



Interactive Visualization

Data Visualization: Foundation

Bachelor of Arts in Interaction Design
Zürich University of the Arts
November 8, 2017

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Benjamin Wiederkehr

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Editor of Datavisualization.ch
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Organizer of Hacks/Hackers Zürich
Participant of Opendata.ch

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Interactive Things

Design Studio

Digital Product Design
Established 2010
Five Equal Partners
Thirteen Employees

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044 / 267 66 44
hello@interactivethings.com
interactivethings.com



Module 1

Foundation

- 1.1 Purpose
- 1.2 History
- 1.3 State of the Art
- 1.4 Future Frontiers



1.1

Purpose

Why do we visualise?



“

Making the Invisible Visible

— Hillman Curtis



Here's Anscombe's Quartet — why should we visualise this?

Dataset A

x	y
10	8.04
8	6.95
13	7.58
9	8.81
11	8.33
14	9.96
6	7.24
4	4.26
12	10.84
7	4.82
5	5.68

Dataset B

x	y
10	9.14
8	8.14
13	8.74
9	8.77
11	9.26
14	8.1
6	6.13
4	3.1
12	9.13
7	7.26
5	4.74

Dataset C

x	y
10	7.46
8	6.77
13	12.74
9	7.11
11	7.81
14	8.84
6	6.08
4	5.39
12	8.15
7	6.42
5	5.73

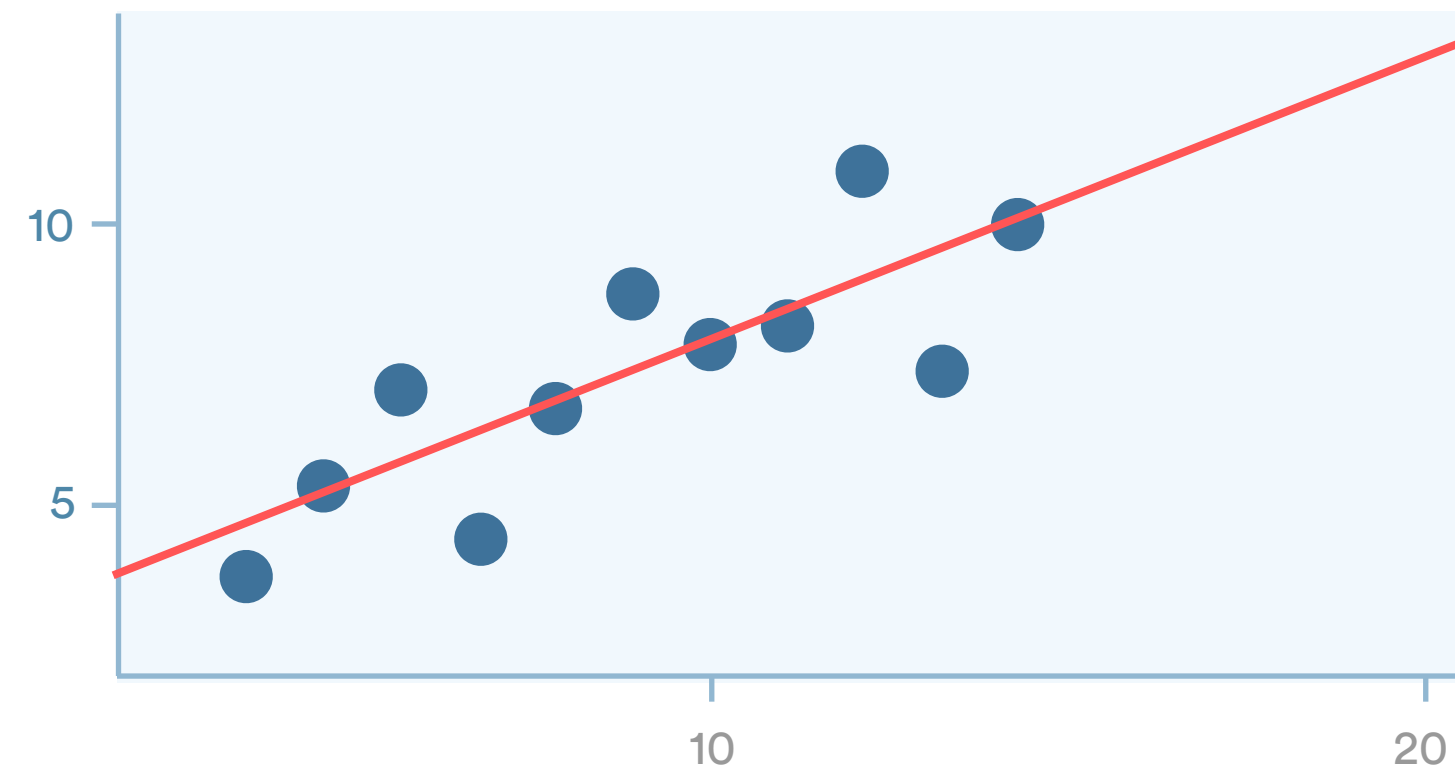
Dataset D

x	y
8	6.58
8	5.76
8	7.71
8	8.84
8	8.47
8	7.04
8	5.25
19	12.5
8	5.56
8	7.91
8	6.89

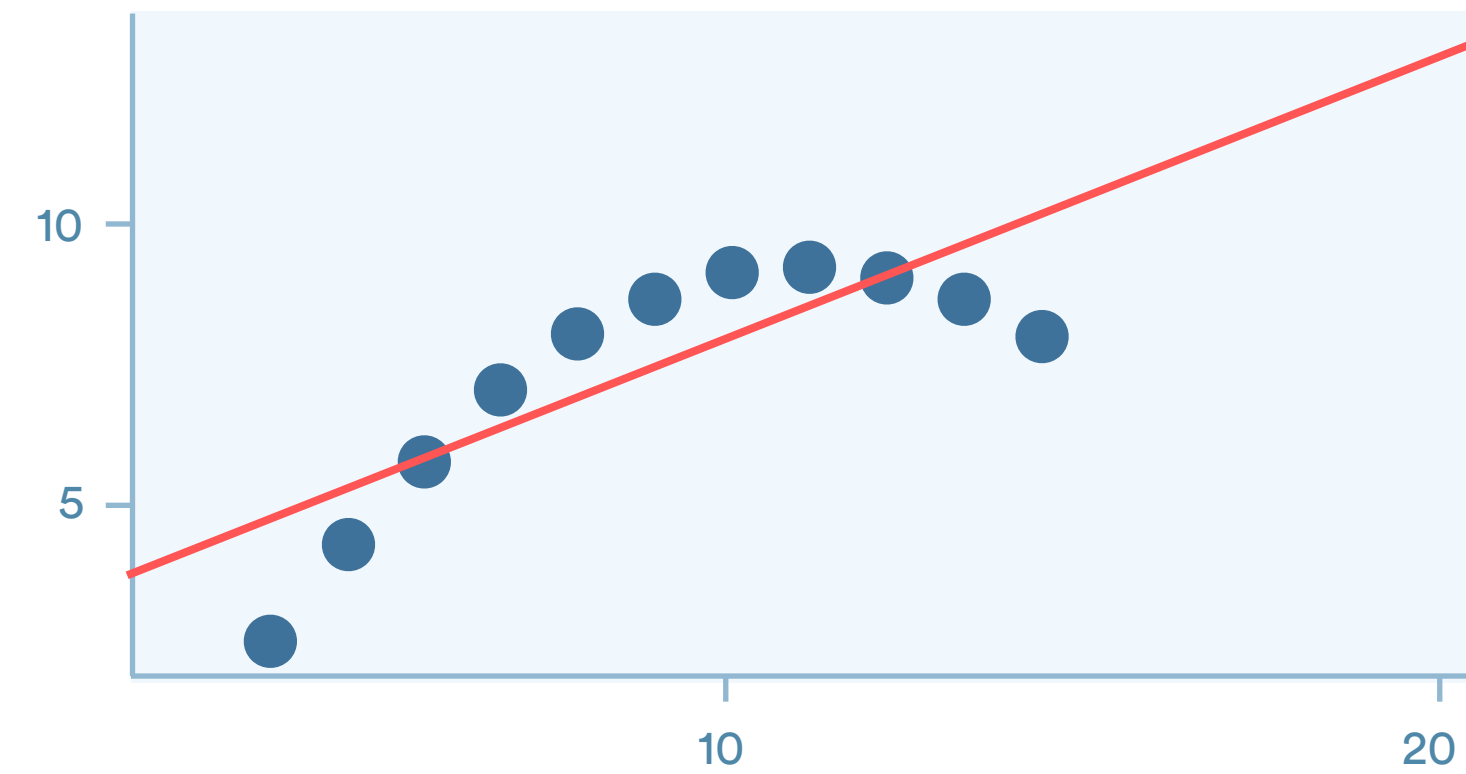


We visualize it to see what's in the data

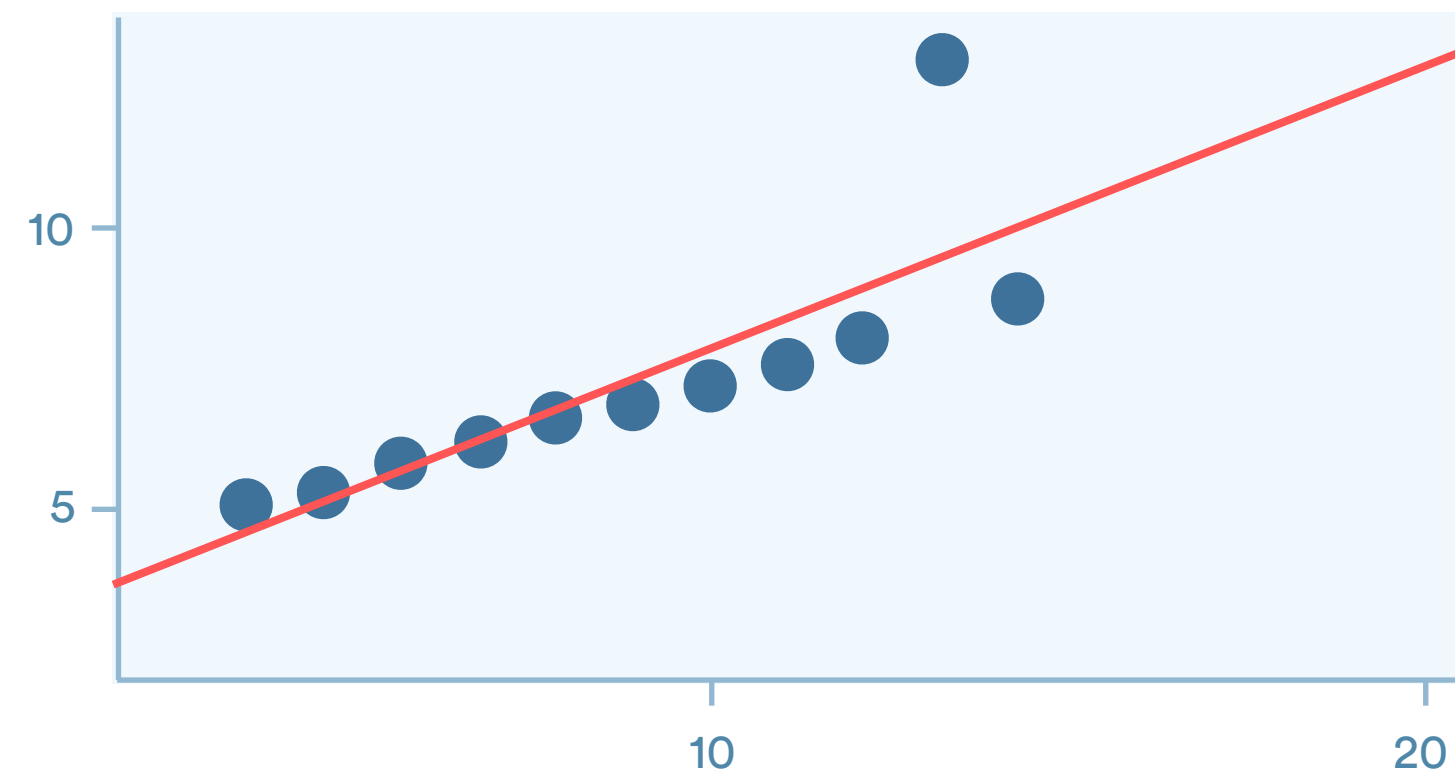
Dataset A



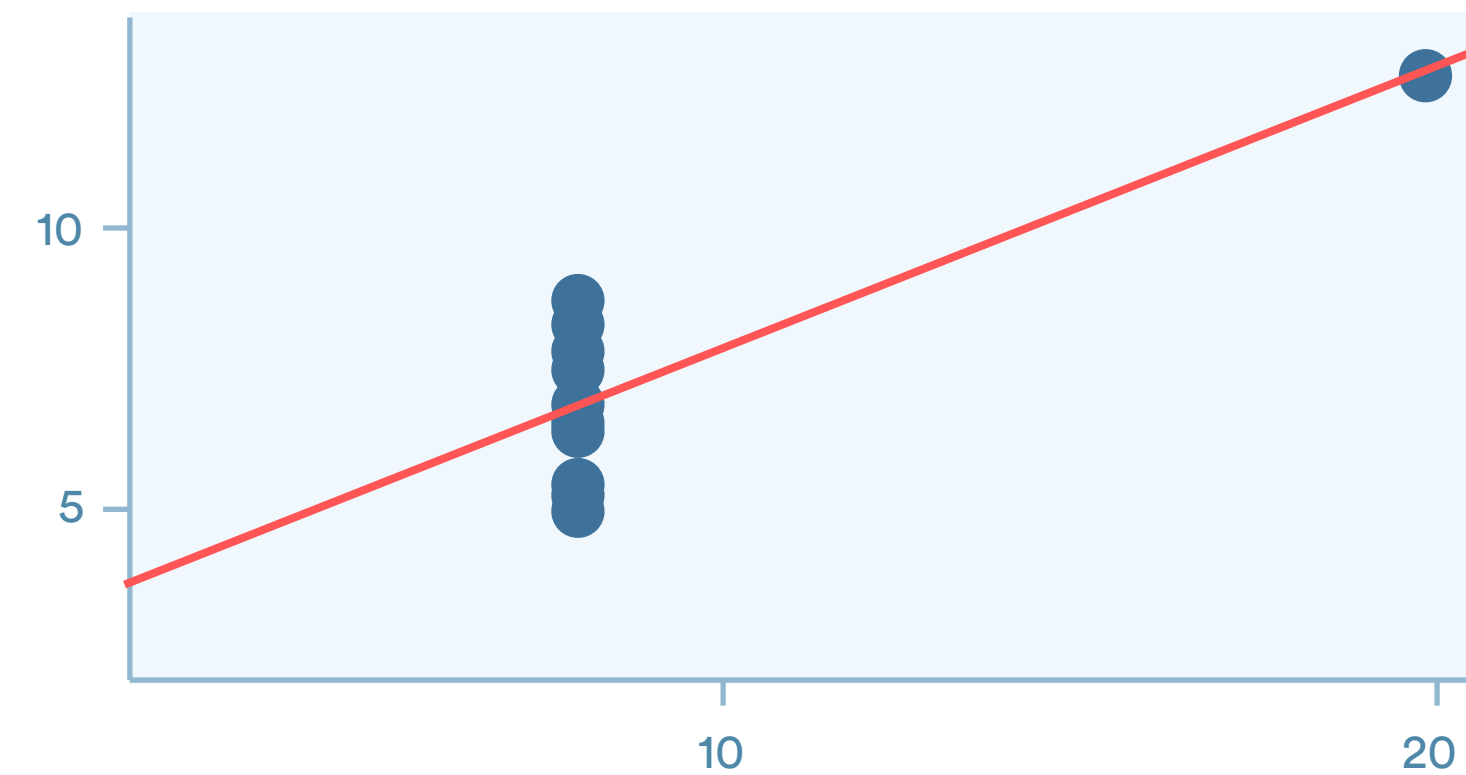
Dataset B



Dataset C



Dataset D





The three jobs of visualization



Exploration

Searching for significant facts.

Discovery



Evaluation

Examining and making sense of data.

Understanding



Explanation

Conveying information to others.

Informed Actions



The three jobs of visualization



Exploration

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Explanation

Conveying information to others.

