Dashboard
Design
Patterns

Dashboard Design Workshop

https://dashboarddesignpatterns.github.io

Benjamin Bach, University of Edinburgh

VIS HUB University of Edinburgh
Visual+ Interactive Data
design informatics
THE UNIVERSITY of EDINBURGH
University of Glasgow
THE UNIVERSITY OF WARWICK
KING'S College LONDON
UNIVERSITY OF OXFORD

Goals

Learn about design guidelines for dashboard design.

Design your own dashboard(s) in the form of visual mockups and sketches.

Understand **design decisions** and tradeoffs.

Make **deliberate design** decisions and reflect on these choices.

Discuss your designs with peers and learn from others.

Not goals

An introduction to Tableau, Power BI, or similar tools.

A workshop on programming visualizations, e.g., using d3.js or other libraries.

An opportunity to obtain a certificate in dashboard design.

Today’s outline

1/ Dashboard Design & guidelines

2/ Design Tradeoffs

3/ Design Patterns

5/ Activity 1: *What am I designing for?*

6/ Activities 2: *How am I creating a design?*

Who are **you**?
Do you have a dashboard **project**?

Dashboard **Design**

“A visual display of the most important information needed to achieve one or more objectives; consolidated and arranged on a single screen so the information can be monitored at a glance.”

Stephen Few, 2006

Few, S., 2006. *Information dashboard design: The effective visual communication of data* (Vol. 2). Sebastopol, CA: O'reilly.

“A dashboard seeks to add as a translator, not simply a mirror, setting the forms and parameters for how data are communicated.”

Rob Kitchin et al., 2015

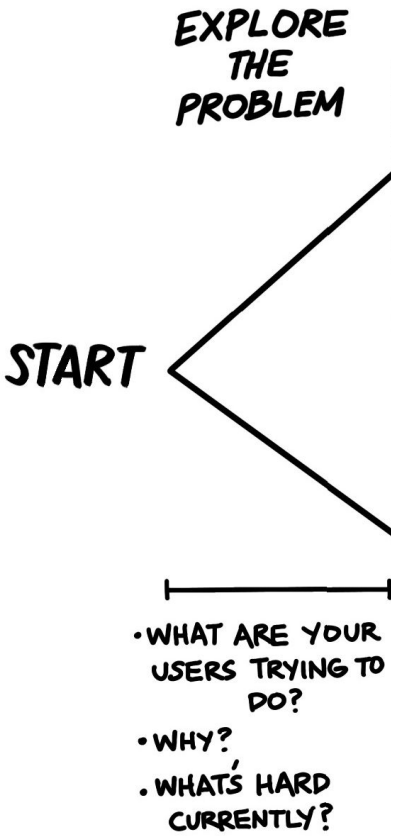
Kitchin, R., Lauriault, T.P. and McArdle, G., 2015. Knowing and governing cities through urban indicators, city benchmarking and real-time dashboards. *Regional Studies, Regional Science*, *2*(1), pp.6-28.

Design Guidelines

1. Don’t overwhelm viewers
2. Avoid visual clutter
3. Avoid poor visual design
4. Carefully chose KPIs
5. Align with existing workflows
6. Don’t add too much data
7. Provide for consistency
8. Provide for interaction affordances
9. Manage complexity
10. Organize charts symmetrically
11. Group charts by attribute
12. Order charts by time
13. Balance data + space
14. Increase information
15. Avoid redundancy of information
16. Show information, rather than data
17. Design is an iterative process
18. Context is very important
19. State your meta data
20. Use color carefully

etc...

