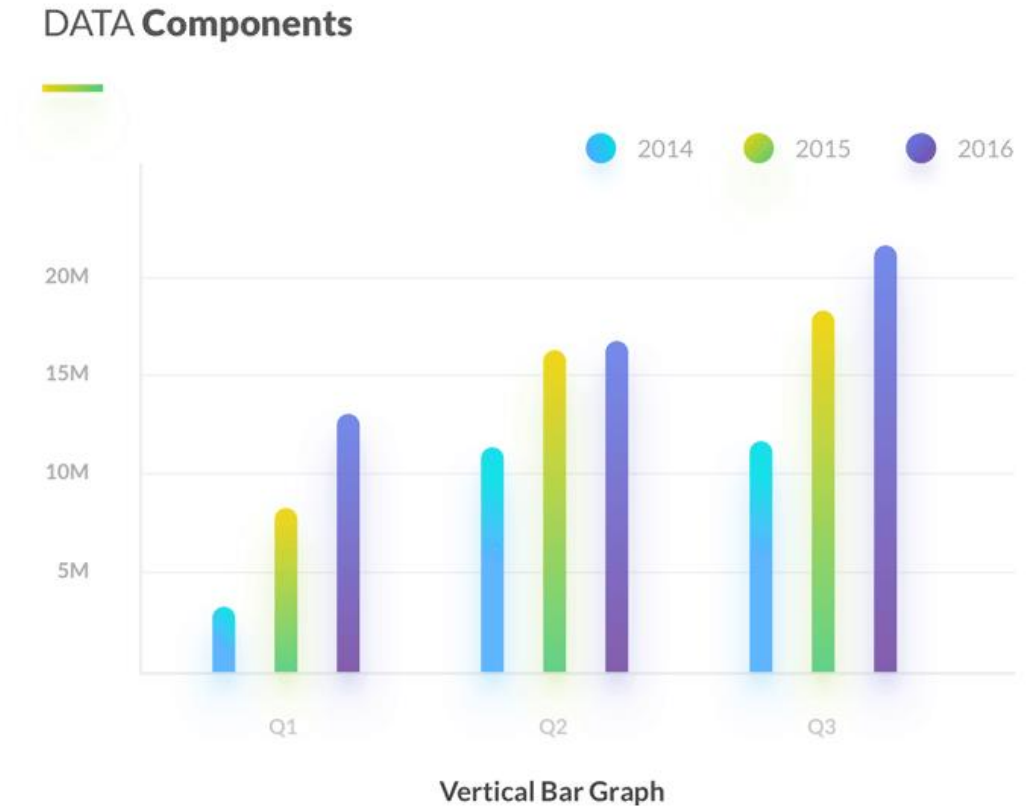
Proposed Implementation

Technology Stack
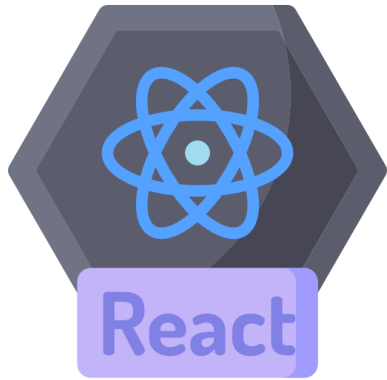
Framework/Library

Data Source

UI Library

Chart Libraries Utilised

Choropleth Chart

Bar Chart

UI Demonstration

https://saritainfotech.com/sarita-nimble/

Milestone Two
Tutorial Group P2-04

Group P2-4 | CSC3007 Project

localhost:3000/CSC3007-project/#/dashboard

World's Carbon Emissions
Interactive PM 2.5 Visualisation Map

Choropleth Map

Map Legend

