

Data.Europa Academy • Visualising data for impact

Data Narrative and Design

Alberto Cairo

OpenVisualizationAcademy.com



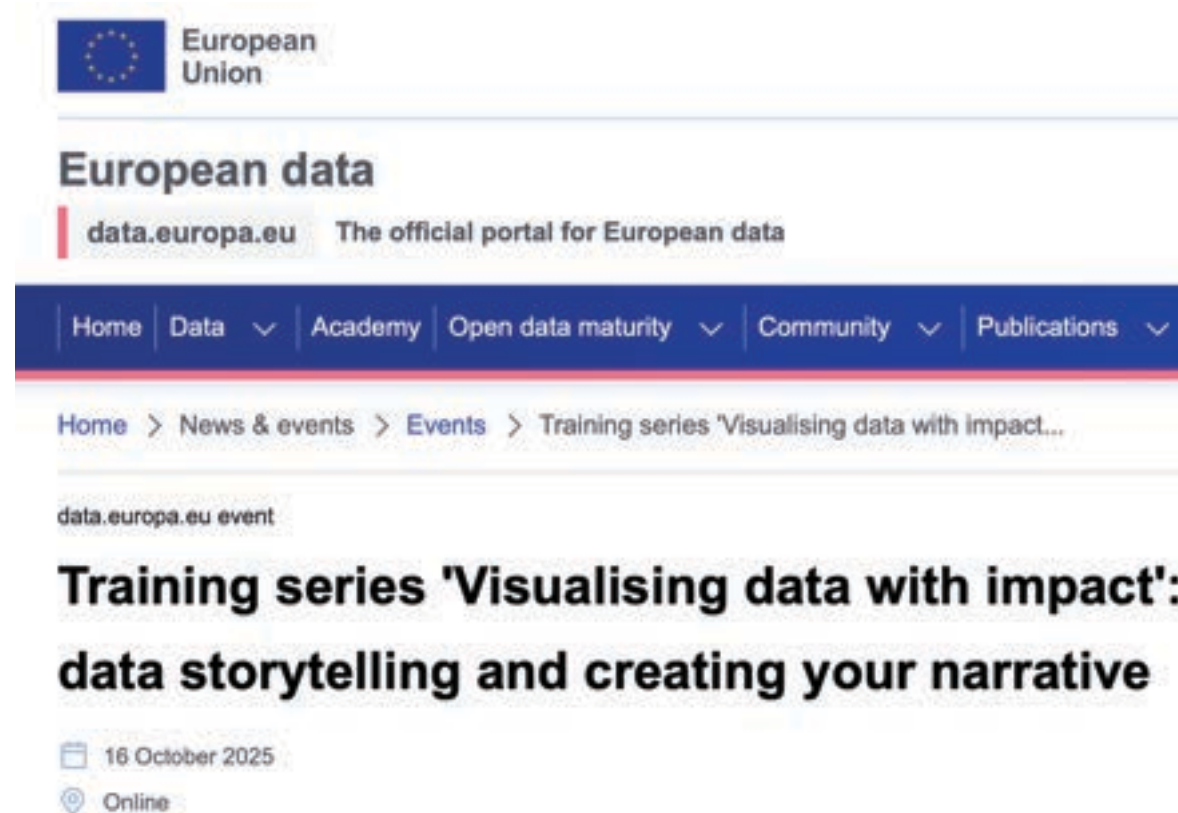
Episode ONE - October 14

<https://data.europa.eu/en/news-events/events/training-data-visualisation-session-1-foundations-effective-data-visualisation>



Episode TWO - October 15

<https://data.europa.eu/en/news-events/events/data-visualisation-training-session-2-designing-integrity>



Episode THREE - October 16

Today's webinar

<https://data.europa.eu/en/news-events/events/data-visualisation-training-session-3-data-storytelling-and-creating-your>

EPISODE ONE: Foundations of effective data visualization

Defining information design and data visualization

Exploration, exposition, explanation, expression in visualization

Why do we visualize? The basics

The grammar of graphics

“Rules” versus decision-making

EPISODE TWO: Designing with integrity

Myths of visualization: From “A picture is worth a thousand words” to “the data should speak for itself”

The role of mental models

Why and when do charts “lie”, and what to do about it?

A structured way for thinking about visualization and minimizing misunderstanding

EPISODE THREE: Data storytelling and creating your narrative

Structuring a layout

Building a narrative

Considering visual design

Creative visualization

What comes next in visualization?

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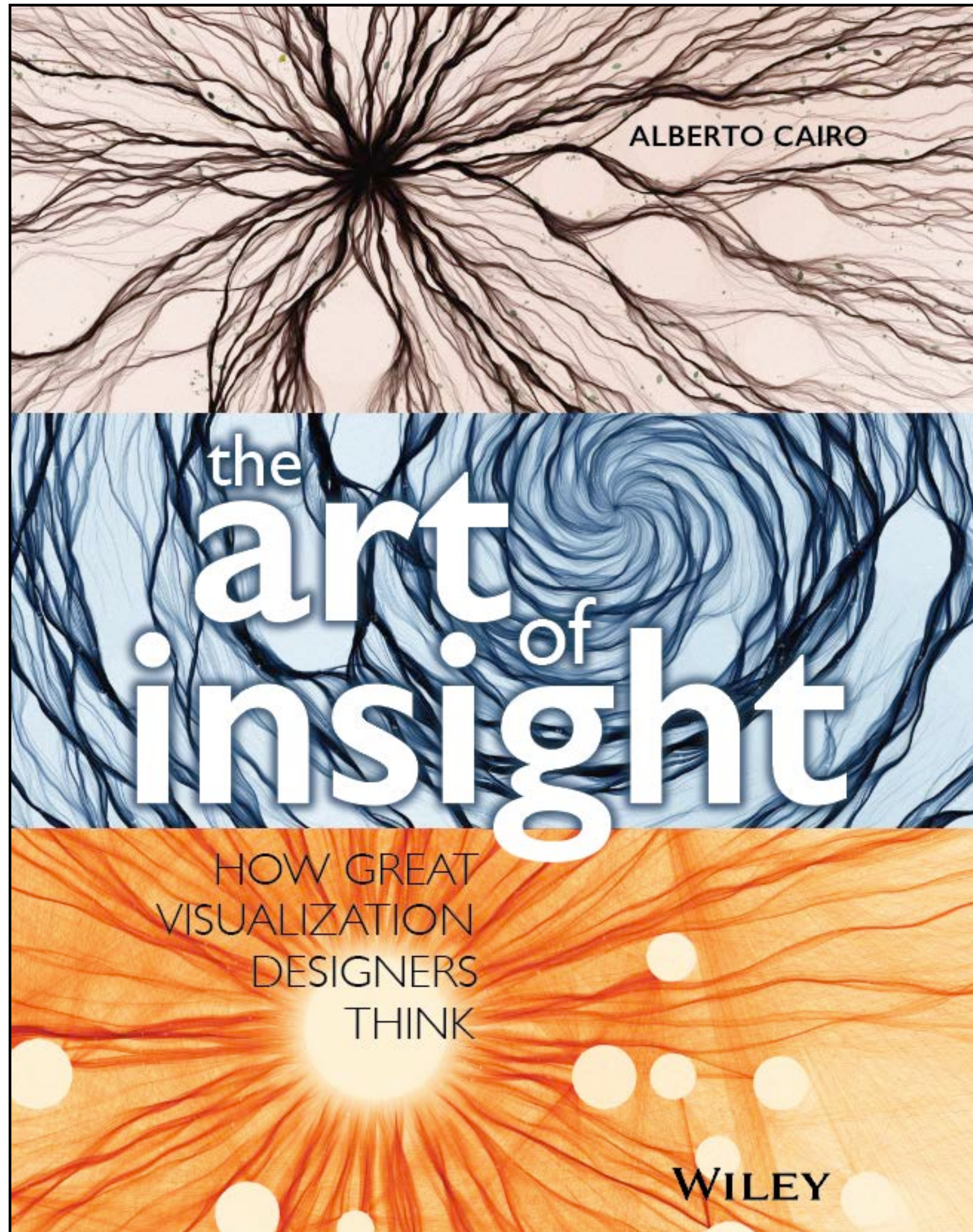
Building a narrative

Considering visual design

Creative visualization

What comes next in visualization?

— A structured way to think about visualization —



Visualization design consists of **reasoning** about possible **choices** by considering the interplay between:

1. **Content:** The nature, origin, and limitations of the data.
2. **People:** Your audience.
3. **Intent:** The purpose(s) that we define.
4. **Constraints:** The limitations that we may face.
5. **Outcomes:** How the graphic is received.

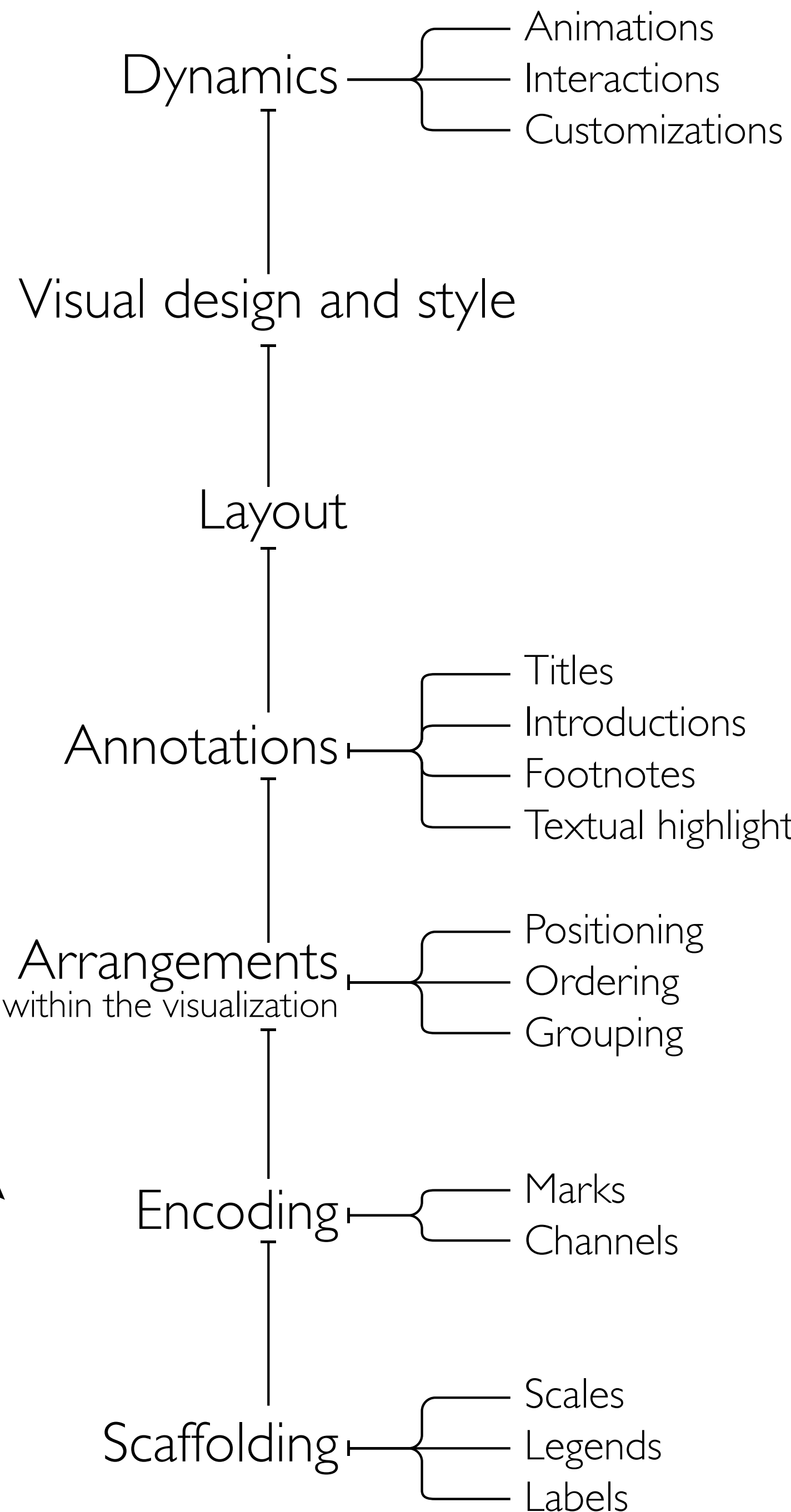
Every design choice must be **deliberate**.

It is inevitably **subjective**, but it should never be **arbitrary**.

Visualization: Layers and elements to think about

Considerations about
the information
to be visualized
—they influence
everything else.

Read from
the bottom-up



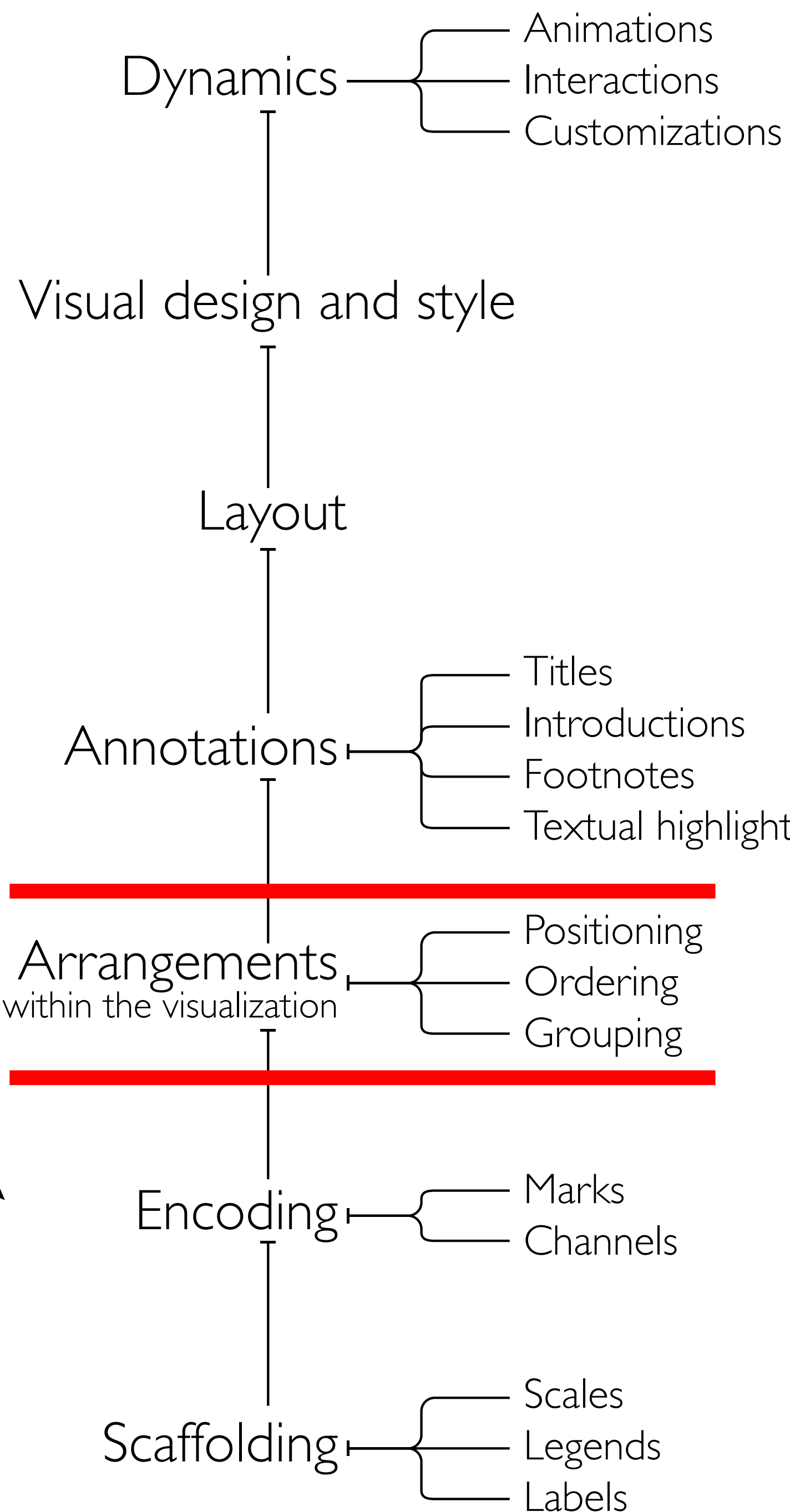
Static
visualizations

Dynamic
visualizations

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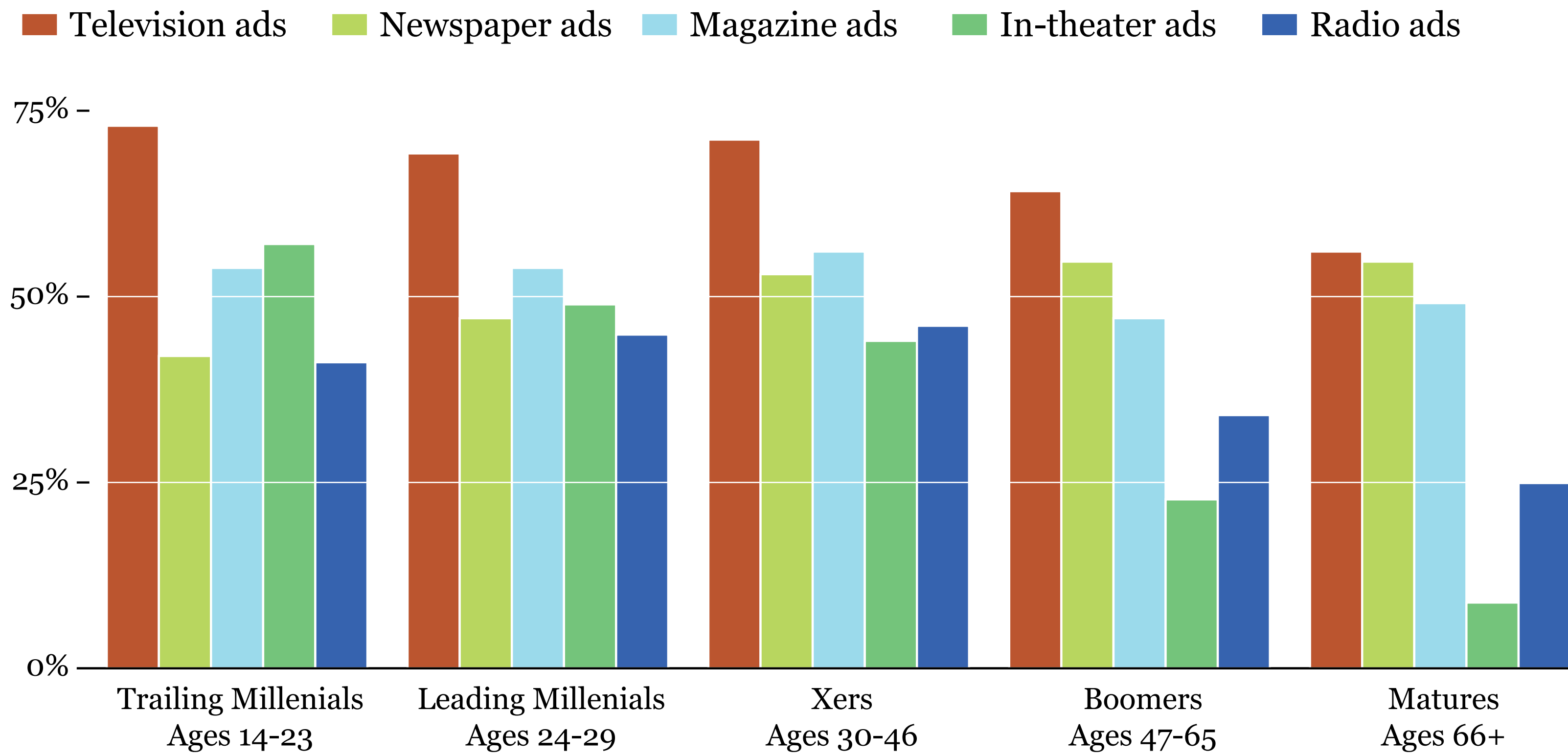
Static
visualizations

Dynamic
visualizations

If the goal is to compare media efficacy **within each group**, this works well.
But what about if the goal is to compare **across age groups**?

To what degree do the following advertising methods influence your buying decisions?

Medium or high net influence



To what degree do the following advertising methods influence your buying decisions?