Design Process: the double diamond



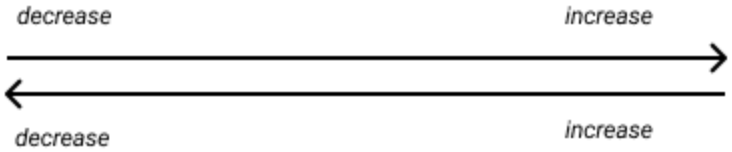
Visual Representation

Number of Pages

Data Abstraction

Interactivity

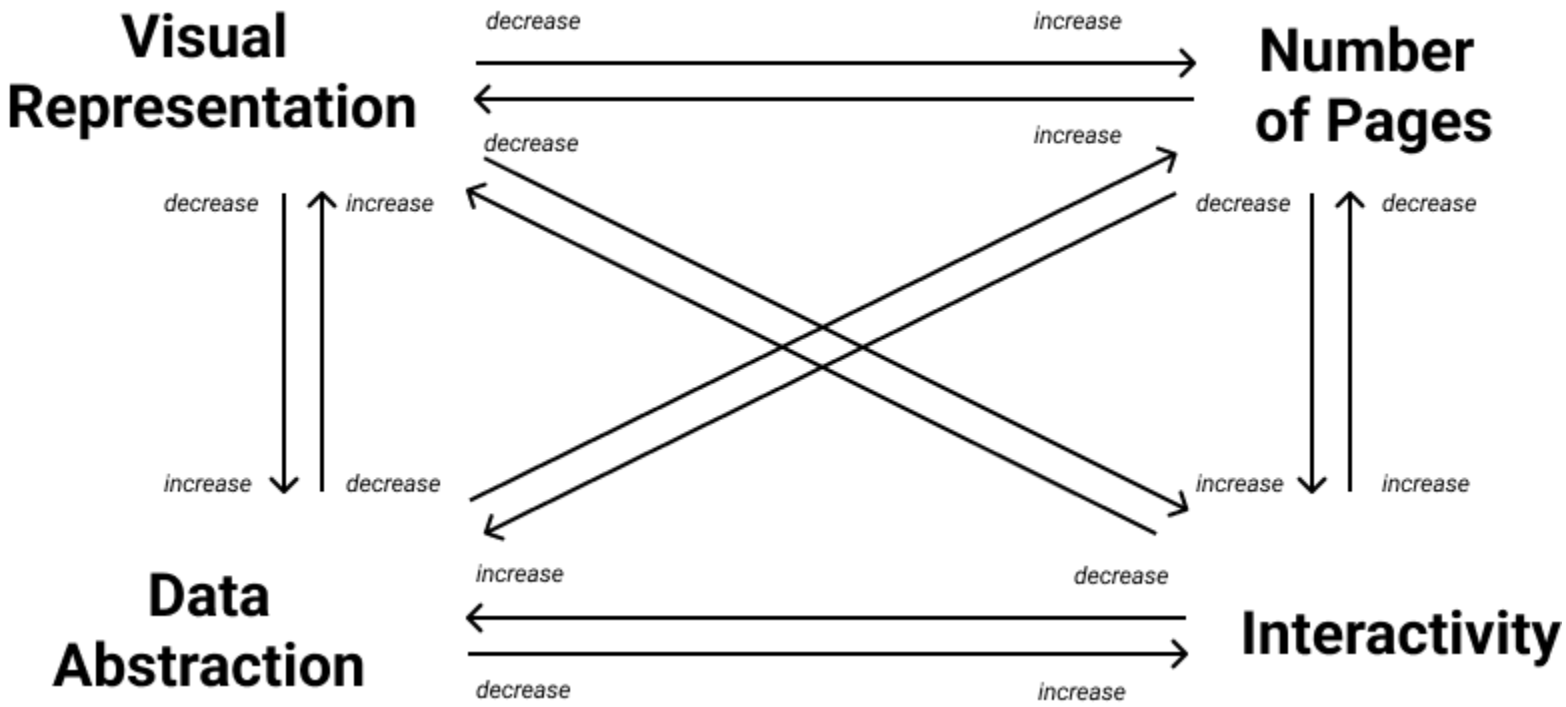
Visual Representation



Number of Pages

Data Abstraction

Interactivity


Visual Representation
Number of Pages
Data Abstraction
Interactivity
decrease
increase
decrease
increase
decrease
increase
decrease
increase
decrease
increase
decrease
increase
decrease
increase
decrease
increase

Dashboard **Genres**

UK Summary

Static Dashboard

The official UK government website for data and insights on coronavirus

See the simple summary for the UK.

Vaccinations

People vaccinated

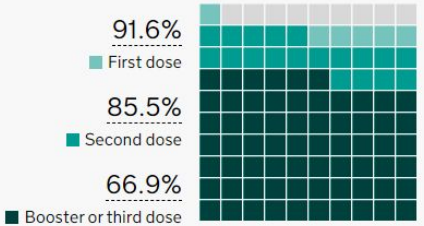
Up to and including 10 March 2022

Daily – first dose	Daily – second dose	Daily – booster or third dose
4,765	14,282	20,616

Total – first dose	Total – second dose	Total – booster or third dose
52,692,089	49,164,620	38,458,430

All vaccinations data

Percentage of population aged 12+



Cases

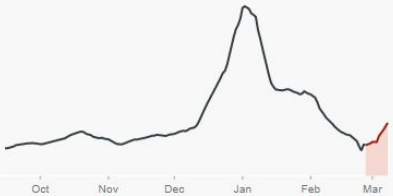
People tested positive

Latest data provided on 11 March 2022

Last 7 days

399,820 ↑ 143,956 (56.3%)

▶ Rate per 100,000 people: 458.7



All cases data

Deaths

Deaths within 28 days of positive test

Latest data provided on 11 March 2022

Last 7 days

730 ↑ 20 (2.8%)

▶ Rate per 100,000 people: 0.9

All deaths data

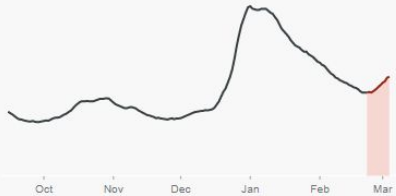
Healthcare

Patients admitted

Latest data provided on 7 March 2022

Last 7 days

9,475 ↑ 1,369 (16.9%)



All healthcare data

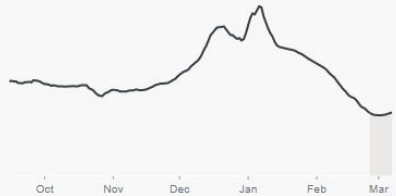
Testing

Virus tests conducted

Latest data provided on 10 March 2022

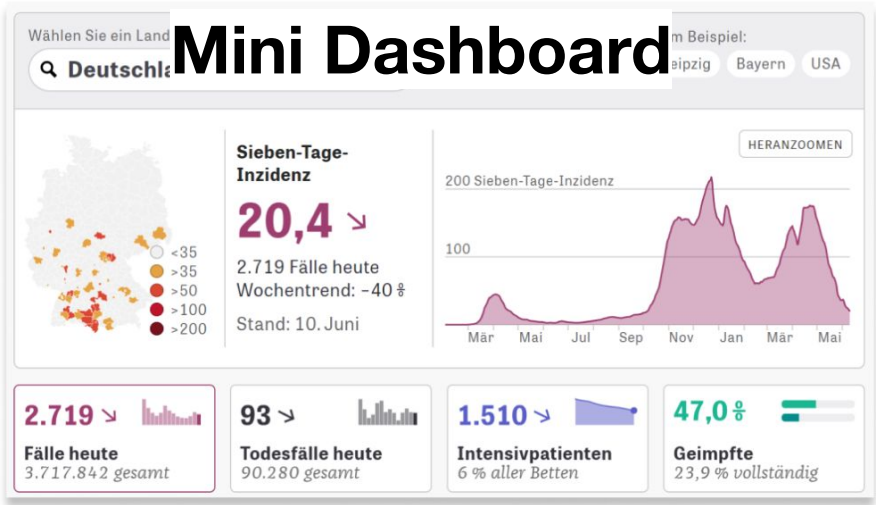
Last 7 days

4,553,814 ↑ 199,269 (4.6%)