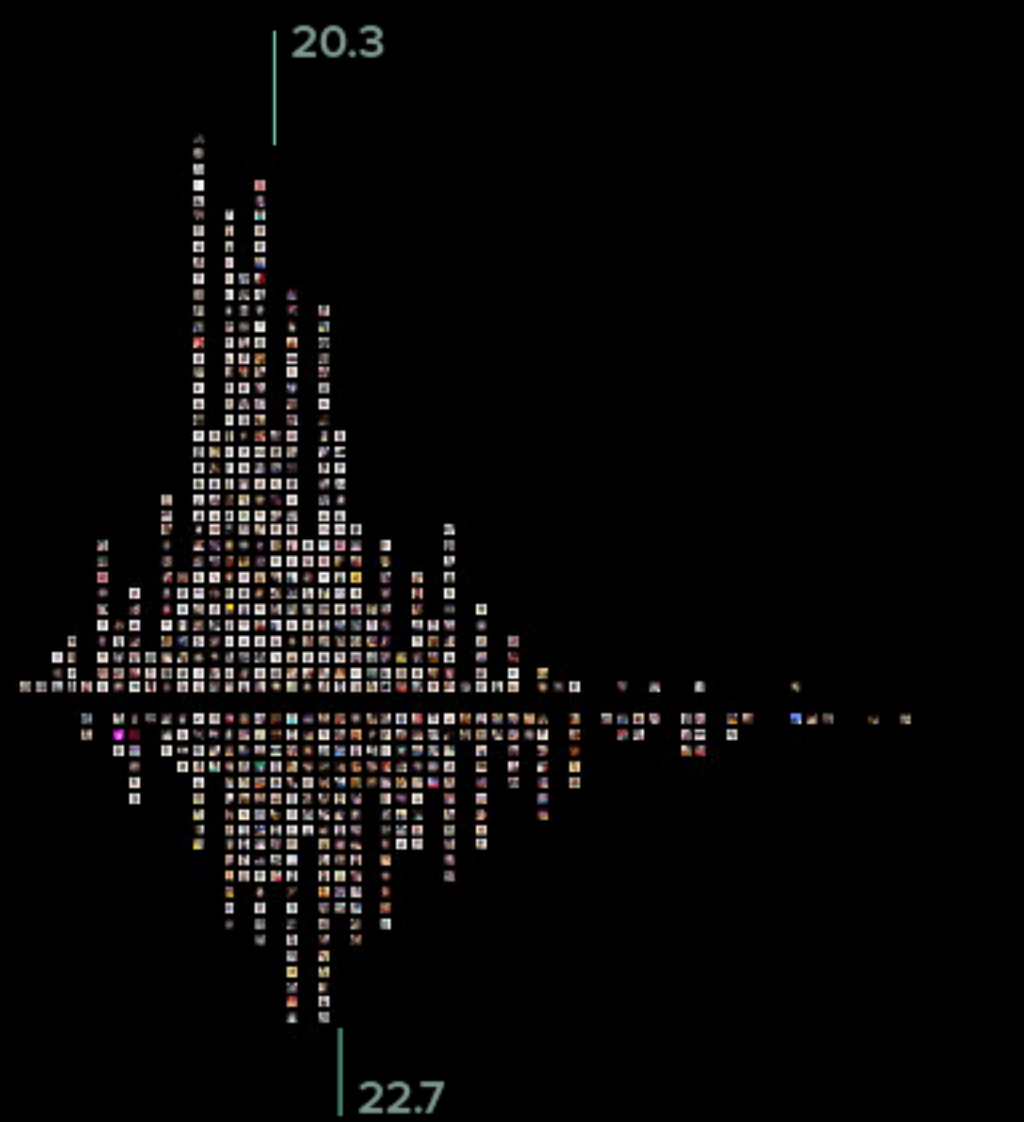
Informed Actions

BANGKOK



55.2%

42.2%

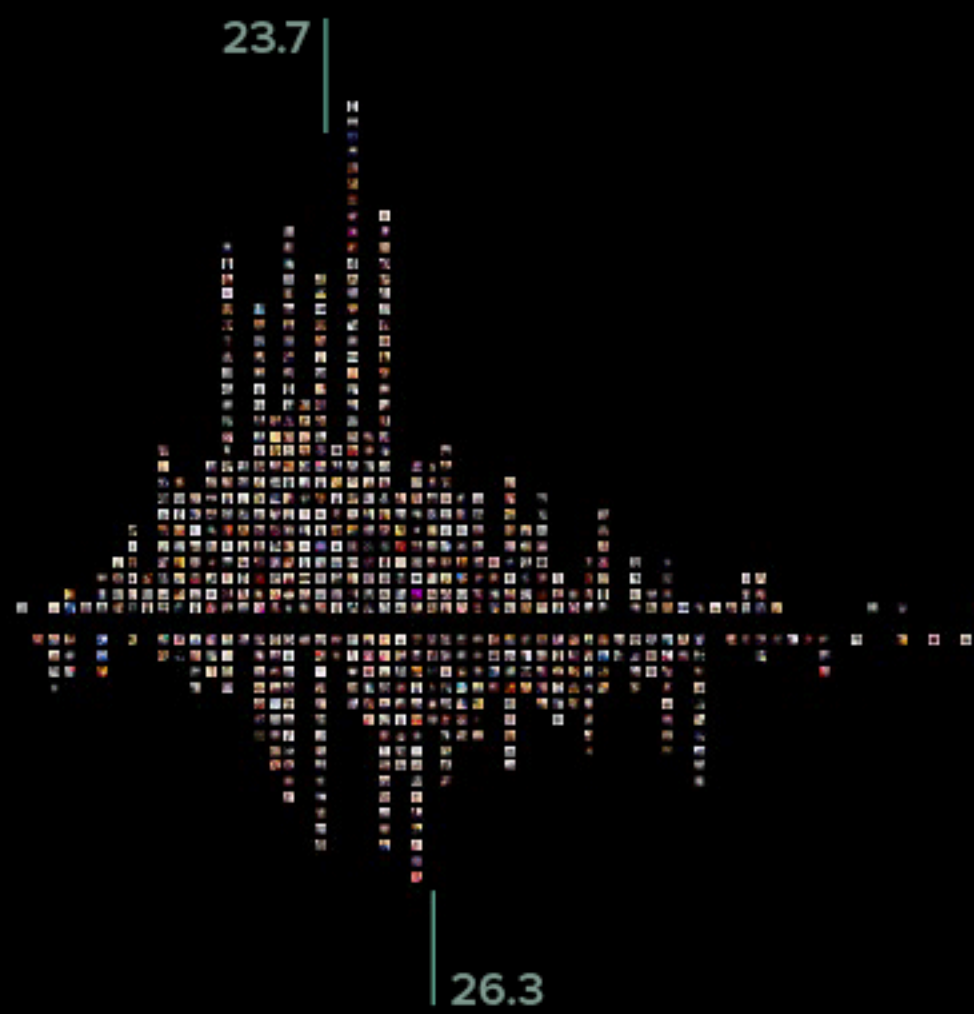


EST. AGE 20 30

BERLIN

59.4%

38.5%



MOSCOW

82.0%

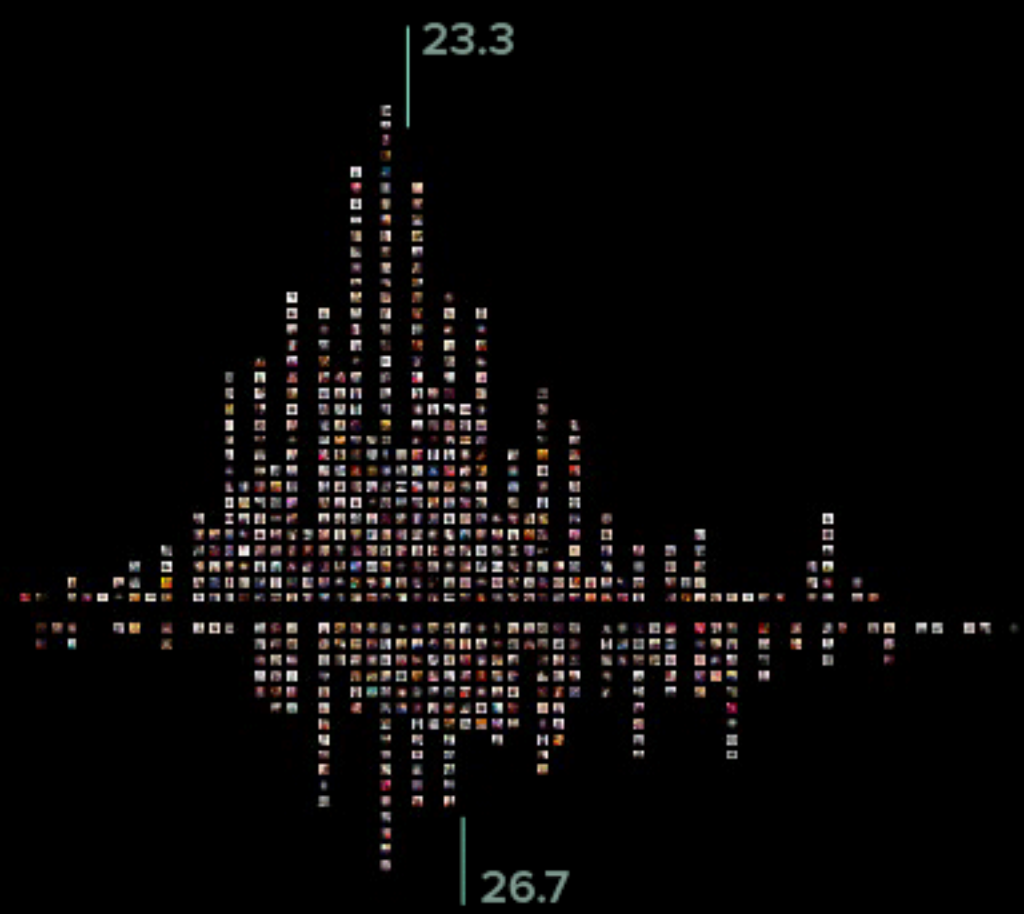
17.3%



NEW YORK

61.6%

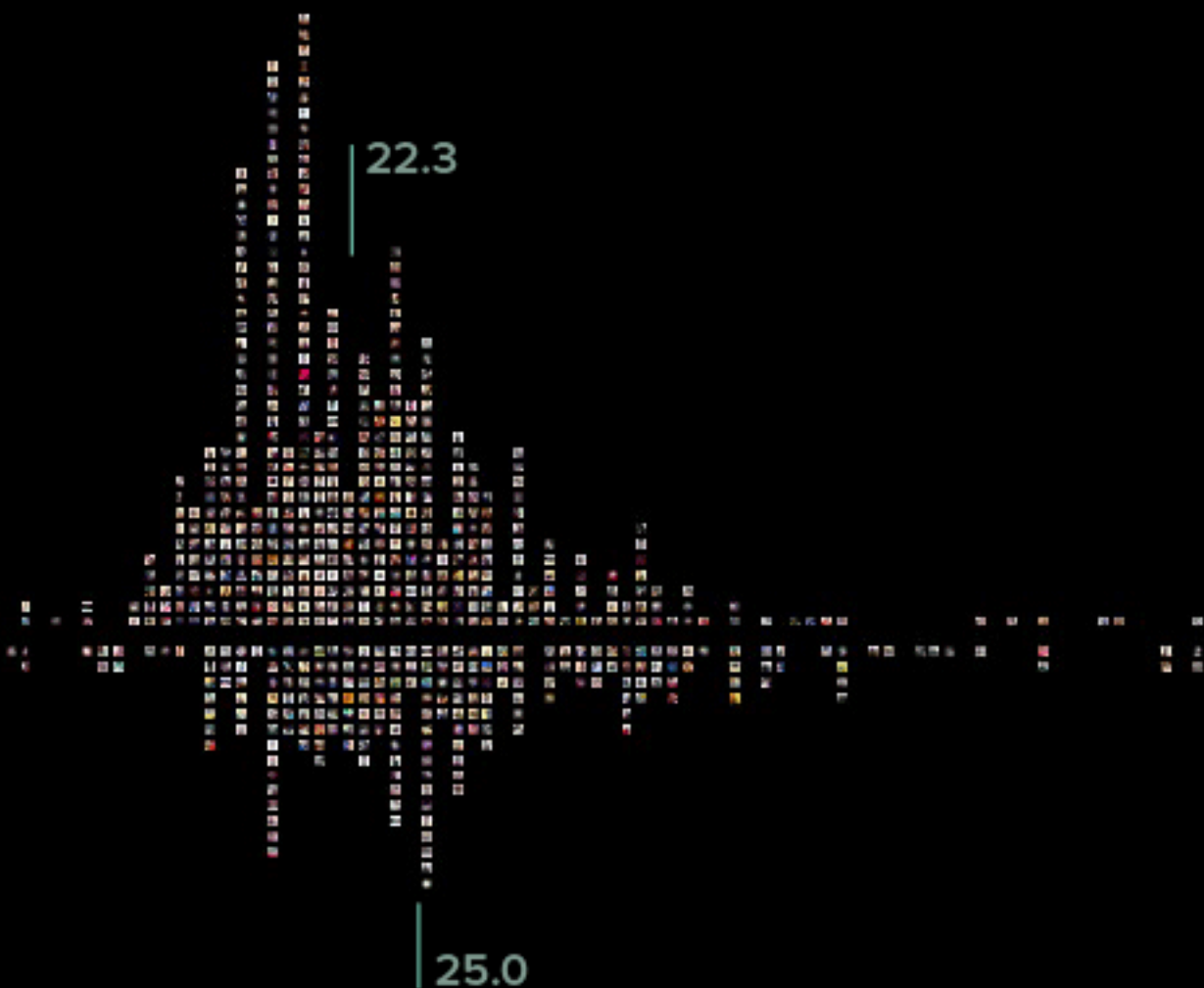
36.7%



SAO PAULO

65.4%

34.0%



SELFIE PEOPLE

City selfie demographics of selfie images based on automatic face analysis and mechanical turk judgements

More information at:

HTTP://**SELFIECITY.NET**



The three jobs of visualization



Exploration

Searching for significant facts.

Discovery



Evaluation

Examining and making sense of data.

Understanding

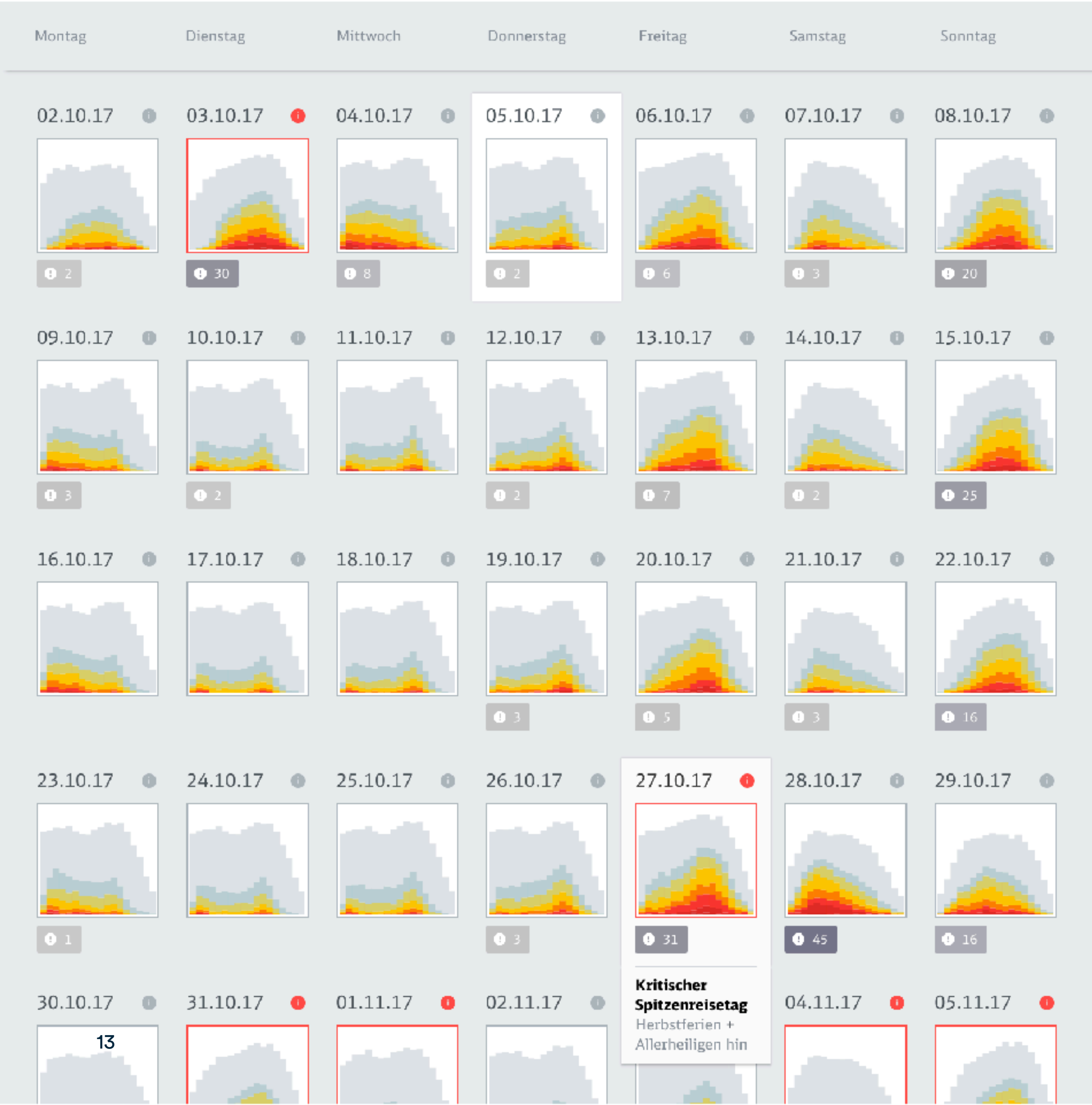


Explanation

Conveying information to others.