Medium or high net influence

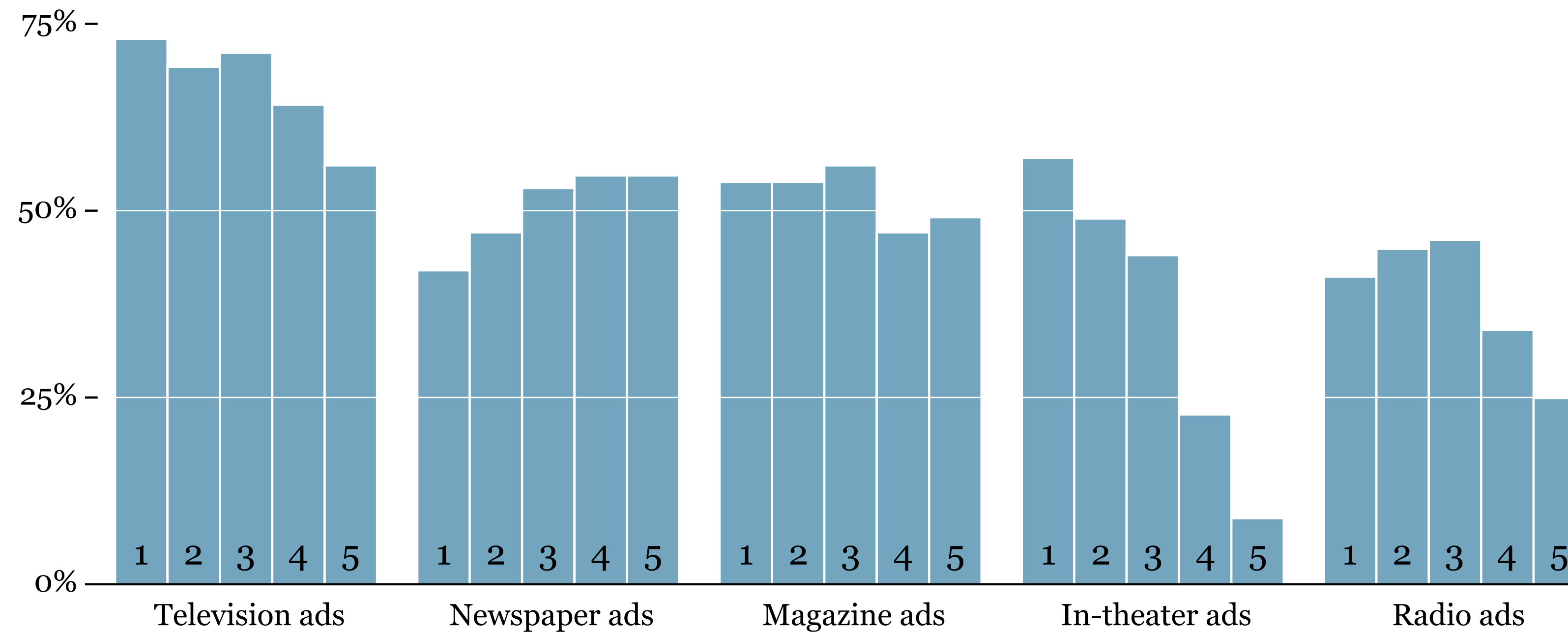
1 Trailing Millennials
Ages 14-23

2 Leading Millennials
Ages 24-29

3 Xers
Ages 30-46

4 Boomers
Ages 47-65

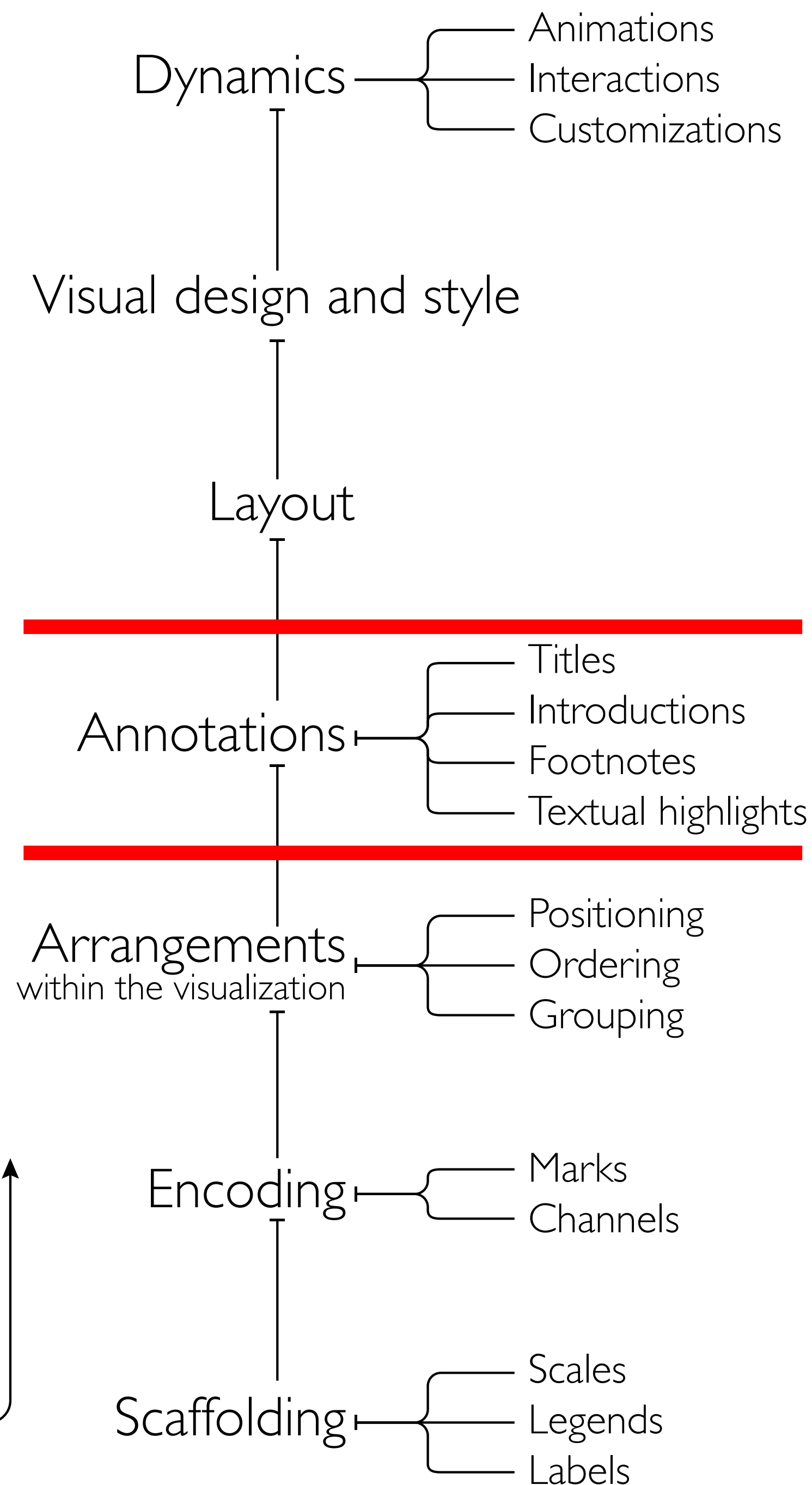
5 Matures
Ages 66+



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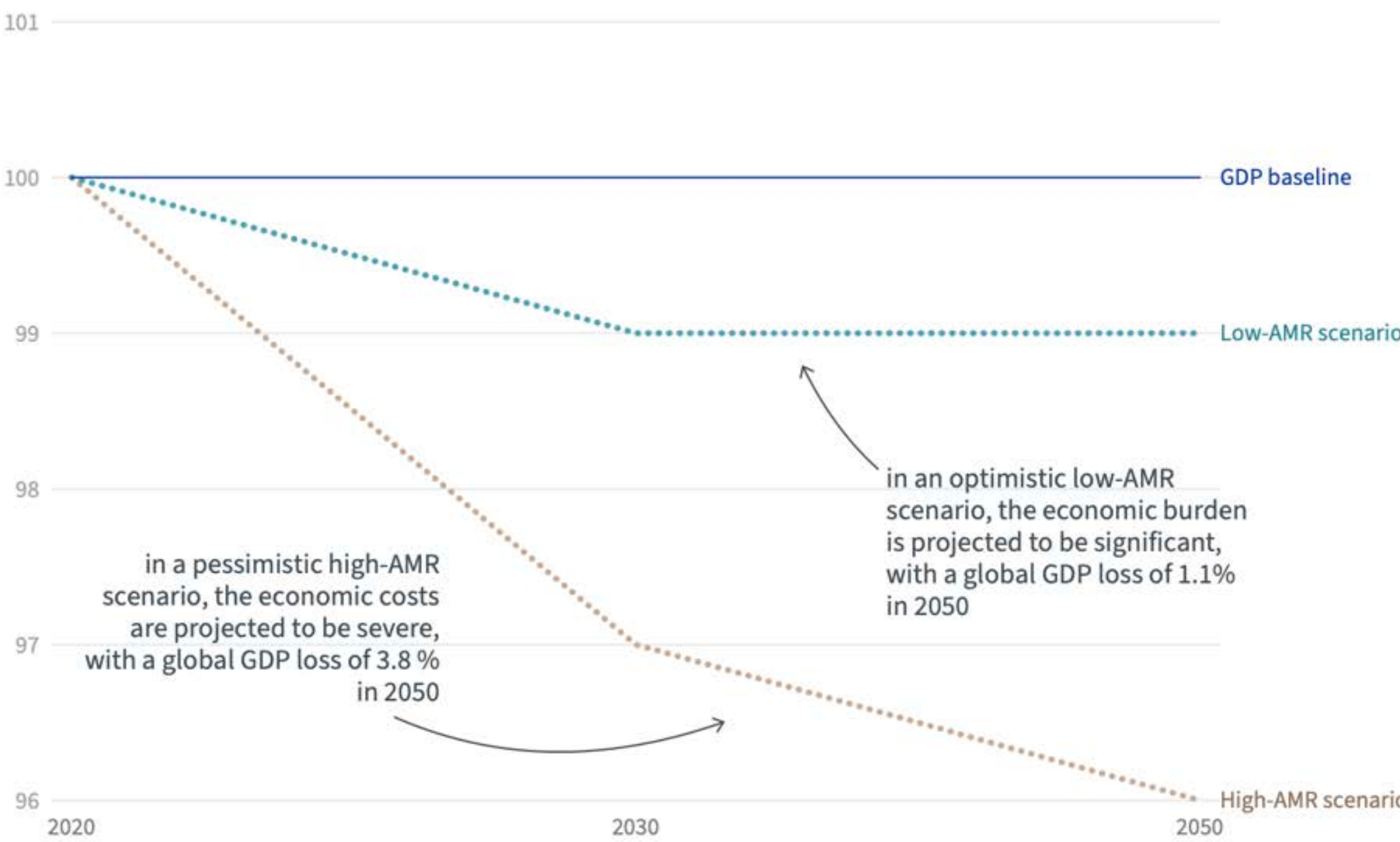


Static
visualizations

Dynamic
visualizations

Greater antimicrobial resistance means a greater impact on global GDP

This graph shows the potential economic losses resulting from the impact of AMR on workers' health and animal health if no effective action is taken.



Source: World Bank (2017)

+ [Text version](#)

Annotations

Context and accessibility
(If in the form of Alt-text)

<https://www.consilium.europa.eu/en/infographics/antimicrobial-resistance/>

Talking about
accessibility...

CHARTABILITY

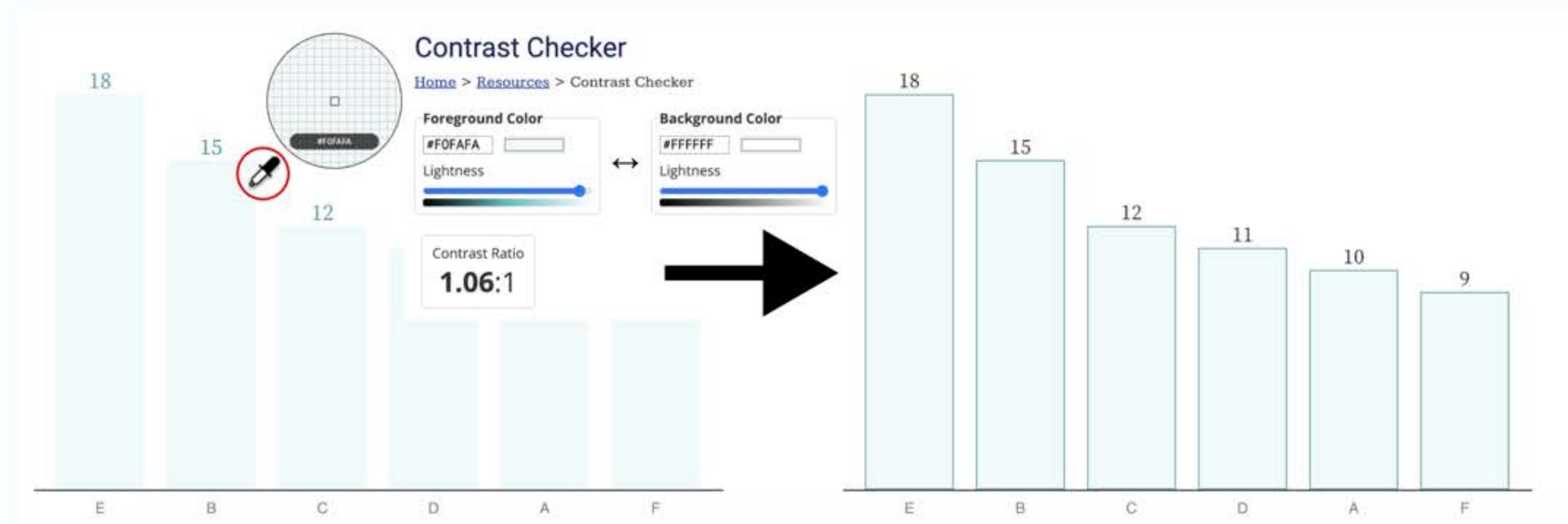
[What is Chartability?](#)[Get the Workbook](#)[Get Help](#)[Learn More](#)[Support Us](#)[Credits](#)

What is Chartability?

Chartability is a set of heuristics (testable questions) for ensuring that data visualizations, systems, and interfaces are accessible. Chartability is organized into principles with testable criteria and focused on creating an outcome that is an inclusive data experience for people with disabilities.

Chartability can help you find accessibility barriers in data visualizations

Being able to recognize which parts of a data visualization produce barriers for people with disabilities can be tough. But Chartability has compiled existing standards, research, and community best practices into a comprehensive set of things to look out for. Ideally, it can help folks who create visualizations really think deeply about accessibility when they design.



<https://chartability.fizz.studio/>

Talking about accessibility...

DIAGRAM
NEWS IN PERSPECTIVE

Brazil's
Demographic
Opportunity

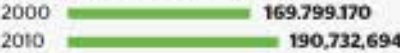
How Brazil can take advantage
of a future with fewer children
per couple.

Alberto Cairo, Francine Lima,
Marco Vergotti

PRELIMINARY DATA FROM THE 2010 CENSUS
create an interesting picture of the changes
that the Brazilian population has gone through
in the past ten years. Brazil's population
grew, on average, 10% between 2000 and
2010, but the fertility rate is below 2.1 children
per woman, the minimum to keep a
population from shrinking. According to
César Marques, a demographer from the
University of Campinas, the main challenge
Brazil will face in the future is how to maintain
a healthy Social Security system if the
number of older and retired people will
likely be much larger than it is today.
Read on to learn about all the variables at play
in this story.

1 BRAZIL'S POPULATION IS BIGGER

The 2010 Census has revealed a 9.4%
population increase between
2000 and 2010. The differences between
states, as you can see on the chart
on the right, are noticeable. Most rich
states, such as São Paulo and Rio, didn't
grow as fast as the ones in the north east.



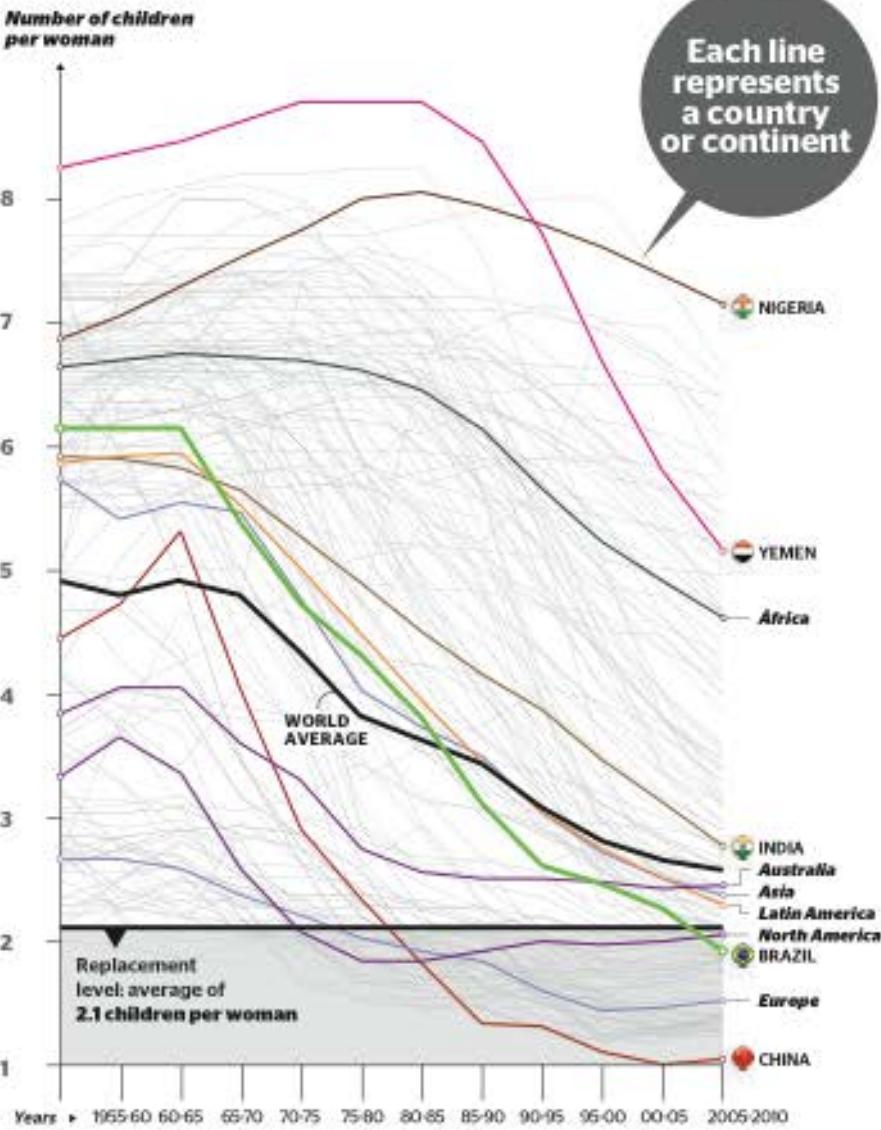
	2000	2010	Change
AP	477,052	648,553	36.0%
RR	324,307	425,358	31.1%
AC	657,526	707,125	26.8%
DF	2,091,148	2,469,489	20.4%
PA	4,503,307	7,442,904	20.2%
AM	2,962,987	3,590,779	19.1%
TO	119,7098	1,575,550	18.2%
MT	2,504,303	2,954,625	18.0%
GO	5,001,228	5,849,105	16.8%
MS	3,078,001	3,404,256	10.3%
SC	5,350,380	6,076,603	13.4%
SE	1,784,476	2,036,277	14.1%
MA	5,451,475	6,404,340	13.3%
RN	3,778,762	4,121,401	12.4%
RO	1,579,787	1,595,625	1.1%
CE	7,430,845	8,180,087	10.1%
AL	2,832,521	3,092,984	9.6%
ES	3,092,252	3,392,775	9.2%
PR	8,443,825	9,755,433	9.0%
PI	2,843,276	3,046,448	8.6%
PE	3,918,344	4,241,250	7.9%
SP	17,032,403	19,524,090	7.8%
PB	9,643,468	10,266,237	7.4%
MG	17,891,494	19,150,260	7.1%
RJ	14,391,282	15,180,636	5.5%
BA	13,070,250	13,623,949	4.3%
RS	10,187,718	10,876,758	3.8%

(Data updated on November 4, 2010)
The map shows the change in population
in Brazilian municipalities. Between
2000 and 2010, 1,630 cities and towns,
from a total of 5,506, lost population. Rio
Grande do Sul is the state with the largest
number of municipalities that lost inhabitants,
due to a significant drop in fertility rates
and domestic migration

Sources: IBGE, UN, World Bank, César Marques (UNICAMP)

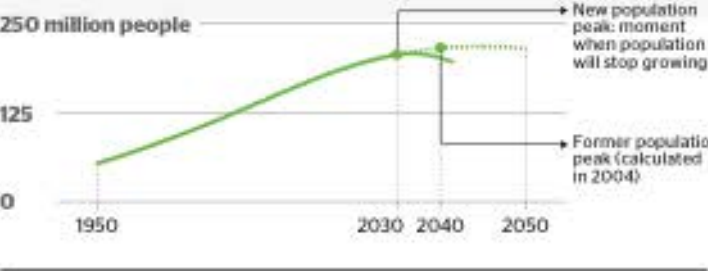
2 —BUT THE FERTILITY RATE IS MUCH LOWER THAN EXPECTED

A study in 2004 estimated that in 2010, the fertility rate would be 2.4 children
per woman, on average. But new data collected by the IBGE prove that
the fertility rate is already 1.9, below the threshold called "replacement rate".
When the fertility rate drops below this number, the population of a country
will eventually start to shrink and grow older.



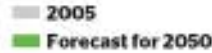
3 AS A CONSEQUENCE, POPULATION WILL STOP GROWING—

Forecasts made in 2004 anticipated that Brazil's population
would stop growing in 2040. But the most recent data from
the IBGE suggests that this could happen much earlier, in 2030.



4 —AND IT WILL BECOME OLDER

Comparing the current
population pyramid with the
one predicted for 2050



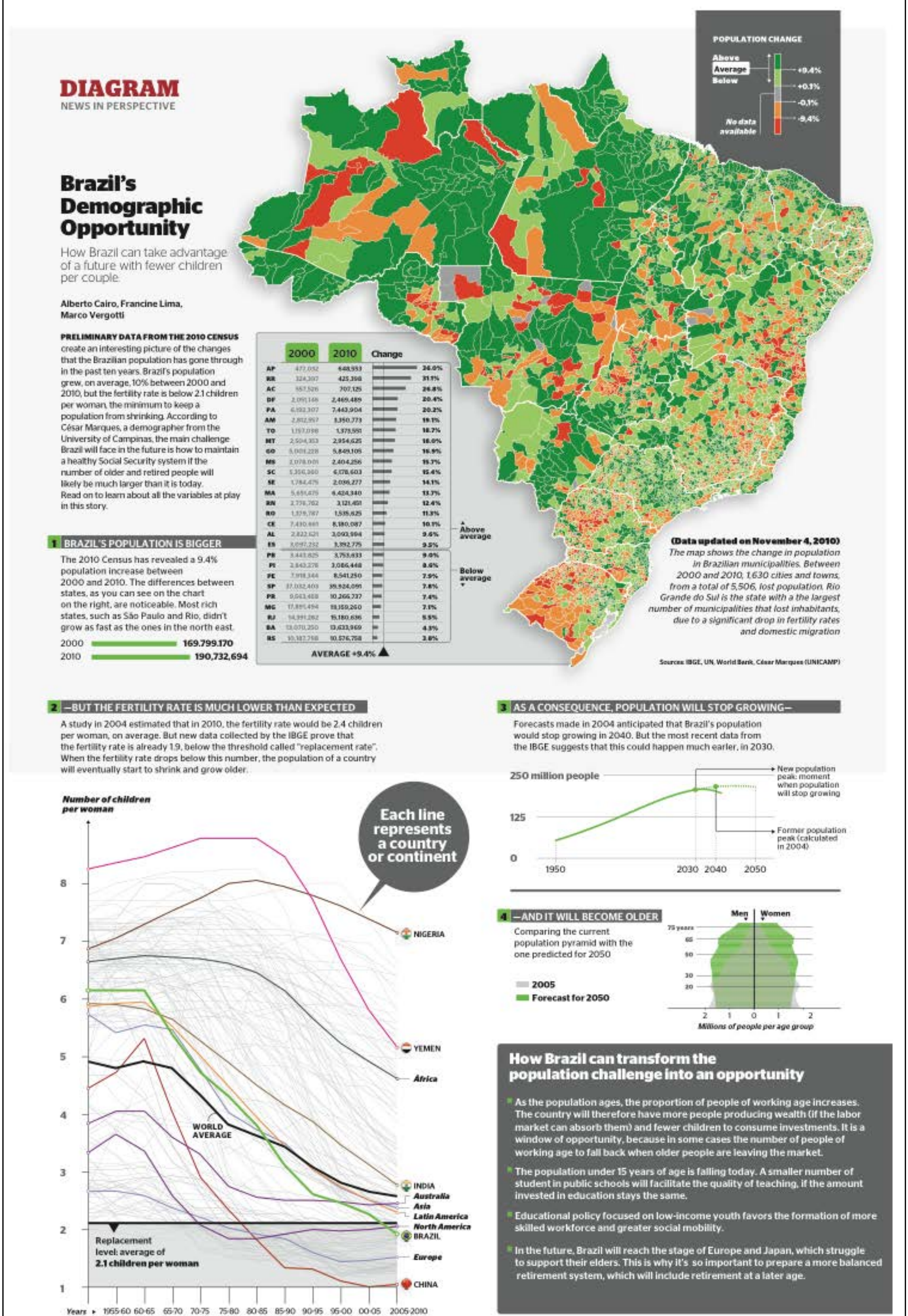
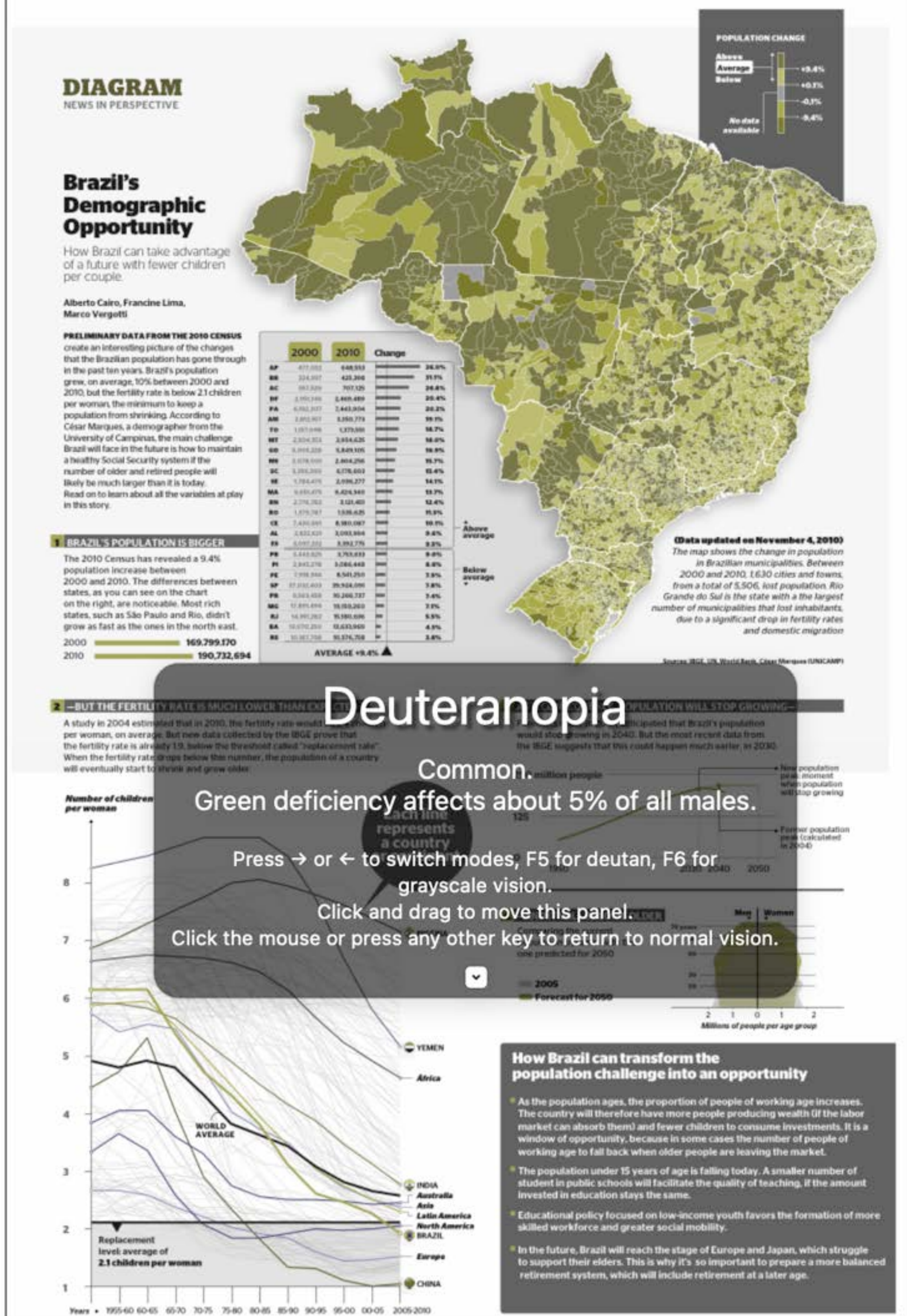
How Brazil can transform the
population challenge into an opportunity

- As the population ages, the proportion of people of working age increases.
The country will therefore have more people producing wealth (if the labor
market can absorb them) and fewer children to consume investments. It is a
window of opportunity, because in some cases the number of people of
working age to fall back when older people are leaving the market.
- The population under 15 years of age is falling today. A smaller number of
student in public schools will facilitate the quality of teaching, if the amount
invested in education stays the same.
- Educational policy focused on low-income youth favors the formation of more
skilled workforce and greater social mobility.
- In the future, Brazil will reach the stage of Europe and Japan, which struggle
to support their elders. This is why it's so important to prepare a more balanced
retirement system, which will include retirement at a later age.

