Data Visualization Workshop

UN Innovation Network

Hong Qu

Adjunct Lecturer

Harvard Kennedy School

Agenda

- How to create charts and maps using
  - Excel
  - Flourish
  - Datawrapper
  - Tableau
- Highlight to focus attention
  - Annotation
  - Animation
  - Interaction (exploration)
- The annotation layer
- Color and contrast
- Workflow and design process
- Question and discussion
- Software demonstrations

DATA

INFORMATION

STORY

What is the difference between data and information?

https://www.eurobricks.com/forum/index.php?/forums/topic/71984-moc-small-train-station/

Data: The 30 Largest Cities 1950-2035

United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

United Nations
Population Division
Department of Economic and Social Affairs

World Urbanization Prospects: The 2018 Revision

File 11a: The 30 Largest Urban Agglomerations Ranked by Population Size at Each Point in Time, 1950-2035

POP/DB/WUP/Rev.2018/1/F11a

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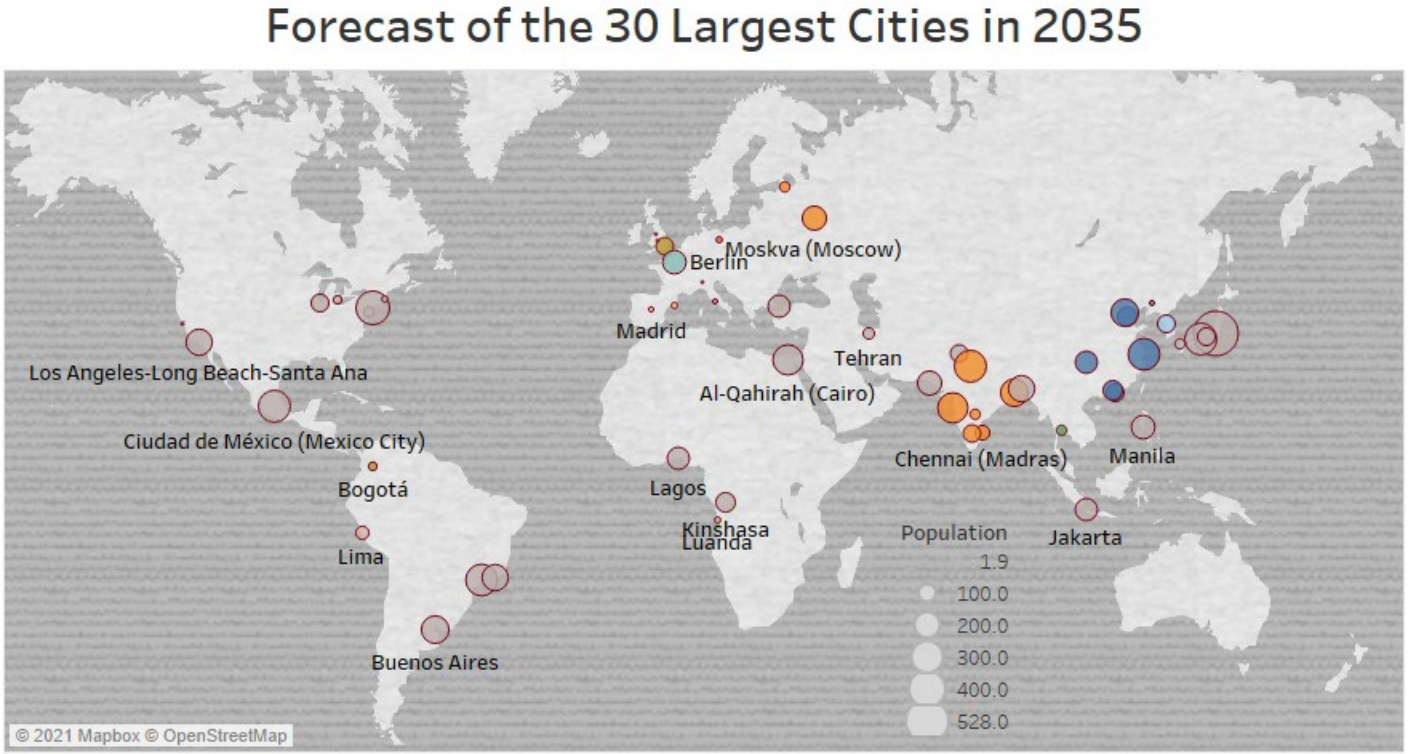
Suggested citation: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

					The 30 Largest Urban Agglomerations Ranked by Population Size at Each Point in Time, 1950-2035					
Index	Year	Rank Order	Country code	Country or Area	City code	Urban Agglomeration	Note	Latitude	Longitude	Population (millions)
1	1950	1	840	United States of America	23083	New York-Newark		40.7170	-74.0037	12
2	1950	2	392	Japan	21671	Tokyo	1	35.6895	139.6917	11
3	1950	3	826	United Kingdom	22860	London	2	51.5085	-0.1257	8
4	1950	4	392	Japan	206459	Kinki M.M.A. (Osaka)	3	34.6758	135.5538	7
5	1950	5	250	France	20985	Paris		48.8534	2.3488	6
6	1950	6	643	Russian Federation	22299	Moskva (Moscow)		55.7550	37.6218	5
7	1950	7	32	Argentina	20058	Buenos Aires	4	-34.6051	-58.4004	5
8	1950	8	840	United States of America	22956	Chicago		41.8500	-87.6501	5
9	1950	9	356	India	21211	Kolkata (Calcutta)		22.5335	88.3560	5
10	1950	10	156	China	20656	Shanghai	5	31.2222	121.4581	4
11	1950	11	840	United States of America	23052	Los Angeles-Long Beach-Santa Ana		34.0317	-118.2417	4
12	1950	12	484	Mexico	21853	Ciudad de México (Mexico City)	6	19.4273	-99.1419	3
13	1950	13	276	Germany	204296	Berlin		52.5244	13.4105	3
14	1950	14	840	United States of America	23098	Philadelphia		39.9523	-75.1638	3
15	1950	15	356	India	21206	Mumbai (Bombay)		19.0740	72.8808	3
16	1950	16	76	Brazil	20272	Rio de Janeiro		-22.9028	-43.2075	3
17	1950	17	643	Russian Federation	22365	Sankt Peterburg (Saint Petersburg)		59.9299	30.3262	3
18	1950	18	840	United States of America	22974	Detroit		42.3871	-83.1026	3
19	1950	19	840	United States of America	22939	Boston		42.3479	-71.0645	3

Tableau


Forecast of the 30 Largest Cities in 2035
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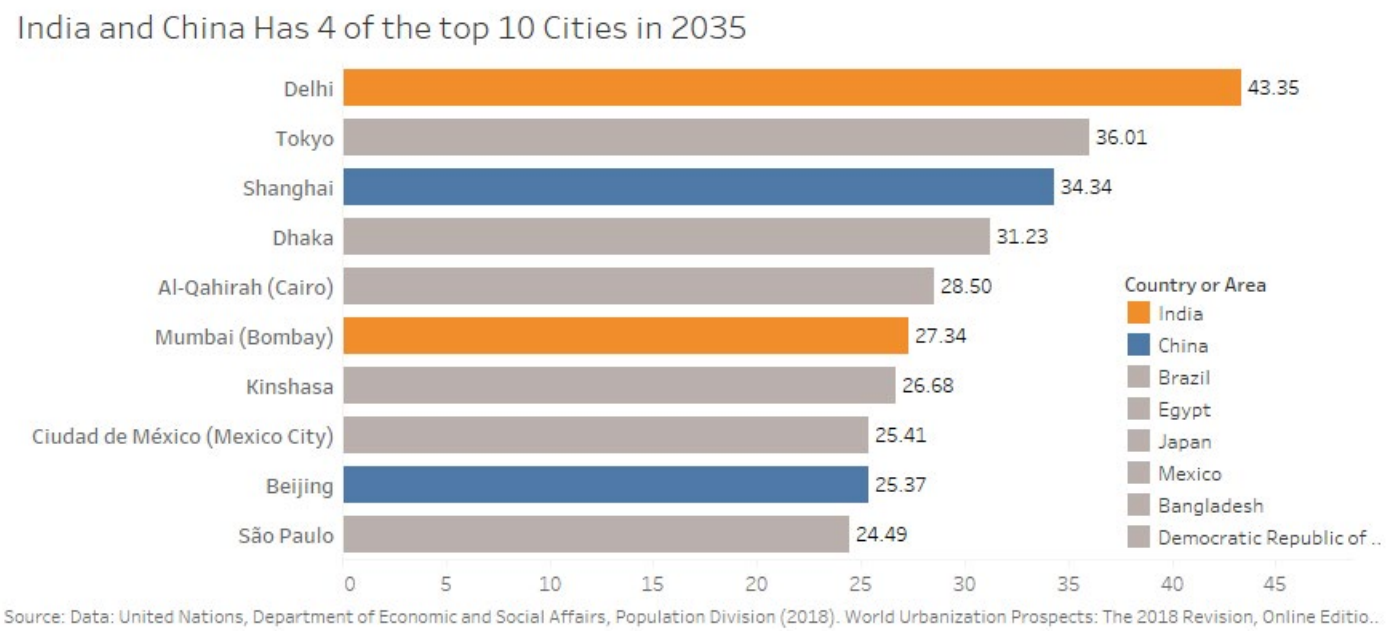
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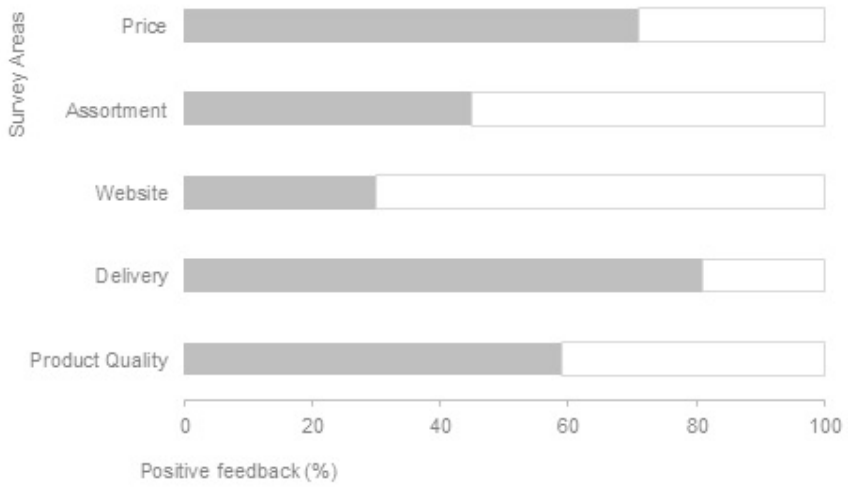
Beijing 25.37
São Paulo 24.49
0 5 10 15 20 25 30 35 40 45
Country or Area
India
China
Brazil
Egypt
Japan
Mexico
Bangladesh
Democratic Republic of ..
Source: Data: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Editio..