Informed Actions

Vorausschau



Tag 05.10.17

FILTER (1)

x

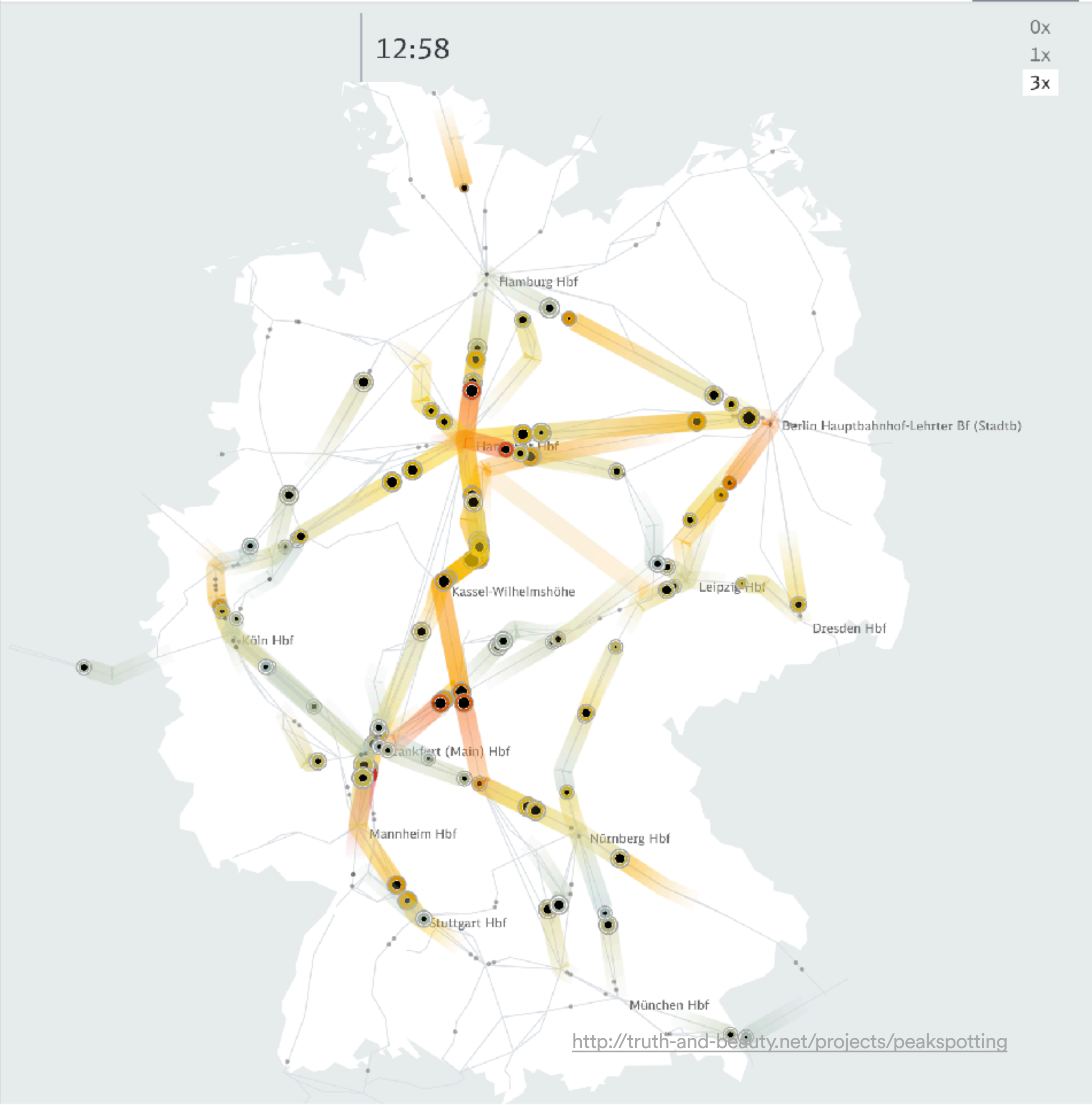
LISTE

KORRIDORE

ZEIT-WEG

STÜNDLICH

KARTE





The three jobs of visualization



Exploration

Searching for significant facts.

Discovery



Evaluation

Examining and making sense of data.

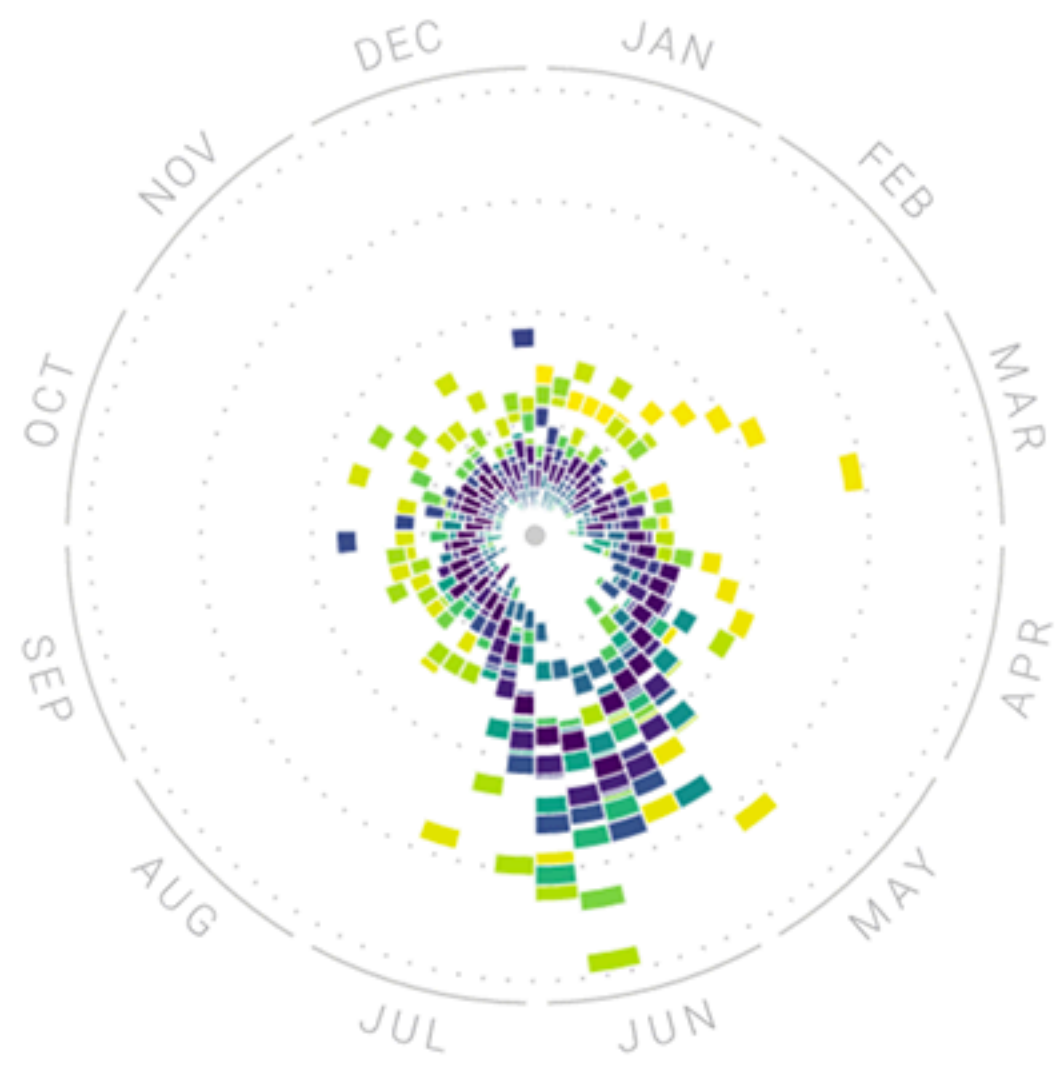
Understanding



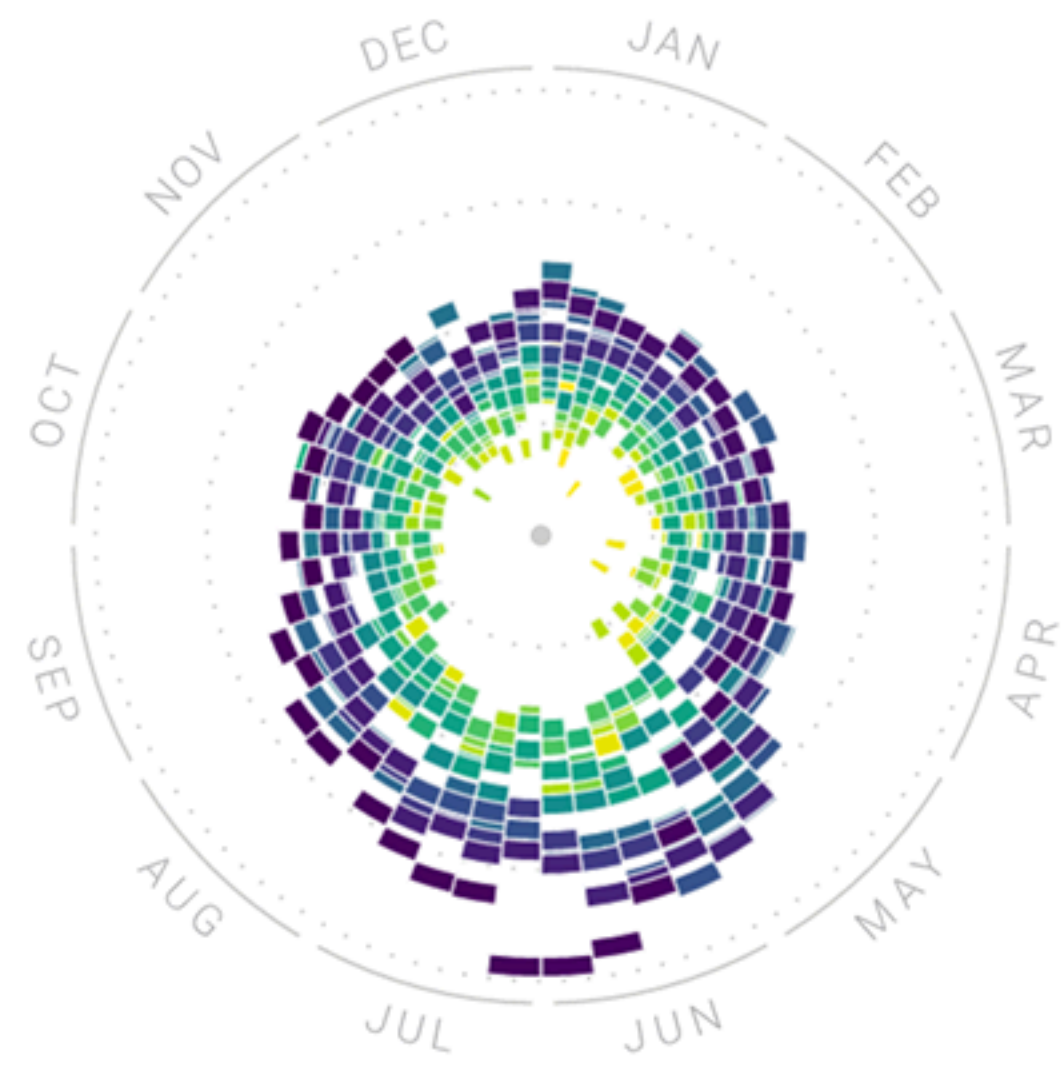
Explanation

Conveying information to others.