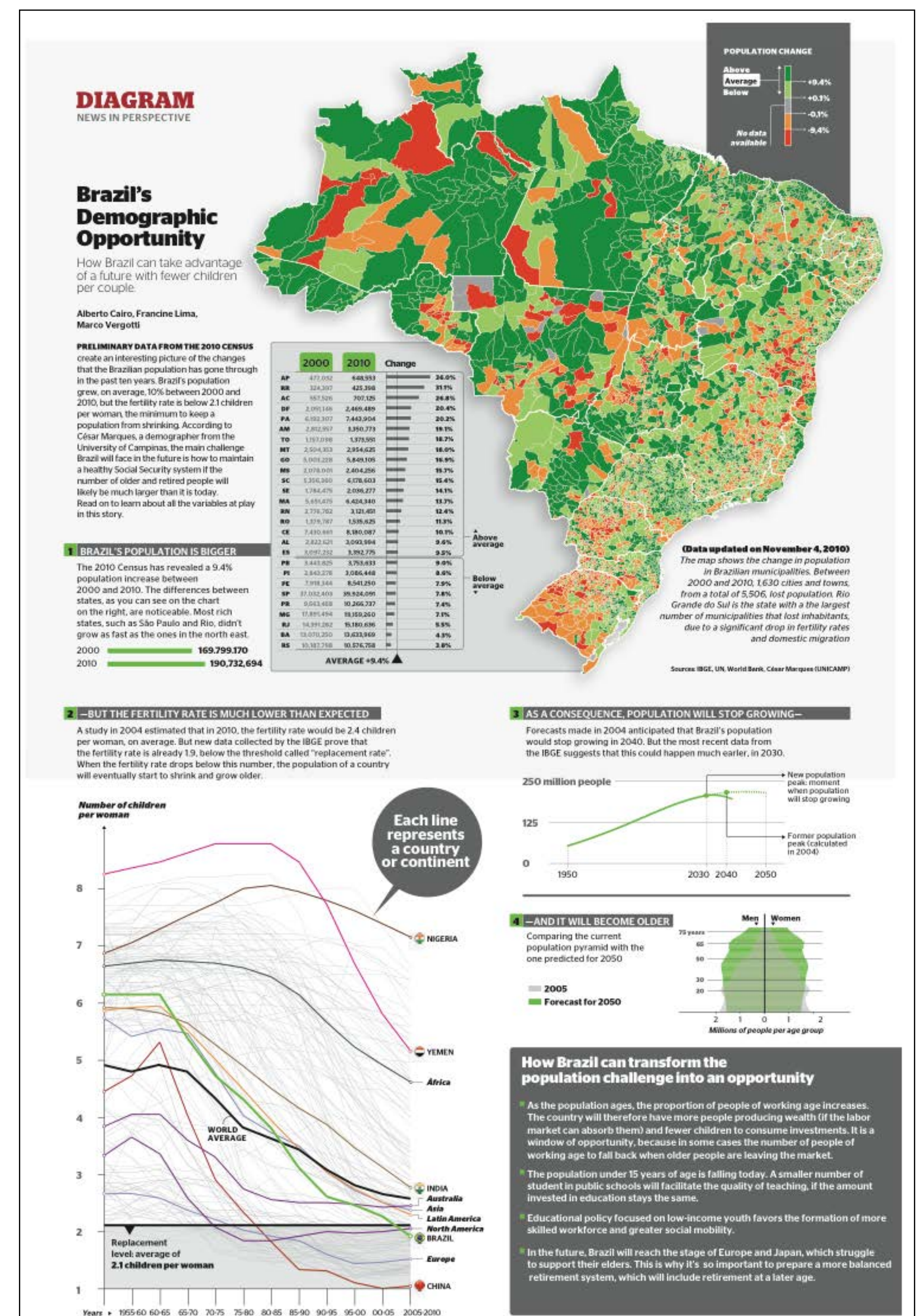
Talking about accessibility...

This is the same graphic seen through Color Oracle

<https://colororacle.org/>



Whenever possible, I try to structure my projects as narratives, making sure that text and visuals are integrated with each other.



DIAGRAM

NEWS IN PERSPECTIVE

Brazil's Demographic Opportunity

How Brazil can take advantage of a future with fewer children per couple.

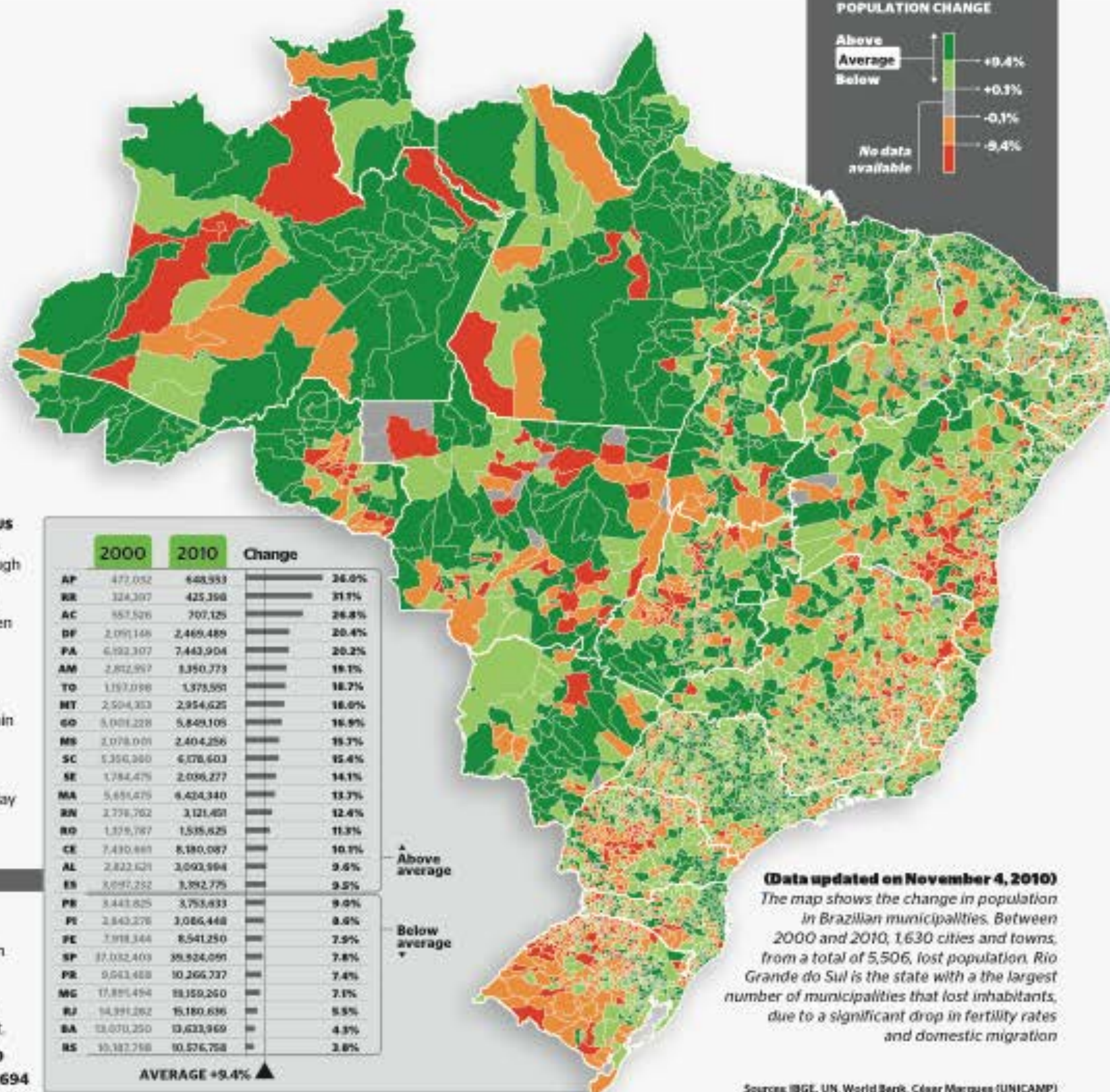
Alberto Cairo, Francine Lima, Marco Vergotti

PRELIMINARY DATA FROM THE 2010 CENSUS create an interesting picture of the changes that the Brazilian population has gone through in the past ten years. Brazil's population grew, on average, 10% between 2000 and 2010, but the fertility rate is below 2.1 children per woman, the minimum to keep a population from shrinking. According to César Marques, a demographer from the University of Campinas, the main challenge Brazil will face in the future is how to maintain a healthy Social Security system if the number of older and retired people will likely be much larger than it is today. Read on to learn about all the variables at play in this story.

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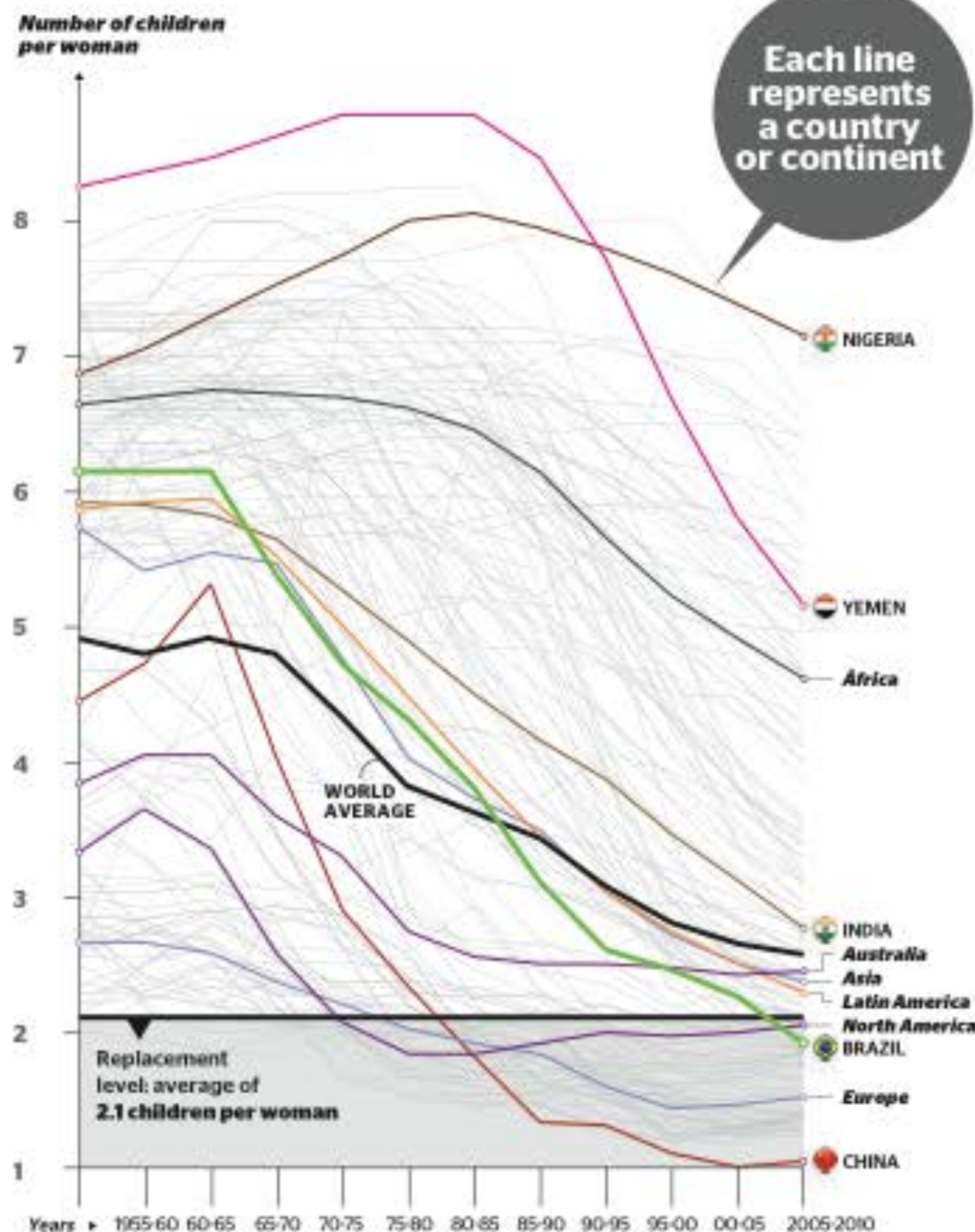
The 2010 Census has revealed a 9.4% population increase between 2000 and 2010. The differences between states, as you can see on the chart on the right, are noticeable. Most rich states, such as São Paulo and Rio, didn't grow as fast as the ones in the north east.

2000 **169,799,170**
2010 **190,732,694**



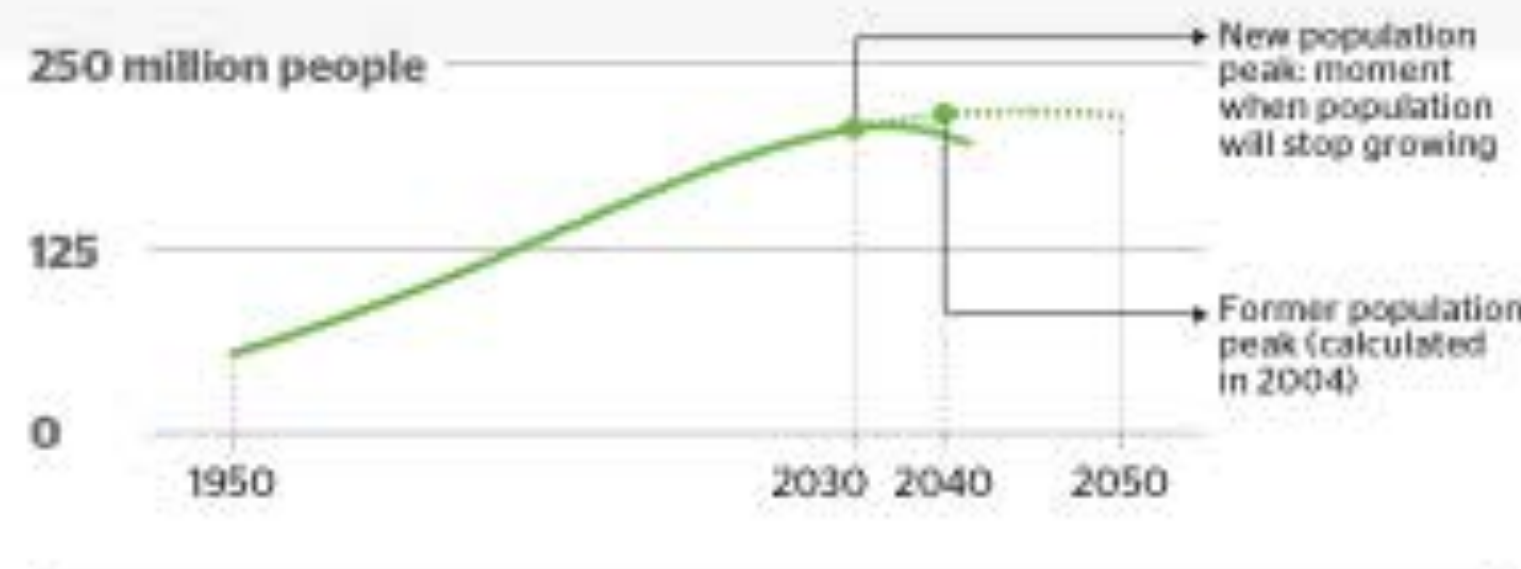
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Comparing the current population pyramid with the one predicted for 2050

2005

Forecast for 2050



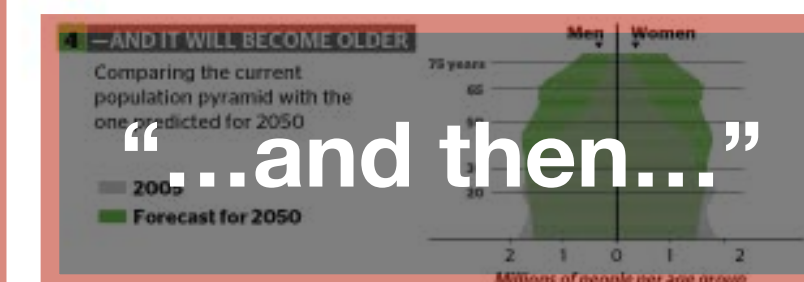
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- The population under 15 years of age is falling today. A smaller number of student in public schools will facilitate the quality of teaching, if the amount invested in education stays the same.
- Educational policy focused on low-income youth favors the formation of more skilled workforce and greater social mobility.
- In the future, Brazil will reach the stage of Europe and Japan, which struggle to support their elders. This is why it's so important to prepare a more balanced retirement system, which will include retirement at a later age.

1. Begin by writing a long sentence that summarizes the points you want to make, and how they connect to each other.

2. Split that long sentence into its components, taking advantage of natural sentence breaks.

3. Transform those pieces into the sections of your infographic. Illustrate them with the appropriate charts, maps, diagrams, etc.



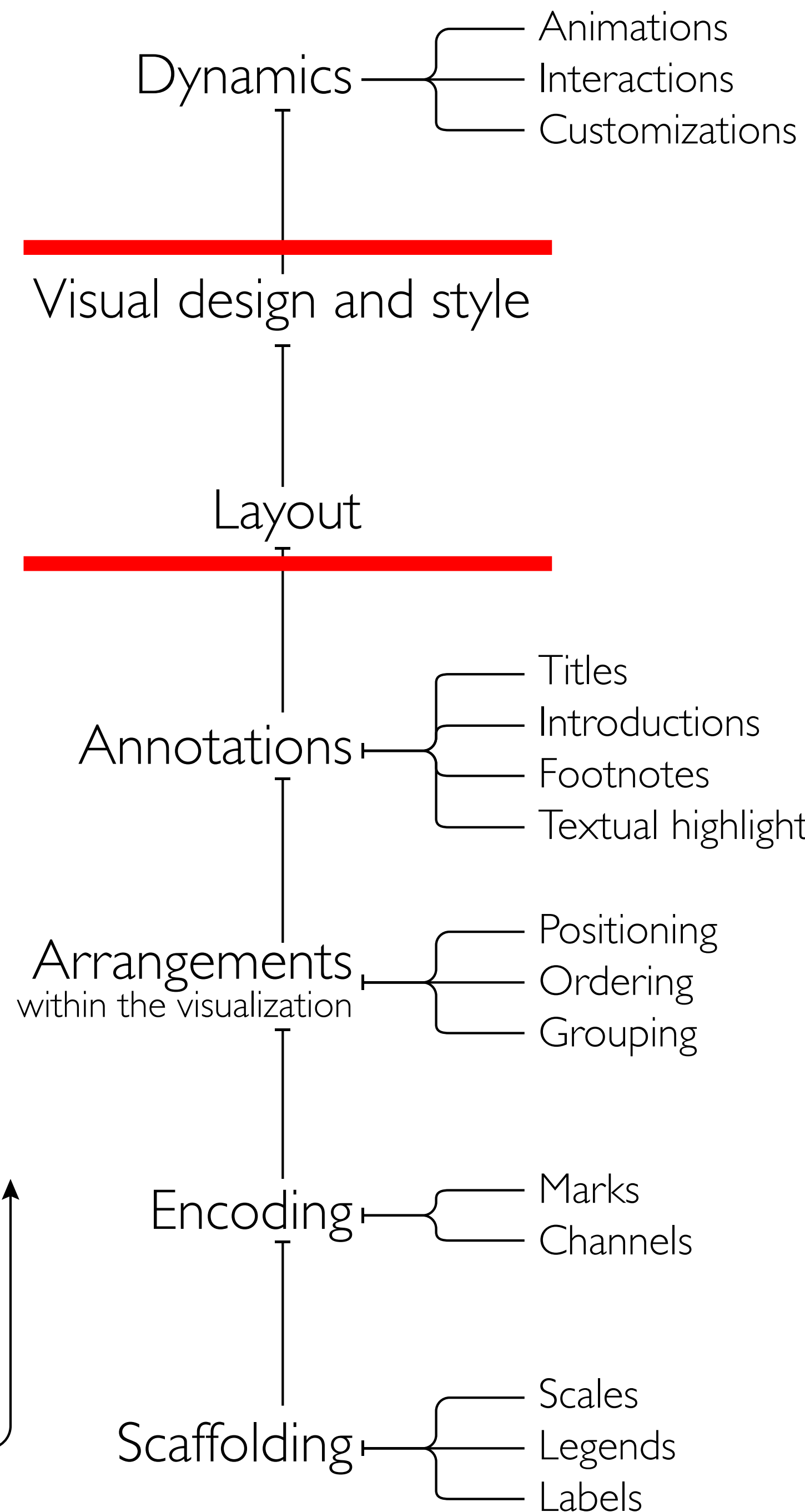
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- As the population ages, the number of children will be smaller. The number of students in the labor market will fall, and the amount invested in education stays the same.
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- In the future, Brazil will reach the stage of Europe and Japan, which struggle to support their elders. This is why it's so important to prepare a more balanced retirement system, which will include retirement at a later age.

Visualization: Layers and elements to think about

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Read from
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Static
visualizations

Dynamic
visualizations

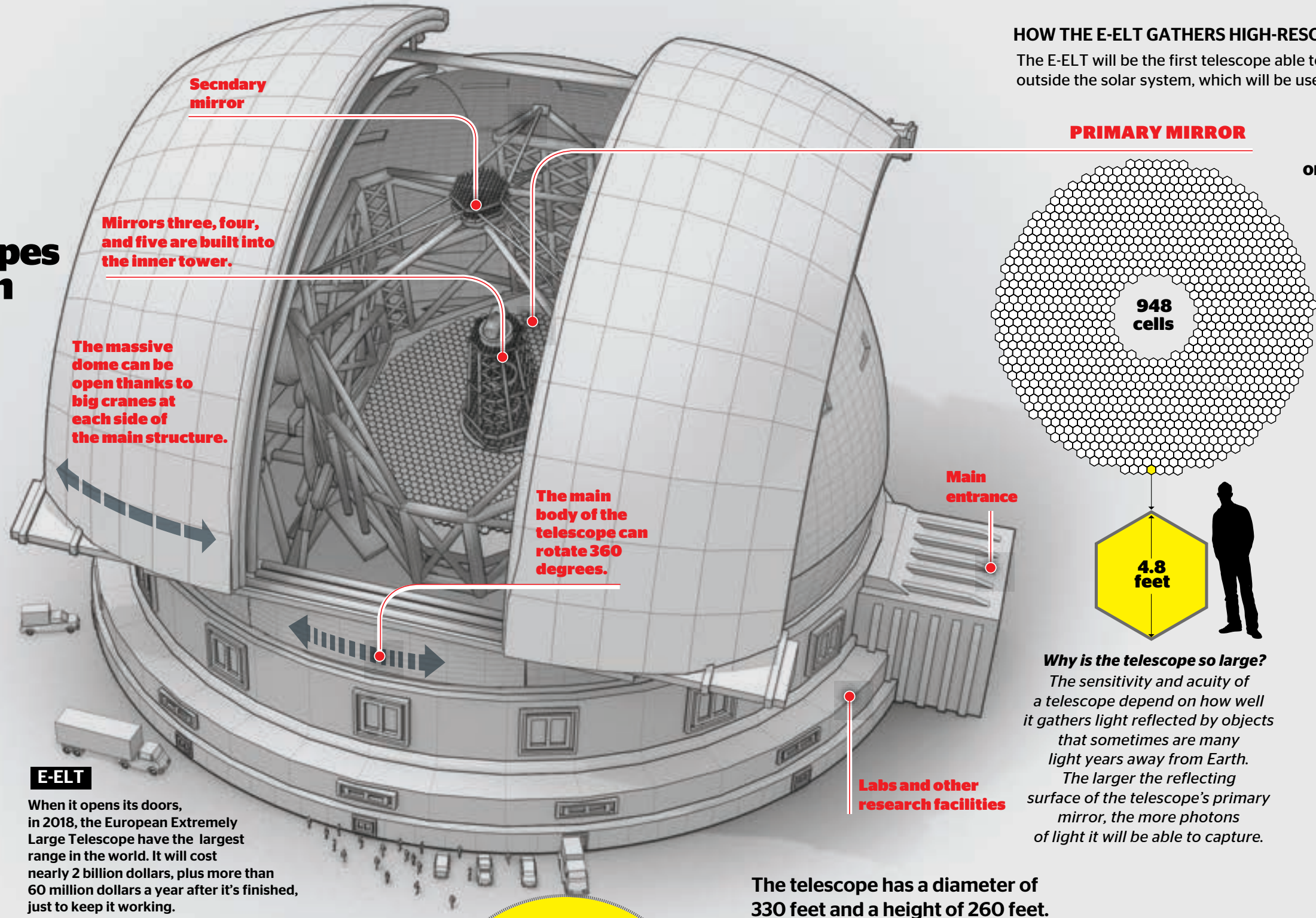
400 years after
Galileo, mega-telescopes
rule space exploration

A new generation of observatories is under construction. Brazil needs to decide if it's going to be part of this new revolution in astronomy.

Peter Moon, Alberto Cairo, Gerson Mora

In 1609, Galileo Galilei perfected the telescope, created in 1608 by Hans Lippershey. Galileo's telescope had a lens of 6 inches. Today, the largest telescopes are in Hawaii and northern Chile. Equiped with mirrors 24 to 35 feet in diameter, they allow the observation of galaxies billions of light years away from us, but with little clarity. So a new generation of mega-telescopes is being built. The largest is the European Extremely Large Telescope (E-ELT), an initiative of the European Space Agency that is under construction in the Atacama Desert in Chile, and will open in 2018. The Ministry of Science and Technology of Brazil defends participation in the project, but the huge investment has unleashed concerns in other areas of the government. The total cost for Brazil would be \$650 million over 20 years.