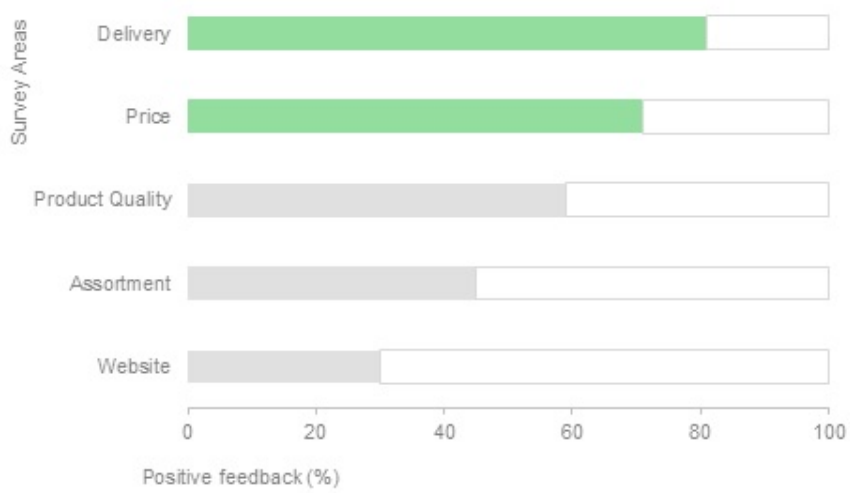
“The goal of visualization is to aid our understanding of data by leveraging the human visual system’s **highly tuned** ability to **see patterns**, **spot trends**, and **identify outliers**.”

–Jeffrey Heer, Michael Bostock, Vadim Ogievetsky

A Tour Through the Visualization Zoo

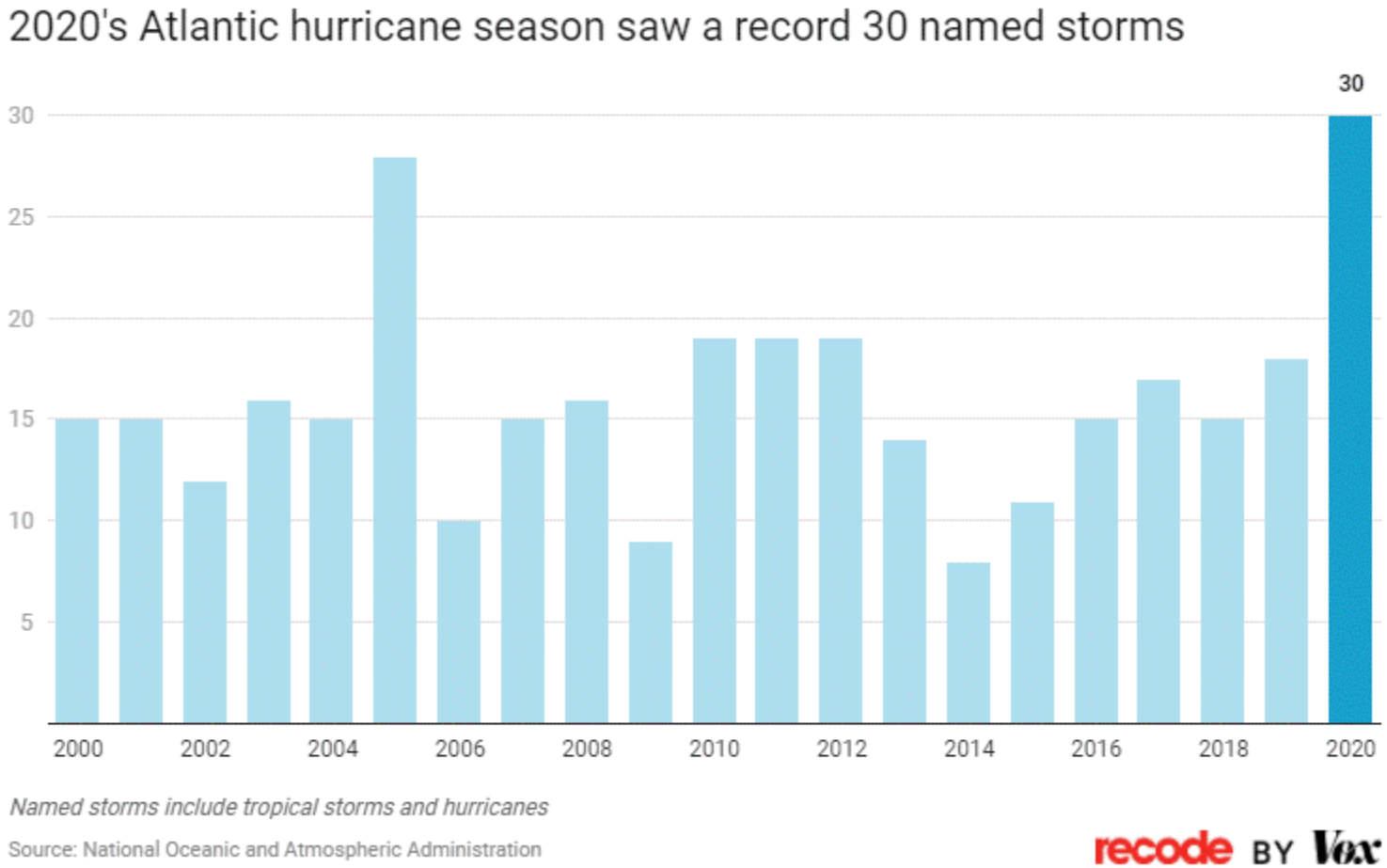
Pre-attentive Perception





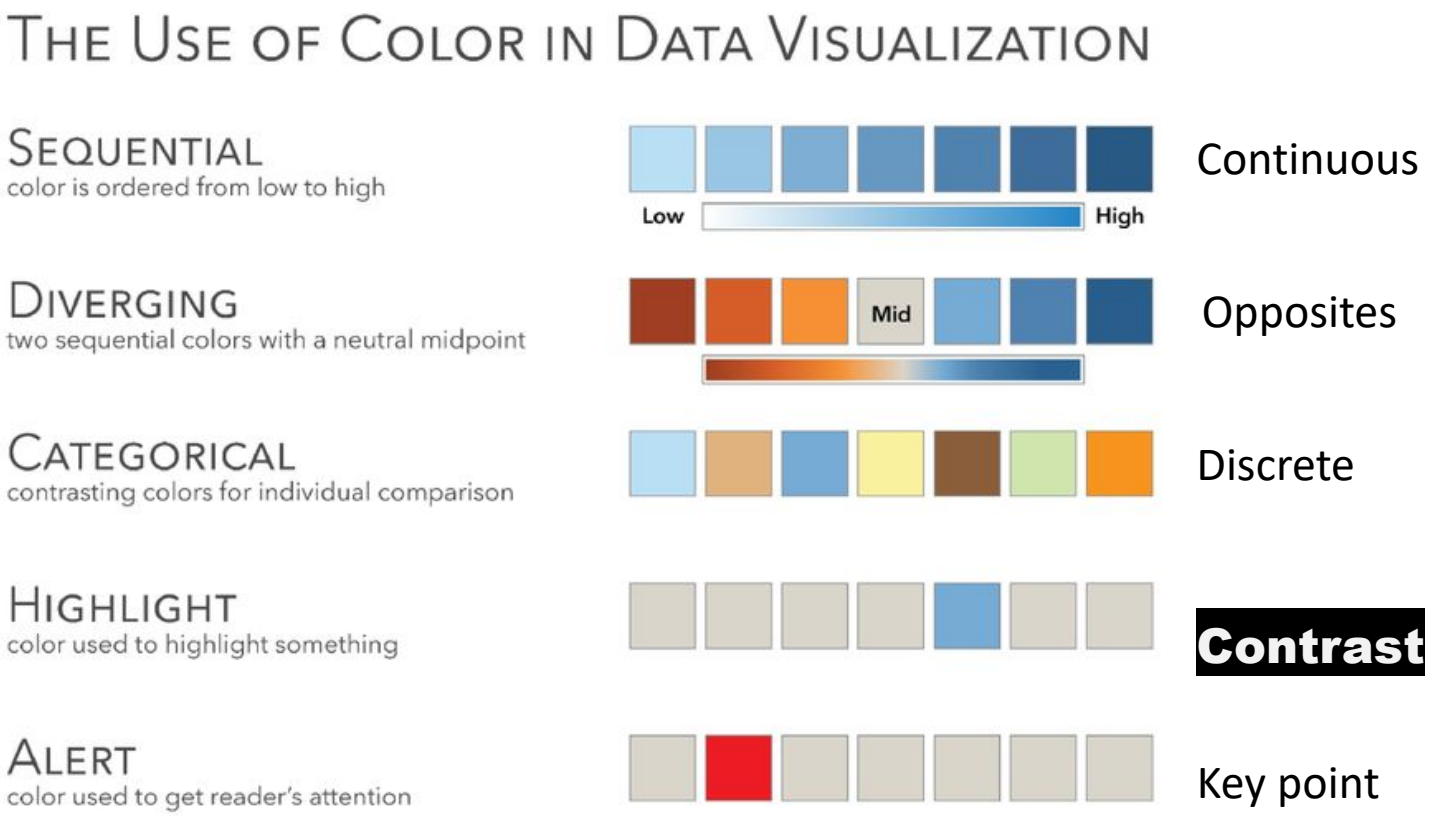
Pre-attentive processing is the subconscious accumulation of information… All available information is pre-attentively processed. Then, the brain filters and processes what is important. Information that has the highest salience (a stimulus that stands out the most) or relevance to what a person is thinking about is selected for further and more complete analysis by conscious (attentive) processing.