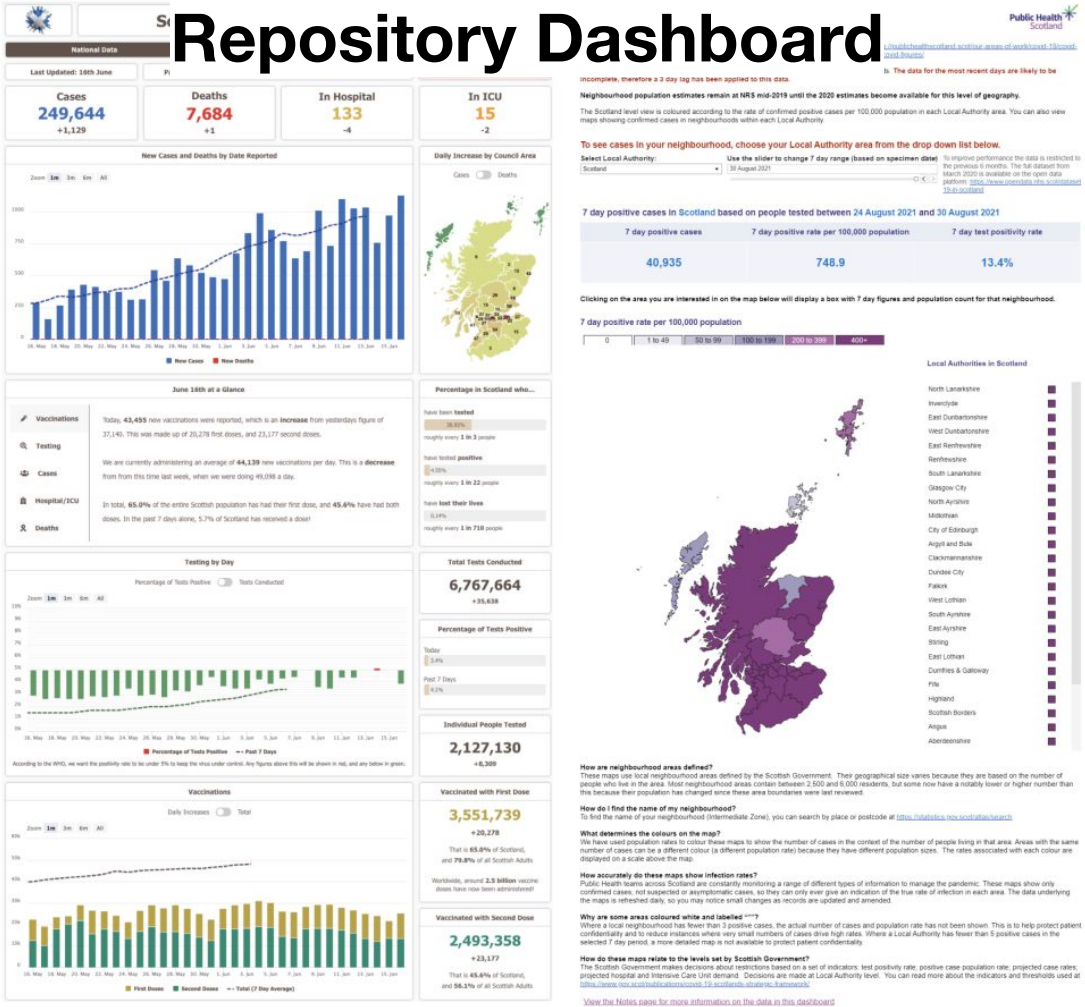


All testing data

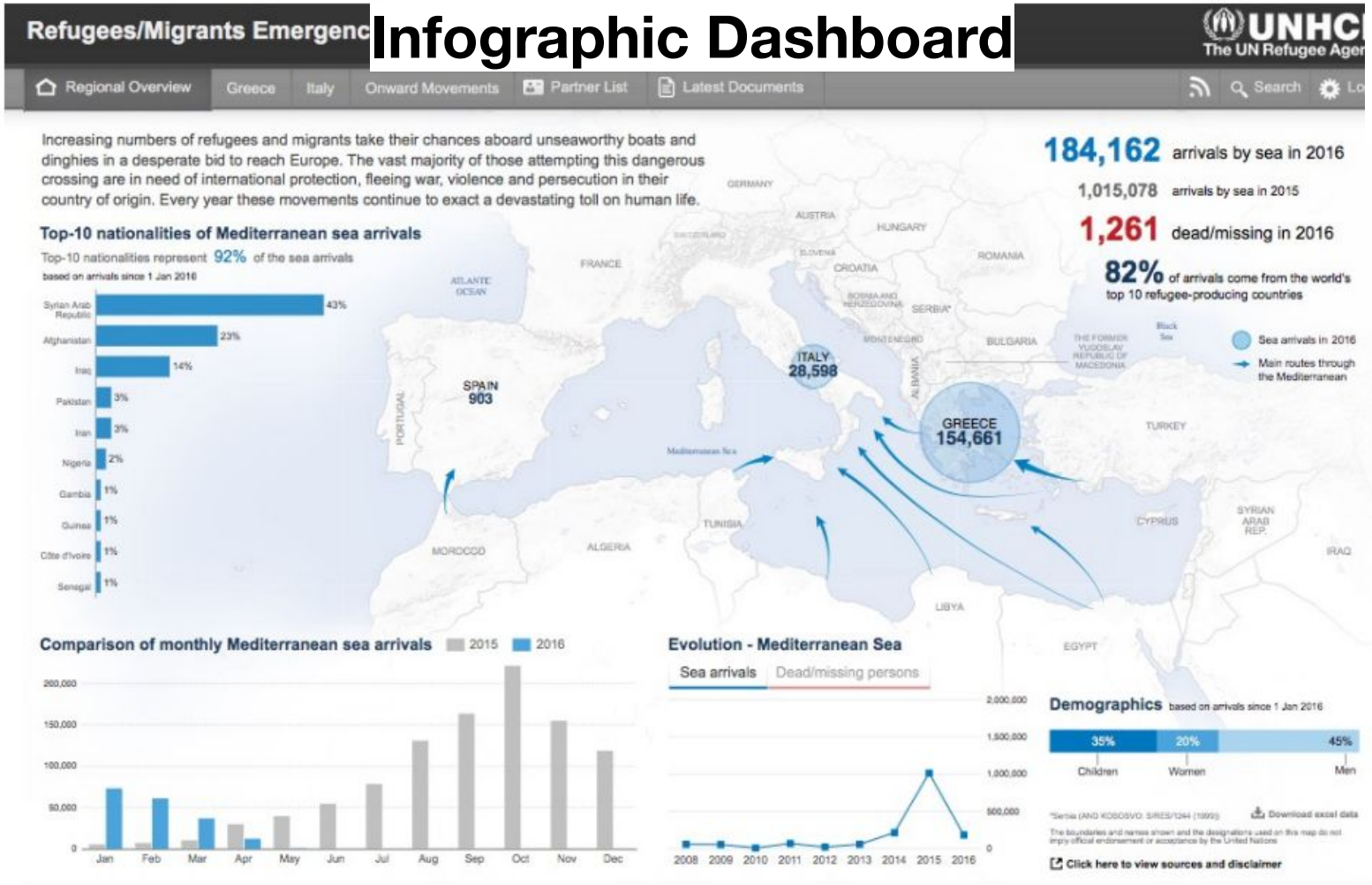
Mini Dashboard



Repository Dashboard



Infographic Dashboard



Magazine Dashboard

Covid

Tracking the coron

How countries and regions are c

APR 19TH 2021

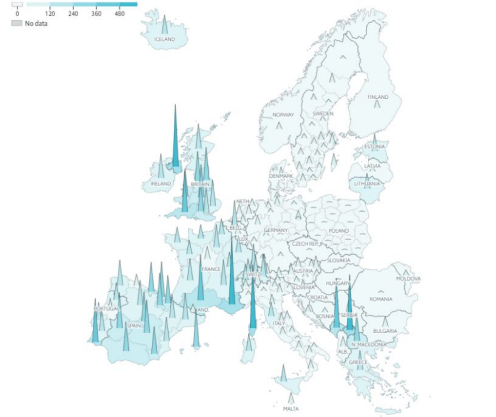
Covid-19 in Europe

Per 100,000 people, last updated on September 3rd

0 120 240 360 480

No data

Cases, last 7 days | Deaths, last 7 days | Deaths, total



IN SPRING 2020 much of Europe was shut down to slow the spread of covid-19. Ten months on the continent is once again trying desperately to restrain the pandemic. By July 27th the first wave had resulted in the loss of 180,000 lives across Europe's 39 countries and territories (see the map above). After some respite during the summer months a second wave—now largely driven by a more infectious variant first spotted in Britain' in December—has caused a further 350,000 deaths.

The latest on the coronavirus

- The future of meetings (Sept 2nd)
- How the pandemic became stagflationary (Sept 2nd)
- Vaccine inequality will cost money as well as lives (Aug 30th)
- Australia is ending its zero-covid strategy (Aug 28th)
- To follow The Economist's coverage of the pandemic, visit our coronavirus hub

Europeans and their governments will be hoping that vaccines, developed in record time, as well as lockdowns will help to reduce infections. More than 30 countries have active inoculation programmes, which make use of three main vaccines, developed by Pfizer/BioNTech, Moderna, and AstraZeneca/Oxford University. So far 14m shots have been administered. Britain, which on December 8th was the first country in the world to begin vaccinations, has now given jabs to more than one person in 20.