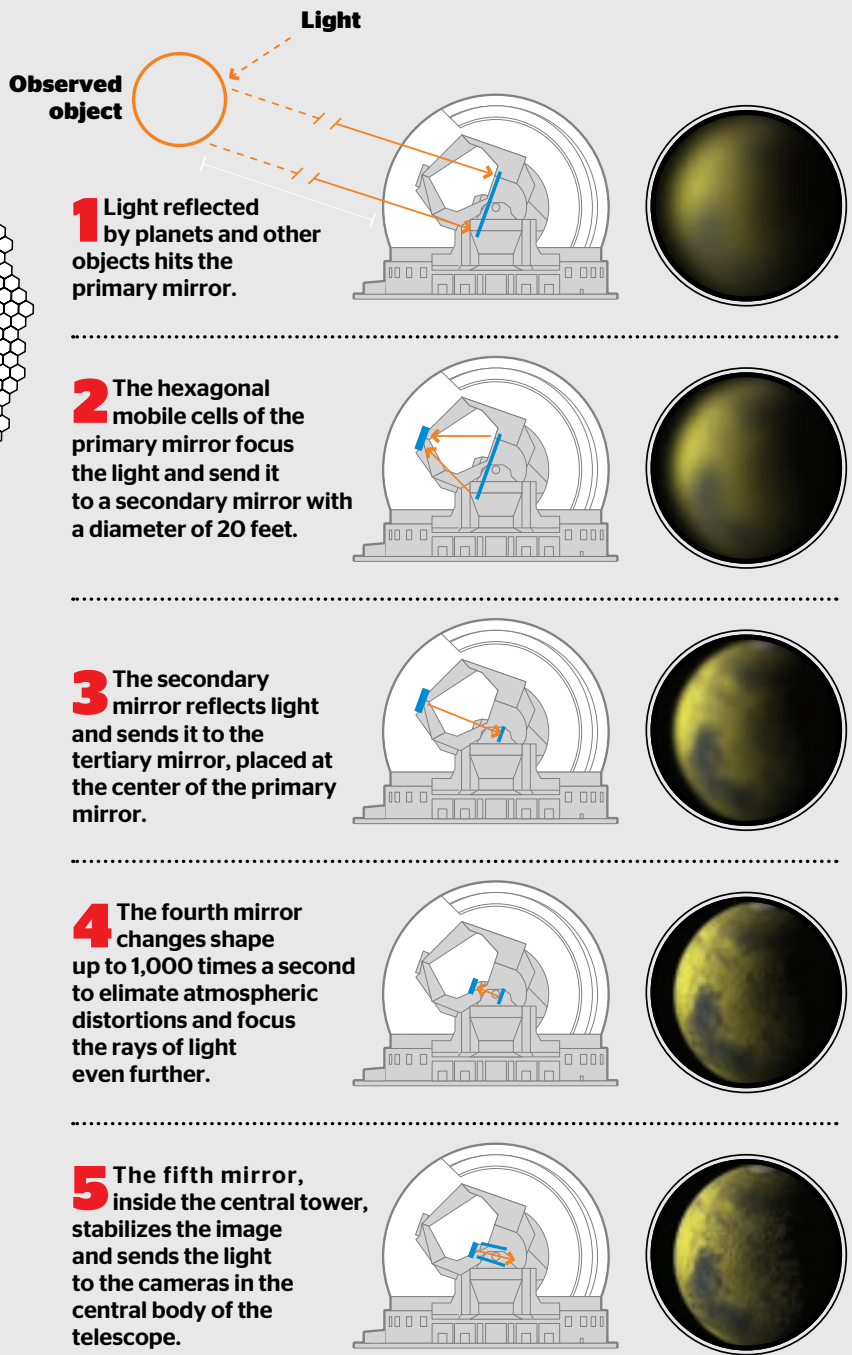
Sources: Southern European Observatory (ESO), TMT, Gemini, Soar



The telescope has a diameter of 330 feet and a height of 260 feet.

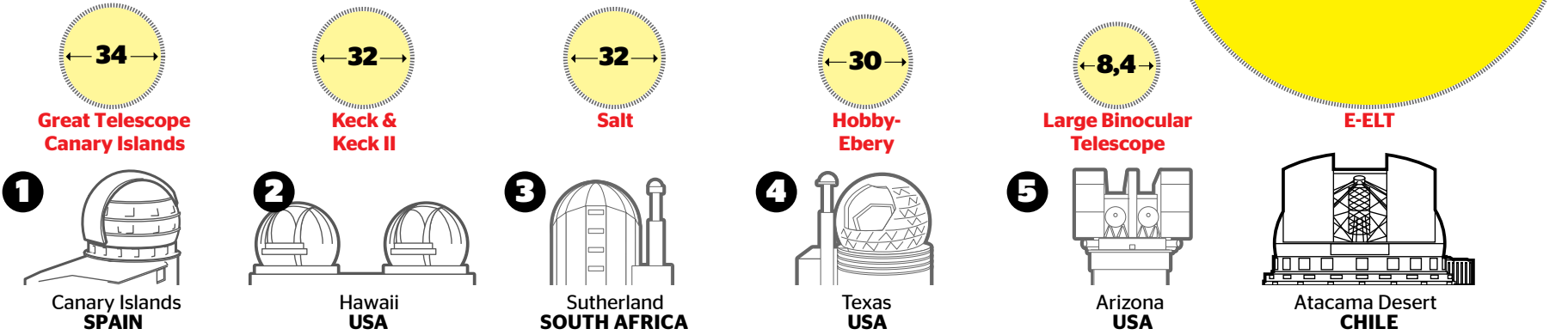
HOW THE E-ELT GATHERS HIGH-RESOLUTION IMAGES

The E-ELT will be the first telescope able to shoot pictures of planets outside the solar system, which will be useful for analyzing their atmospheres.



THE SUPER TELESCOPE RANKING

The E-ELT is a giant compared to the existing mega-telescopes. Its primary mirror is four times the size of the one in the largest telescope, in the Canary Islands, Spain.
Mirror diameter in feet.



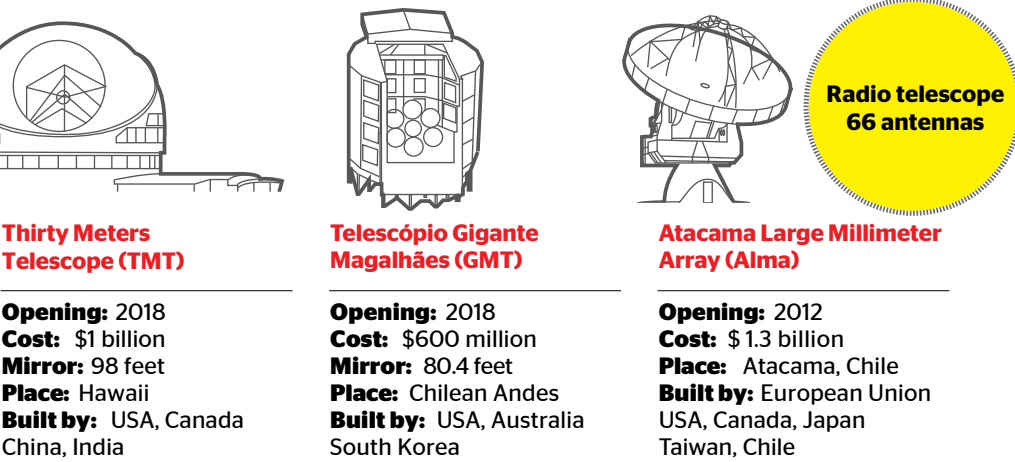
TELESCOPES WITH BRAZILIAN INVOLVEMENT

Brazil participates on just two of the largest telescopes.



OTHER LARGE TELESCOPES UNDER CONSTRUCTION

Besides the E-ELT, there are other projects in development.



Consistency, variety,
and hierarchy

Objects that are the same
should look the same.

Objects that are different
should look different.

Size and style can be used to
emphasize hierarchy.

STRUCTURE

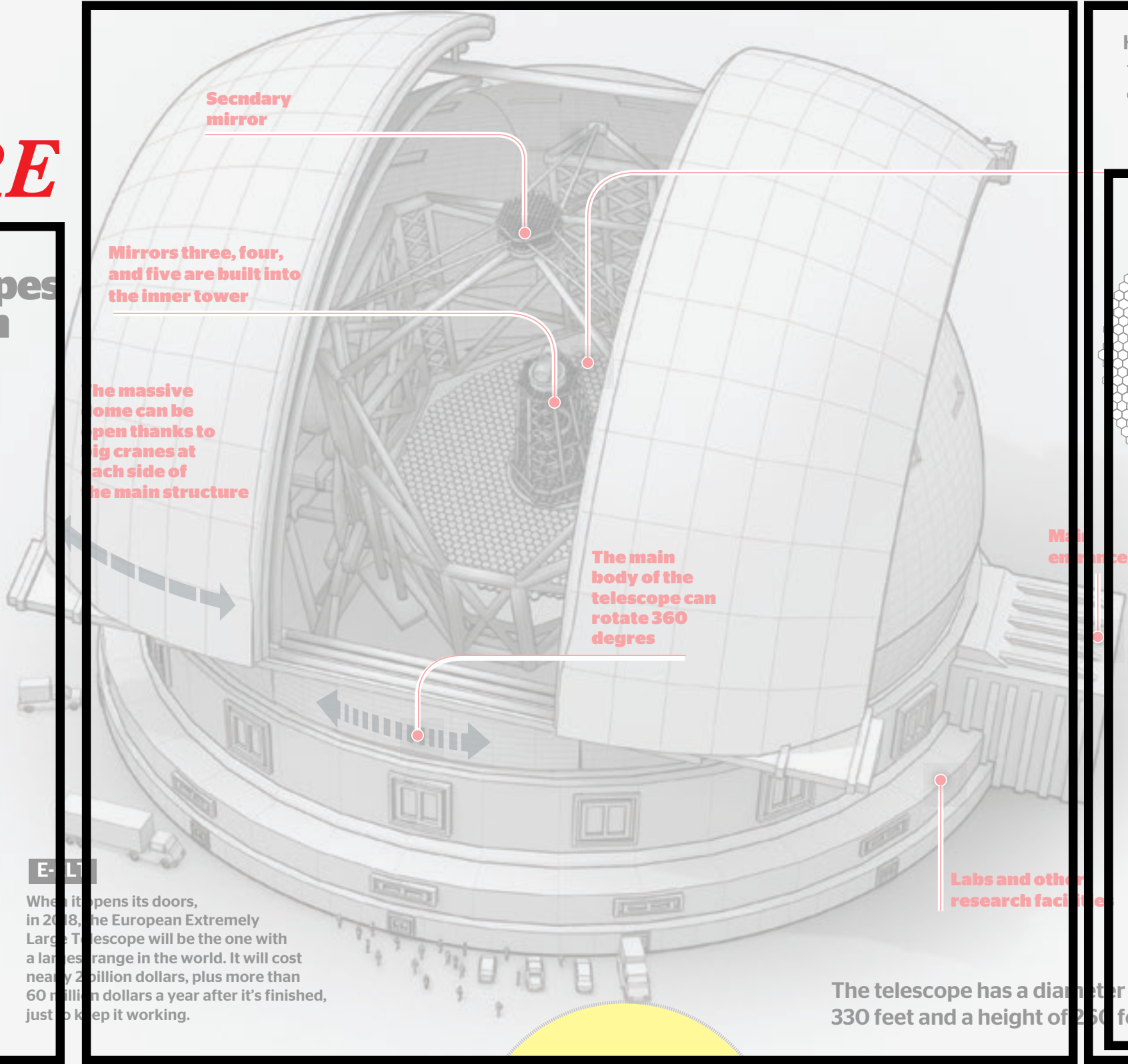
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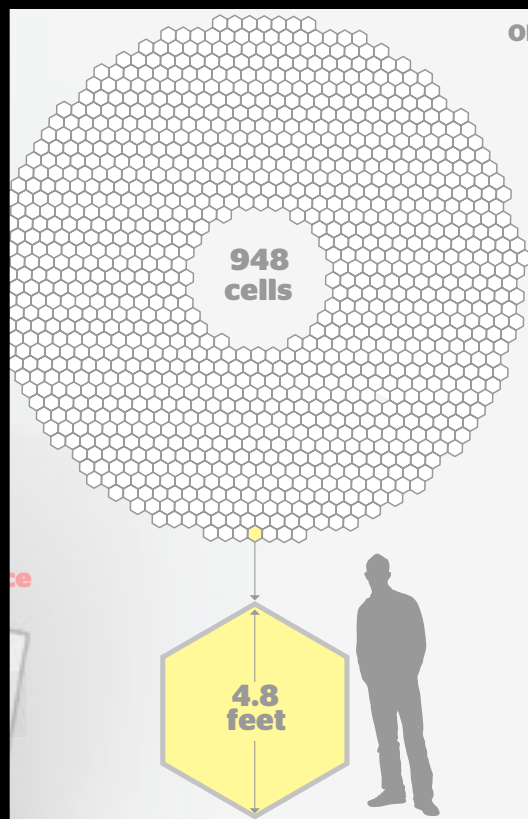
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HOW THE E-ELT GATHERS HIGH-RESOLUTION IMAGES

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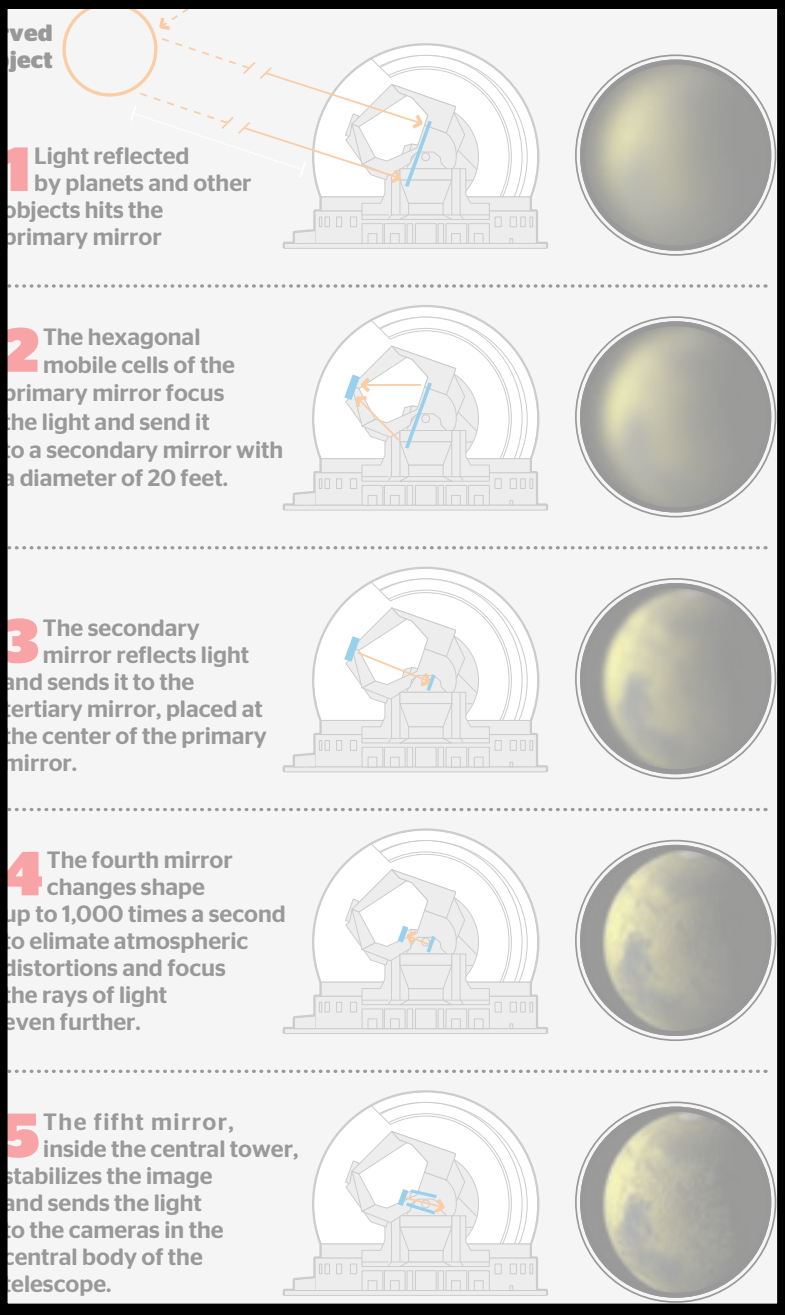
PRIMARY MIRROR



Why is the telescope so large?

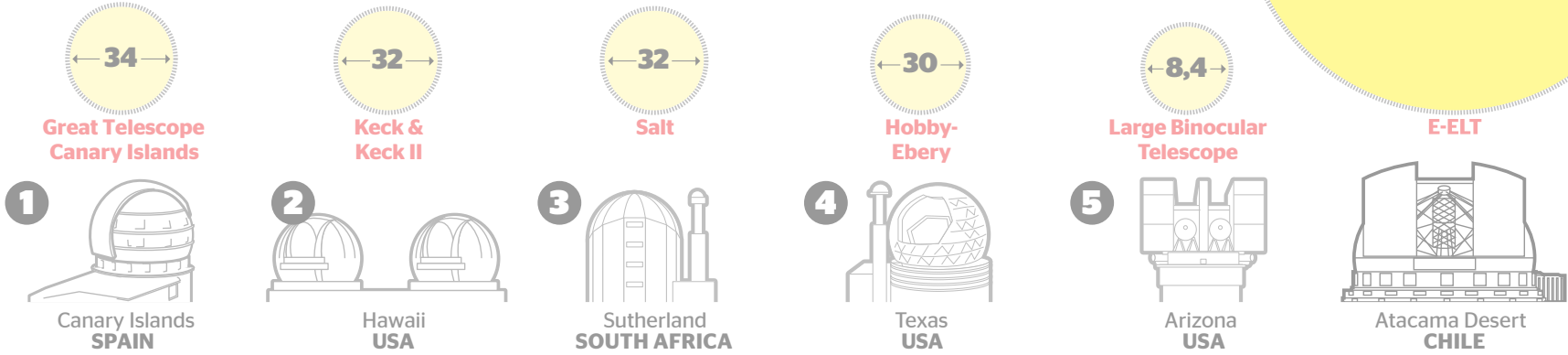
The sensitivity and acuity of a telescope depend on how well it gathers light reflected by objects that sometimes are many light years away from Earth. The larger the reflecting surface of the telescope primary mirror, the more photons of light it will be able to capture.

Light



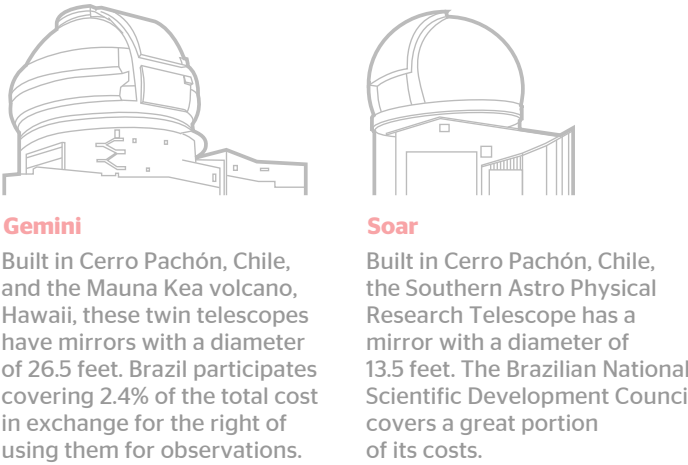
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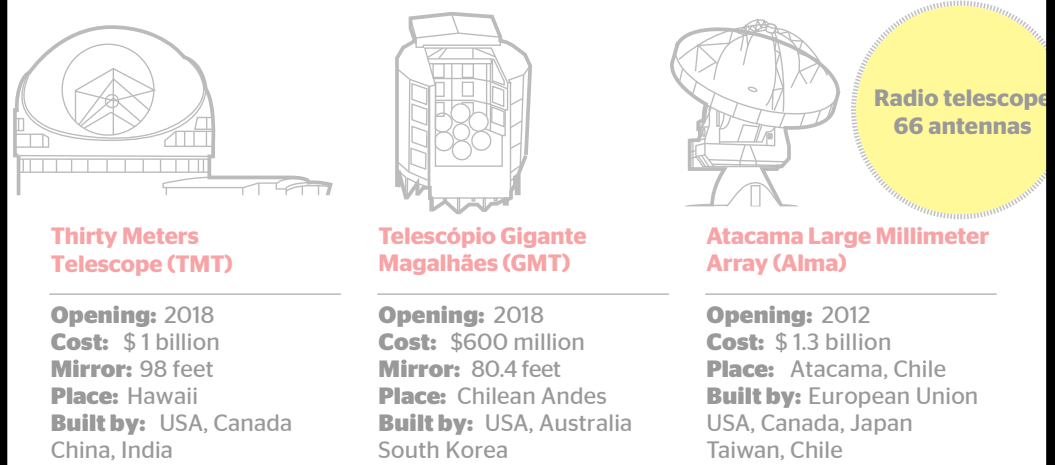
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Consistency, variety, and hierarchy

Modular layout.

3.4 EU fisheries controls- SR 2017/08

Pages 34-35

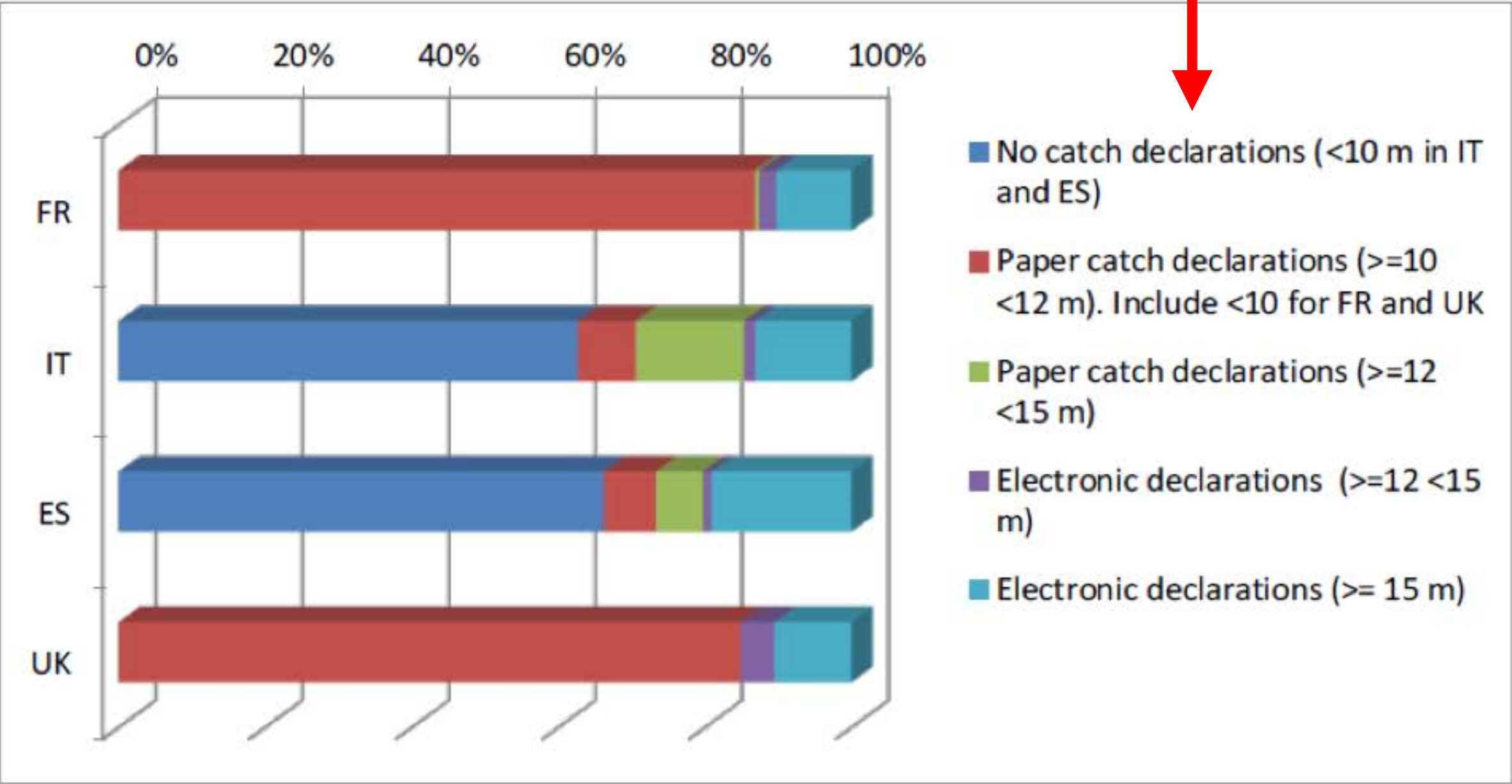
51. The proportion of vessels in the Member States visited²⁵ using paper and electronic data declarations is illustrated in Figure 6. This shows that relatively few vessels used electronic declarations. In Spain and Italy most vessels between 12 and 15 meters long (85 % and 90 % of the vessels respectively) were exempted from electronic declaration.