Preattentive Attributes in Visualization – An Example



https://www.vox.com/recode/21727016/2020-in-charts-covid-vaccine-pandemic-election

Color



Source: *The Big Book of Dashboards* (Figure 1.16)

The Annotation Layer

"Making a graphic is the equivalent to interviewing your source; but it's then your job to actually **pick out…the bits the reader should know about**."

– John Burn-Murdoch

Three Ways to Annotate Your Graphs

[Storytelling with Data]

With a focus on simple lessons and practical application, we equip and inspire individuals to take data storytelling to the next level

understand the
context

choose an
effective visual

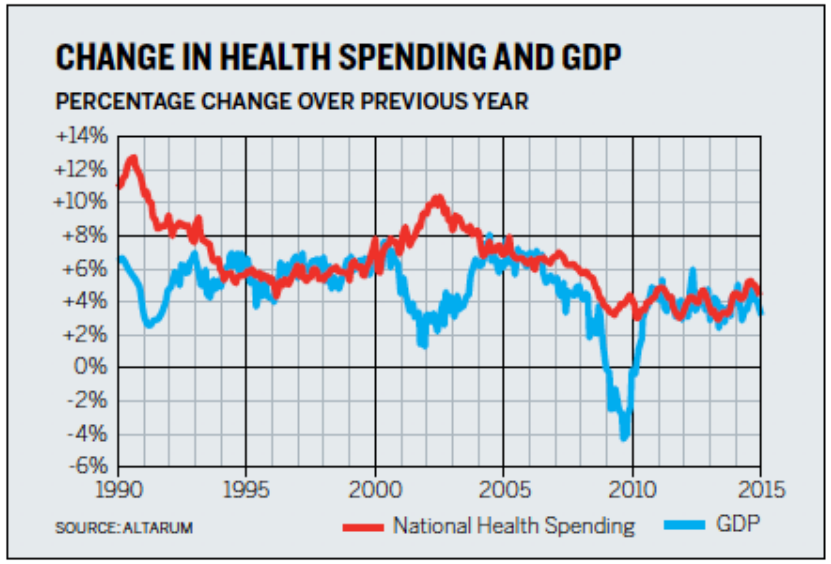
eliminate
clutter

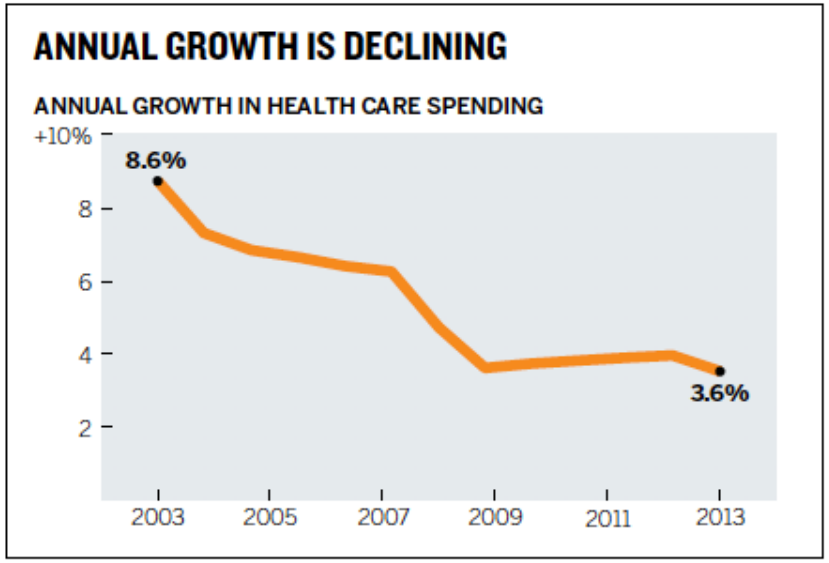
focus
attention

tell a
story

[*Storytelling with Data*]