Search country...

				Vaccinations per day, per 100,000
Ireland	6.84m	89.5%	82.0%	612.2
Spain	66.1m	88.0%	80.4%	596.8
Denmark	8.57m	87.3%	83.4%	452.2
France	87.9m	86.4%	71.9%	745.5
Belgium	16.2m	84.1%	81.2%	335.6
Finland	6.83m	83.0%	57.9%	796.4
Norway	6.95m	82.6%	66.0%	1,459.9
Britain	91m	82.5%	73.6%	284.3
San Marino	46.5k	80.5%	80.5%	198.3
Netherlands	21.9m	79.7%	71.3%	156.1
Sweden	12.7m	79.7%	66.8%	776.0
Italy	78.2m	78.7%	67.8%	503.2

152.2
340.3
647.9

Show all countries

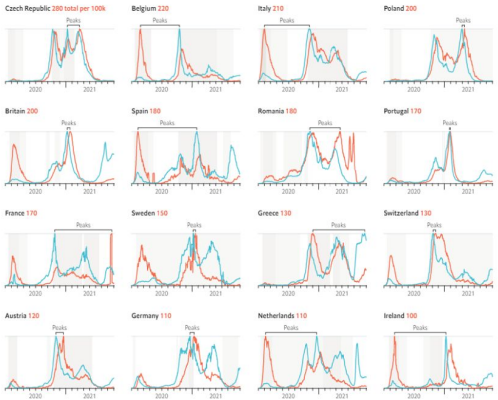
Although vaccination programmes offer hope that life can return to normal, they remain nascent. In the meantime, to assess how European countries are coping with suppressing the virus, The Economist has assembled data on covid-19 cases and deaths for 39 countries, and for 173 sub-national areas for which data are available. We present the total number of deaths per 100,000 in the population. We also break down the infection and death rates for the past seven days to give a better sense of where the virus is most active.

A different way of visualising these data is shown below, in time series for deaths and infections in 16 countries. To facilitate country-by-country comparisons, we have smoothed both variables using a seven-day moving average and indexed them so that each curve peaks at 100. Just three of the countries in our selection —Ireland, Spain and Sweden—have so far recorded fewer deaths during the second wave than the first. Largely because testing regimes have improved, all 16 have recorded far higher infection peaks than in the spring.