08

35

Paying attention to text style and arrangement.

Figure 6 - Proportion of vessels that register catch and landing data, and data format



3.4 EU fisheries controls- SR 2017/08

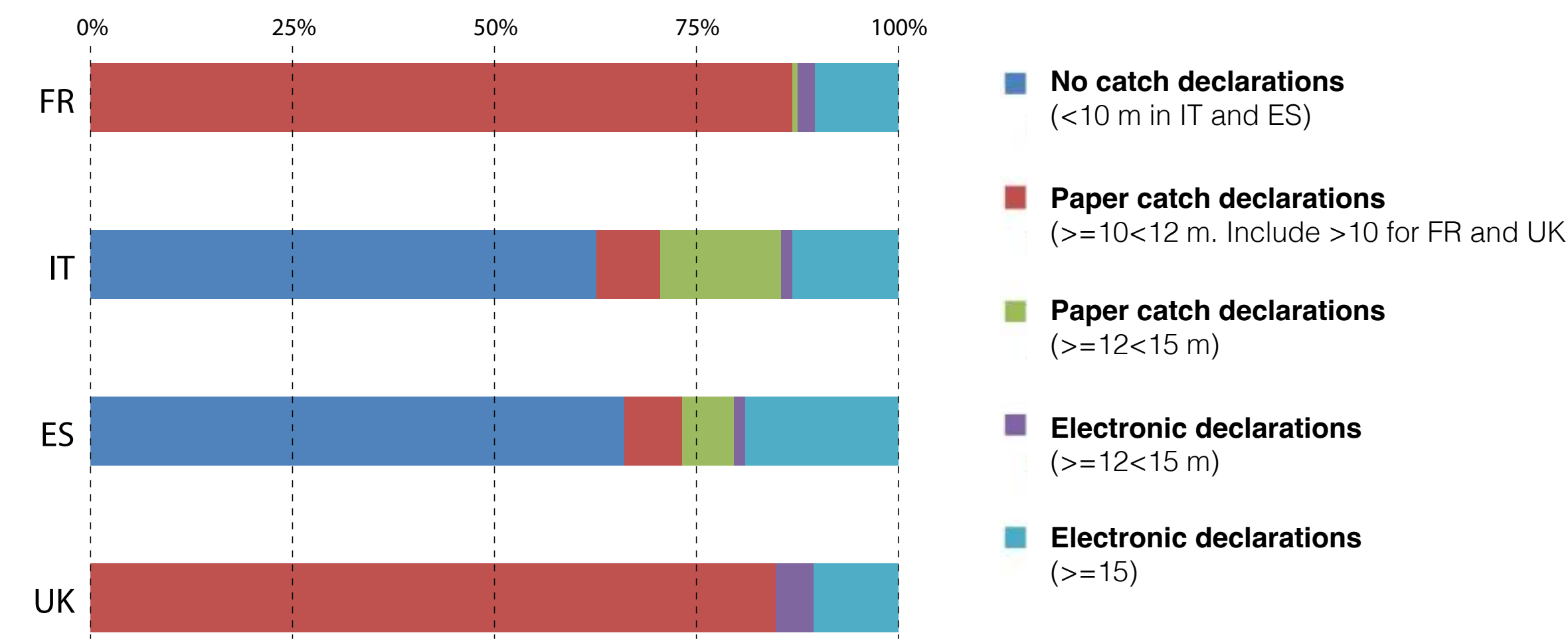
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Paying attention to text style and arrangement.

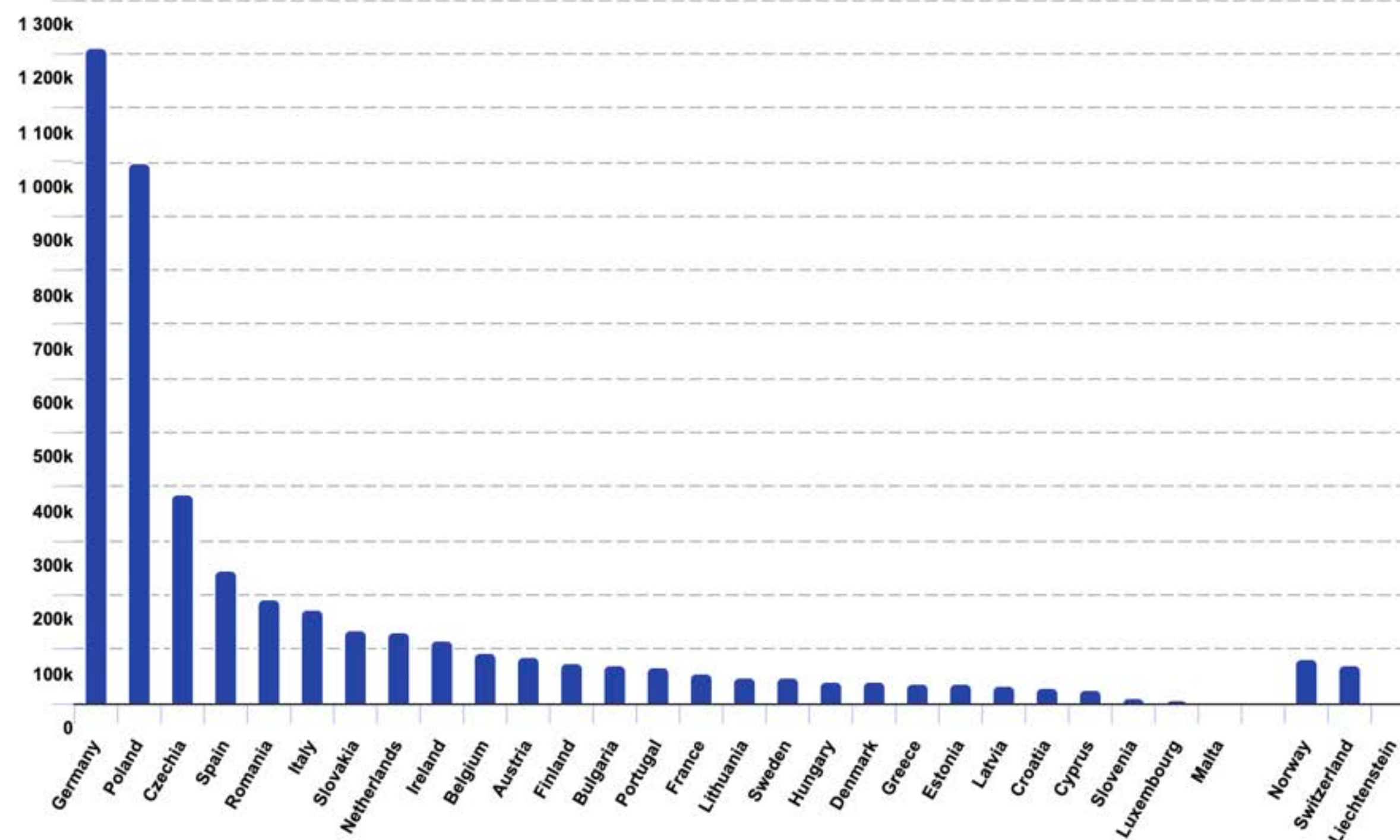
Number of person: ▼

Selected categories: 30 ▼



Non-EU citizens under temporary protection at the end of August 2025

(Number of persons, ratio per 1 000 people, share in % of the EU total)



French data does not generally include minors. Data on the number of persons under temporary protection at the end of the month in Spain, Cyprus and Greece include some persons whose temporary protection status was no longer valid. Iceland: data for August 2025 are not available.
Source: Eurostat - [migr_asytpsm](#), [migr_asytpspop](#)

eurostat

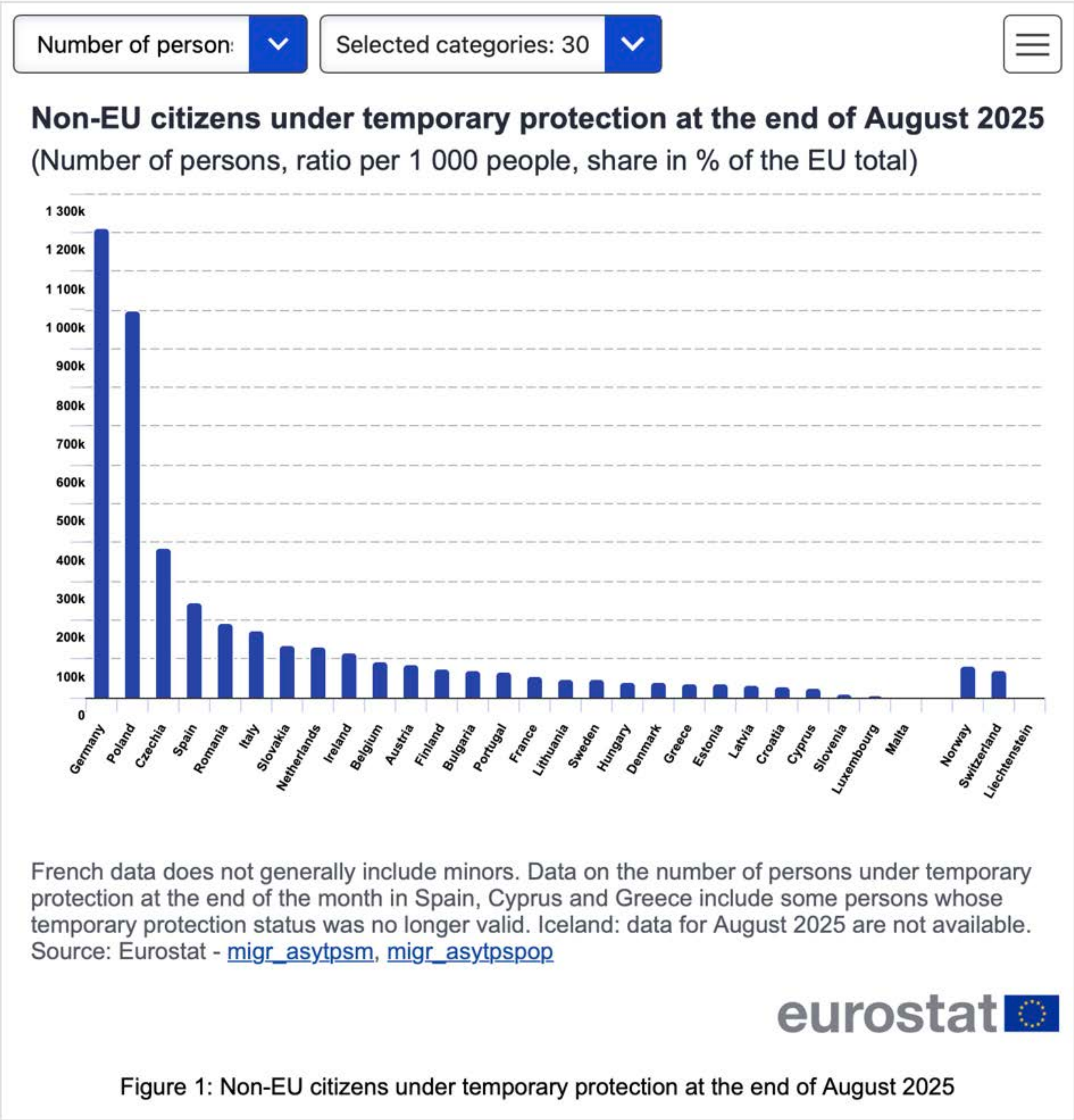
Figure 1: Non-EU citizens under temporary protection at the end of August 2025

Tilted text.

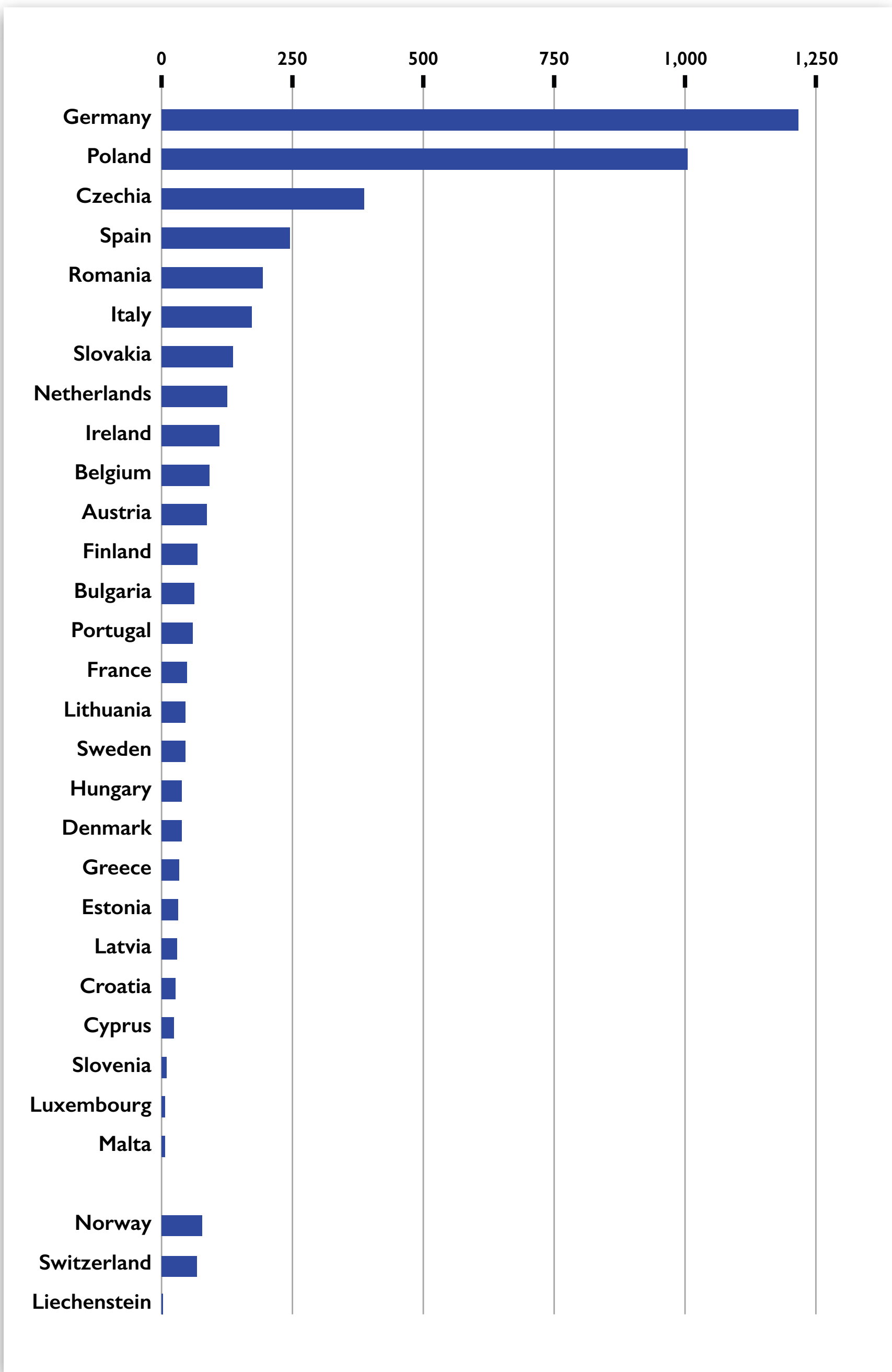
As a general rule, try to avoid it.

https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Temporary_protection_for_persons_fleeing_Ukraine_-_monthly_statistics

Original



Alternative



Multi-scale Modeling and Assessment of Malaria Risk in Northern South America

Alimi, T. O.¹; Fuller, D. O.^{1,2} and Beier, J.C.^{1,3}

¹ Abess Center for Ecosystem Science and Policy; ² Department of Geography and Regional Studies; ³ Department of Epidemiology and Public Health, University of Miami

1. Introduction

The public health problem posed by malaria has made it a top priority for control efforts and the general consensus globally, is that its elimination is crucial for continued international development. Consequently, there is ongoing research in different regions including South America (SA) to better understand the disease dynamics with the intent that findings may establish scientific framework that would support the development of new intervention strategies for malaria elimination in areas with seasonal malaria. One of such investigations is undertaken by the International Centers of Excellence in Malaria Research (ICEMR) under a National Institutes of Health (NIH) grant.

While only about 3% of the global malaria burden is borne by SA¹, undertaking malaria research in the region is currently important because an estimated 23million people are still at risk² and approximately about 80% of clinical cases are found in Northern South America (NSA)³. A key factor limiting effective control is lack of data and uneven implementation of control measures, including use of bed-nets, sprays, early diagnosis, and treatment. As part of the ICEMR investigation, this project seeks to model the spatial patterns of malaria risk in NSA through vector distribution and land-use changes. Furthermore, I intend to investigate the perceptions of malaria risk in order to identify barriers to adoption and how they can be circumvented.

2. Significance

Spatial distribution of malaria risk is still perceived as broadly categorized by the WHO's traditional risk maps which are highly generalized, of low resolution and have broad categories with uncertain boundaries (see da Nunes-Silva et al. 2012). There is need for up- to-date high resolution risk maps which can aid malaria control efforts. Secondly, modeling distribution of principal malaria vectors and land use changes which may explain the observed distribution and risk are useful tools which would guide future management strategies. Finally, understanding the perceptions of at risk populations may help address barriers to adoption of interventions and influence policies. Overall, findings will empower NMCPs to achieve effective control and move them closer to elimination.

3. Specific Aims

- Specific Aim 1: Model the spatial patterns of malaria risk through vector distribution and land use changes
 - Hypothesis 1.1: GIS-based Multi-Criteria Evaluation (MCE) model can accurately predict spatial extent of malaria risk areas. **Objective:** Generate risk maps that represent risk of malaria transmission.
 - Hypothesis 1.2: The Maximum Entropy (Maxent) model can accurately depict actual and predict potential distribution of three *Anopheles* species. **Objective:** Model observed and potential spread of *An. albimanus*, *An. darlingi*, and *An. nuneztovari*.
 - Hypothesis 1.3: Land- use changes can explain the variations in predicted malaria risk. **Objective:** Characterize land use land cover (LULC) and investigate changes in areas of risk.
- Specific Aim 2: Investigate the perceptions of malaria risk in order to identify barriers to adoption and how they can be circumvented.
 - Hypothesis 2.1: Knowledge of perception of malaria risk can aid design of malaria control strategies. **Objective:** Obtain and analyze data on subjective perceptions of risk.
 - Hypothesis 2.2: Identification of barriers to adoption of malaria control interventions provide means of tackling them. **Objective:** Analyze data addressing perceived barriers and policy implications

*Only ongoing work on Hypothesis 1.1 in presented here

4. Materials and Methods

- **Study Area:** is NSA comprising of ten countries- Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Panama, Peru, Suriname and Venezuela. These countries account for approximately 90% of clinical cases in the region hence, the choice as study area (Fig. 1).



Figure1: Map of study area

- **Research Approach:** Due to the complexity of malaria problem, I'm employing an interdisciplinary approach to address the problem (Fig. 2).

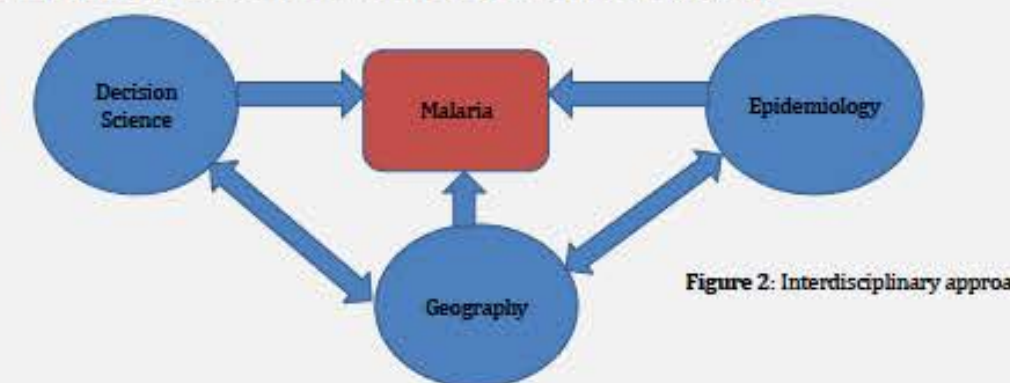


Figure 2: Interdisciplinary approach

- **Materials:** Raster data layers of environmental, climatic and anthropogenic parameters from satellite imagery, weather monitoring stations, global land cover and population data were collected from Worldclim, Digital Charts of the World, Globcover and Landsat. Vector data was collected from field sampling by our collaborators and the Walter Reed Biosystematics Unit. Sociological data would be collected through questionnaires to be administered in one of the study area. Other data will be collected as needed.
- **Procedure:** To test hypothesis 1.1, raster data of parameters that influence mosquito distribution (rivers, wetlands, urban areas, roads, population and elevation) were combined using a Multi-Criteria Evaluation in Idrisi GIS package. This produced a map of potential exposure to malaria vectors which is used as a proxy for risk of malaria transmission. All the data layers were gridded at 1km spatial resolution. A set of distance layers had been created for discrete factors using standard GIS operations. All factors were subsequently standardized into a continuous common numeric range on a byte 0-255 probability scale using a fuzzy function based on knowledge of mosquito interaction with the factor. Weights were generated for each factor based on the importance of the factor to malaria transmission by expert opinions and then assigned using Analytical Hierarchy Process. The risk maps produced were validated statistically using data on *An. darlingi* distribution and malaria case data from some parts of the study area. See preliminary results (Fig. 3,4,5)

5. Preliminary Results

- Areas of high to moderate risk corresponded with locations of some of the anophelines collected.

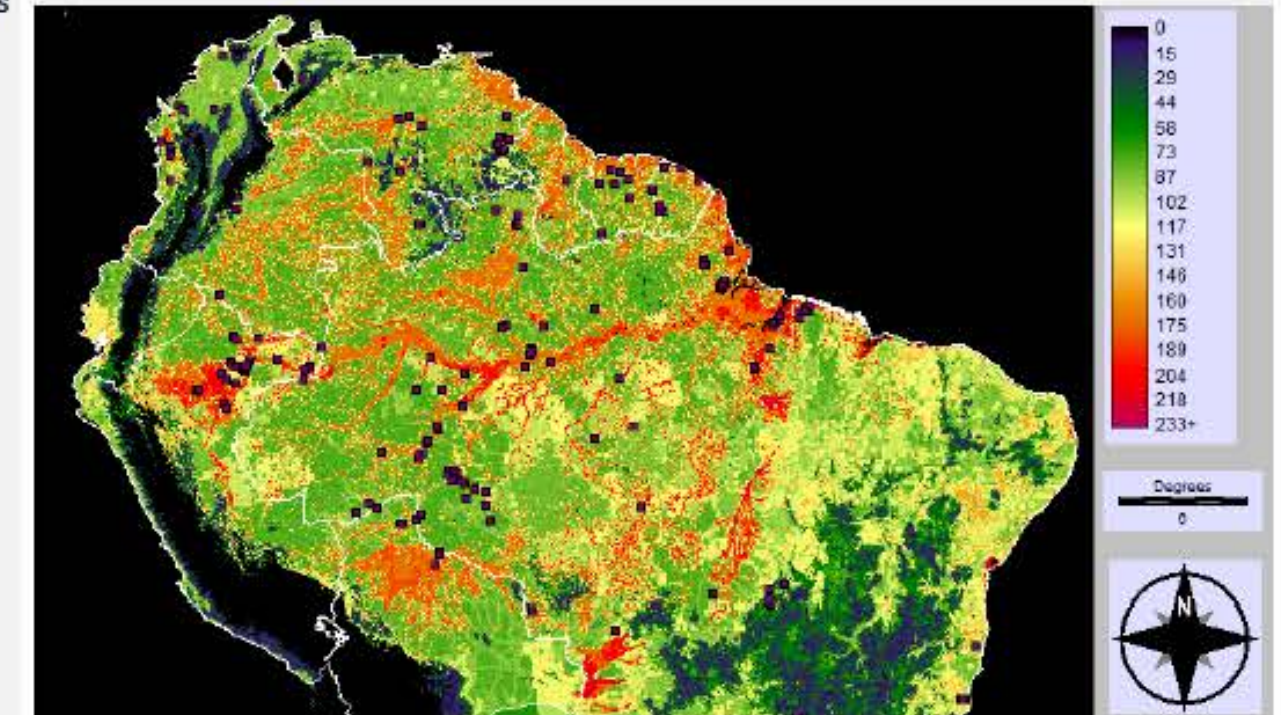


Figure 3: Potential risk of exposure to malaria vectors across NSA (0 indicate little or no risk while 233 indicate high risk)

- Risk scores for mosquito occurrence points were significantly higher than those generated randomly (Fig. 4).