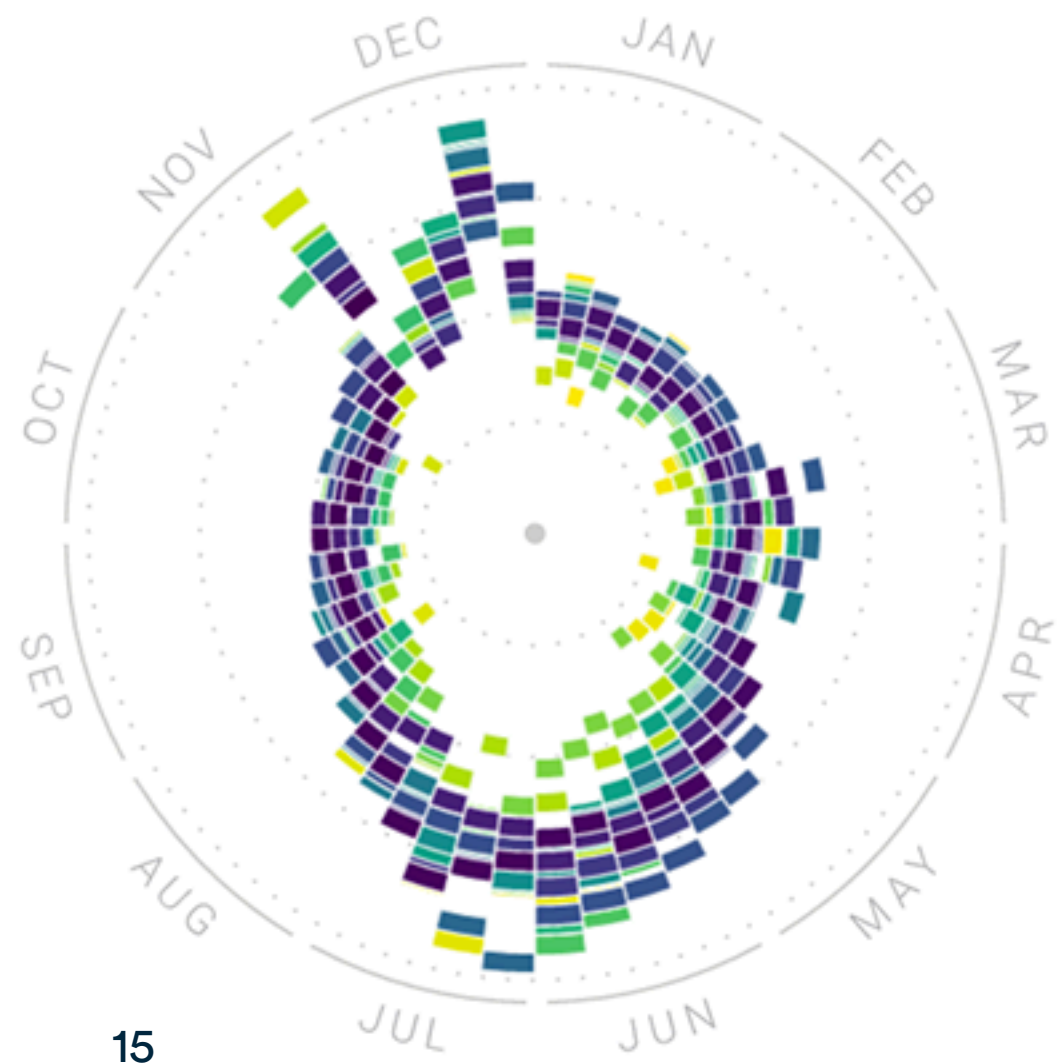
Informed Actions



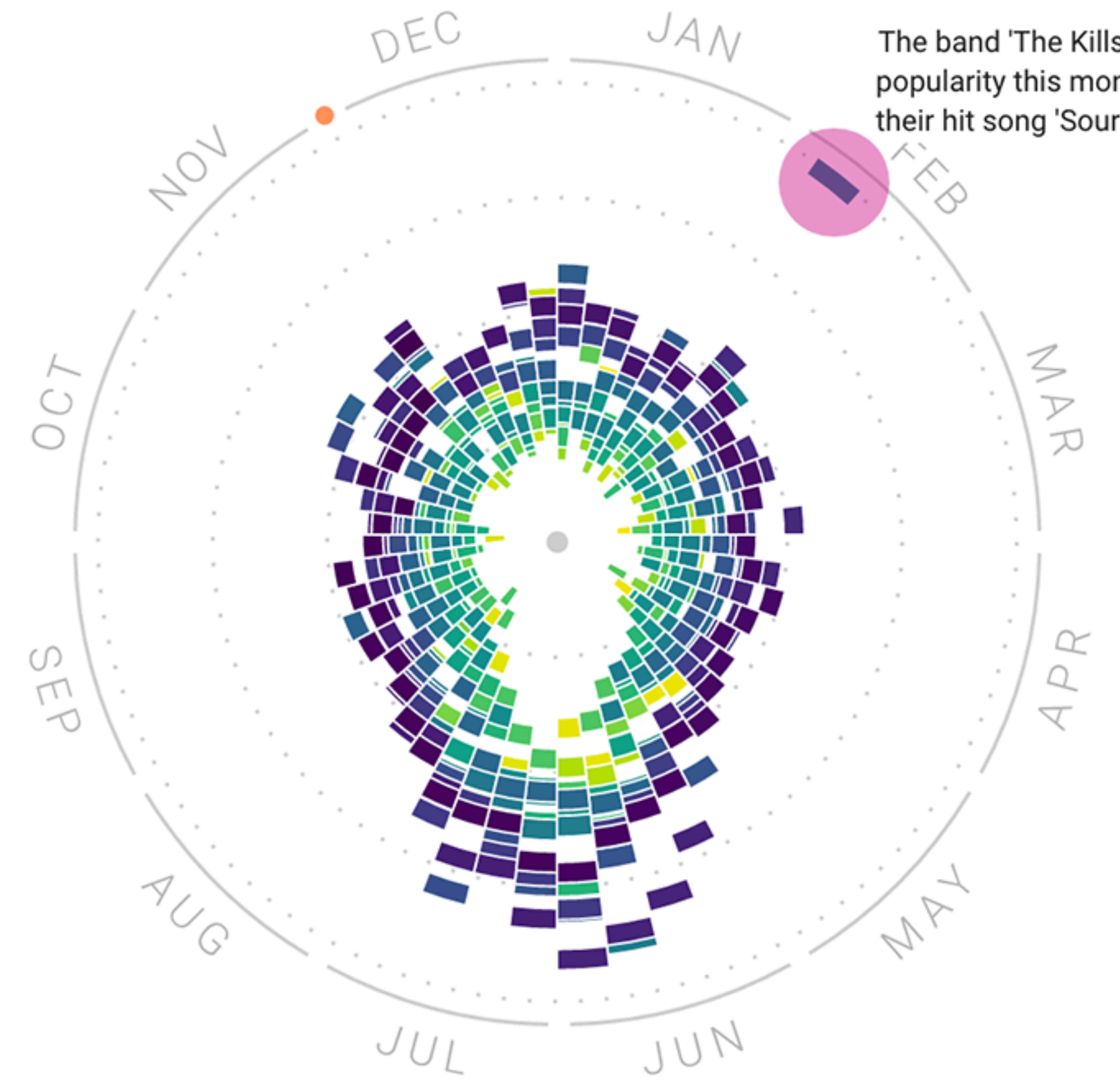
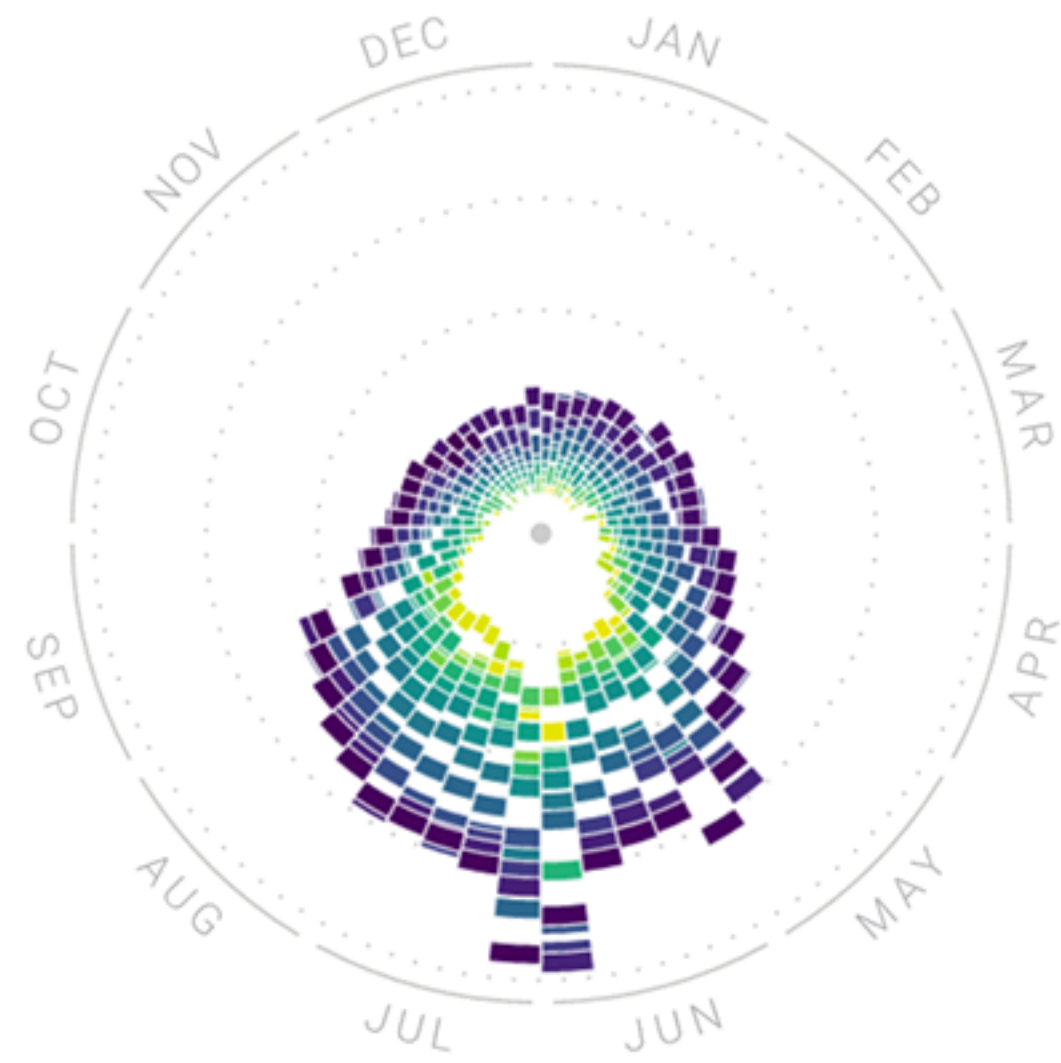
MULBERRY



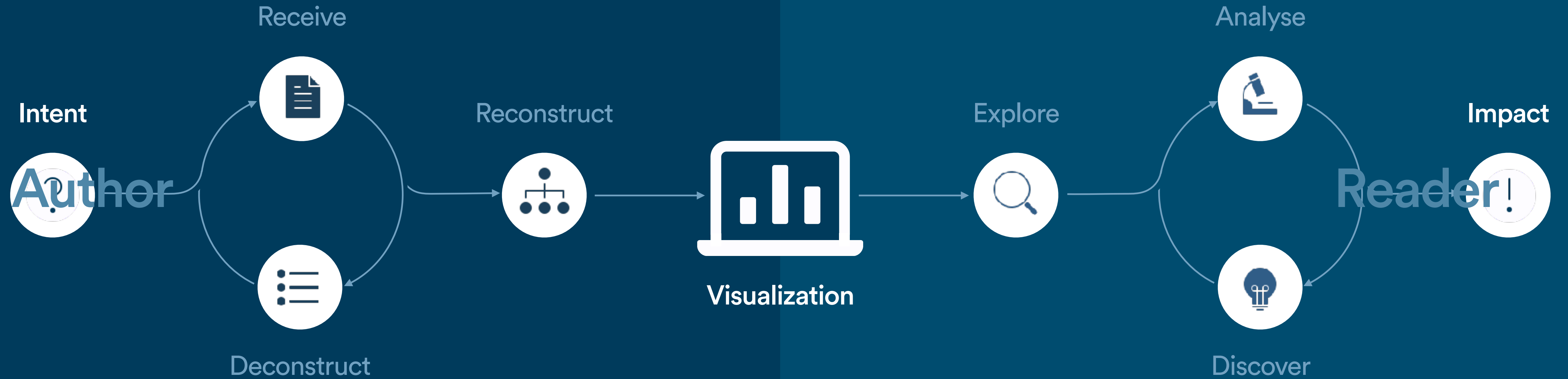
LYCHEE



SOUR CHERRY



The band 'The Kills' peaks in popularity this month, along with their hit song 'Sour Cherry.'

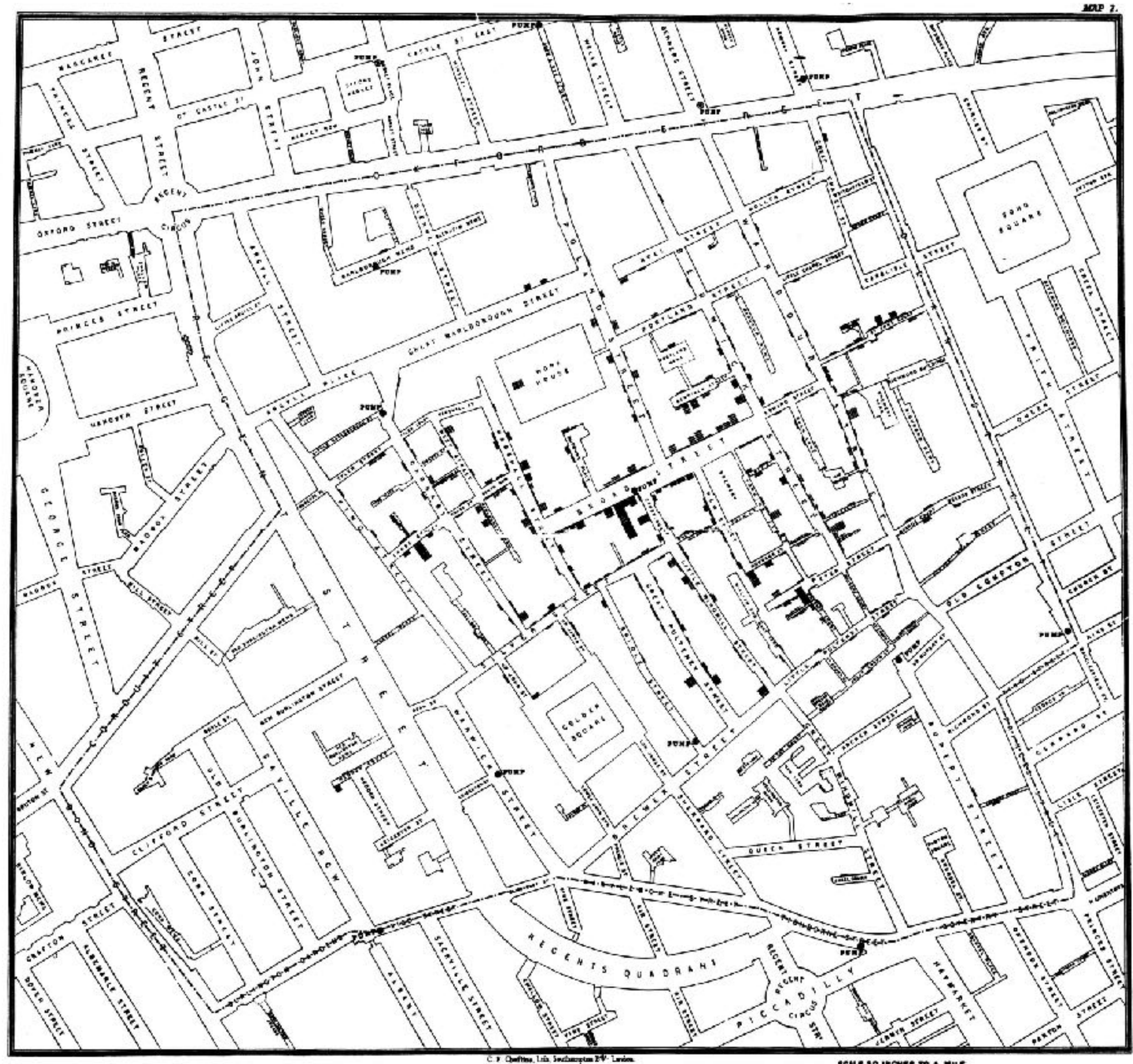




1.2

History

Where are we coming from?



C. F. Cheffins, Lith. & Engraving 24, Ludlow St. London.

SCALE 50 FEET TO A MILE.

John Snow: Map Showing the Clusters of Cholera Cases in the London Epidemic of 1854 (1854)

Carte Figurative des pertes successives en hommes de l'Armée Française dans la campagne de Russie 1812-1813.

Dressée par M. Minard, Inspecteur Général des Ponts et Chaussées en retraite Paris, le 20 Novembre 1869.

Les nombres d'hommes présents sont représentés par les largeurs des zones colorées à raison d'un millimètre pour dix mille hommes; ils sont de plus écrits en travers des zones. Le rouge désigne les hommes qui entrent en Russie; le noir ceux qui en sortent. — Les renseignements qui ont servi à dresser la carte ont été puisés dans les ouvrages de M.M. Chiers, de Léger, de Fexendac, de Chambray et le journal inédit de Jacob, pharmacien de l'Armée depuis le 28 Octobre.

Pour mieux faire juger à l'œil la diminution de l'armée, j'ai supposé que les corps du Prince Jérôme et du Maréchal Davoust qui avaient été détachés sur Minsk et Mohilow et qui rejoignirent Orscha et Witebsk, avaient toujours marché avec l'armée.

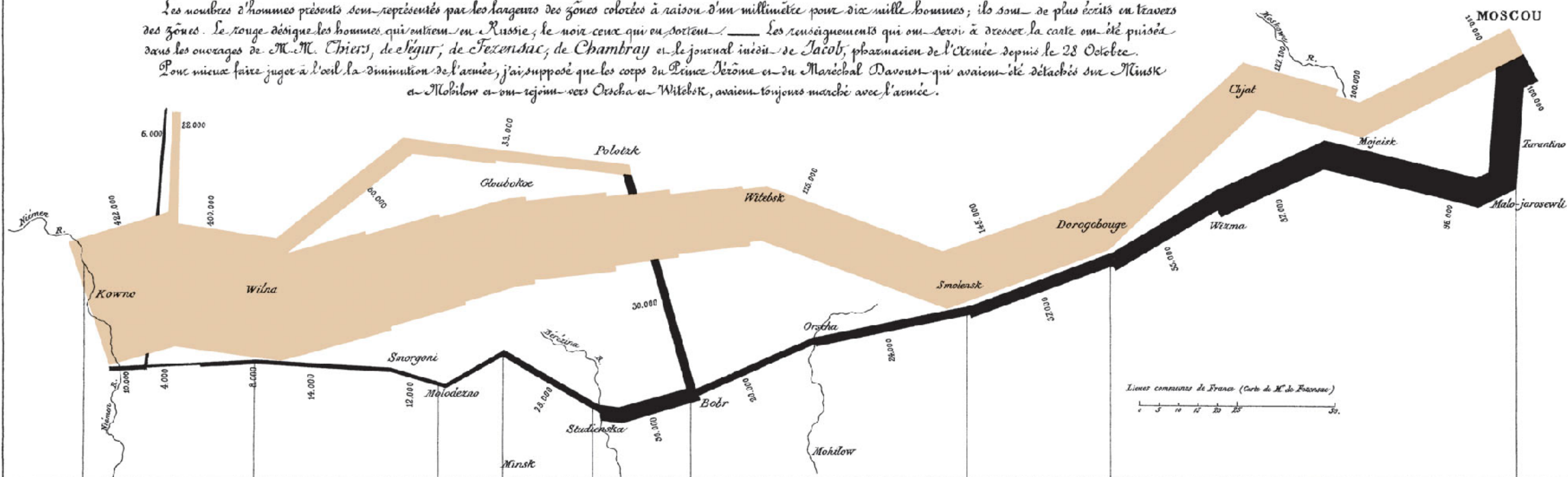
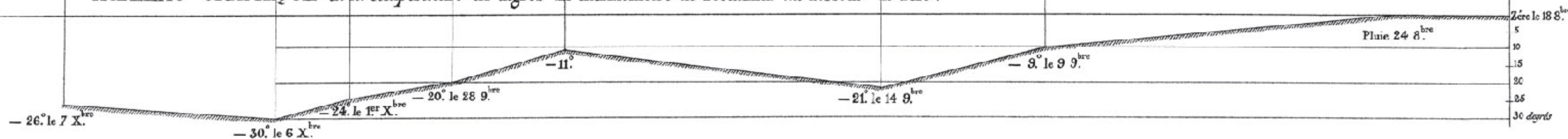


TABLEAU GRAPHIQUE de la température en degrés du thermomètre de Réaumur au dessous de zéro.