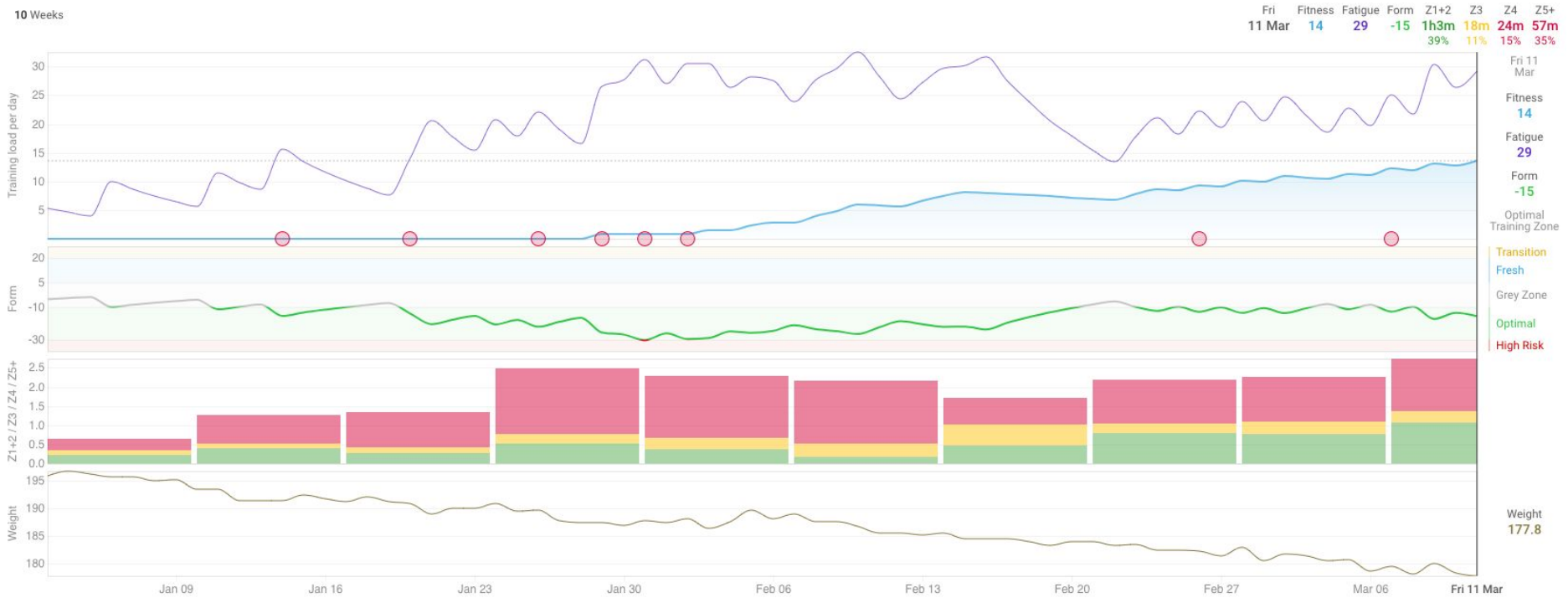
New covid-19 cases and deaths per 100,000 people

Scaled to peak, seven-day moving average, last updated on September 3rd 06:08 UTC

Confirmed cases — Confirmed deaths — Nationwide stay-at-home order, darker=more stringent



Analytic Dashboard



The blue line shows fitness. This is a 42 day exponentially weighted moving average of your training load. The purple line shows fatigue. This is a 7 day exponentially weighted moving average of your training load above the blue line. Your form is your fitness less fatigue. When your form is in the optimal training zone you are gaining fitness. When your form is fresh and you are fit then you are ready to race. Avoid staying in t weeks in your training to recover from fatigue and to be at your best for goal events. References: Monitoring your training load by Science2Sport and Managing Training Using TSB by Joe Friel

Fri 11 Mar 2022	09:24 AM	Avg HR	Intensity	Pace	Load	Weight
5.78 km	29m02s	175	99%	5:01/km	48	80.648

Morning Run ~ 2x 8m4s 178bpm 3m53s 182bpm

Dashboard Types

https://dashboarddesignpatterns.github.io/processguidelines.html

Worksheet 1:

What am I designing for?

Parameters (that you may not control)

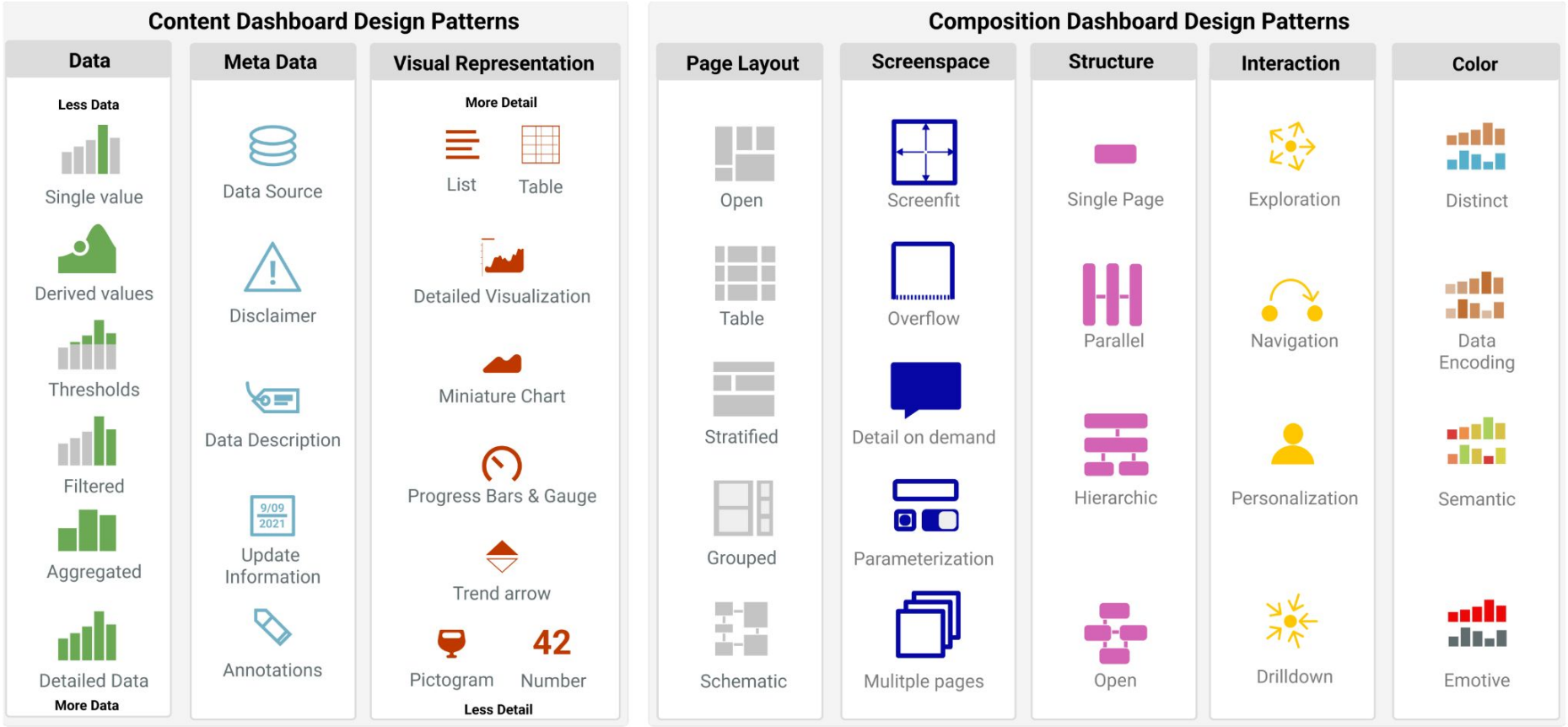
1. Who is your audience?
2. What is the context & devices they engage with the dashboard?
3. What are the tasks they perform / decisions they make?
4. What information do they need to fulfill these tasks / make these decisions?