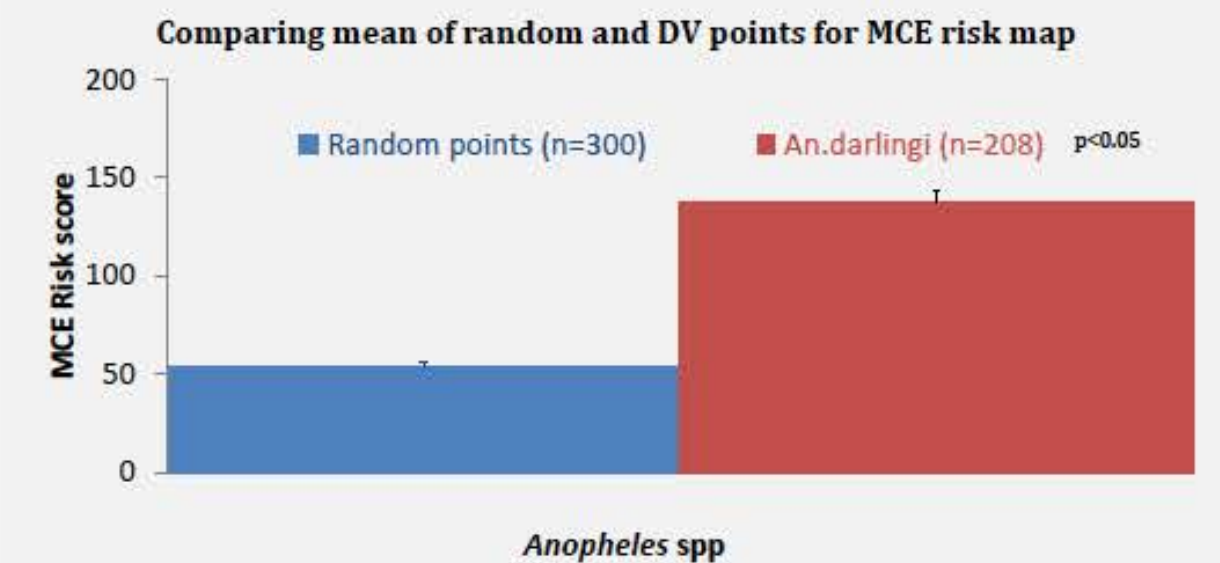


Figure 4: Plot showing the MCE risk values for randomly sampled points and for occurrence points of a DV, *An. darlingi*

6. Conclusion

Findings from preliminary results suggest that the MCE approach is a viable method to modeling spatial risk. The high resolution risk map produced aligned well with sampled vector points and may therefore be used to plan control of malaria vectors. Further analysis is planned to generate and validate risk maps with actual measures of malaria transmission, results of which could be used to plan containment of future outbreaks.

References

1. WHO. (2007). MALARIA ELIMINATION: A field manual for low and moderate endemic countries
2. PAHO (2012) PAHO Honors 2012 Malaria Champions of the Americas. Available: http://new.paho.org/hq/index.php?option=com_content&view=article&id=7429&Itemid=39639
3. Gusmao R. (1999) Overview of malaria control in the Americas. Parasitologia 41:355-60.
4. Da Silva-Nunes, M., Moreno, M., Conn, J.E., Gamboa, D., Abeles, S., Vinetz, J.M., and Ferreira, M.U. (2012) Amazonian malaria: Asymptomatic human reservoirs, diagnostic challenges, environmentally driven changes in mosquito vector populations, and the mandate for sustainable control strategies. Acta Tropica 121 (3): 281-29

Visual editing

Multi-scale Modeling and Assessment of Malaria Risk in Northern South America

Alimi, T. O.¹; Fuller, D. O.^{1,2} and Beier, J.C.^{1,3}

INTRODUCTION

Malaria as a public health problem has become a priority for control efforts worldwide. The global consensus is that its elimination is crucial for continual development. Ongoing research projects in different regions, including South America (SA), try to improve our understanding of the disease dynamics. Their goal is to establish a new framework that would lead to new intervention strategies for malaria elimination in areas where the disease is seasonal. One of such investigations is undertaken by the International Centers of Excellence in Malaria Research (ICEMR) under a National Institutes of Health grant.

While only about 3% of the global malaria burden is borne by SA, undertaking malaria research in the region is currently important because an estimated 23 million people are still at risk² and approximately about 80% of clinical cases are found in **Northern South America (NSA)**³. A key factor limiting effective control is lack of data and uneven implementation of control measures, including use of bednets, sprays, early diagnosis, and treatment. As part of the ICEMR investigation, this project seeks to model the spatial patterns of malaria risk in NSA through vector distribution and land-use changes. Furthermore, I intend to investigate the perceptions of malaria risk in order to identify barriers to adoption and how they can be circumvented.

SIGNIFICANCE

Spatial distribution of malaria risk is still perceived as broadly categorized by the WHO's traditional risk maps which are highly generalized, of low resolution and have broad categories with uncertain boundaries (see da Nunes-Silva et al. 2012). There is need for up-to-date high resolution risk maps which can aid malaria control efforts. Secondly, modeling distribution of principal malaria vectors and land use changes which may explain the observed distribution and risk are useful tools which would guide future management strategies. Finally, understanding the perceptions of at risk populations may help address barriers to adoption of interventions and influence policies. Overall, findings will empower NMCPs to achieve effective control and move them closer to elimination.

AIMS

Specific Aim 1: Model the spatial patterns of malaria risk through vector distribution and land use changes

- **Hypothesis 1.1:** GIS-based Multi-Criteria Evaluation (MCE) model can accurately predict spatial extent of malaria risk areas. **Objective:** Generate risk maps that represent risk of malaria transmission.
- **Hypothesis 1.2:** The Maximum Entropy (Maxent) model can accurately depict actual and predict potential distribution of three Anopheles species. **Objective:** Model observed and potential spread of *An. albimanus*, *An. darlingi*, and *An. humeroviridis*.
- **Hypothesis 1.3:** Land-use changes can explain the variations in predicted malaria risk. **Objective:** Characterize land use land cover (LULC) and investigate changes in areas of risk.

Specific Aim 2: Investigate the perceptions of malaria risk in order to identify barriers to adoption and how they can be circumvented.

- **Hypothesis 2.1:** Knowledge of perception of malaria risk can aid design of malaria control strategies. **Objective:** Obtain and analyze data on subjective perceptions of risk.
- **Hypothesis 2.2:** Identification of barriers to adoption of malaria control interventions provide means of tackling them. **Objective:** Analyze data addressing perceived barriers and policy implications.

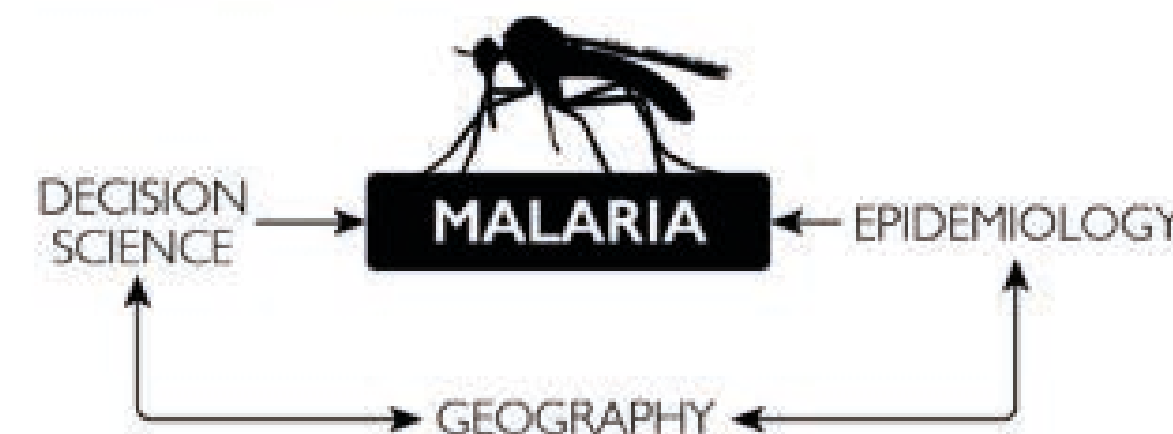
*Only ongoing work on Hypothesis 1.1 is presented here

MATERIALS AND METHODS

NSA comprising of ten countries - Bolivia, Brazil, Colombia, Ecuador, French Guiana, Guyana, Panama, Peru, Suriname and Venezuela. These countries account for approximately 90% of clinical cases in the region.



Research approach: Due to the complexity of malaria problem, I'm employing an interdisciplinary approach to address the problem.

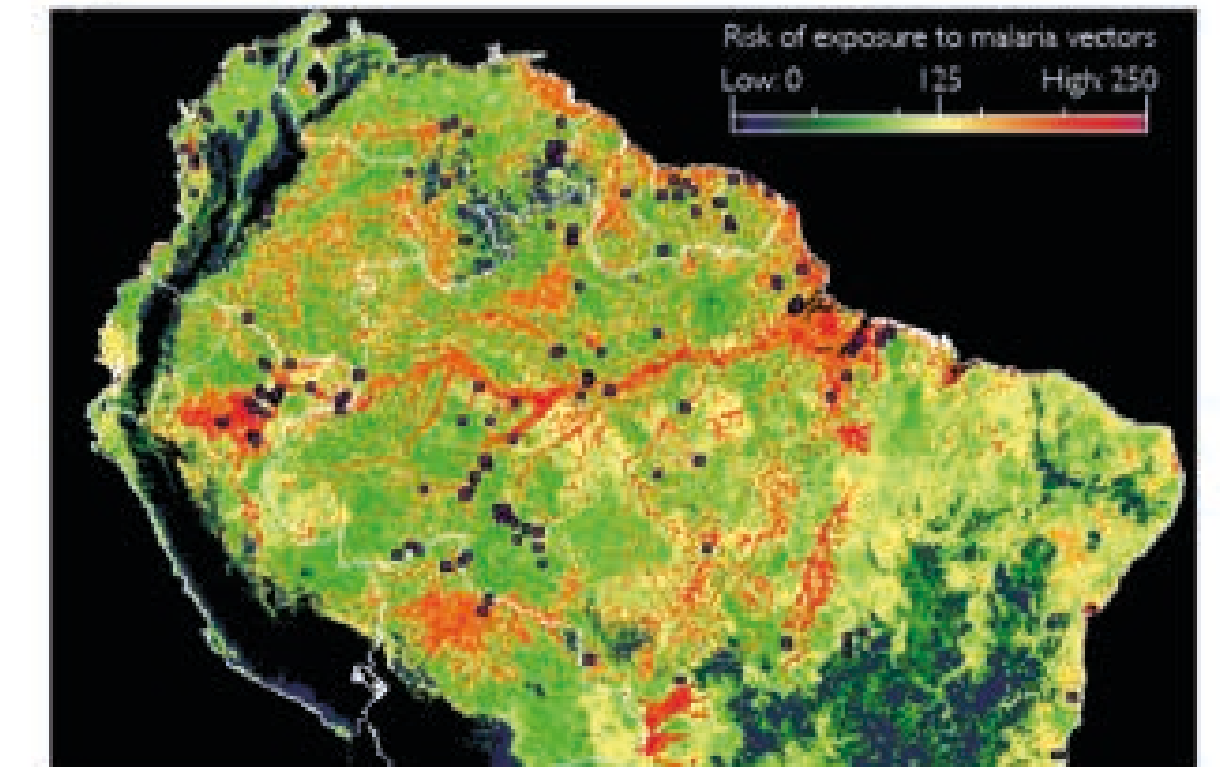


Materials: Raster data layers of environmental, climatic and anthropogenic parameters from satellite imagery, weather monitoring stations, global land cover and population data were collected from WorldClim, Digital Charts of the World, Globcover and Landscan. Vector data was collected from field sampling by our collaborators and the Walter Reed Biosystematics Unit. Sociological data would be collected through questionnaires to be administered in one of the study area. Other data will be collected as needed.

Procedure: To test hypothesis 1.1, raster data of parameters that influence mosquito distribution (rivers, wetlands, urban areas, roads, population and elevation) were combined using a Multi-Criteria Evaluation in Idrisi GIS package. This produced a map of potential exposure to malaria vectors which is used as a proxy for risk of malaria transmission. All the data layers were gridded at 1km spatial resolution. A set of distance layers had been created for discrete factors using standard GIS operations. All factors were subsequently standardized into a continuous common numeric range on a byte 0-255 probability scale using a fuzzy function based on knowledge of mosquito interaction with the factor. Weights were generated for each factor based on the importance of the factor to malaria transmission by expert opinions and then assigned using Analytical Hierarchy Process. The risk maps produced were validated statistically using data on *An. darlingi* distribution and malaria case data from some parts of the study area. See preliminary results

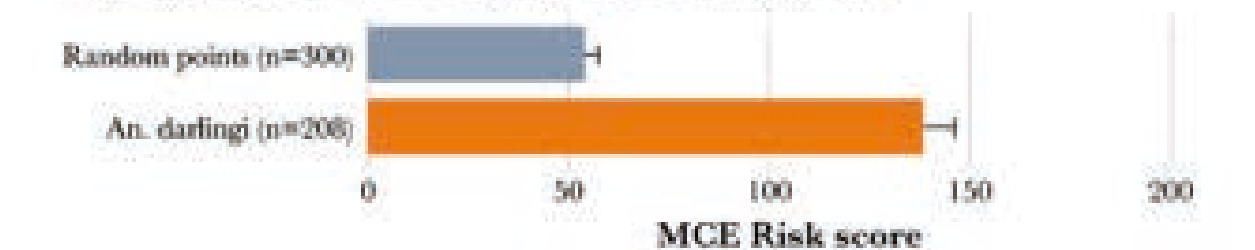
RESULTS

Areas of high to moderate risk corresponded with locations of some of the anophelines collected.



Risk scores for mosquito occurrence points were significantly higher than those generated randomly.

Comparing mean of random and DV points for MCE risk map - $p < 0.05$



CONCLUSION

Findings from preliminary results suggest that the MCE approach is a viable method to modeling spatial risk. The high resolution risk map produced aligned well with sample vector points and may therefore be used to plan control of malaria vectors. Further analysis is planned to generate and validate risk maps with actual measures of malaria transmission, results of which could be used to plan containment of future outbreaks.

References

1. WHO. (2007). MALARIA ELIMINATION: A field manual for low and moderate endemic countries.
2. PAHO. (2012). PAHO. Hoors. 2012. Malaria Champions of the Americas. Available: http://www.paho.org/hq/index.php?option=com_content&view=article&id=7629&Itemid=29632
3. Guimao R. (1999) Overview of malaria control in the Americas. Parasitologia 41:355-60.
4. Da Silva-Nunes, M., Morino, M., Conn, J.E., Gamboa, D., Abalos, S., Venz, J.M., and Ferreira, M.U. (2012) Amazonian malaria: Asymptomatic human reservoir, diagnostic challenges, environmentally driven changes in mosquito vector populations, and the mandate for sustainable control strategies. Acta Tropica 121 (3): 281-29.

Visual editing

— The creative side of visualization —

Jaime Serra

<https://www.archivosjaimeserra.com/>



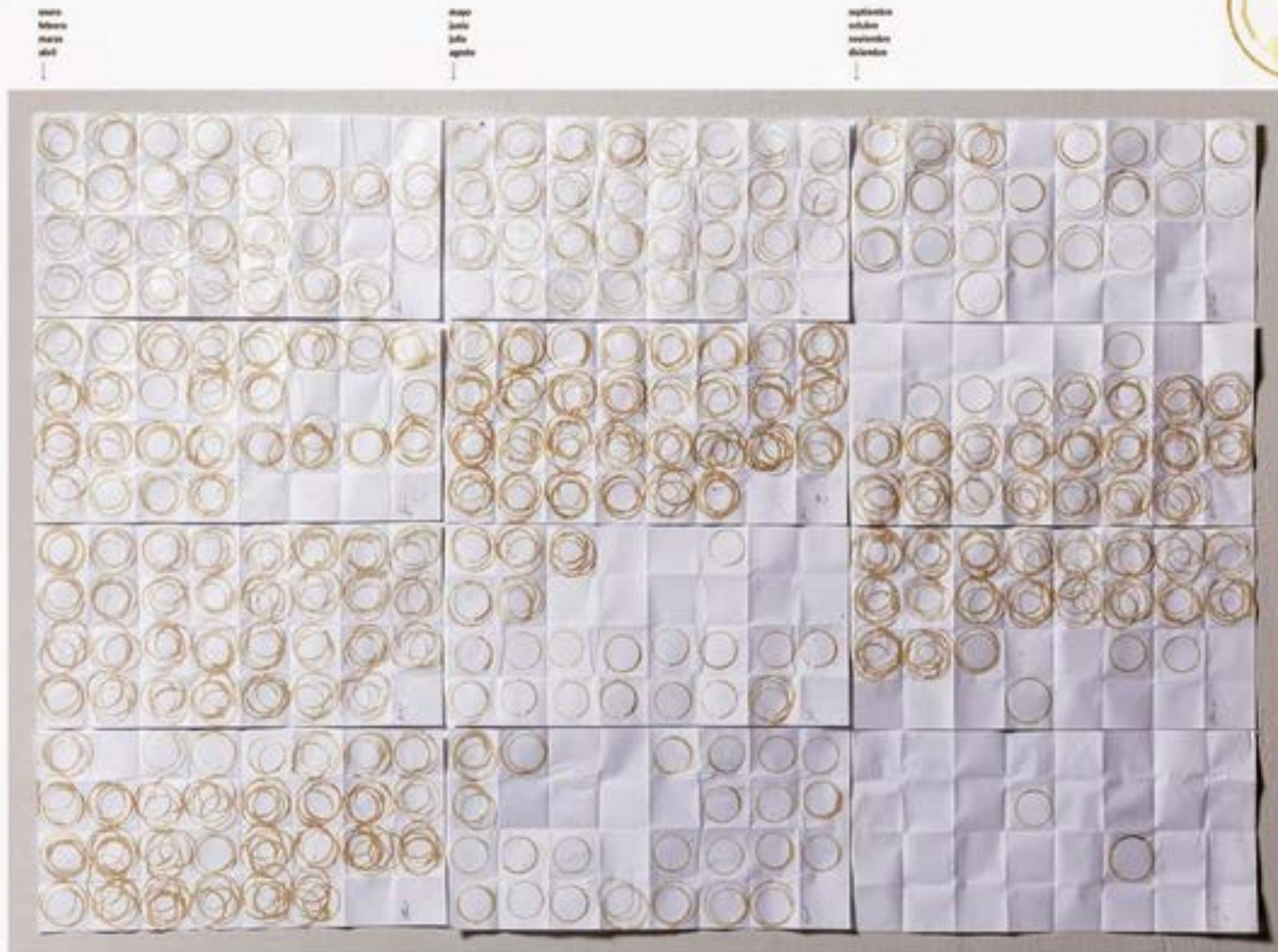
Documental: Jaime Serra III

Jaime Serra Pádel, periodista y artista multidisciplinario. En los últimos 25 años ha dirigido la infografía de algunos de los principales medios de Europa, EE.UU. y Latinoamérica. En su trabajo artístico utiliza los métodos y el lenguaje propio de la infografía científica para hacer formatos performáticos y su propio mundo personal. Su obra se ha expuesto en Estados Unidos, Argentina, México y España. Recientemente por la prestigiosa Society for News Design como el infógrafo más innovador del periodo 1992-2012. Es, desde octubre del 2012, responsable de las infografías de 'La Vanguardia'.

Tres historias verdaderas

Los datos son materia prima, en bruto no tienen utilidad. Deben ser procesados y transformados a un lenguaje visual para ser comprendidos. La herramienta que ilustra la información que contienen es la infografía. Una herramienta de comunicación habitualmente asociada a la divulgación científica pero que, como cualquier otra herramienta de comunicación humana, puede narrar hechos o verdades, realidades o ficciones. Los datos colectivos, venidos con las actuales tecnologías capaces de prescindir de la intermediación del individuo, son objetivos. Proclaman por eso no pueden apartar nada sobre el individuo: no pueden ser verdad. La verdad continúa en componente de interpretación que permite que cada individuo disponga de la suya propia. Son los datos aplicados a lo que hace una persona concreta, en un momento dado concreto, sobre un tema concreto lo que puede resultar revelador para otro individuo. Porque en la intimidad todos, los seres humanos, por analogía u oposición, nos entendemos.

PATROCINADO POR
E
endesa



Café a diario

La relación que mantengo con el café es dual: por una parte puedo llegar a consumirlo de modo compulsivo, casi como una adicción, por otra parte la reacción de mi organismo a los lacteos -no me gusta solo- me obliga a reducir o abandonar por completo su consumo durante días.

Durante el año 2012 contabilicé las tazas de café que tomaba a partir de las manchas que dejaban sobre hojas de papel.

Del mismo total de tazas existen dos tipologías: café cortado y café con leche, usando un modelo de taza de diferente diámetro para cada caso. Con el fin de otorgarle mayor exactitud a la contabilización, utilicé las mismas tazas todo el año.

Para la visualización utilicé una hoja de 25 cm x 50 cm para cada mes. Como debía transportar las hojas a todas partes era necesario doblarla. La dimensión de la hoja elegida permitía que, doblada cinco veces sobre su mitad y nuevamente desplegada, dibujara rectos y dos cuadrados de 8 cm cada uno, una forma ligeramente mayor que el diámetro de la taza de café con leche. A modo de calendario, cada cuadrado correspondía a un día, reservando el último para el nombre del mes y otras anotaciones.

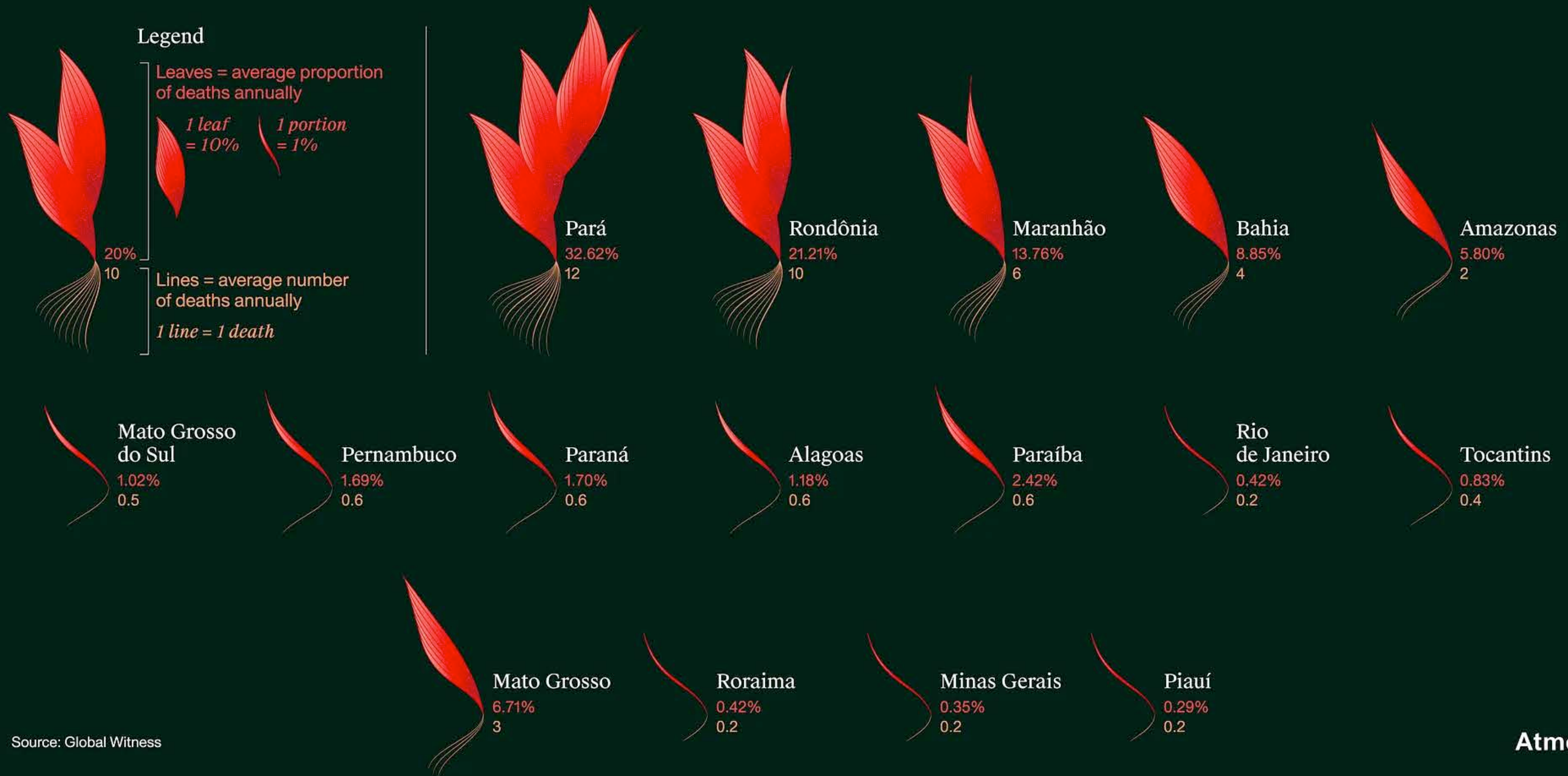


Giorgia Lupi

<http://giorgialupi.com/>

Patterns of Violence in Brazil

The average proportion and number of environmental defender deaths in Brazil from 2015 to 2019 by state