Simplicity takes discipline and courage

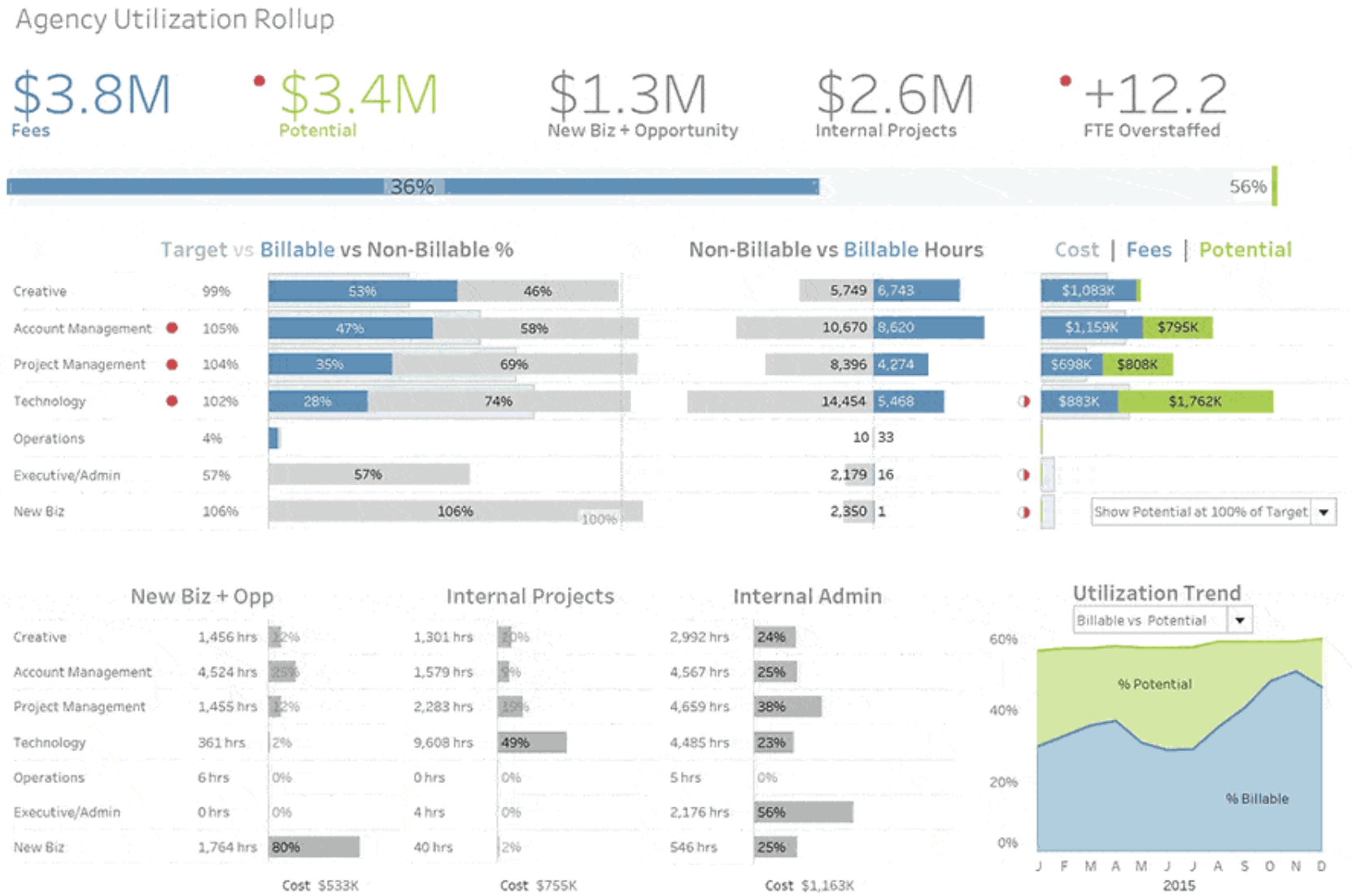




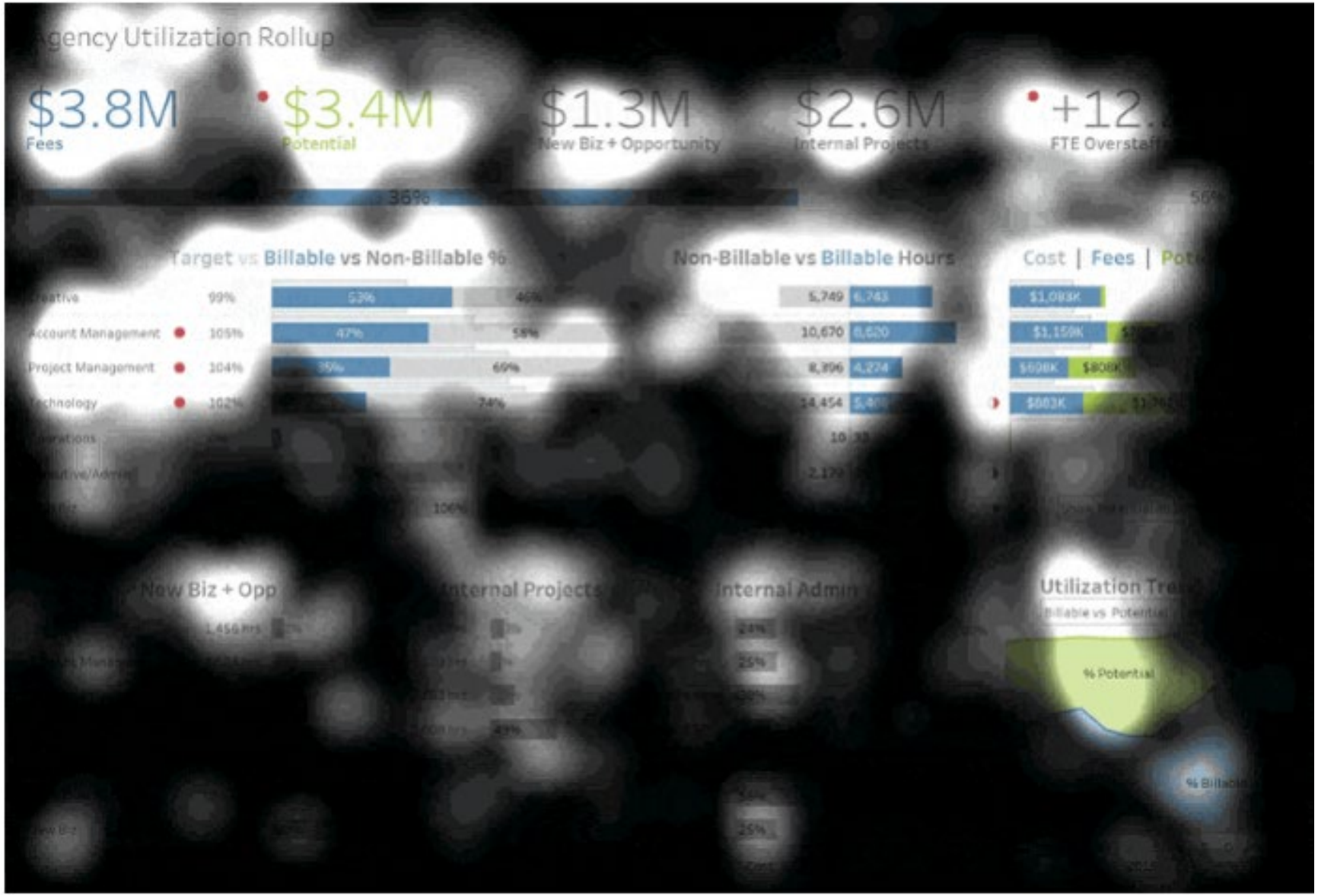
"I have only made this letter longer because I have not had the time to make it shorter."
— Blaise Pascal

Visualizations That Really Work

How people actually “see”

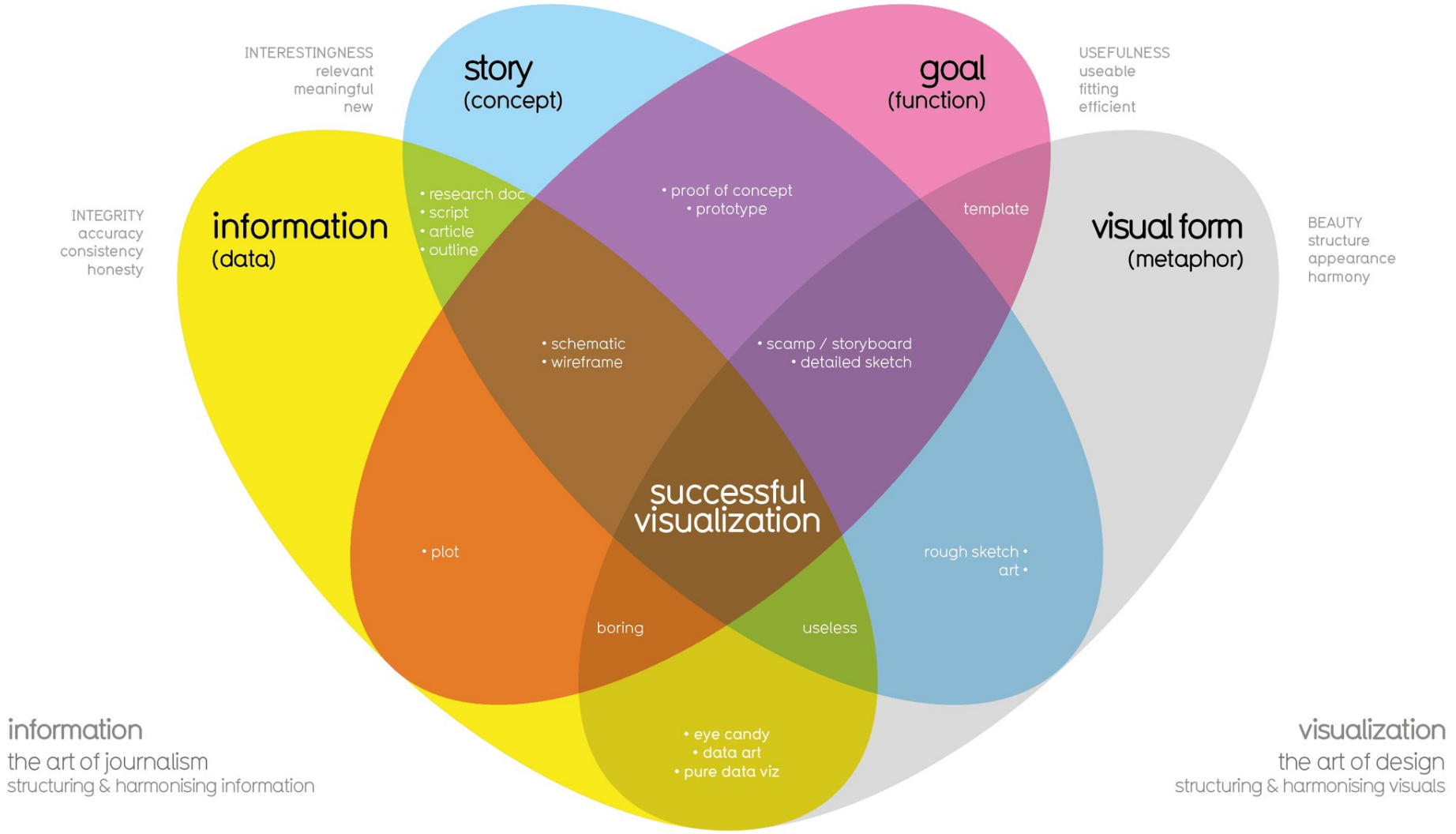


What most people see:



What Makes a Good Visualization?

explicit (implicit)



information
the art of journalism
structuring & harmonising information

visualization
the art of design
structuring & harmonising visuals

David McCandless
InformationisBeautiful.net

taken from new book
Knowledge is Beautiful

find out more
bit.ly/KIB_Books

What Makes a Good Data Visualization?