Worksheet 1: Data, Use, & Genres

DATA *List and describe your data. What are the facets/dimensions in your data?*	**USE**	**GENRES** *Look at the Genre patterns. Pick 1-3 genres and describes how they might fit your scenario?*
	*Describe your **audience?** What does the audience know about the data?* *Describe the **information, tasks and decisions** your audience is performing? What do they know about these tasks? During which steps of their workflows and during which situations do they need access to the dashboard?* *What is the **context & devices** they engage with the dashboard? Is it a mobile, a 2nd screen, a wall-sized display, etc.? What else do they do when they consult the dashboard? How frequently do they consult the dashboard?*	 Static  Magazine  Analytical  Infographic  Mini  Repository  Slideshow

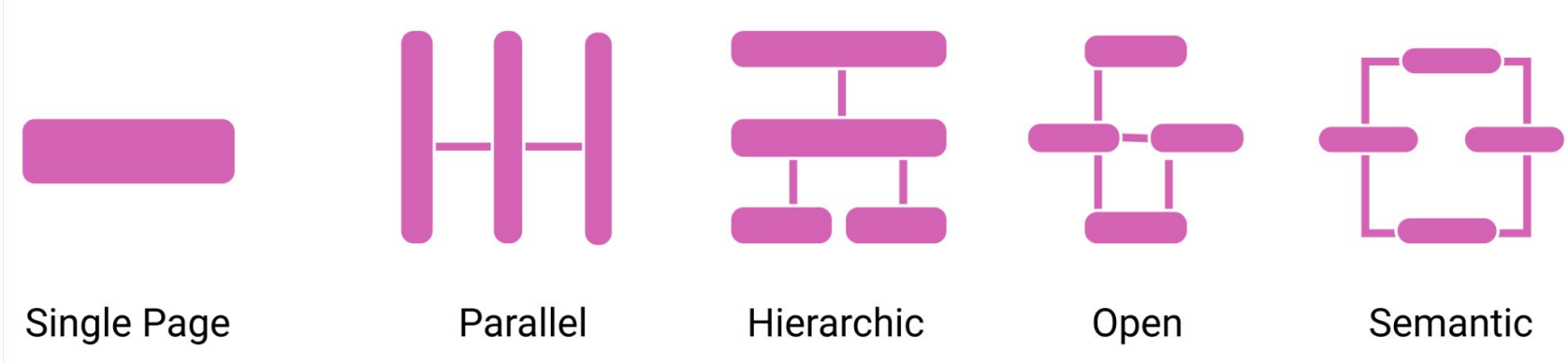
Design **Patterns**

23 Dashboard Design Patterns



Worksheet 2:
Structure

Structure Patterns



Worksheet 2: Structure Patterns

Look at the structure patterns and use the space below to draw possible dashboard structures. A page is a screen the reader sees at any given time. They could switch between pages using interaction.

1. Does your dashboard need (or can) have multiple separate pages?
2. How would you **group information meaningfully** across these pages?
3. What information **must be shown together** on the same page (don't be afraid of duplicating information)?
4. Pick one page to continue the workshop with. (you can repeat the following steps for each of your pages individually and make chances to your page design).

Single Page

Parallel

Hierarchic

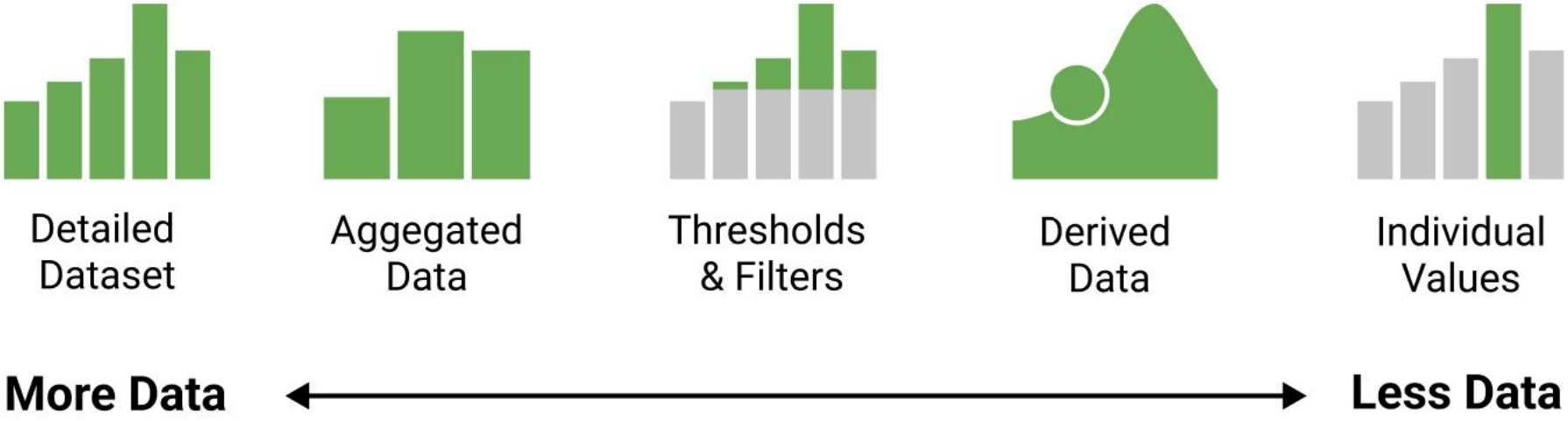
Open

Semantic

Worksheet 3

Data & Visual Encoding

Data Information



UK Summary

The official UK government website for data and insights on coronavirus (COVID-19).