Map Legend

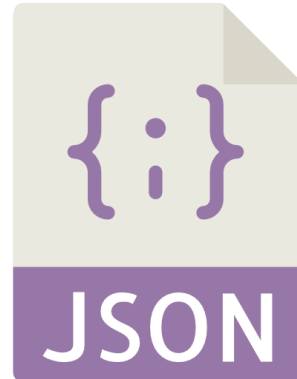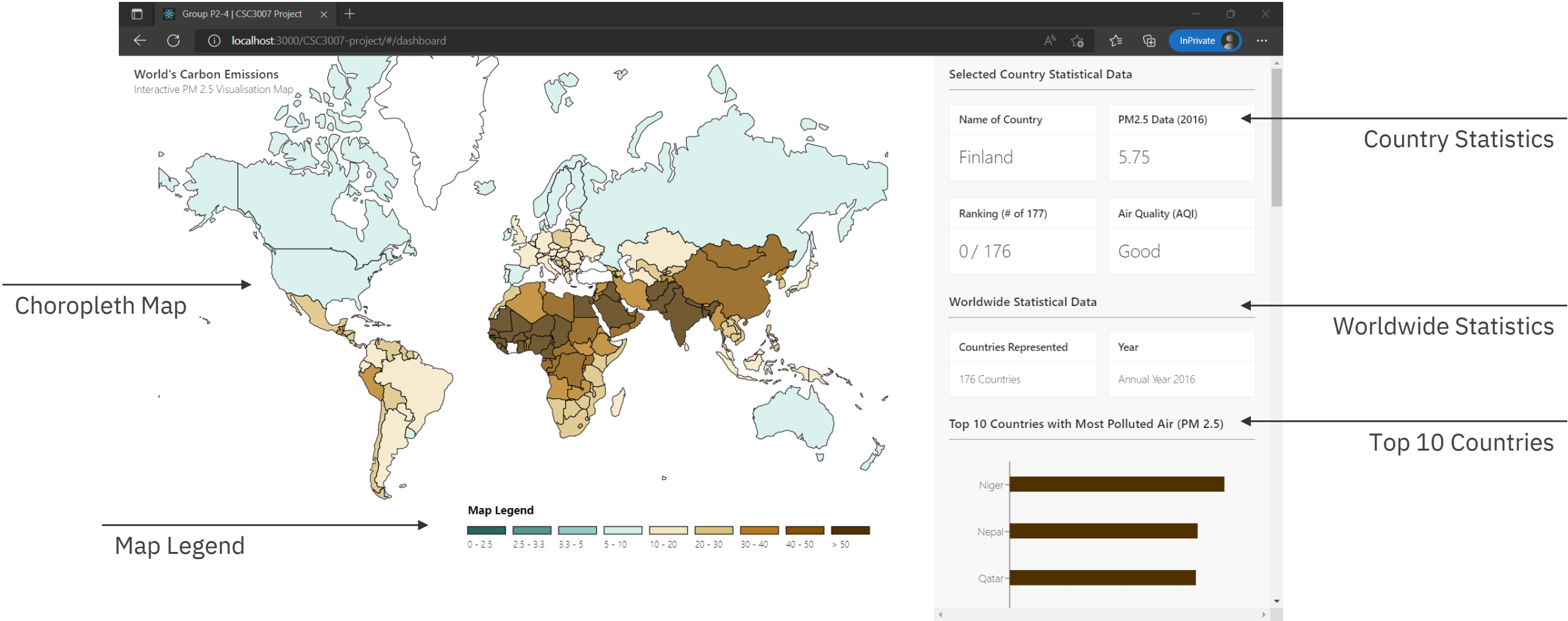| 0 - 2.5 | 2.5 - 3.3 | 3.3 - 5 | 5 - 10 | 10 - 20 | 20 - 30 | 30 - 40 | 40 - 50 | > 50 |

Selected Country Statistical Data

Country Statistics

Name of Country	PM2.5 Data (2016)
Finland	5.75

Ranking (# of 177)	Air Quality (AQI)
0 / 176	Good

Worldwide Statistical Data

Worldwide Statistics

Countries Represented	Year
176 Countries	Annual Year 2016

Top 10 Countries with Most Polluted Air (PM 2.5)