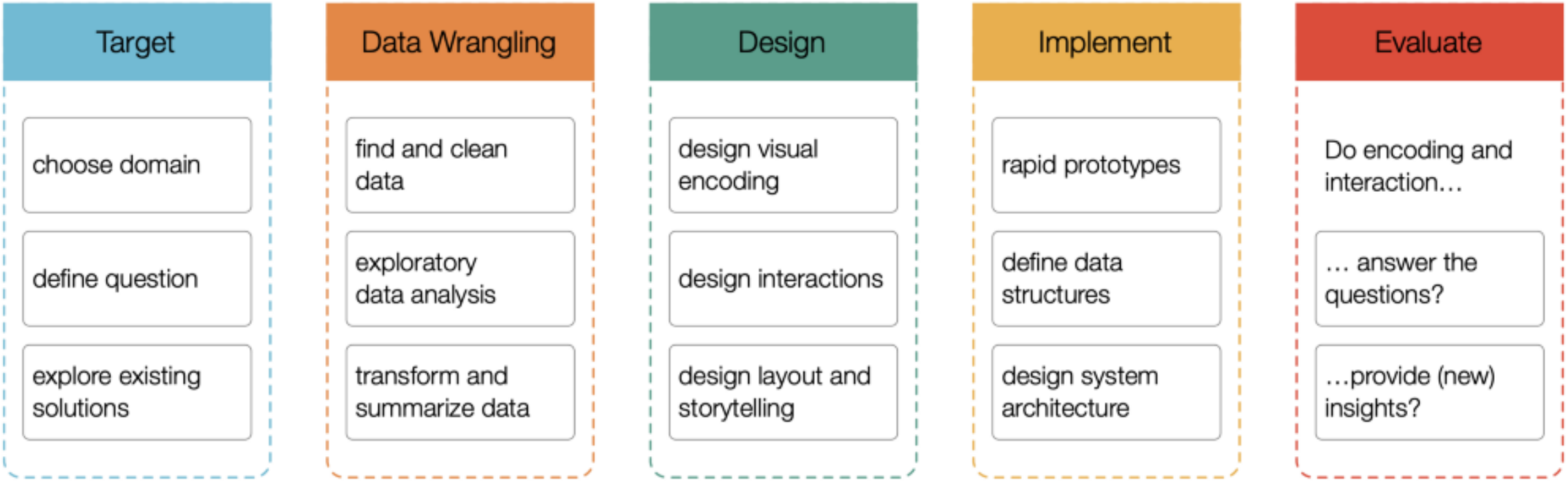
Recap

- Your mission is to enrich:
  1. Data
  2. Information
  3. Story
- Declutter and highlight to focus the viewer’s attention
- Make use of the annotation layer
- What makes a good visualization?
  - ✓ Information
  - ✓ Story
  - ✓ Goal
  - ✓ Visual

RESOURCES

- Software
  - Tableau for exploratory data analysis and interactive dashboards
    - Tutorial videos on LinkedIn Learning
    - Book Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master
  - Flourish Studio for animations
    - Tutorial videos by Alberto Cairo
  - Datawrapper for charts and maps
    - Tutorials
  - Canva for infographics
- Design Books
  - Storytelling with Data: A Data Visualization Guide for Business Professionals
  - Now You See It: Simple Visualization Techniques for Quantitative Analysis
  - Information Is Beautiful
  - Good Charts: The HBR Guide to Making Smarter, More Persuasive Data Visualizations
  - Functional Art, The: An introduction to information graphics and visualization
- Data Visualization Society
  - Nightingale Medium Journal

The Five-Step Process



[The Power of Visualization in Data Science]