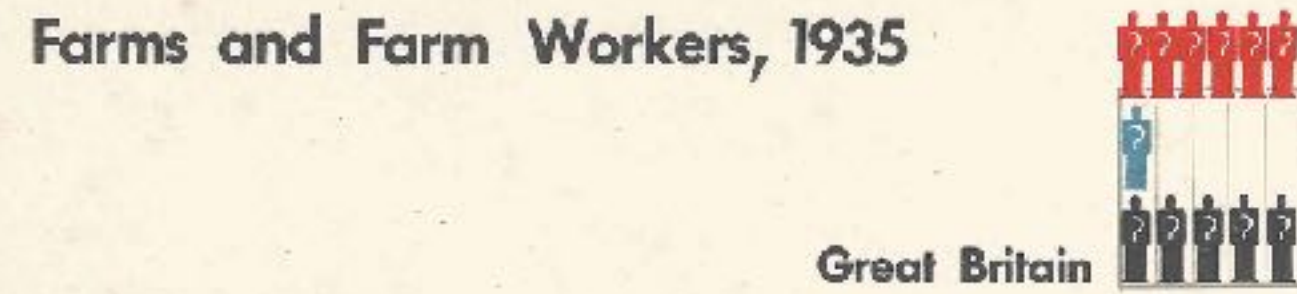
Les Cosaques passent au galop le Niemen gelé.



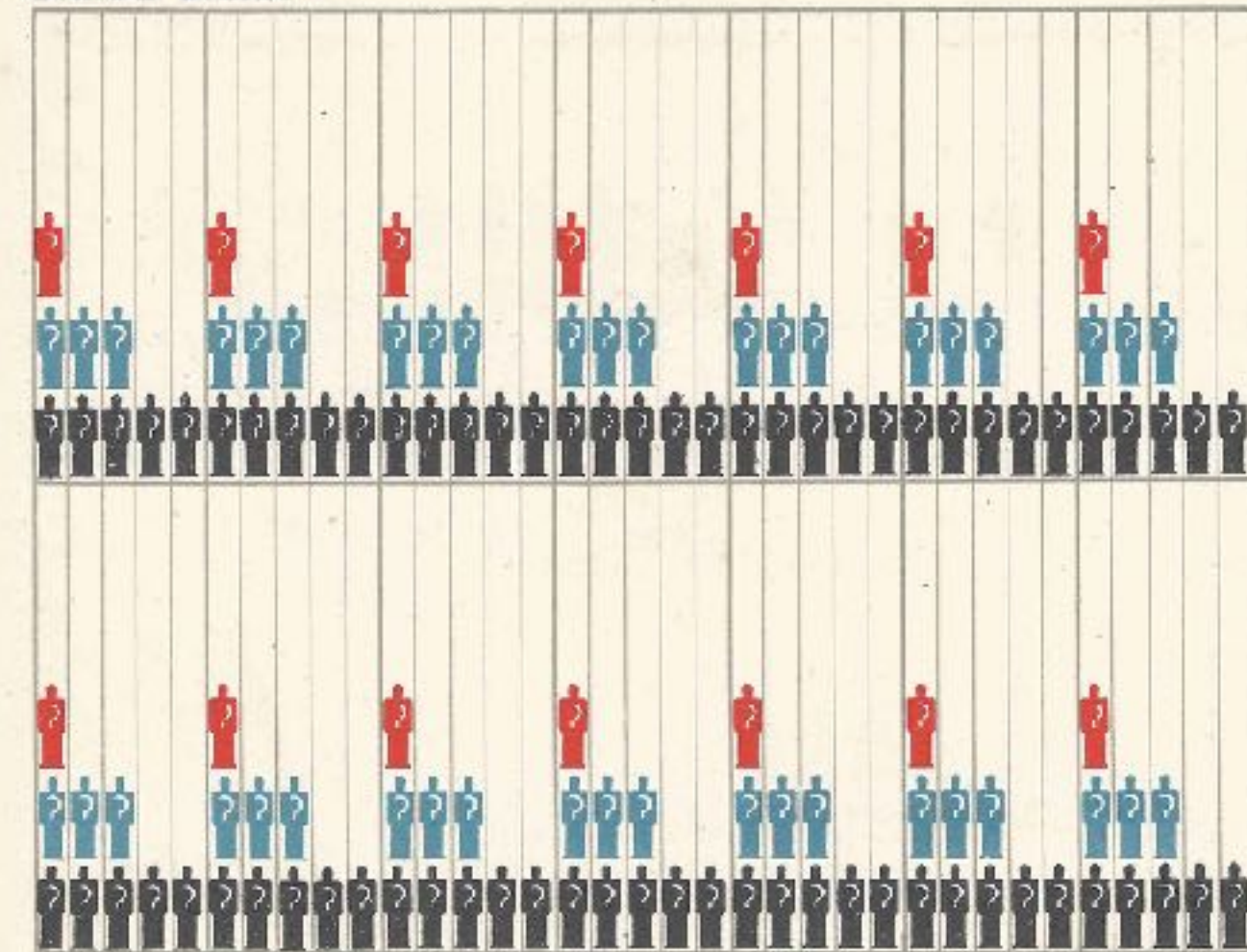
Auq. par Rognier, s. Pas. S^{te} Marie St O^{me} à Paris.

Imp. Lit. Rognier et Doucet.

Farms and Farm Workers, 1935



United States



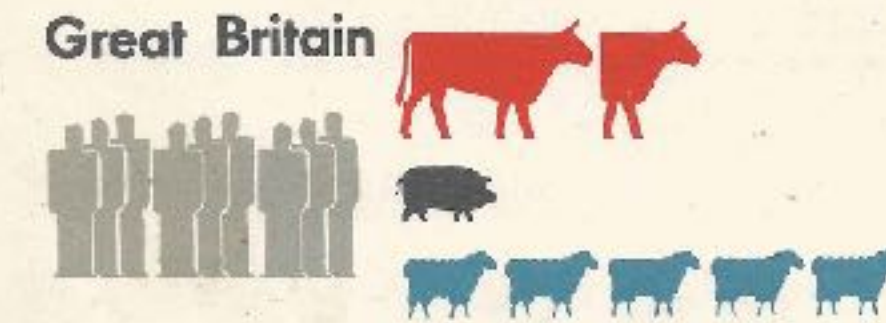
Each black symbol represents 100,000 farms
 Each blue symbol represents 100,000 working relatives of farmers
 Each red symbol represents 100,000 hired labour
 Each section represents 100,000 farms or holdings (average size in Gt. Britain 60 acres, in the United States 150 acres)

Note the number of farms and the extent of farm land in America compared to Britain. Each section (grouped in fives for easy counting) is 100,000 farms. A British farm or holding of any size, however small, has on the average rather more than one labourer (red), but a hired man is found in only one out of five American farms. More relatives work on family farms in America. Labourers, farmers, and relatives all wear sickles in our picture as a symbol of their trade.

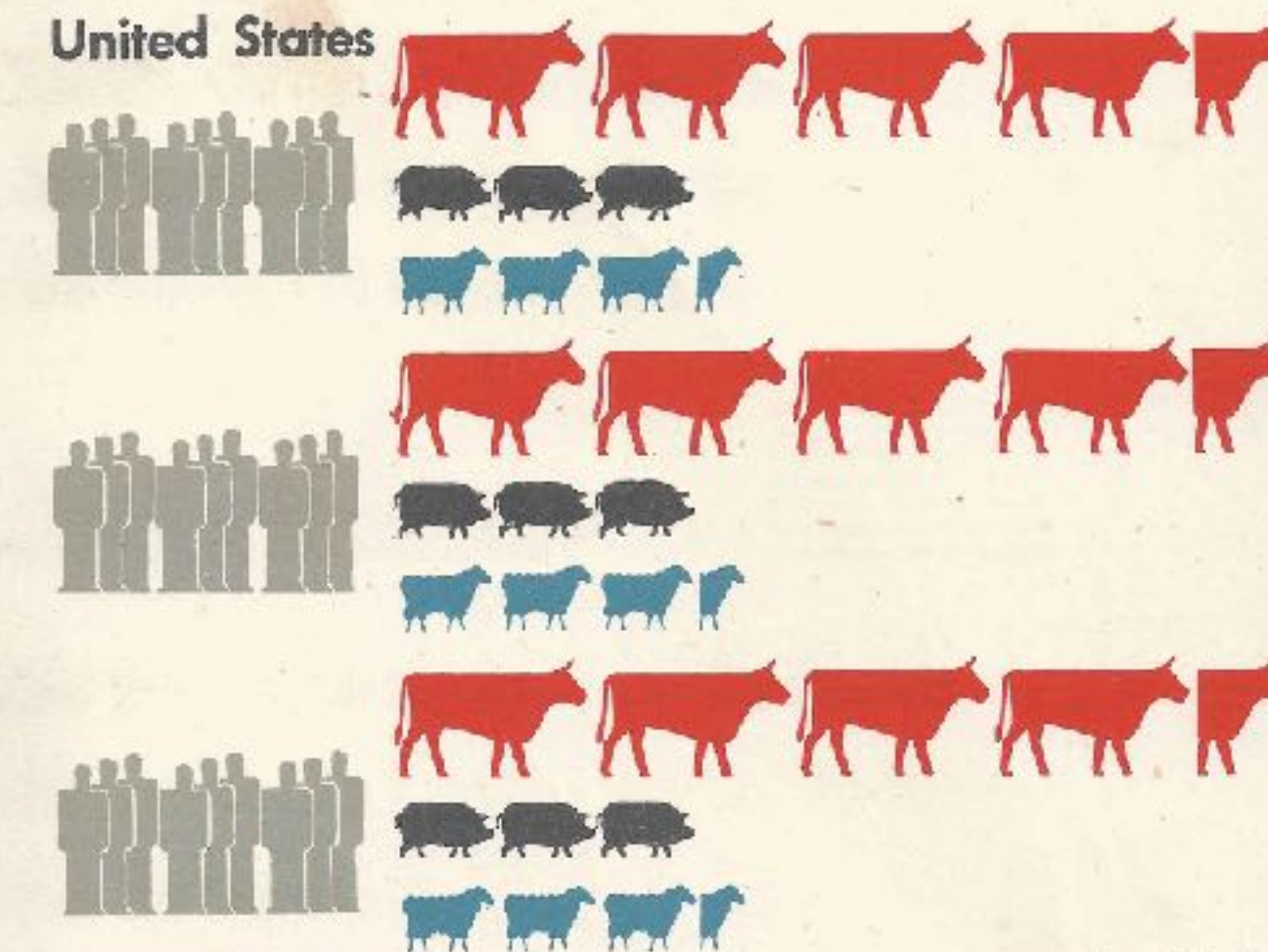
ISOTYPE

Population and Live Stock

Great Britain



United States

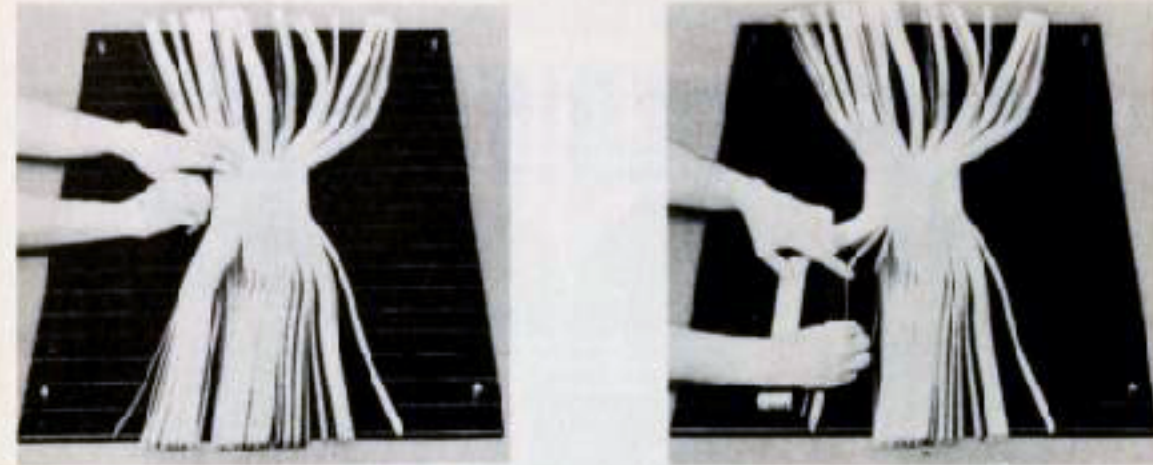


Each grey figure represents 5 million population
 Each complete red symbol represents 5 million cattle
 Each complete black symbol represents 5 million pigs
 Each complete blue symbol represents 5 million sheep

Average for 1935 - 1939

There are more cattle and pigs per head of population in America than Britain, but sheep—only 5 in U.S. for every 9 in Britain—are a different story, and provide the tender home-grown leg of mutton prized by the British.

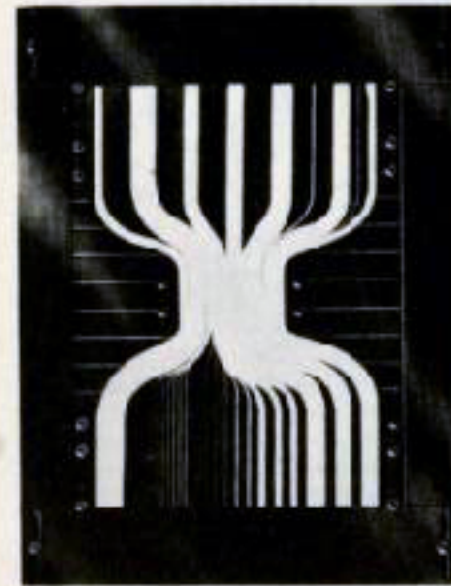
ISOTYPE



International Business Machines Corp., N. Y. C.

A. The Use of a Cosmograph to Make a Flow Chart.

1. The "Cosmograph" is a flow chart made by using the device shown above. One thousand strips of paper are set on edge to represent 100%, and are separated into component parts of 100%.
2. These two illustrations give two steps in making a "Cosmograph." The first shows the process of locating and firmly clamping the strips of paper into position. The second shows wedge spacers and bar spacers being inserted between groups of strips of paper.



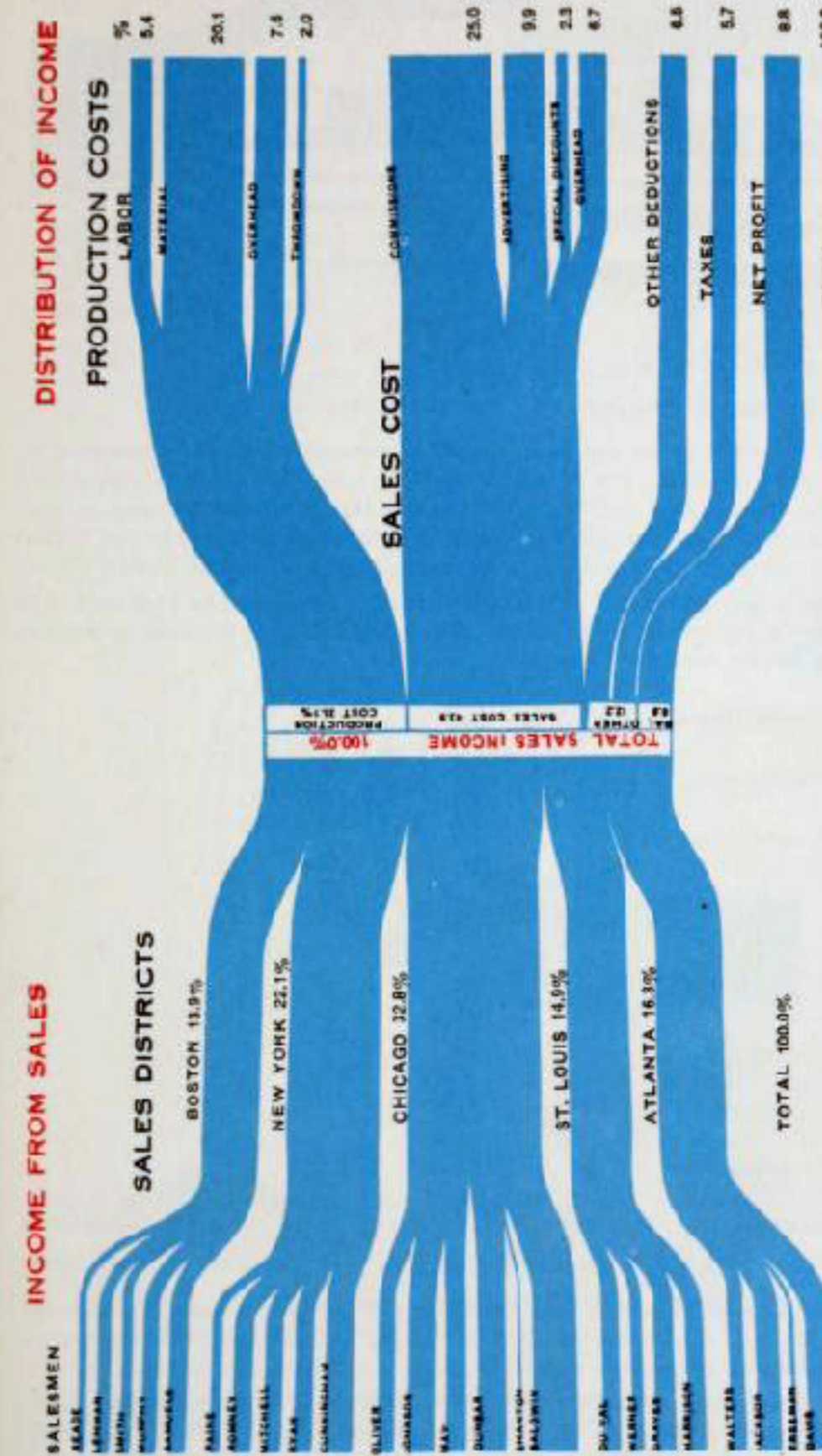
International Business Machines Corp., N. Y. C.