See the simple summary for the UK.

Vaccinations

People vaccinated

Up to and including 10 March 2022

Daily – first dose
4,765

Daily – second dose
14,282

Daily – booster or third dose
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Individual Values

Total – first dose
52,692,089

Total – second dose
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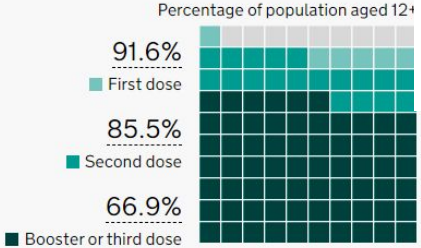
Total – booster or third dose
38,458,430

All vaccinations data

Percentage of population aged 12+



Detailed Dataset

Cases

People tested positive

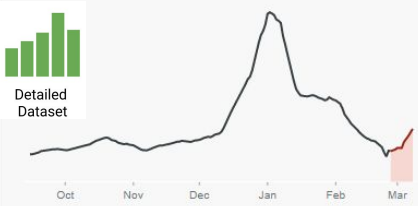
Latest data provided on 11 March 2022

Last 7 days
399,820
↑ 143,956 (56.3%)

▶ Rate per 100,000 people: **458.7**

Derived Data

Detailed Dataset



All cases data

Deaths

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Last 7 days
730
↑ 20 (2.8%)

▶ Rate per 100,000 people: **0.9**

All deaths data

Healthcare

Patients admitted

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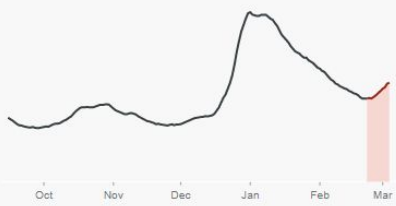
↑ 1,369 (16.9%)



All healthcare data

Testing

Virus tests conducted

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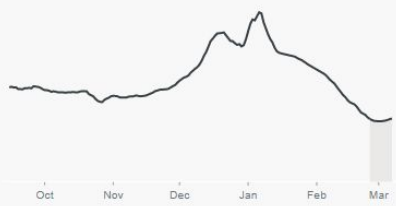


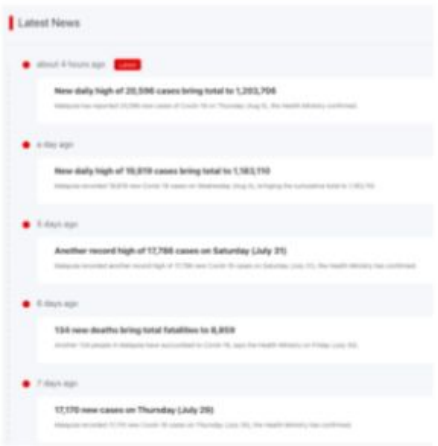
All testing data

Visual Representation

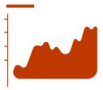
Visual Representation: Data Visualization

List

Table



Visual Representation: Data Visualization



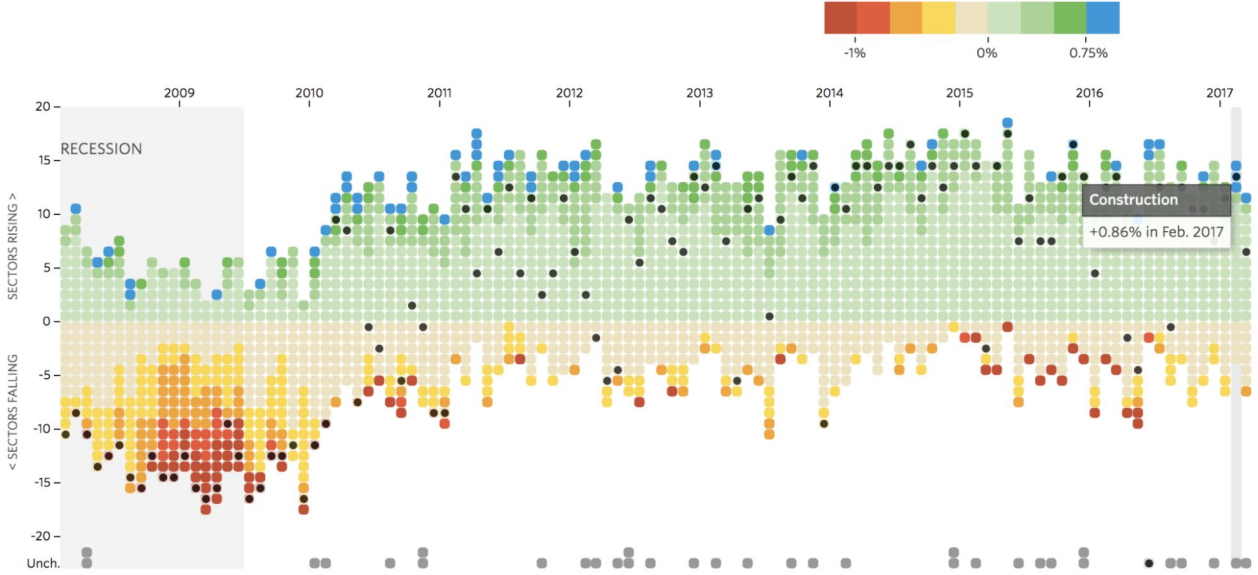
Detailed Visualization

Track National Unemployment, Job Gains and Job Losses

By **Andrew Van Dam** and **Renee Lightner**

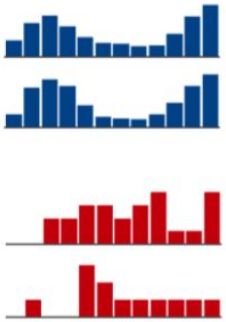
Winners and Losers: Job Gains and Losses Jump to National Unemployment

Track the number of sectors gaining or losing jobs each month. Boxes are shaded based on percentage change from the previous month in each sector's payrolls.