Questions and Discussion

Software tools

Datawrapper

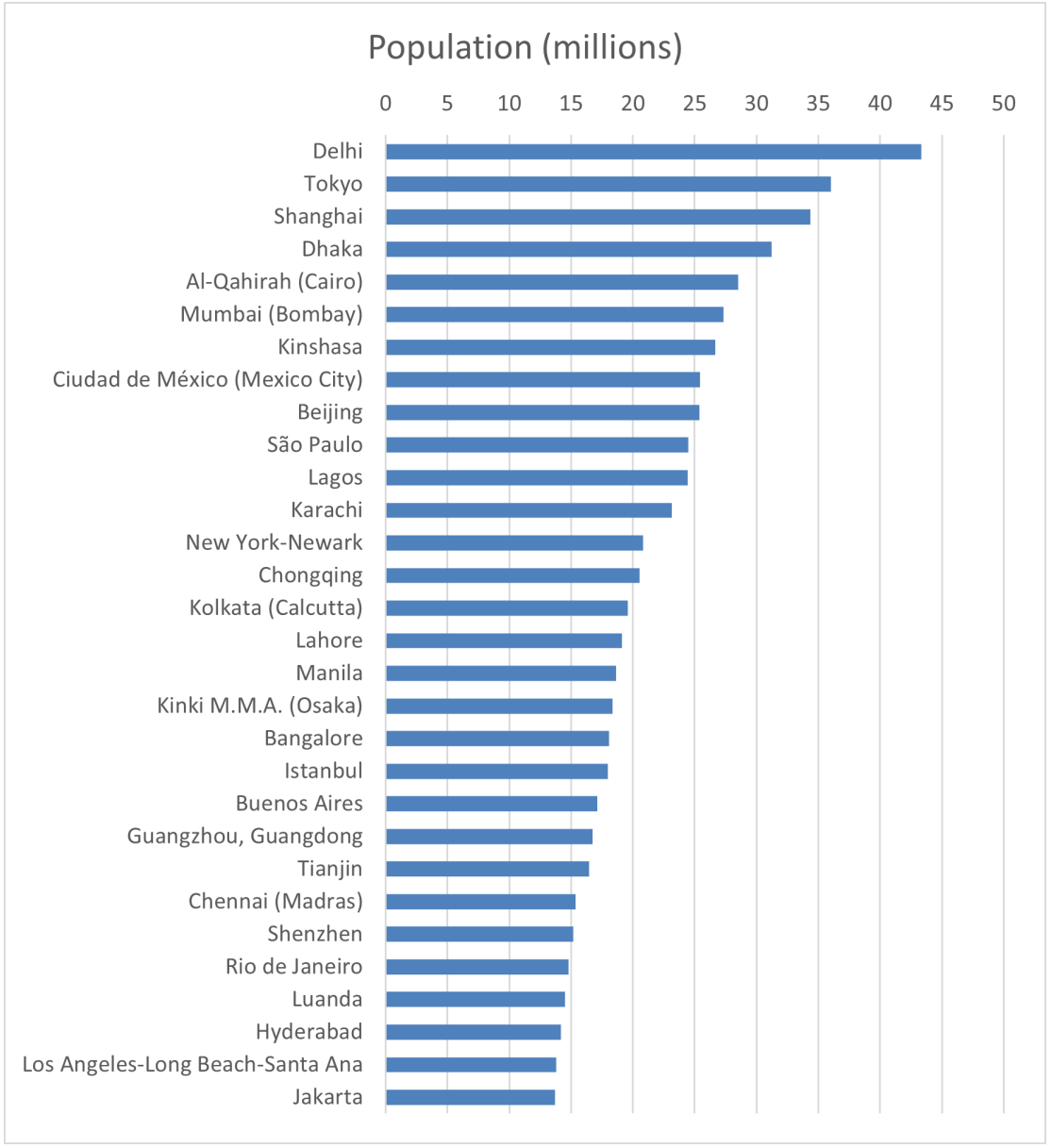
https://www.datawrapper.de

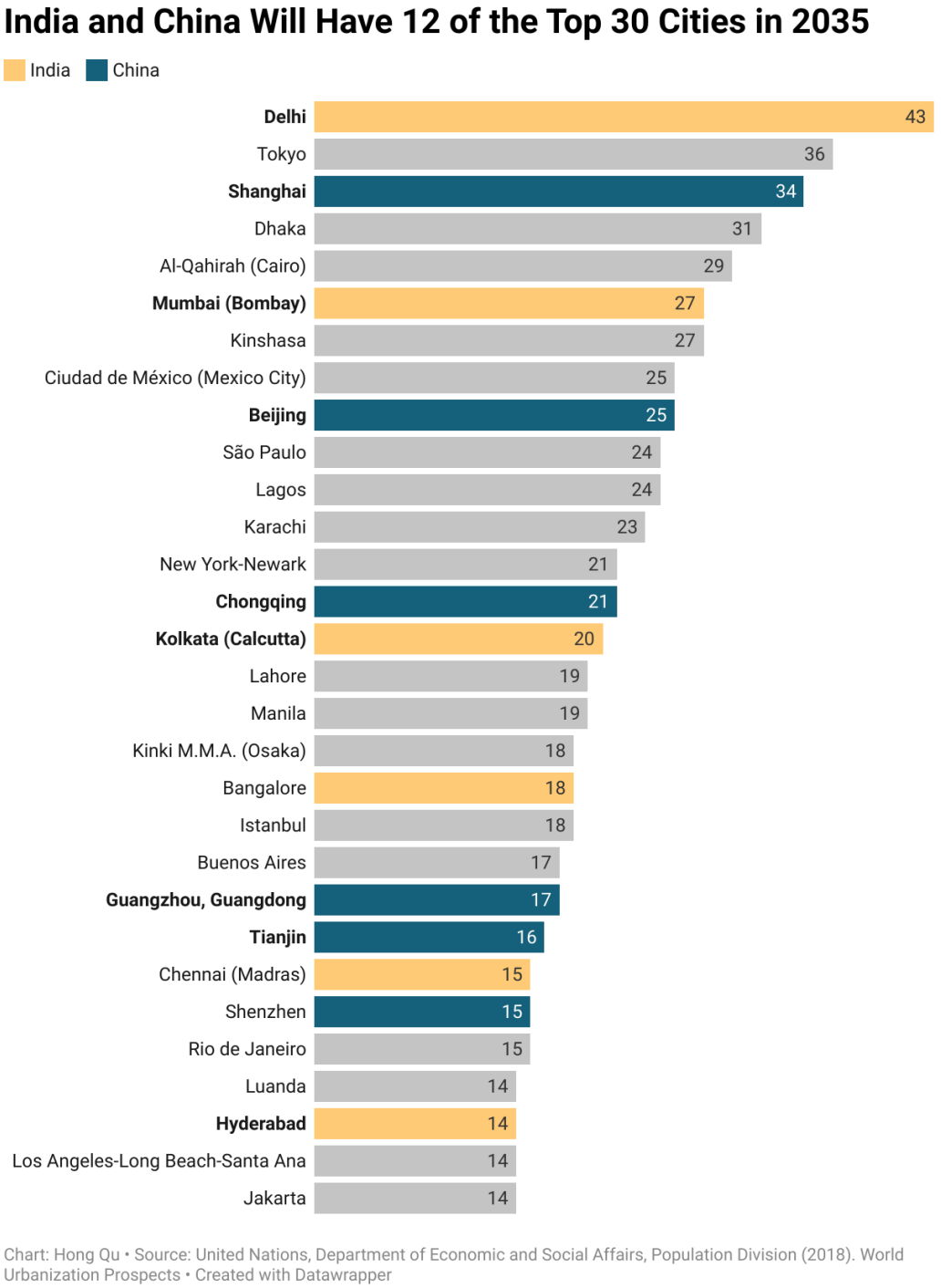
Flourish

https://flourish.studio

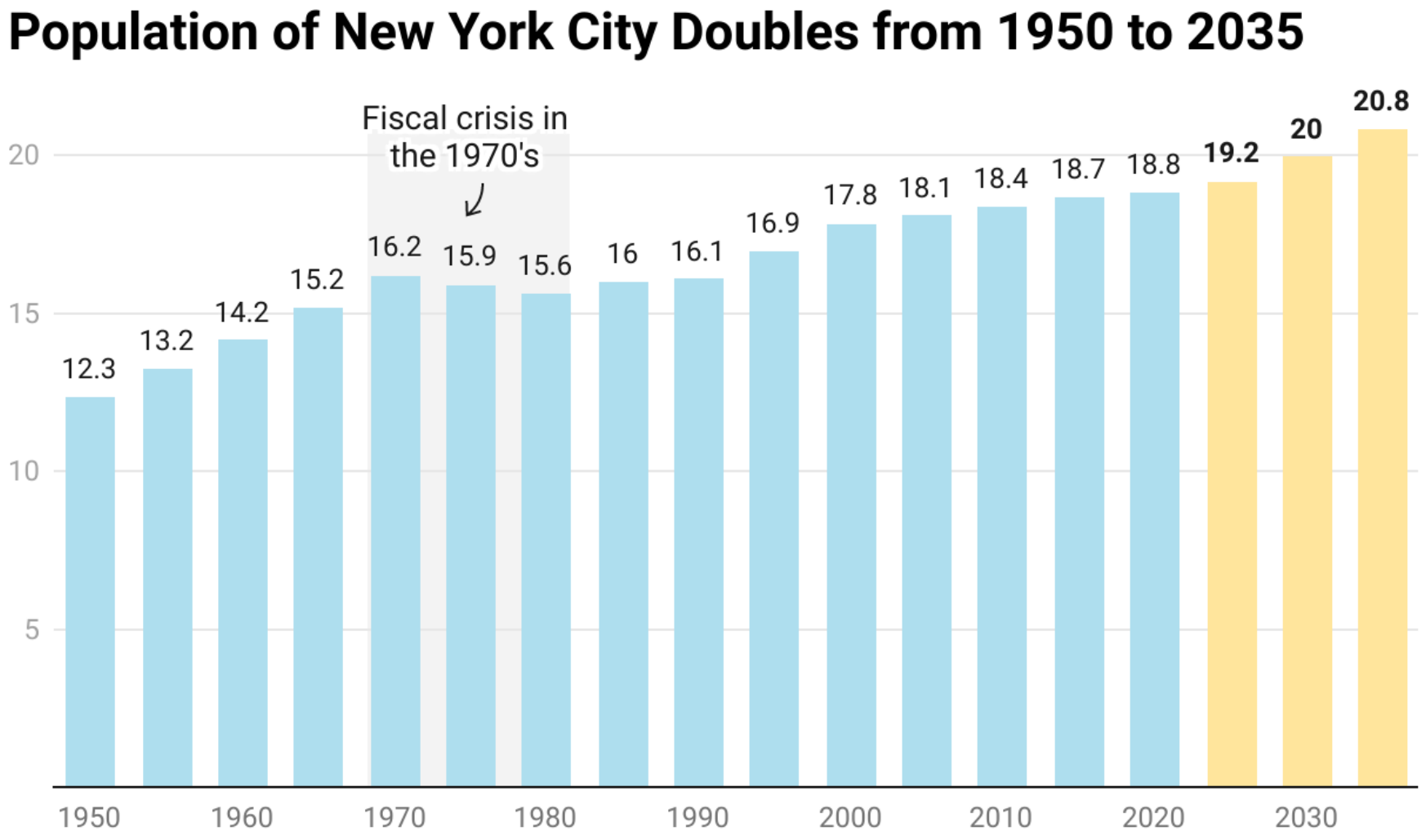
https://www.tableau.com

Excel vs Datawrapper

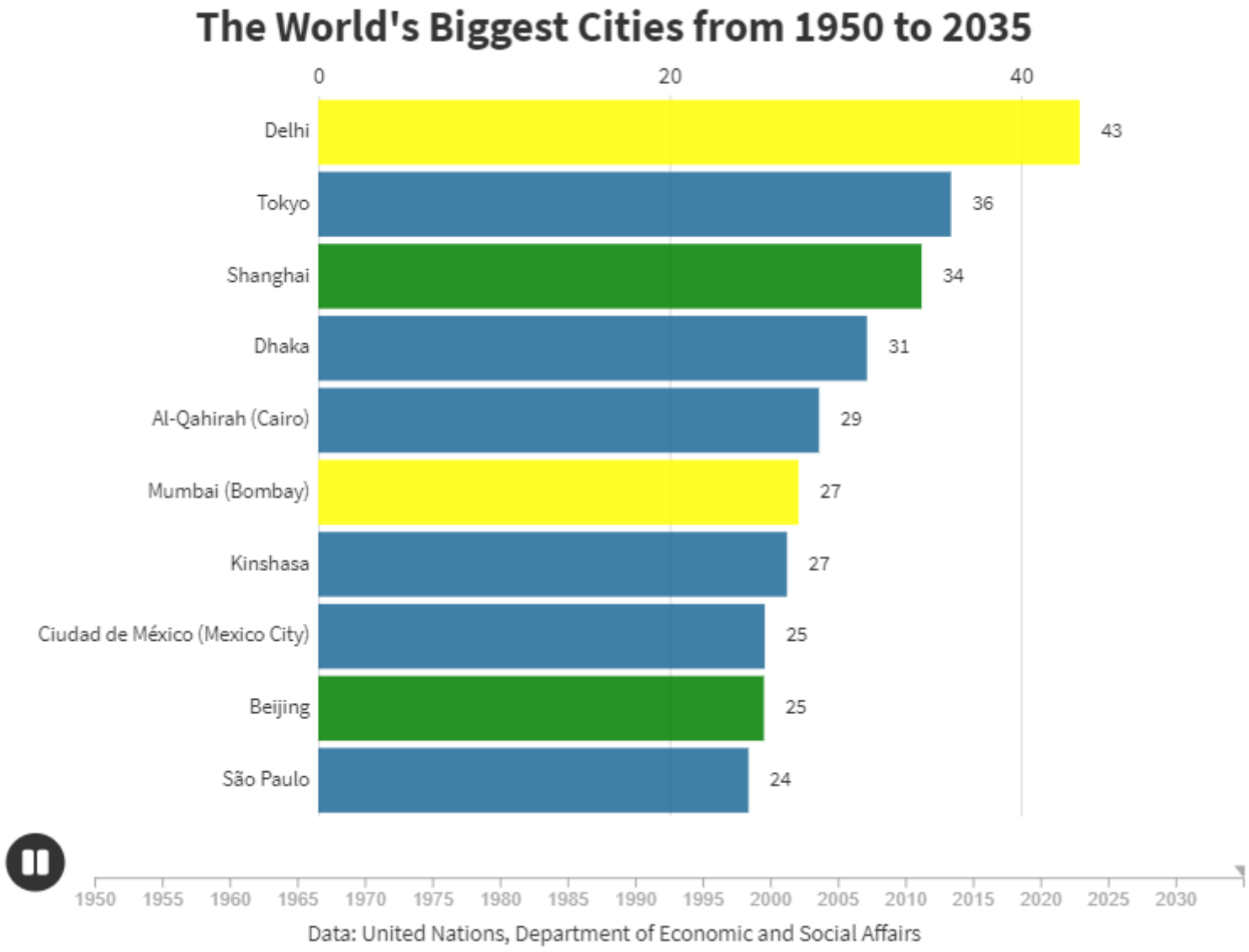




Datawrapper



Flourish


The World's Biggest Cities from 1950 to 2035
0
20
40
Delhi
43