B. The Completed Cosmograph.

1. Border guides are placed in position to block out excess ends of the paper strips and the Cosmograph is ready for photostating.
2. The negative photostatic print appears at the right. Note that all black portions of the device fail to reproduce. Of the one thousand strips of paper, twenty are red and are set at each 5% mark. In the negative photostat, these red strips of paper reproduce as white.



The flat or negative photostatic print of the Cosmograph strip, as the left.



A Cosmograph Showing Distribution of Income From Sales.

The right side of the chart shows the distribution of the income on the left. It shows not only the major channels of distribution —production cost, sales cost, etc.—but also the factors of which these major costs are composed.



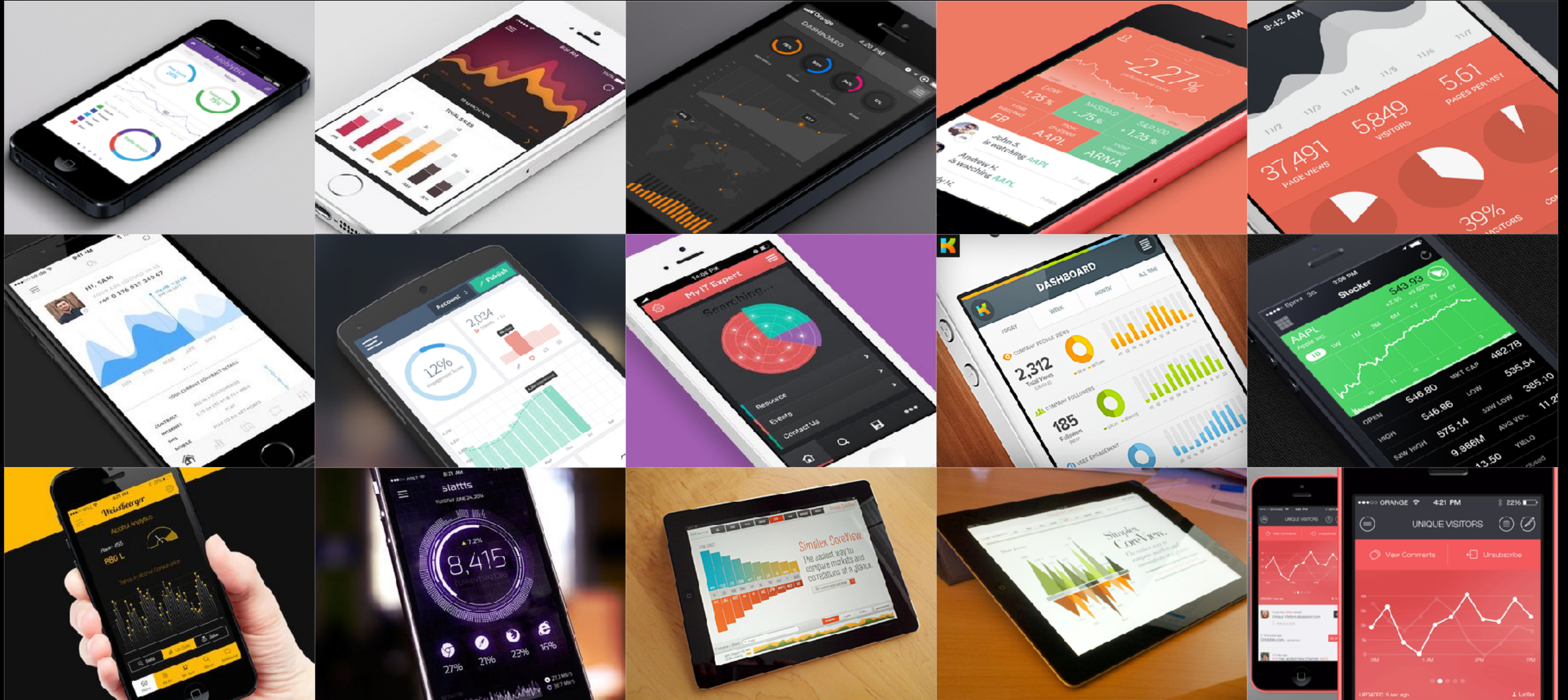
1.3

State of the Art

Where are we today?



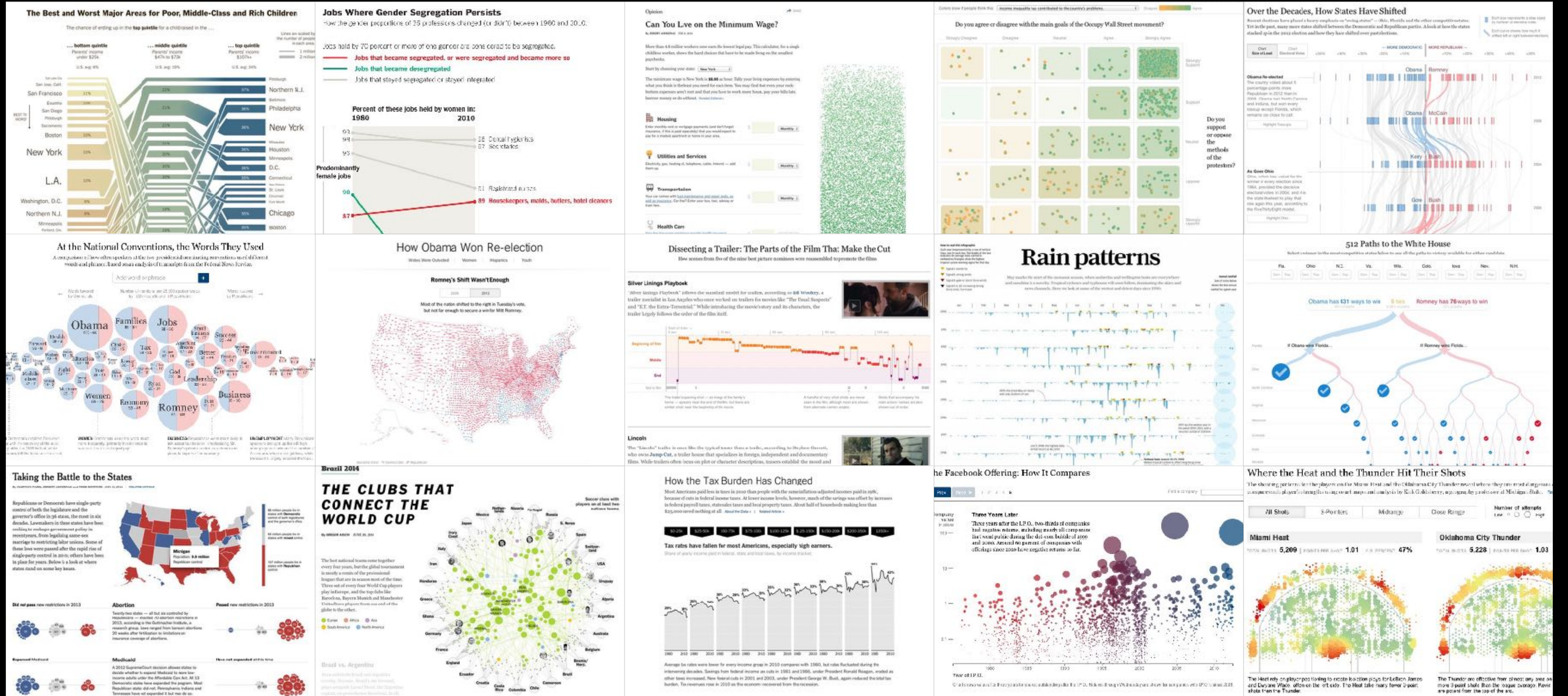
Consumer Products



Selection of consumer applications from Dribbble.com



Data-Driven Journalism



Selection of data-driven reportings from NYTimes.com



Analytics and Reporting



Selection of visual analytics tools from various visualization designers

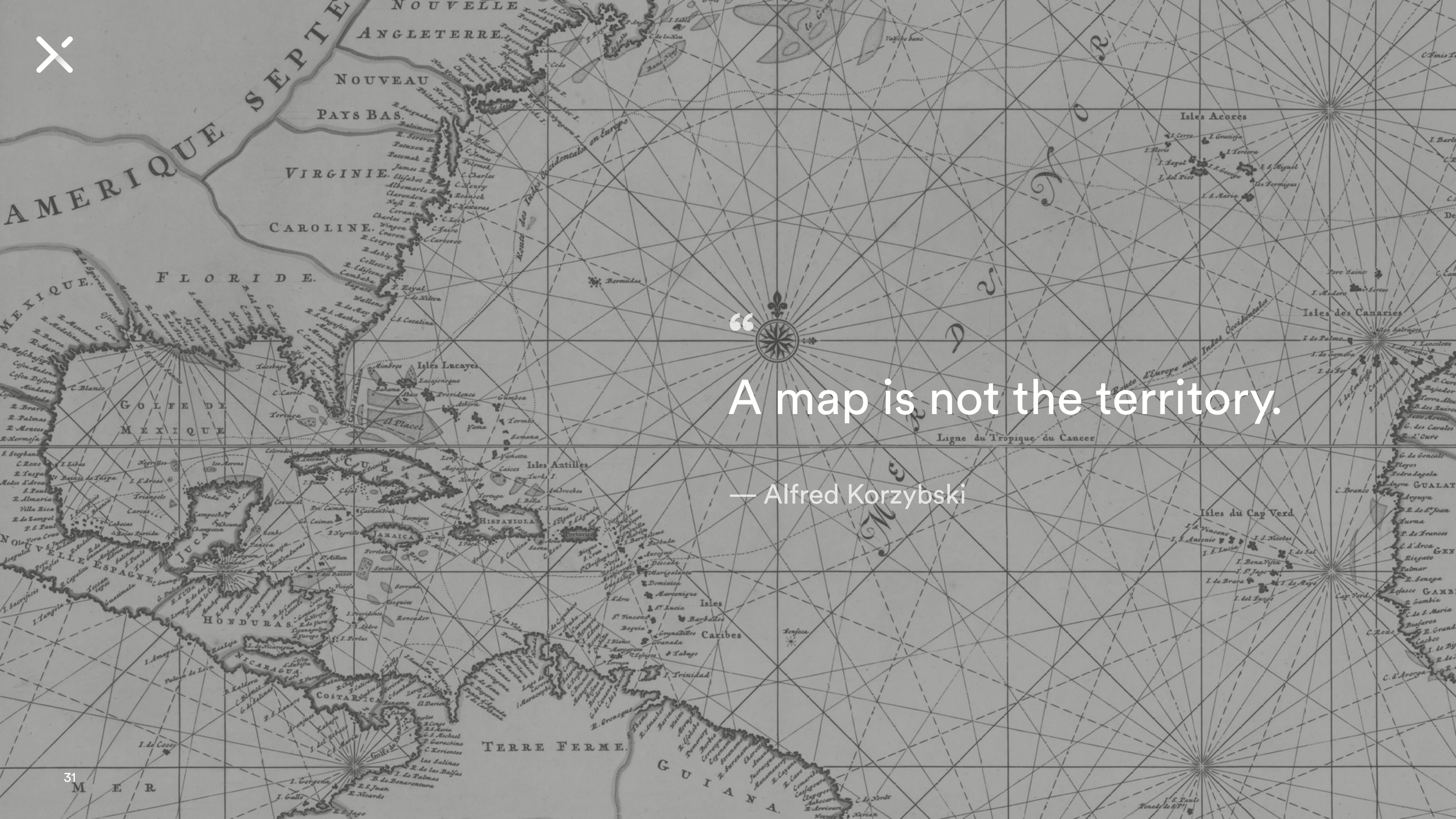


1.4

Future Frontiers

Where will we go in the future?





“

A map is not the territory.