Top 10 Countries

Niger

Nepal

Qatar

Milestone Two
Tutorial Group P2-04

Choropleth Map

Map Legend

Table of all Countries

Limitations / Future Works / Retrospective

Limitations Discovered

- **Design/Data Mismatch**

  - Data does not tally with the actual data in Matt's Cartograph

- **WHO Data is up to 2016?**

  - Despite "last updated" in 2021, the latest data is for 2016

  - Cartograph is not clear on the year(s) used
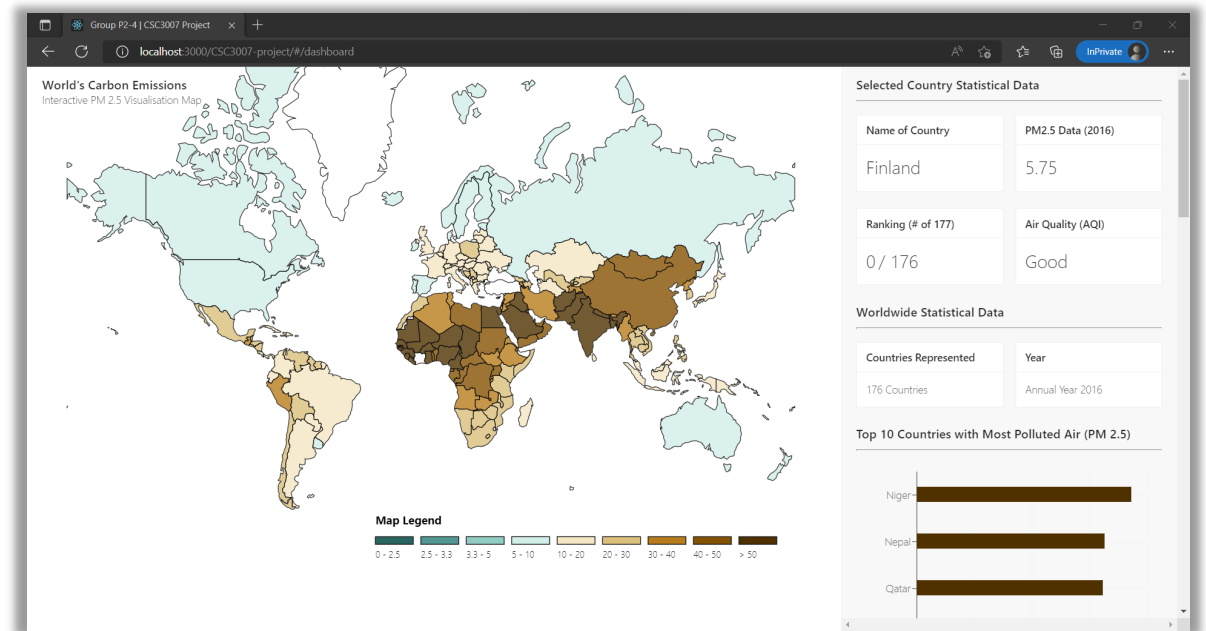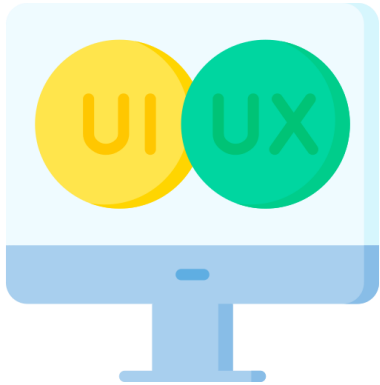
UI Development Issues

- **Outdated D3 Source Code**
  - Most source code found online and on the official D3 gallery website are deprecated

- **JSON/GeoJSON Name Mismatch**
  - Additional time is needed to resolve country name mismatches in the WHO JSON and GeoJSON file
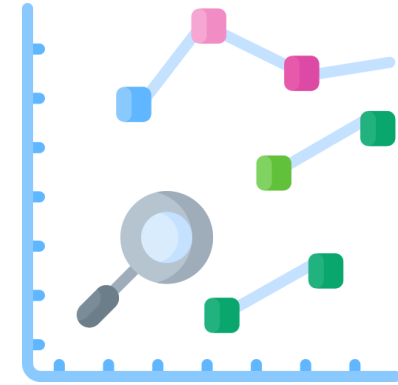
Future Works (If there is more time)

Explore Other Libraries

Toggle 2D vs 3D

Population Trends?

Distribution of Project Work

Zheng Yu

✓ Data filtering and restructuring for GeoJSON

✓ Research on graphs for data representation

✓ Development of Table UI component (all countries)

✓ Documentations for GitHub

Claudia

✓ Data filtering and restructuring for GeoJSON

✓ Research on graphs for data representation

✓ Development of Bar Chart component (Top 10 countries)

✓ Documentations for GitHub

Keith

✓ UI design scheme

✓ Development of Choropleth Map component

✓ Development of Card UI components (Country details)

✓ Documentations for GitHub

✓ Overall Project Integration and ReactJS state management

Team Retrospective

Need more time to explore more data visualisation libraries

Should have crafted User Stories to sieve out unnecessary functions

All team members are receptive of new findings and UI changes

Some source code are not compactible with ReactJS

Using of UI library helps standardise the UI layout

Feedback from Milestone #1 is very helpful

Thank you!