Tokyo
36
Shanghai
34
Dhaka
31
Al-Qahirah (Cairo)
29
Mumbai (Bombay)
27
Kinshasa
27
Ciudad de México (Mexico City)
25
Beijing
25
São Paulo
24
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
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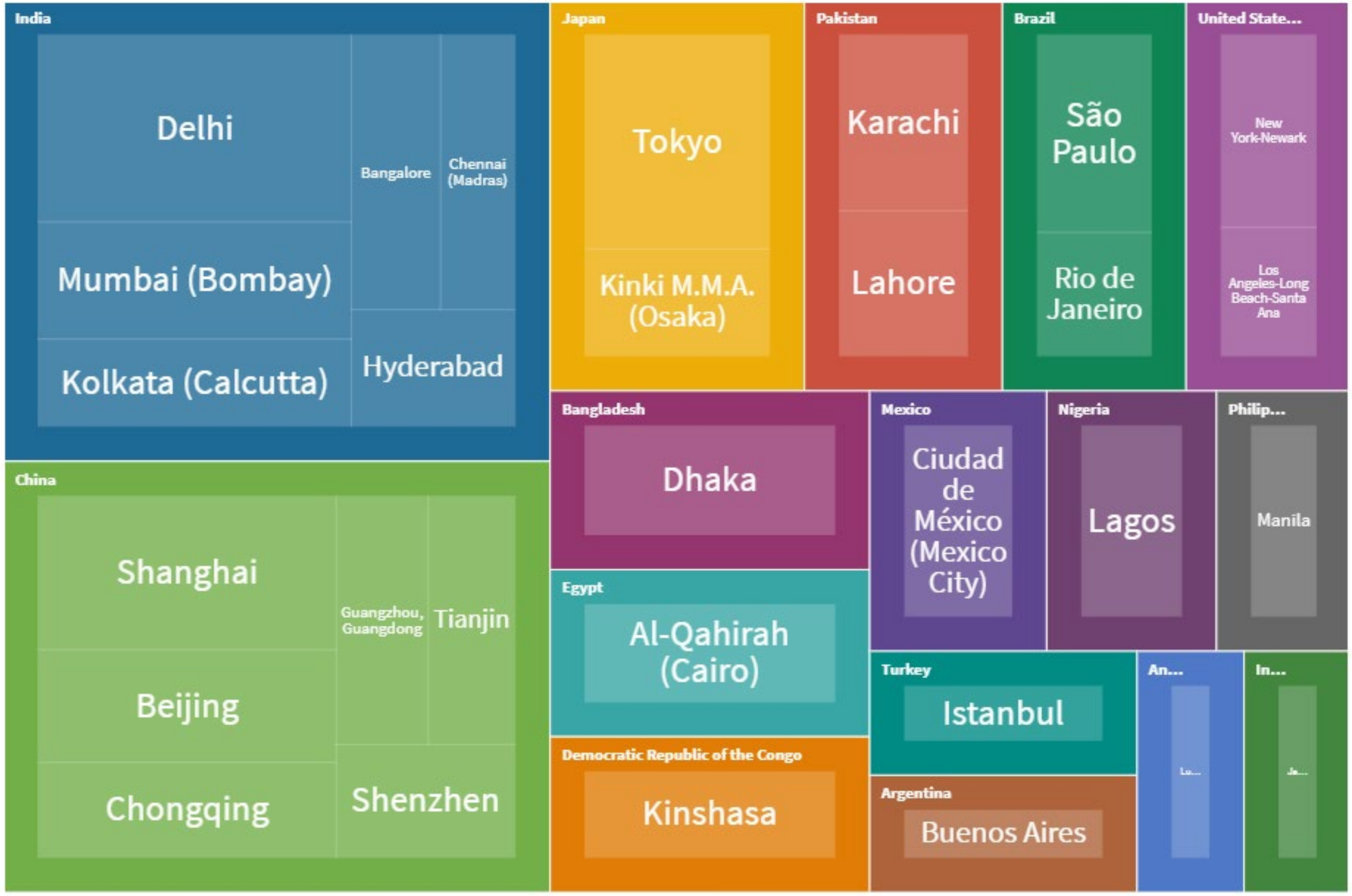
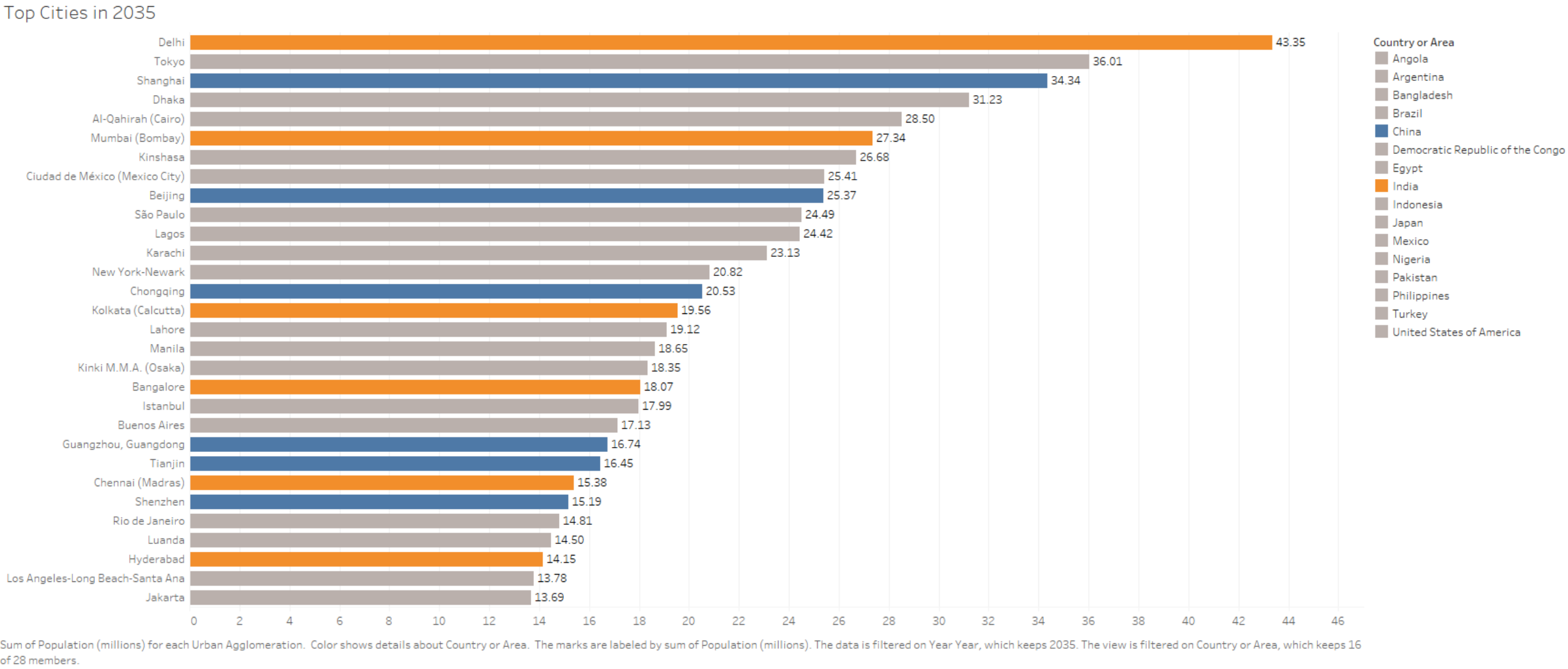
2005
2010
2015
2020
2025
2030
Data: United Nations, Department of Economic and Social Affairs