— Alfred Korzybski

Macrometeorites

the largest meteorites throughout history

Click and drag to select a period, click to deselect

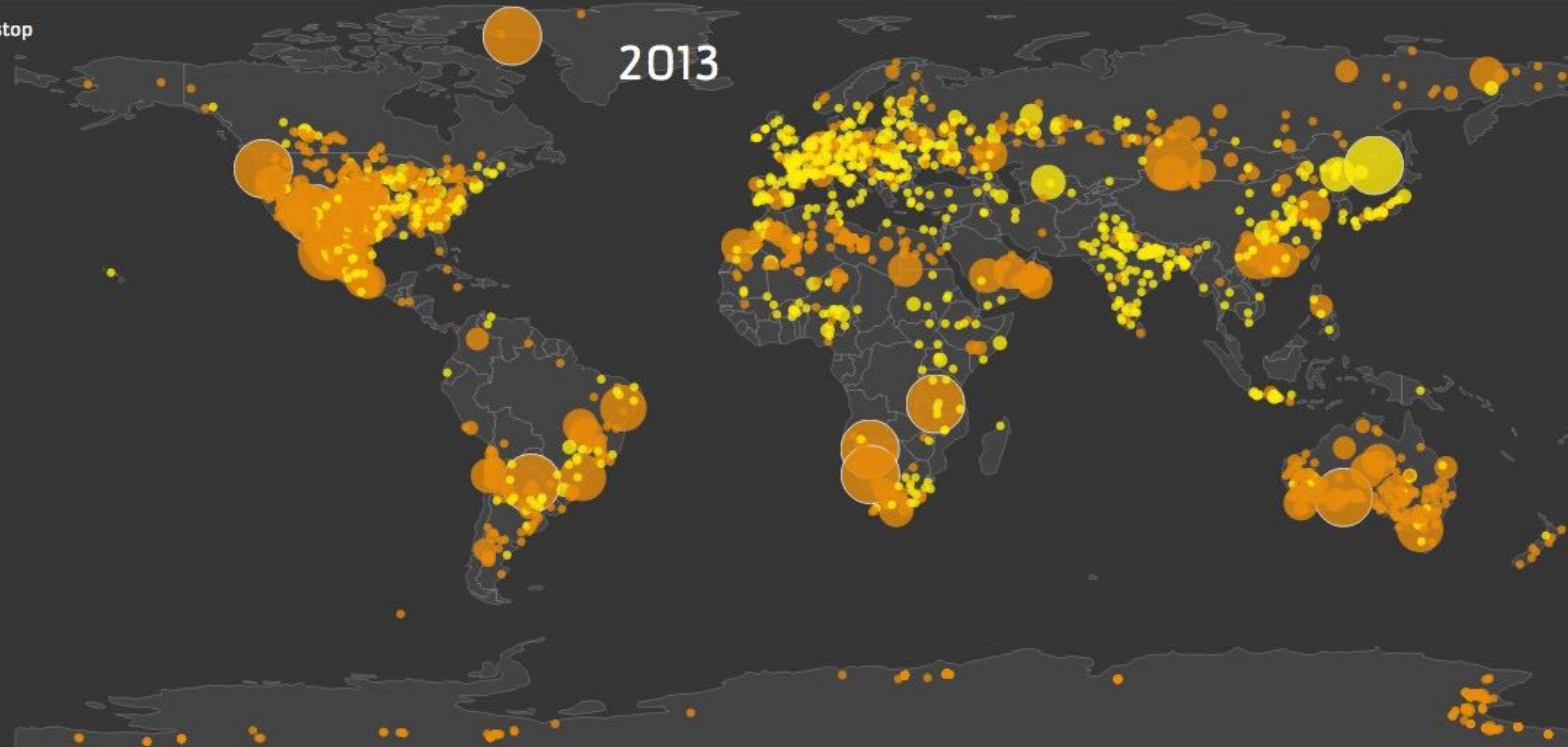
Number of Falls

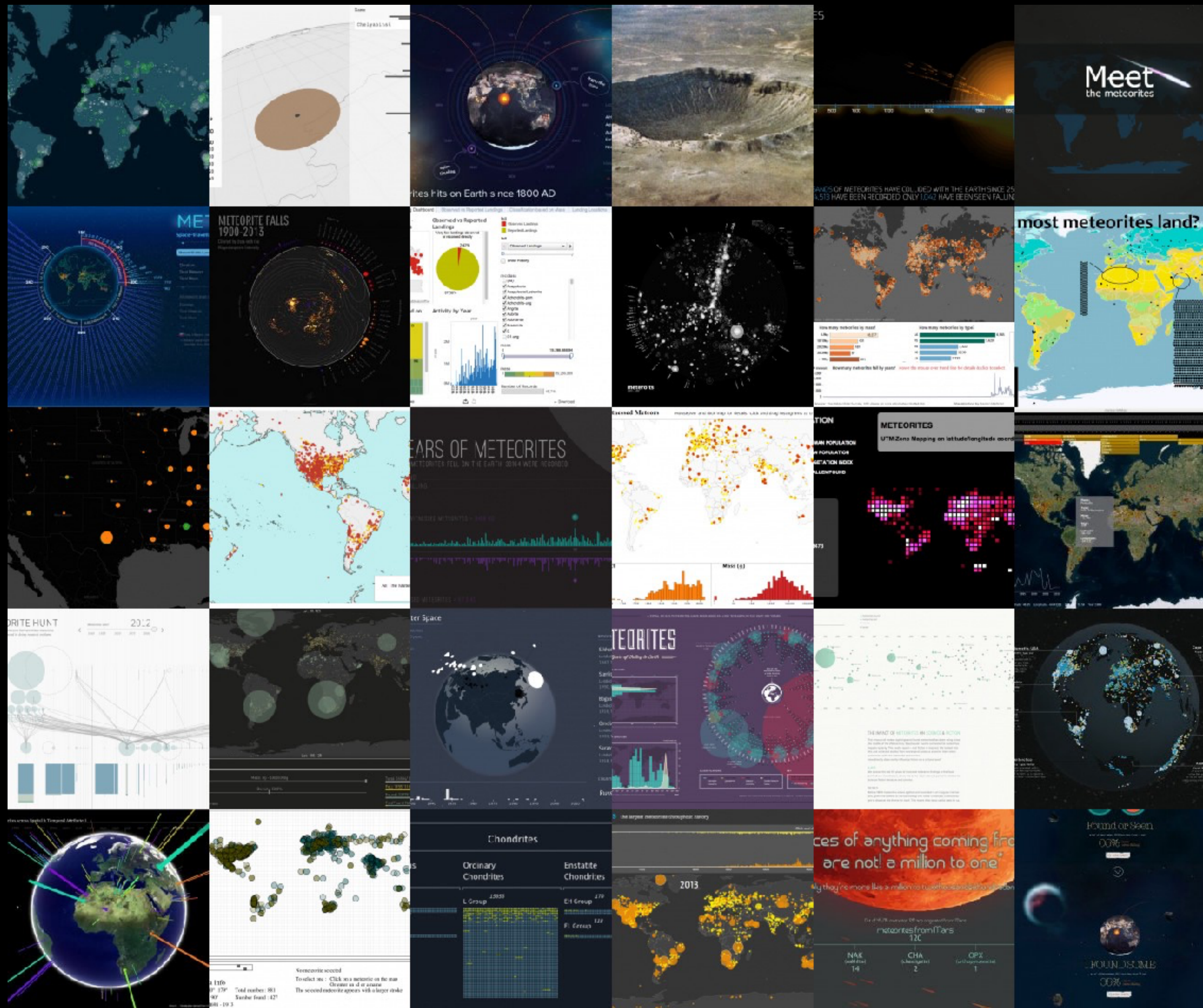
Number of Finds

1400 1500 1600 1700 1800 1850 1900 1950 2000 2013

start stop

2013







New Device Classes



Mobile

TouchWave by Domenikus Baur



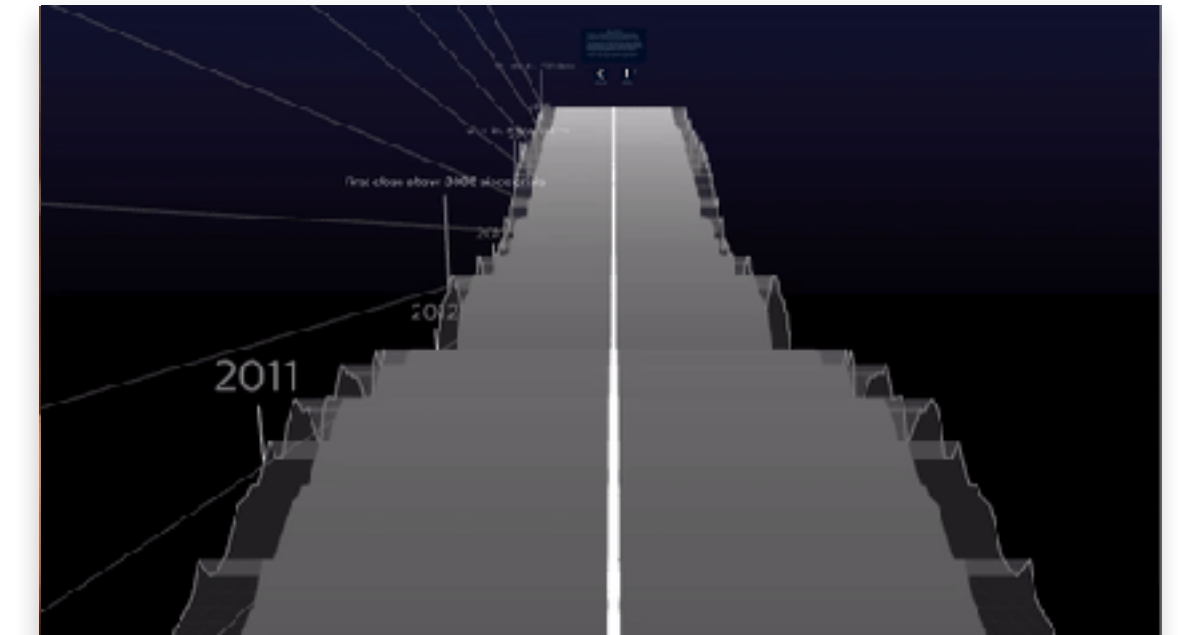
Wearable

Smart Watch for Air Quality by Clever°Franke



Augmented

Augmented Reality Mockup by Domenikus Baur



Virtual

21 Years of the Nasdaq by Wall Street Journal



Briefing

Module Assignment

- Theme
- Approach
- Deliverables
- Schedule
- Data Sources
- Materials



Theme

Instability

Stability, instability, or the dynamic between these two in data sets covering the world around us.

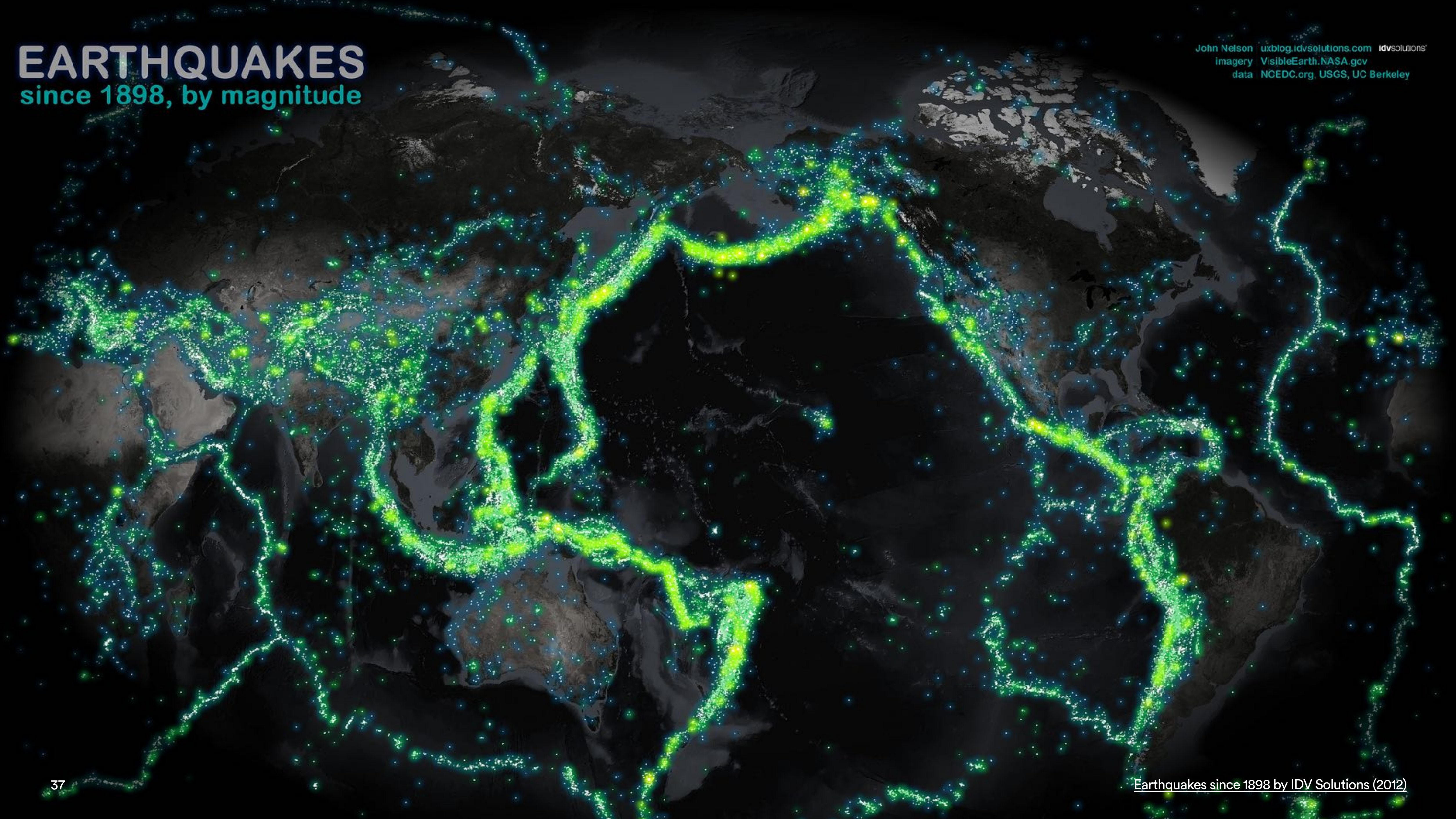
Examples

Tectonic instability leading to earthquakes, job instability leading to fluctuating jobless rates, economic instability leading to financial crises, political instability leading to democratic overhaul, are just some of the potential examples.

EARTHQUAKES

since 1898, by magnitude

John Nelson uxblog.idvsolutions.com idvsolutions.com
imagery VisibleEarth.nasa.gov
data NCEDC.org, USGS, UC Berkeley