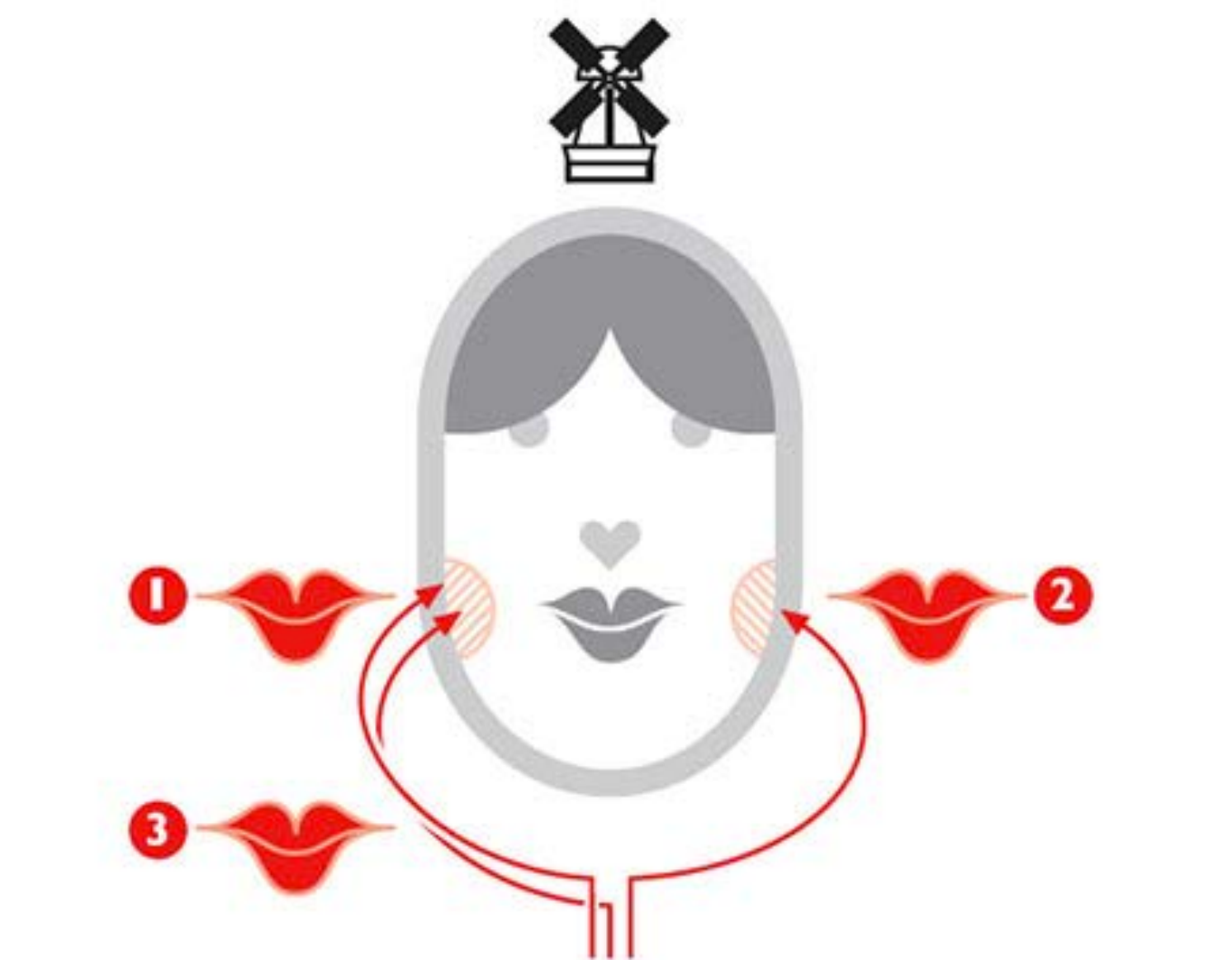
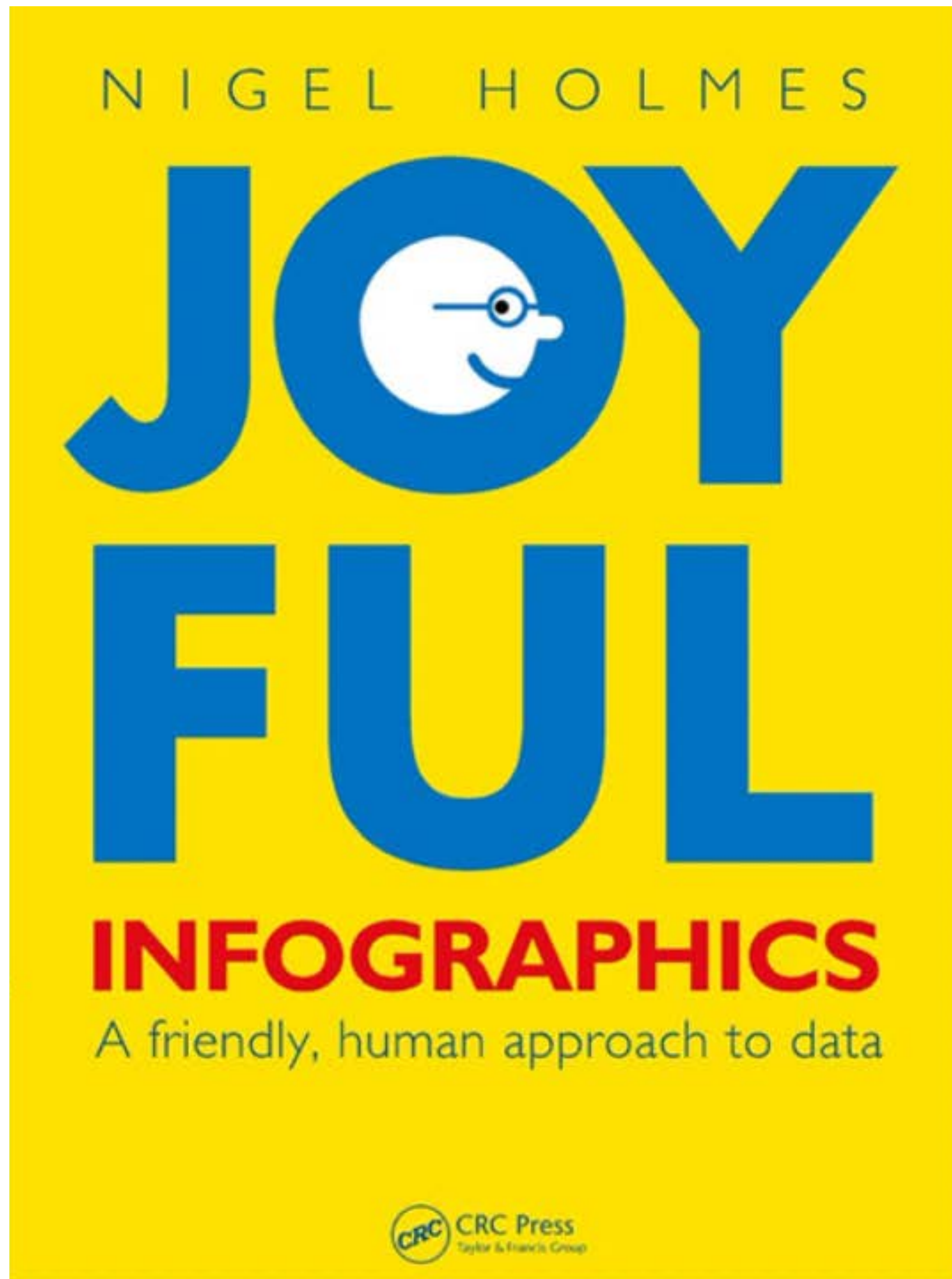


Federica Fragapane

<https://medium.com/@federicafragapane/alive-political-visual-words-65a5e00396e3>

— Trends that intrigue me these days —

Making readers smile (if appropriate)



Putting readers at the center of the visualization

Design: Vinicius Sueiro, Tiago Maranhão, Rodrigo Menegat, **Art direction:** Alberto Cairo
Google + Agência Lupa



<https://noepicentro.news/>

Design: Vinicius Sueiro, Tiago Maranhão, Rodrigo Menegat, **Art direction:** Alberto Cairo
Google + Agência Lupa



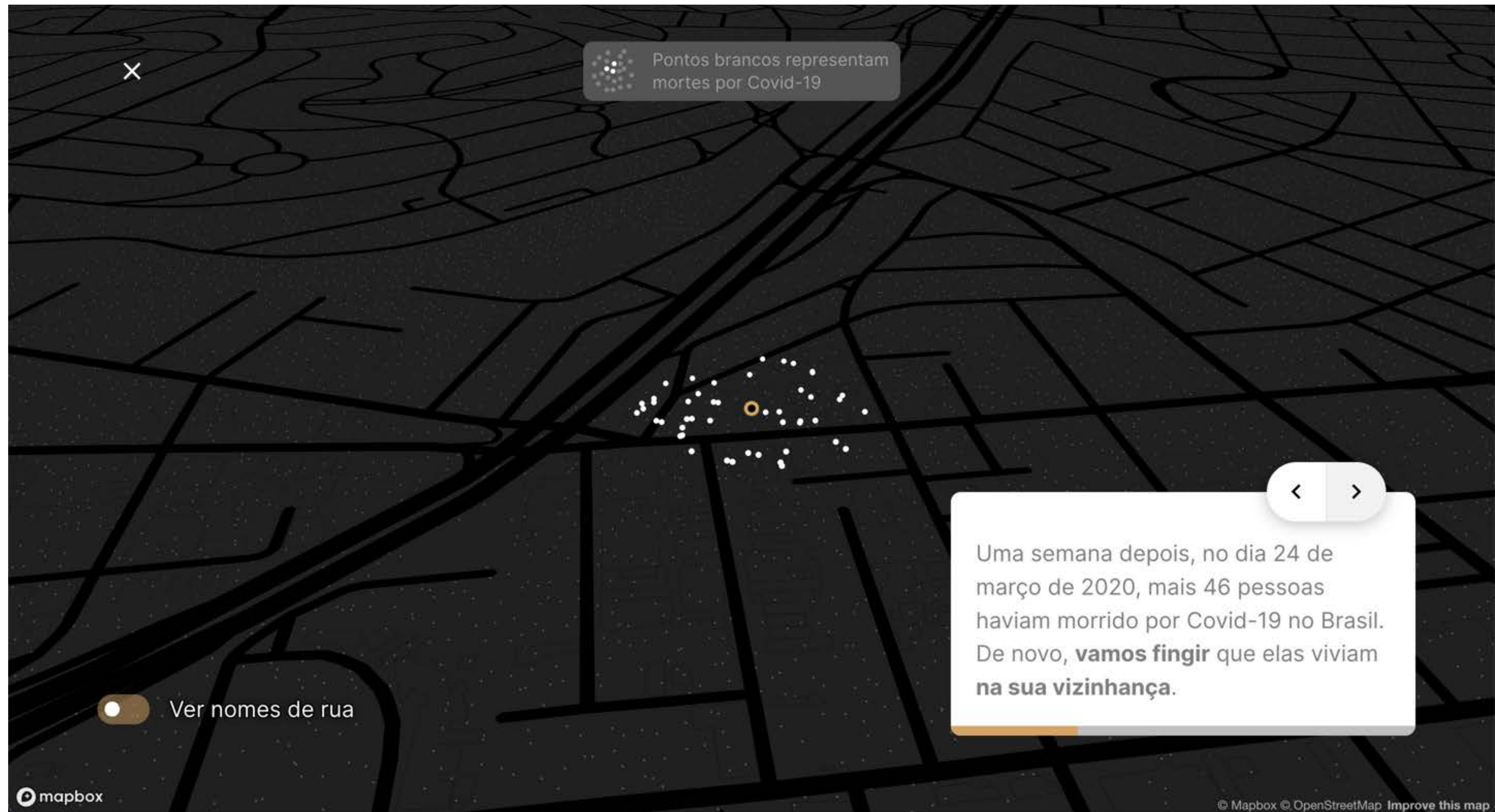
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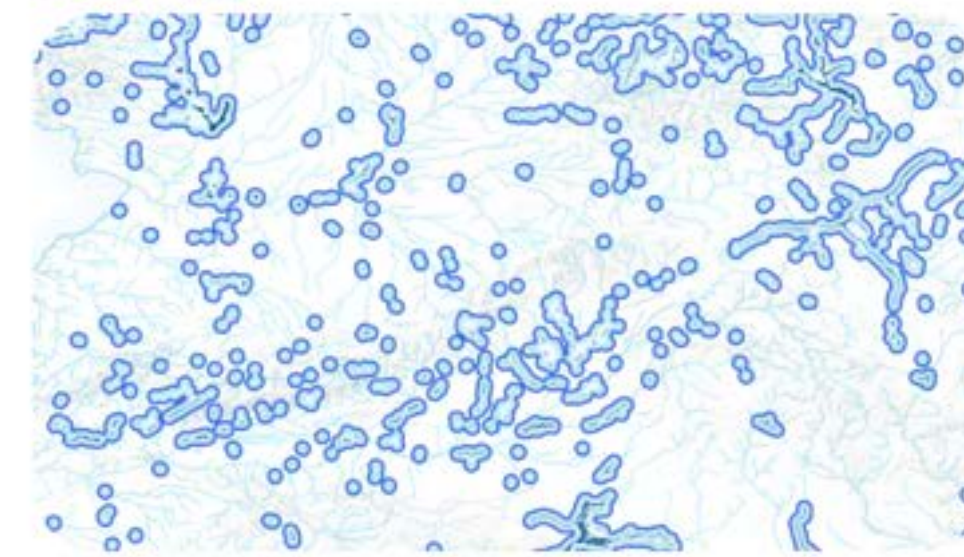
Combining narrative and pedagogy

Understanding the EU through high-value datasets

This series of data stories is intended to bring attention to the [European Union's \(EU\) high-value datasets](https://data.europa.eu/en/publications/datastories/high-value-datasets/index.html), and to demonstrate how they can be used to inform public discussions of relevant issues. Each story is paired with a visualisation note, an article that introduces readers to the language of data visualisation.

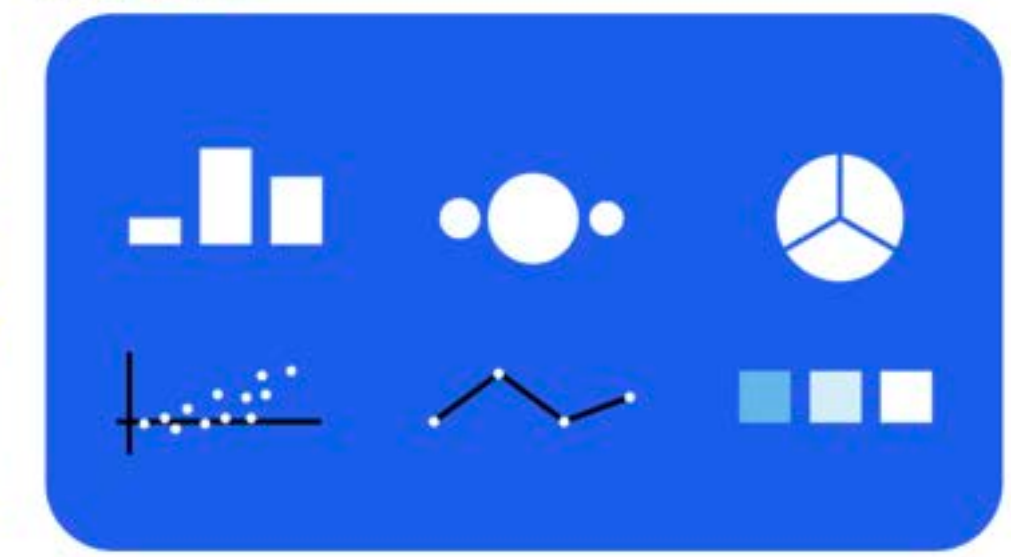
Story #1

STORY #1



What Water Can Take from Us

NOTES #1



The Power of Data Visualisation

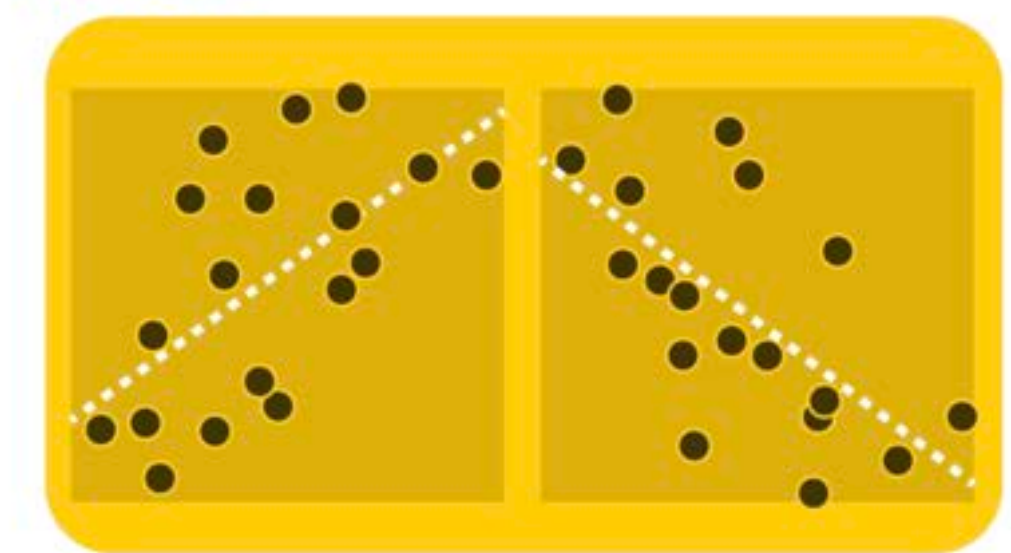
Story #2

STORY #2



Everyone's Busy - But not Equally

NOTES #2

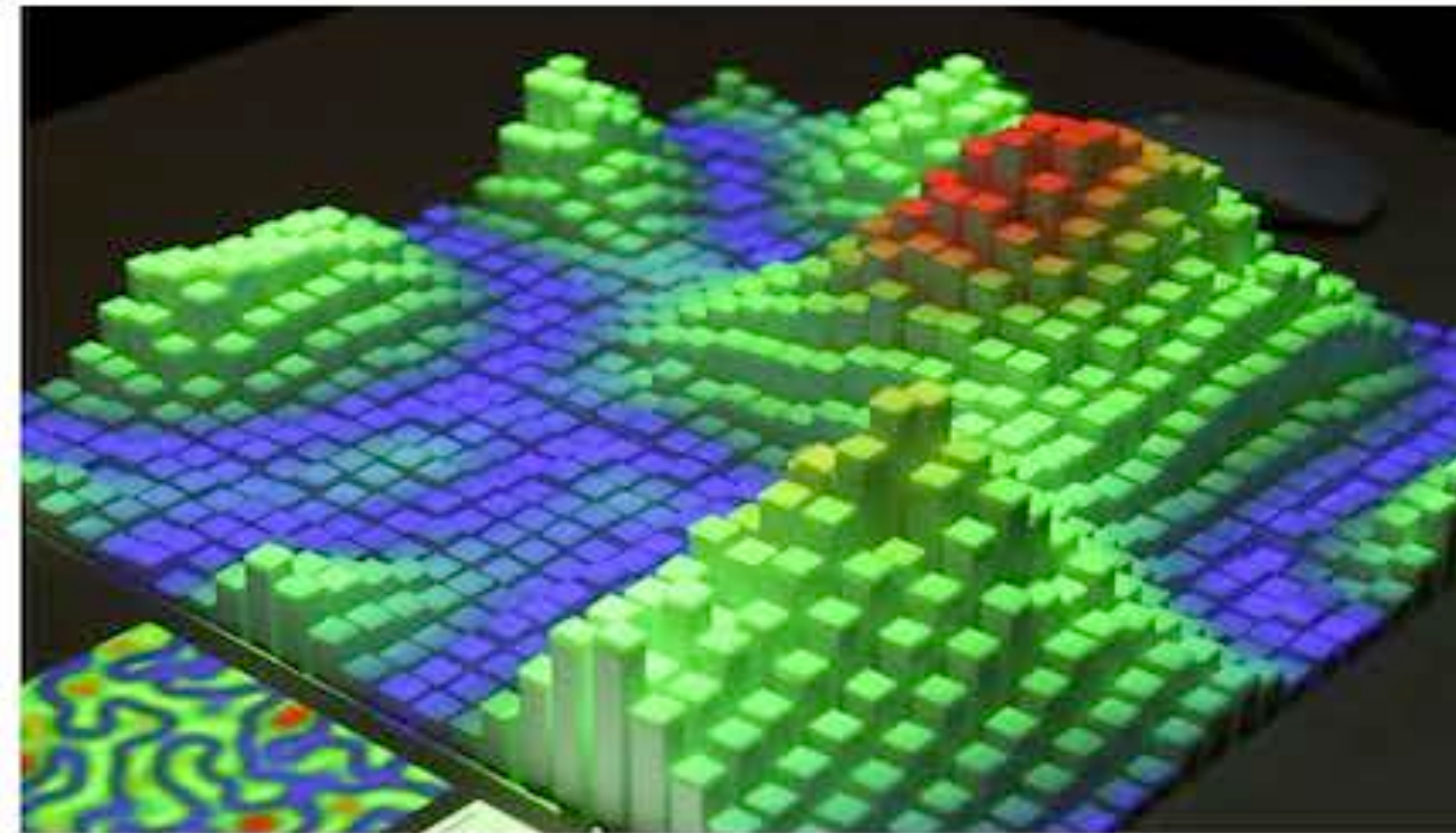


Association, Aggregation and Causation

<https://data.europa.eu/en/publications/datastories/high-value-datasets/index.html>

Visualization is just one type of Data sensification

Opportunities and Challenges for Data Physicalization

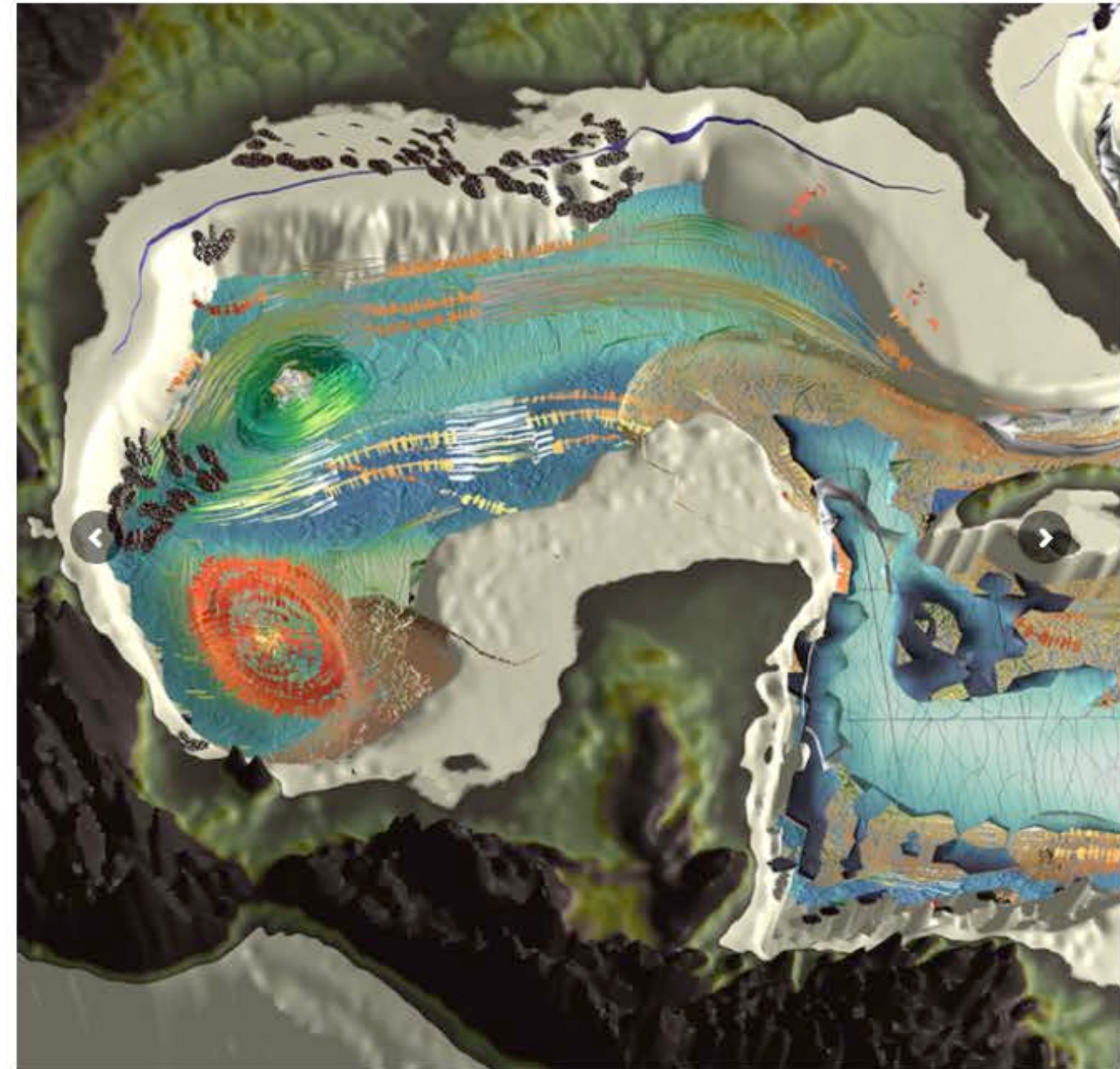


Data physicalization <http://yvonnejansen.me/dataphys>

Introduction to the field <https://id.iit.edu/news/form-follows-data/>

Sculpting Visualization

Towards a Practice and Theory of 3D Scientific Visualizations
using Physical Objects and Augmented Reality



<https://www.sculpting-vis.org/>

Data Sonification Archive

This curated collection is part of a broader research endeavor in which data, sonification and design converge to explore the potential of sound in complementing other modes of representation and broadening the publics of data. With visualization still being one of the prominent forms of data transformation, we believe that sound can both enrich the experience of data and build new publics.