Flourish



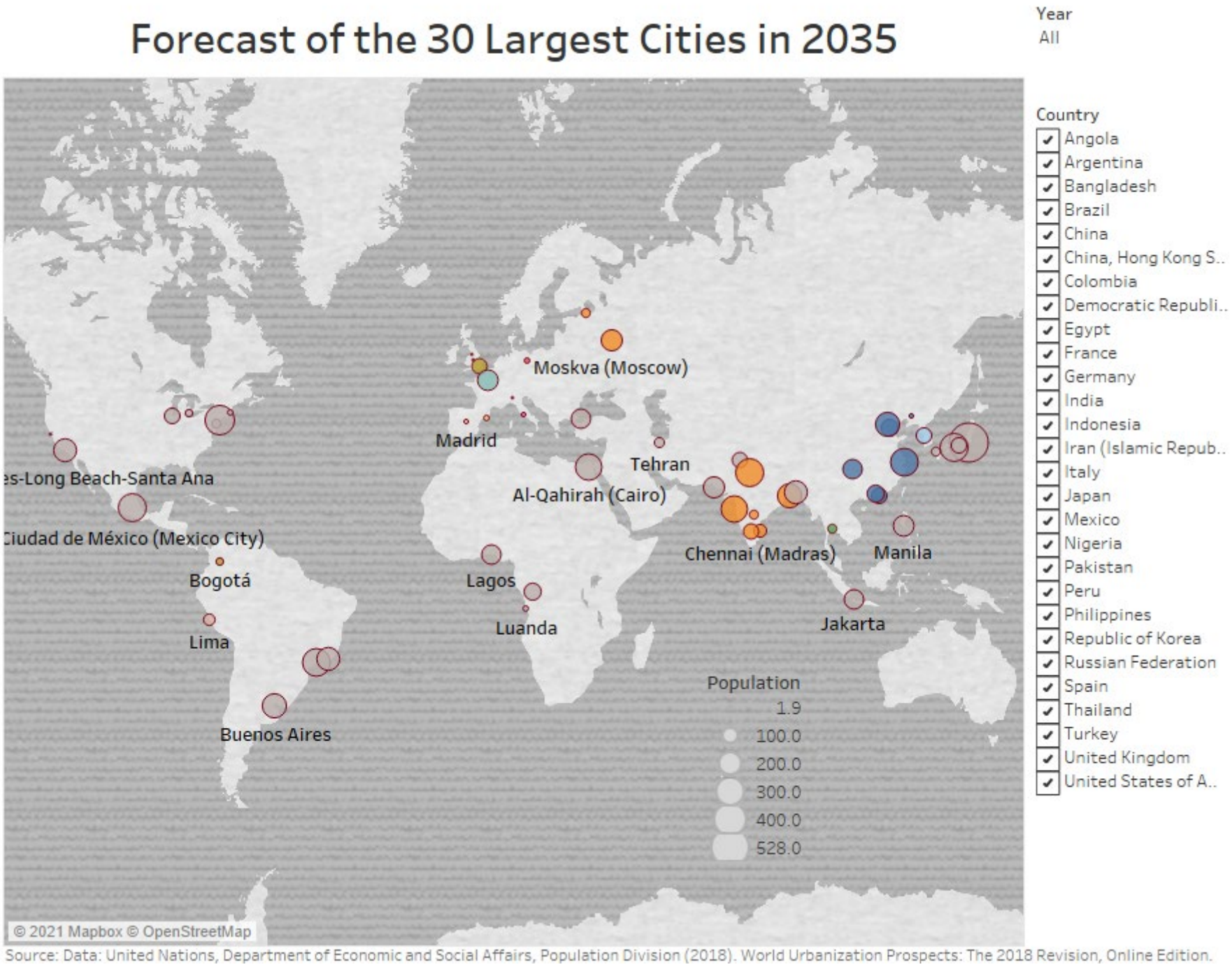
Source: Data: United Nations, Department of Economic and Social Affairs

Tableau



Sum of Population (millions) for each Urban Agglomeration. Color shows details about Country or Area. The marks are labeled by sum of Population (millions). The data is filtered on Year Year, which keeps 2035. The view is filtered on Country or Area, which keeps 16 of 28 members.

Tableau


Forecast of the 30 Largest Cities in 2035
Year
All
Country
Angola
Argentina
Bangladesh
Brazil
China
China, Hong Kong S..
Colombia
Democratic Republi..
Egypt
France
Germany
India
Indonesia
Iran (Islamic Repub..
Italy
Japan
Mexico
Nigeria
Pakistan
Peru
Philippines
Republic of Korea
Russian Federation
Spain
Thailand
Turkey
United Kingdom
United States of A..
Moskva (Moscow)
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© 2021 Mapbox © OpenStreetMap
Source: Data: United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization Prospects: The 2018 Revision, Online Edition.

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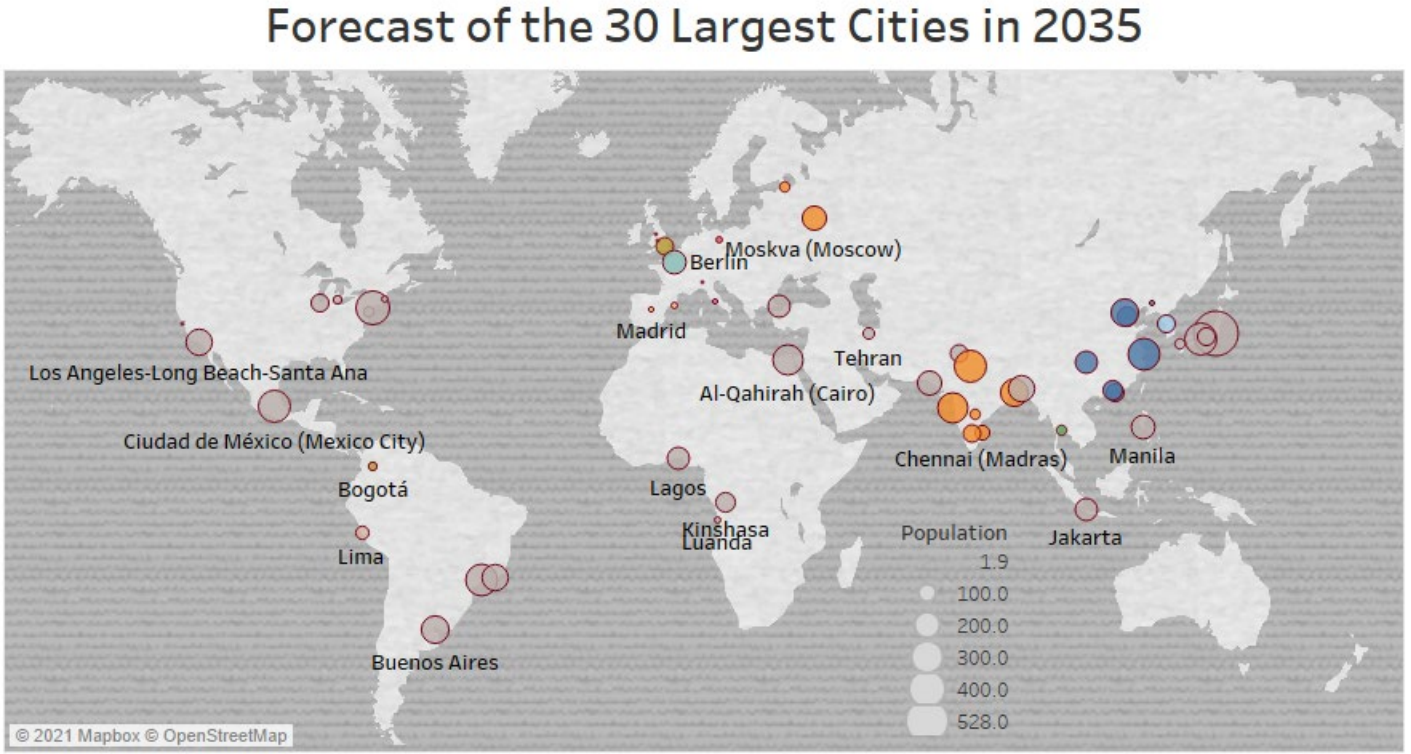
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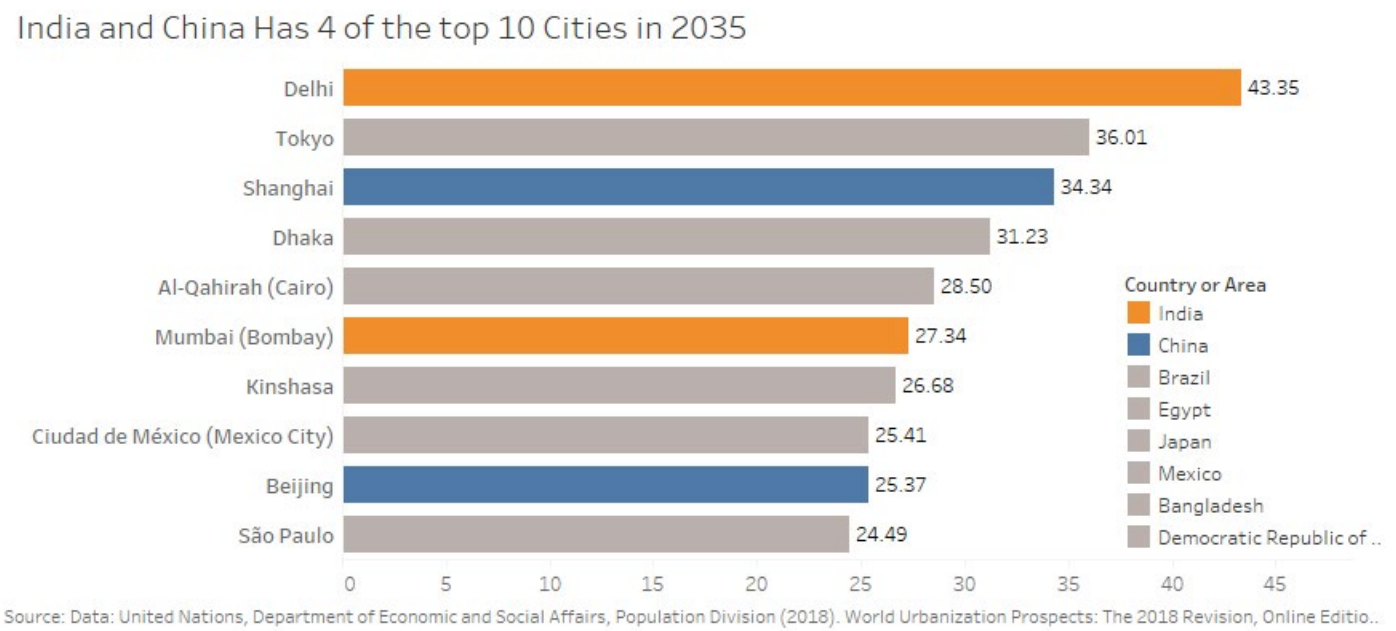
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0 5 10 15 20 25 30 35 40 45
Country or Area
India
China
Brazil
Egypt
Japan
Mexico
Bangladesh
Democratic Republic of ..
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Thank you

Workshop exercise files