2016 | Syria Aleppo Falls to Regime Forces

VIEWING



ORIGINATING FROM SYRIA

5,524,333

POPULATION
18,502,000

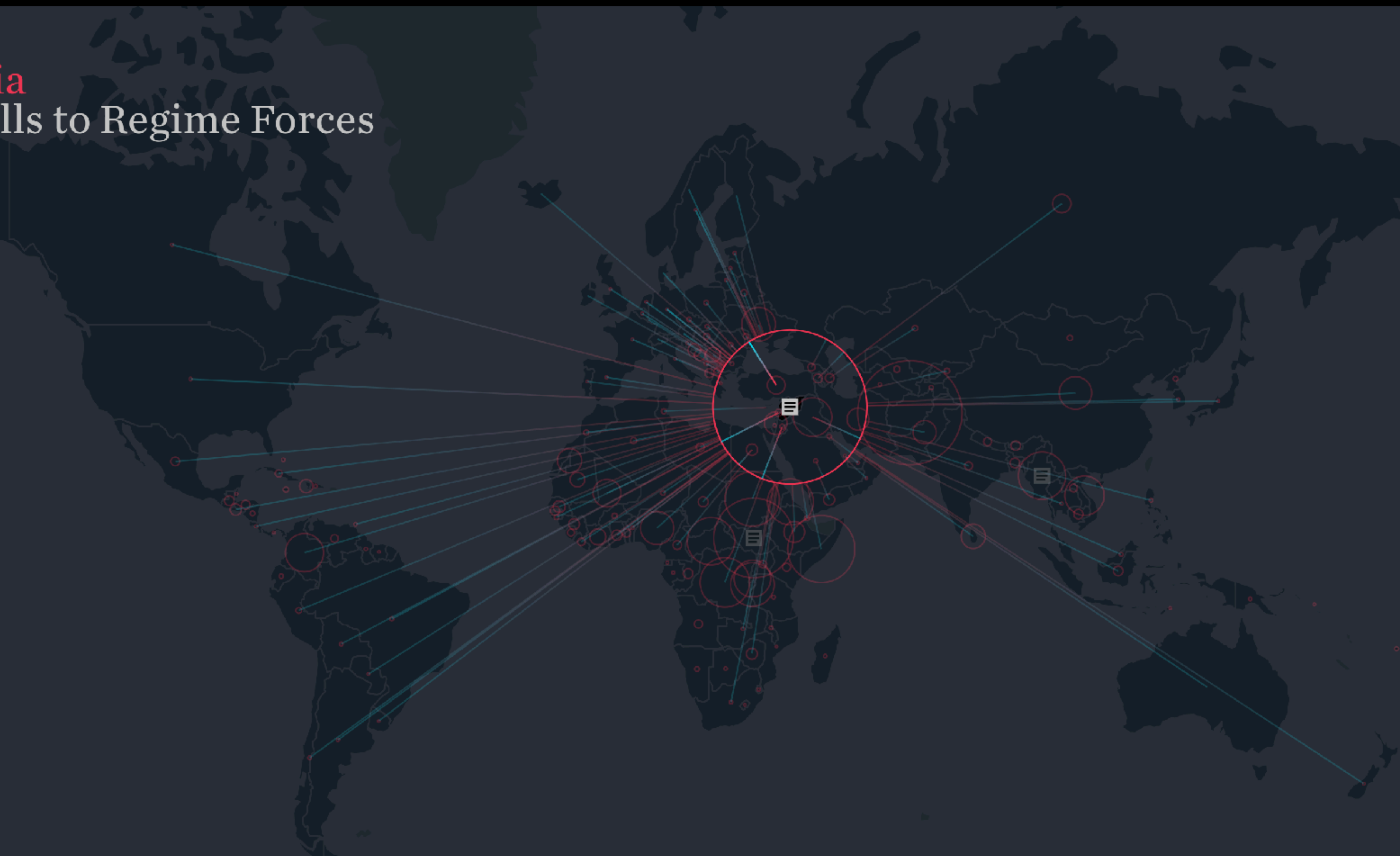
REFUGEES / POPULATION
1 of 3

TOP 3 OF 110 ASYLUMS

TURKEY
2,823,987

LEBANON
1,005,503

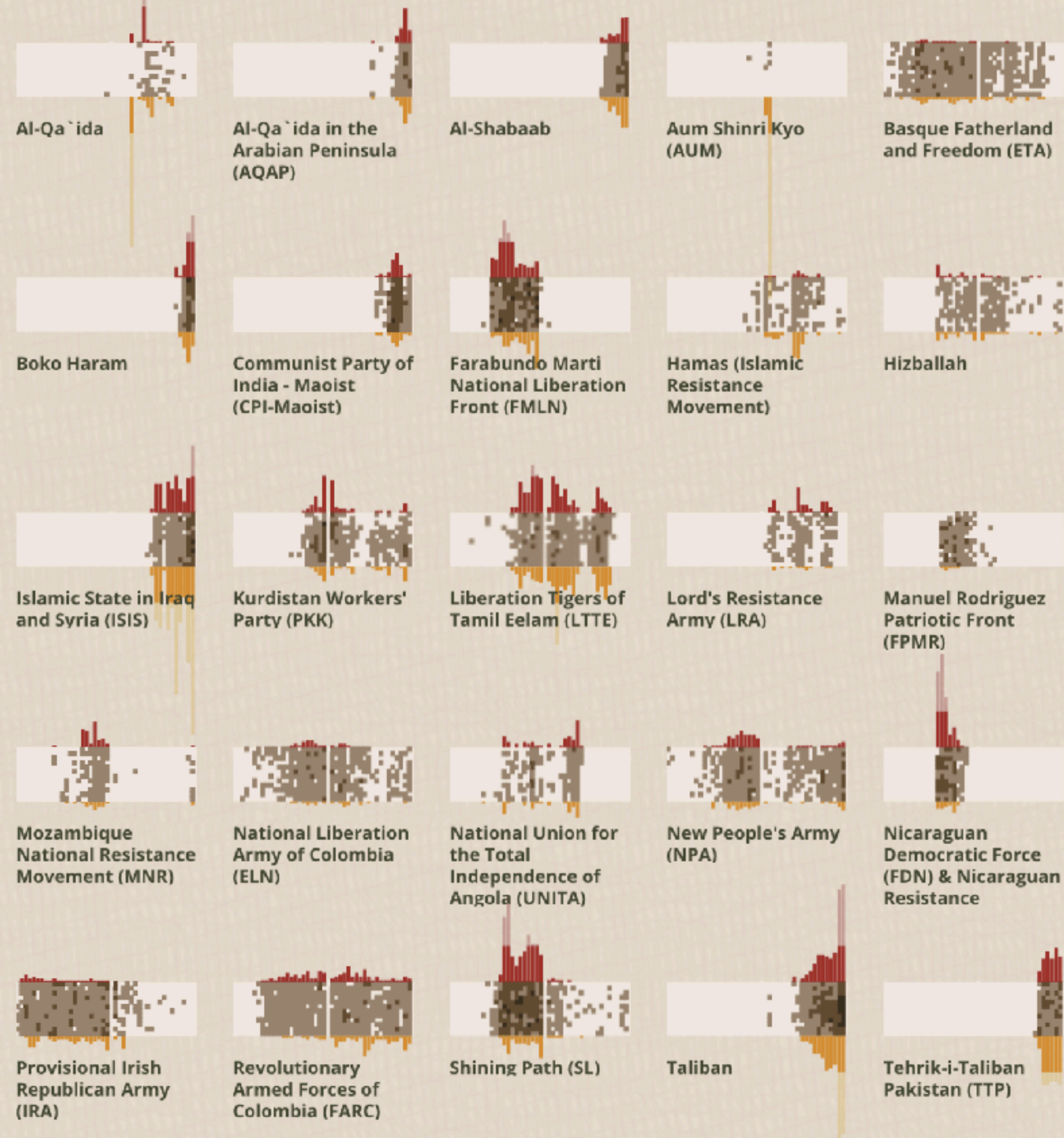
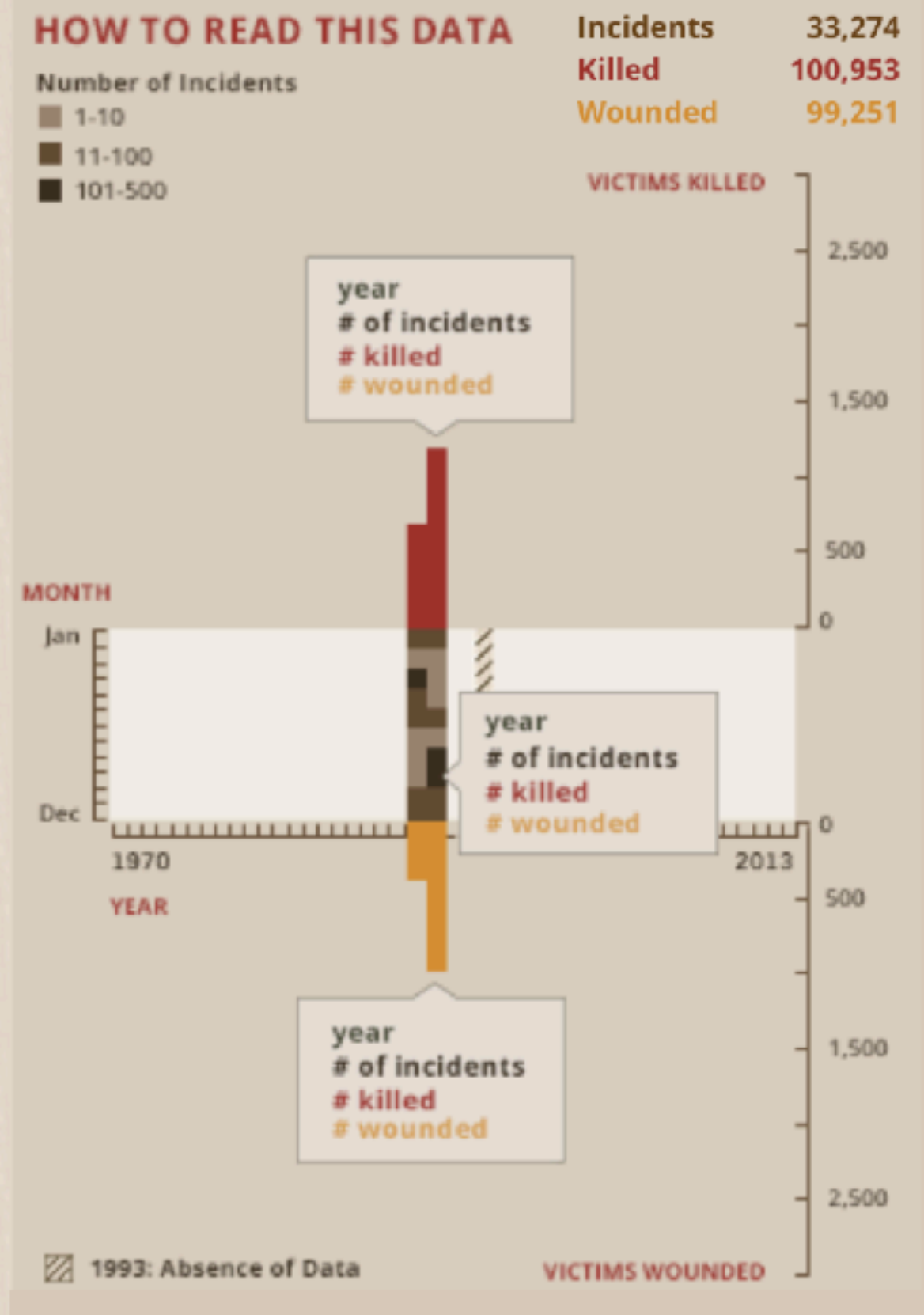
JORDAN
648,836

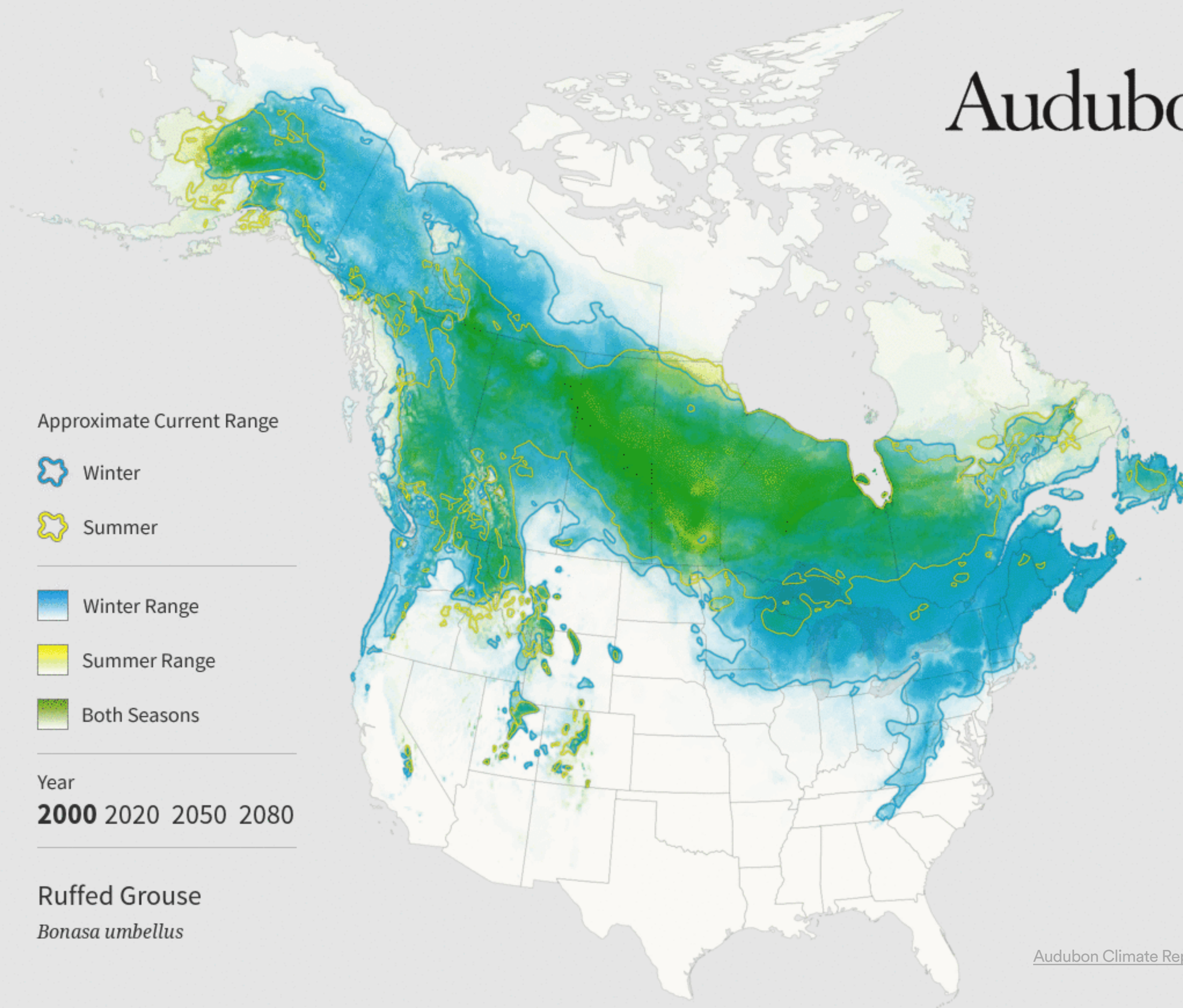


A WORLD of TERROR

Exploring the reach, frequency and impact of terrorism around the world

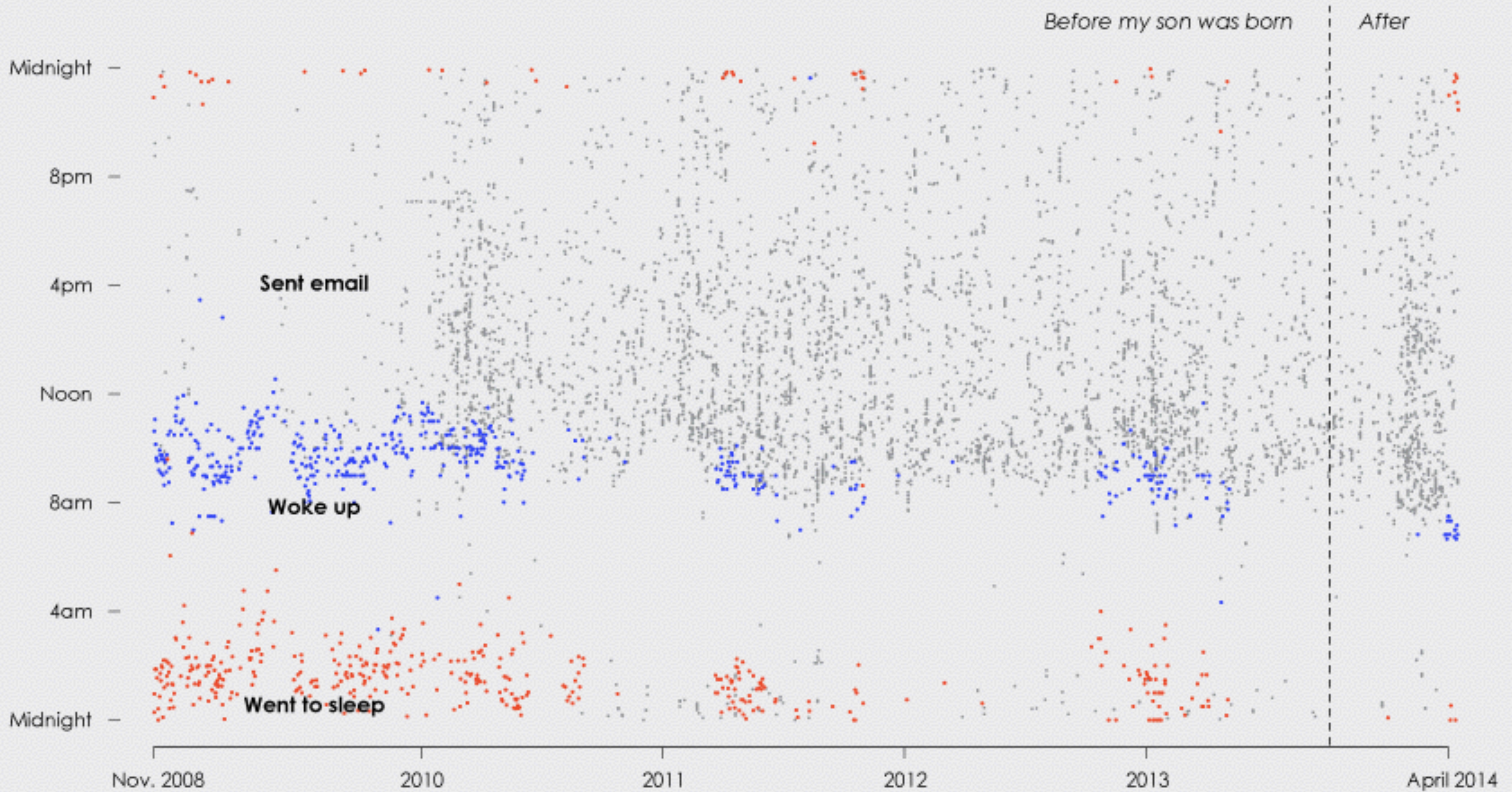
Longest Active Recent Activity Most Victims Geographic Spread **Name of Group** Verified ?





Ruffed Grouse
Bonasa umbellus

Email and sleep





Approach

1. Discovery

Research data sets which hold the potential to describe or even explain indicators of instability in the world around us.

2. Definition

Conduct visual analysis of the selected data set to find their key insight and define a question which can now be answered.

3. Design & Development

Design and develop your visualization into a final visual artifact.

4. Delivery

Exhibit and present your work to the rest of the class and document it.



Deliverables

Graphical Poster

Scope: Static visualization with highlights and annotations.

Format: A3 printed

Interactive Prototype

Scope: Clickable prototype of an interactive version of the visualization.

Format: InVision, Principle, Animate, HTML, ...

Documentation

Scope: Topic, analysis, ideation, result, conclusion

Format: PDF and assets for the web



Schedule

Week 2	Tuesday 7.11	Wednesday 8.11	Thursday 9.11	Friday 10.11
Discover		Introduction & Briefing	Design Input 1: Basic Techniques	Tech Input 1: Tools and Data Processing
		Topic and Data Research	Topic and Data Research	Topic and Data Research + Mentoring
Week 3	Tuesday 14.11	Wednesday 15.11	Thursday 16.11	Friday 17.11
Define	Data Analysis	Data Analysis	Ideation and Concept	Ideation and Concept
Week 4	Tuesday 21.11	Wednesday 22.11	Thursday 23.11	Friday 24.11
Design & Develop	Design Input 2: Intermediary Techniques	Tech Input 2: Programming and Exporting	Aesthetics of Interaction	Production + Mentoring
	Concept + Mentoring	Concept Finalization	Production	Production
Week 5	Tuesday 28.11	Wednesday 29.11	Thursday 30.11	Friday 1.12
Deliver	Production	Aesthetics of Interaction	Production	Presentation
		Production + Mentoring		Documentation



Data Sources

- Portal für Schweizer Open Government Data
<https://opendata.swiss/>
- Open-Data-Plattform öV Schweiz
<https://opentransportdata.swiss/>
- Stadt Zürich Open Data Katalog
<https://data.stadt-zuerich.ch/>
- Bundesamt für Statistik
<https://www.bfs.admin.ch/bfs/de/home/statistiken.html>



Materials

Books

- [The Visual Display of Quantitative Information](#)
Edward Tufte (2001)
- [Semiology of Graphics](#)
Jacques Bertin (1983)
- [Visualization Analysis and Design](#)
Tamara Munzner (2014)
- [Design for Information](#)
Isabel Meirelles (2013)
- [The Functional Art](#)
Alberto Cairo (2012)
- [Interactive Data Visualization for the Web](#)
Scott Murray (2017)

Websites

- [Flowing Data](#)
Nathan Yau
- [Information Aesthetics](#)
Andrew Vande Moere
- [Visual Complexity](#)
Manuel Lima
- [Visualising Data](#)
Andy Kirk
- [The Functional Art](#)
Alberto Cairo
- [Visual Business Intelligence](#)
Stephen Few
- [Visualizing, The Field](#)
Various Authors

Podcasts

- [Data Stories](#)
Moritz Stefaner and Enrico Bertini
- [Policy Viz](#)
Jon Schwabish
- [Especially Big Data](#)
Fathom
- [Data Skeptic](#)
Kyle Polich

Videos

- [Eyeo Festival](#)
2011 – 2017
- [Visualized Conference](#)
2012 – 2015
- [Information+ Conference](#)
2016
- [OpenVis Conference](#)
2013 – 2017
- [Tapestry Conference](#)
2013 – 2017



Many Thanks!

Don't hesitate to get in touch.

Benjamin Wiederkehr

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Interactive Things

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