COVID-19 data sonification

Chelidon Frame | 2020

Epidemiology Model Sonification Public Engagement



Care Tunes for Families

Chen Chou | 2020

Healthcare Parameter Mapping Public Engagement



The THC Code

Deraoul ft. GenM | 2020

Biology Parameter Mapping Art



DNA Sonification - Sex determining region of the Y (SRY) Human Orangutan

Edward Martin | 2020

Biology Parameter Mapping Public Engagement



Every UK Covid 19 Death by Day - from March 5th 2020 to June 23rd 2020

Jamie Pereira | 2020

Epidemiology Parameter Mapping

Public Engagement



Noisy City. Audible Data Visualization in Brussels

Jetpack | 2020

Environment Parameter Mapping Public Engagement



Unemployment rate

Jordan Wirfs-Brock | 2020

Economy Parameter Mapping Public Engagement



Stock Market Data

Jordan Wirfs-Brock | 2020

Finance Parameter Mapping Public Engagement

Data sonification https://twitter.com/NU_CfD/status/1346455054568595463

Resources

 1_The_Basics

 2_History

 3_Chart_Taxonomies

 4_Perception_and_Accessibility

 5_Visual_Design

 6_Annotations_And_Storytelling

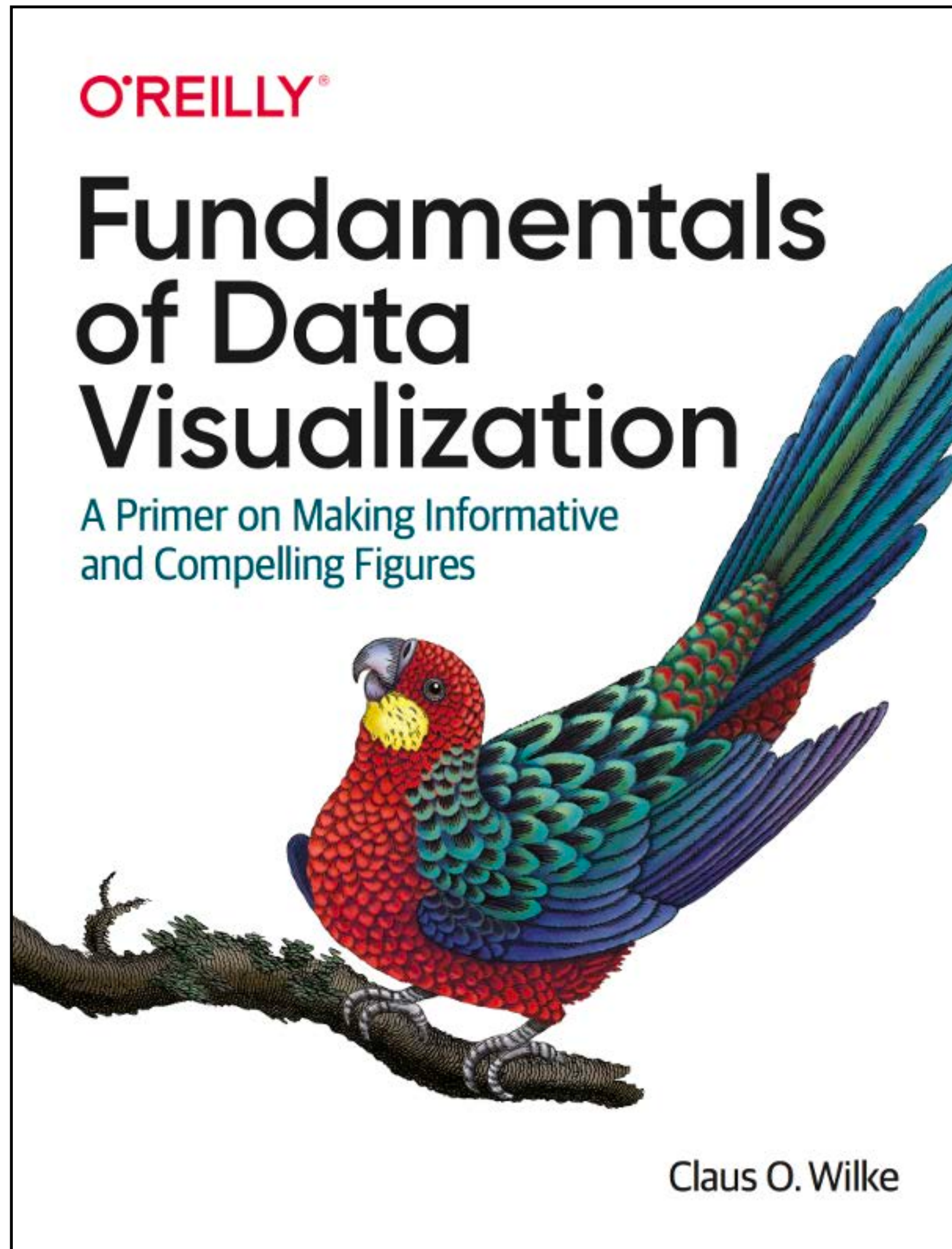
 7_Uncertainty

 8_Maps

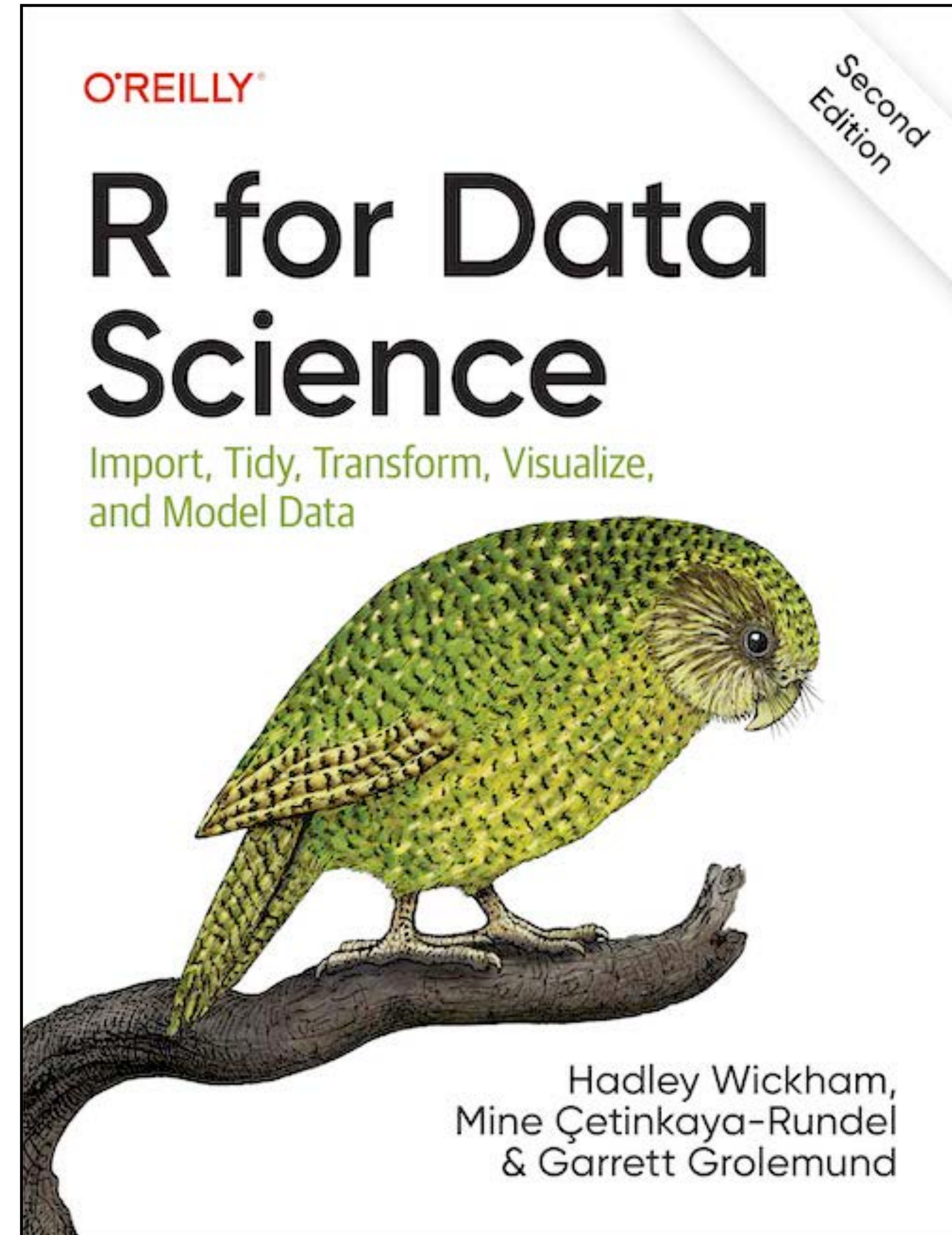
Extra readings

<https://tinyurl.com/mr2st327>

Books freely available online

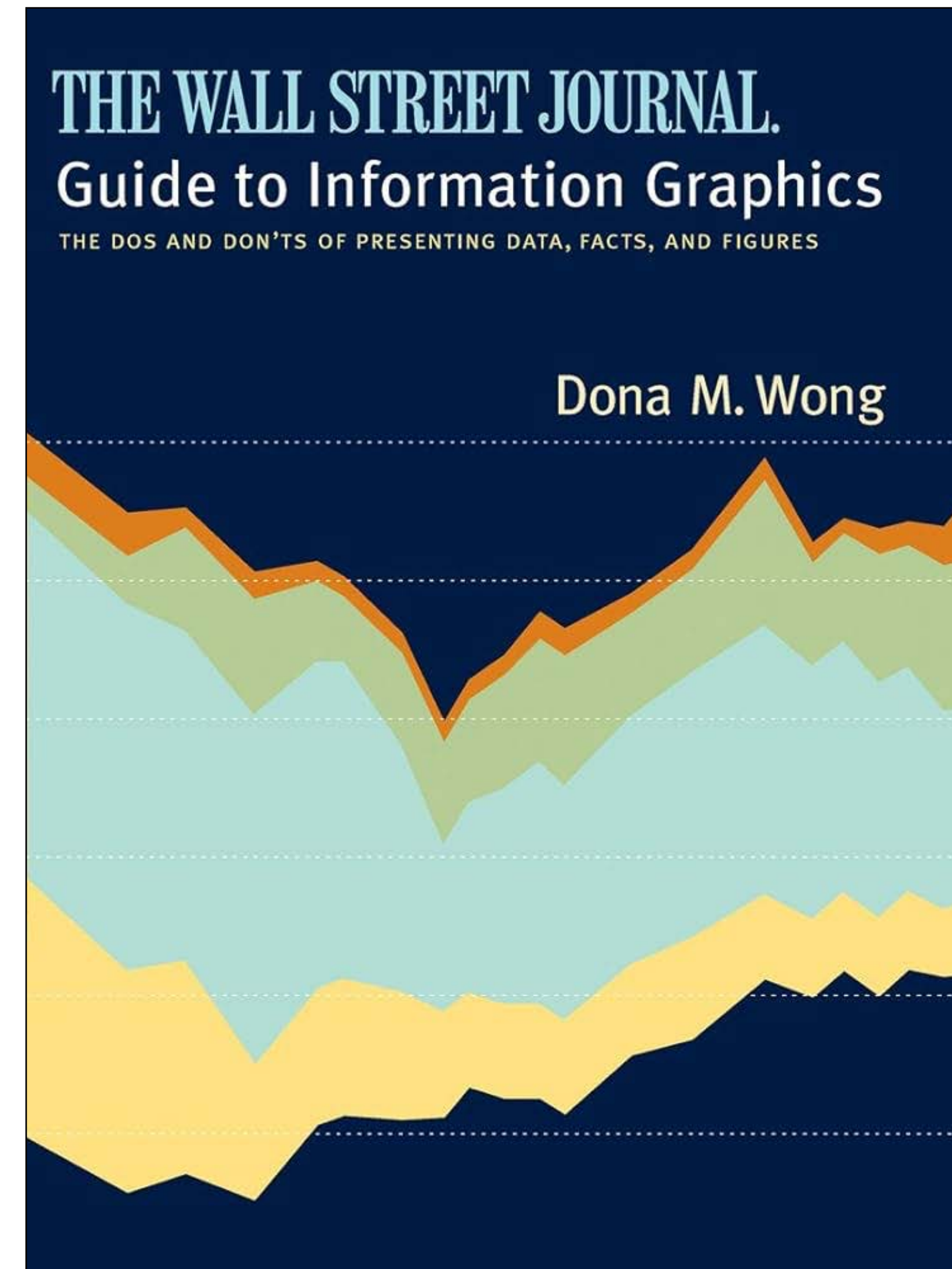
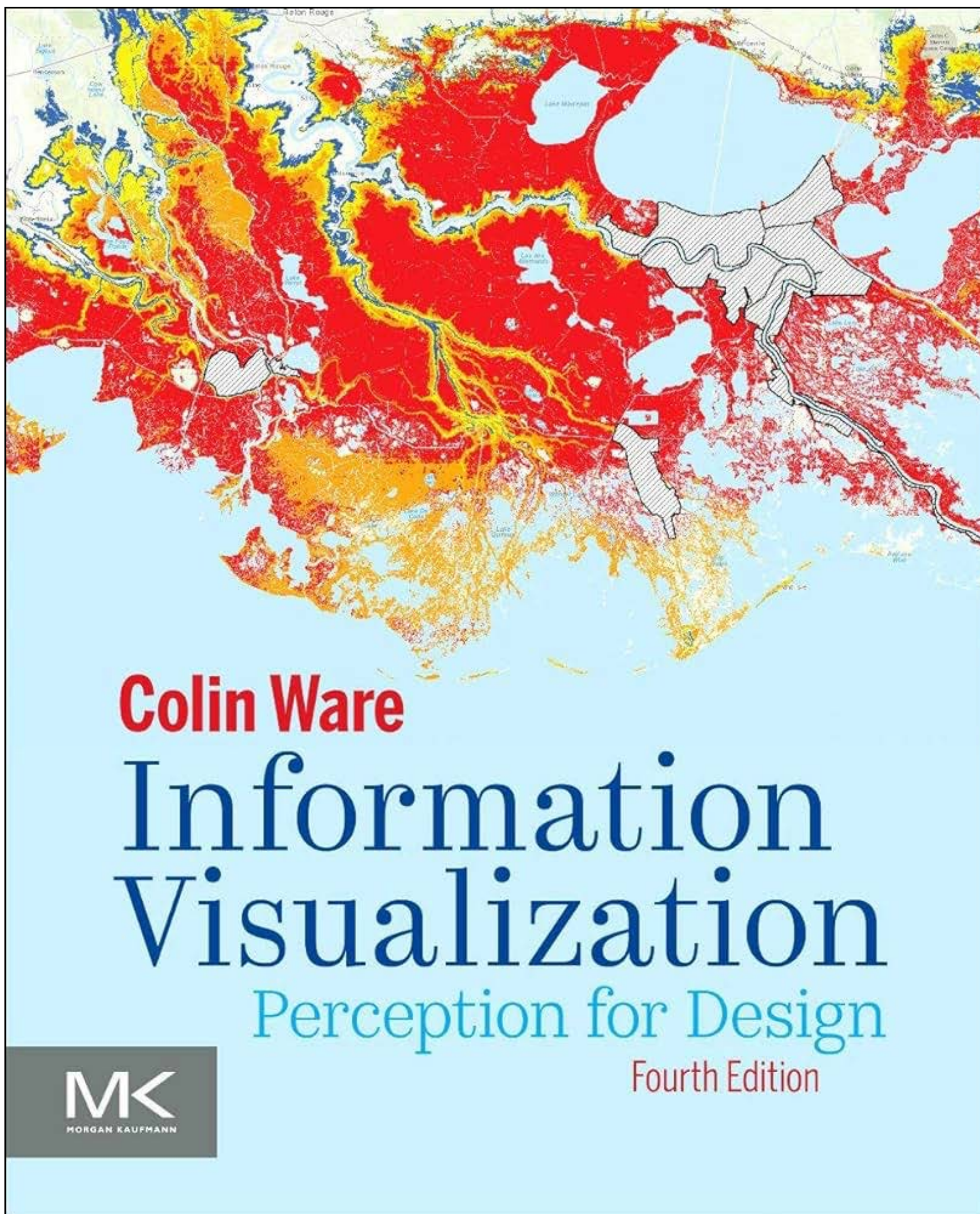


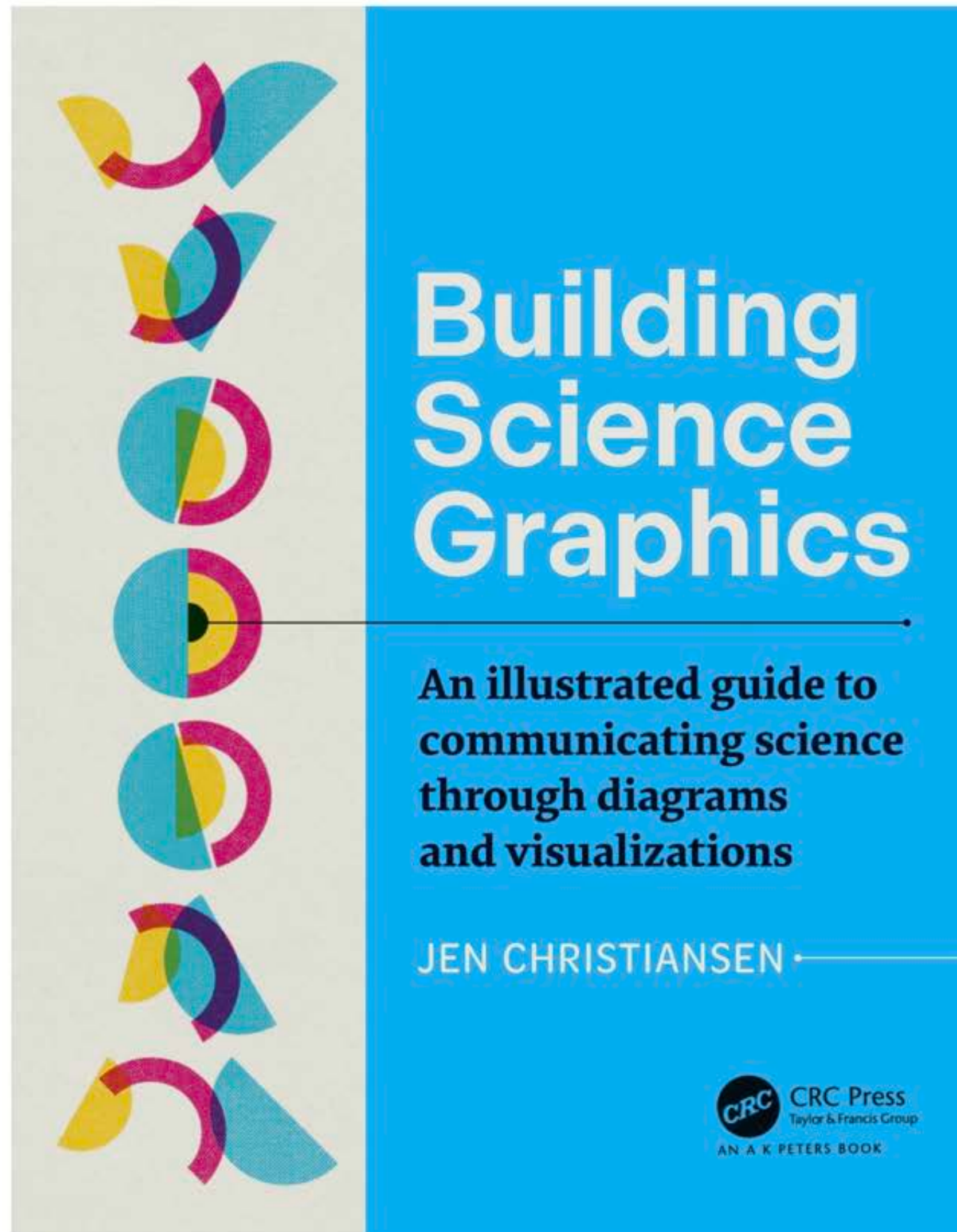
<https://serialmentor.com/dataviz/>



<https://r4ds.hadley.nz/>

Perception, cognition, and visual design



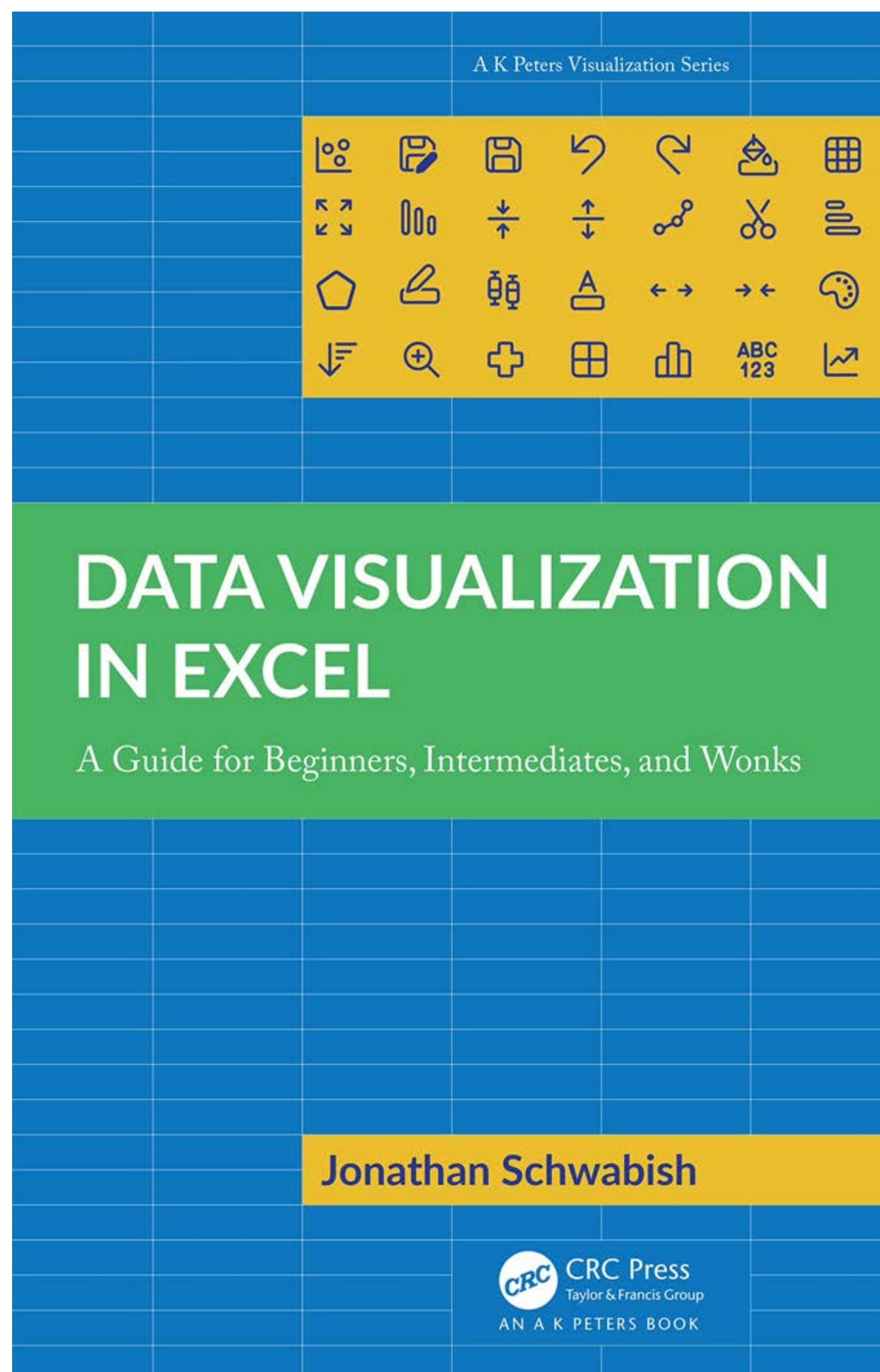


Building Science Graphics: An illustrated guide to communicating science through diagrams and visualizations...

...is a practical guide for anyone—regardless of previous design experience and preferred drawing tools—interested in creating scientific illustrated explanatory diagrams. Starting with a clear introduction to the concept of information graphics and their role in contemporary science communication, it then outlines a process for creating graphics using evidence-based design strategies. The heart of the book is composed of two step-by-step graphical worksheets, designed to help jump-start any new project. This is both a textbook and a practical reference for anyone that needs to convey scientific information in an illustrated form for articles, poster presentations, slide shows, press releases, blog posts, social media posts, and beyond.

Published by CRC Press / Routledge (AK Peters Visualization series)

<https://www.buildingsciencegraphics.com/>



Visualization design with Excel

Data Visualization in Excel, by John Schwabish

And these websites:

<https://stephanieevergreen.com/how-to/>

<https://peltiertech.com/blog/>

Data Narrative and Design

Thank you!

Alberto Cairo

OpenVisualizationAcademy.com