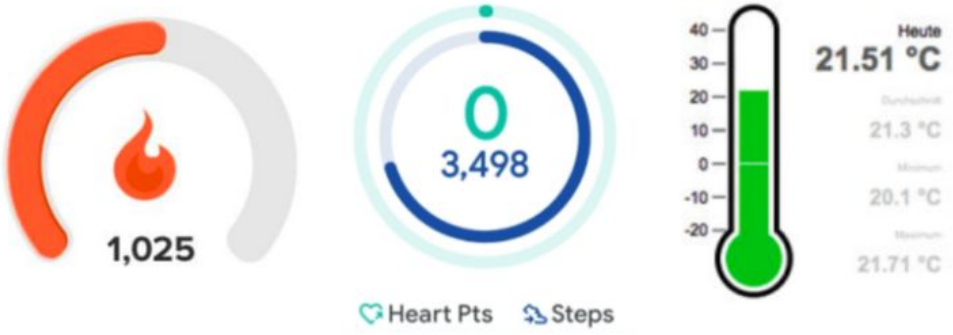
Visual Representation: Data Visualization

Miniature Chart



Visual Representations

Progress Bars
Gauges



(b) Gauges and progress bars (#19, #99, #16).

Visual Representations

Pictogram

42

Numbers

(a) Pictograms as *data* (#85, #37) and *index* (#102).

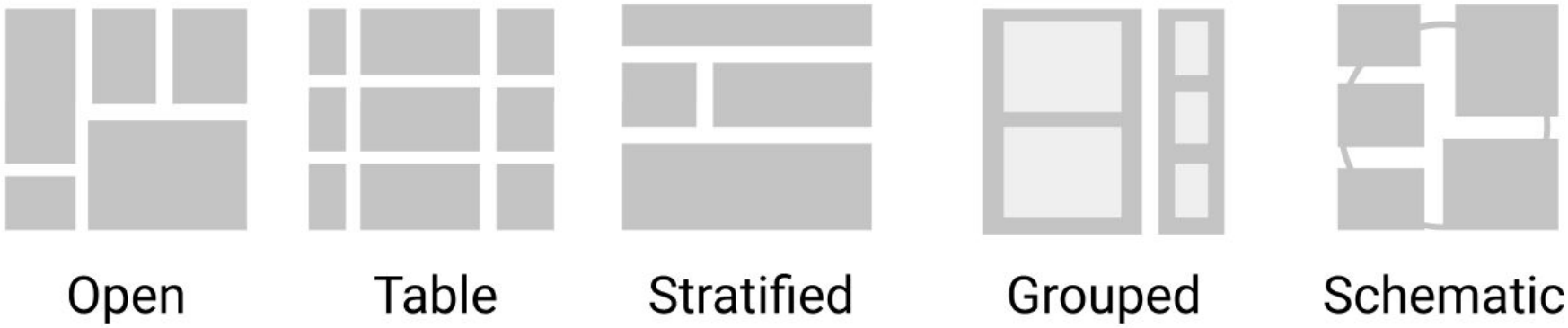
Worksheet 3: Data & Representation

DATA ABSTRACTION
Which level of abstraction would you chose for your data for the page you have chosen?

VISUAL REPRESENTATION
Which visual representations would you chose for the data and their abstractions?

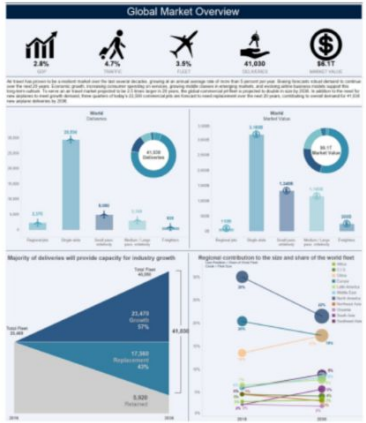
Worksheet 4:
Layout

Layouts

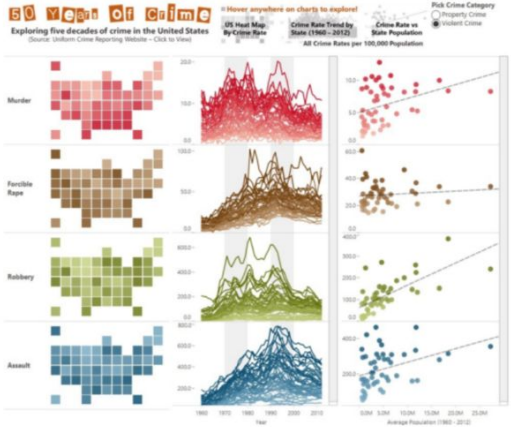


Open Layout

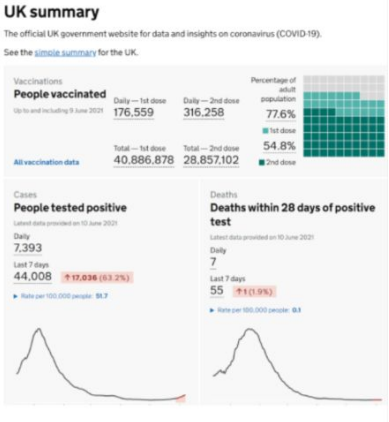
Strata Layout



Grid Layout



Grouped Layout



Worksheet 4: Layout

Look at the layout patterns. Which layout would make sense for your visualizations? Why? Use this page to experiment with different layouts. Use post-its to move components around easier.

Open

Table

Stratified

Grouped

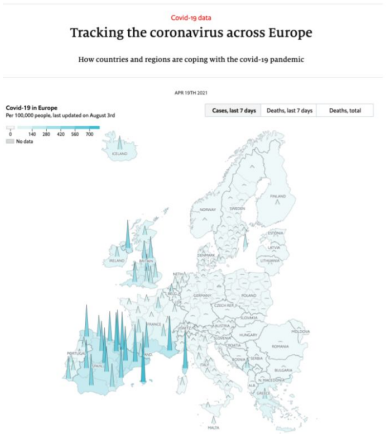
Schematic

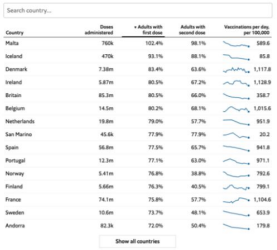
Design Patterns 5:
Screen space & Interaction

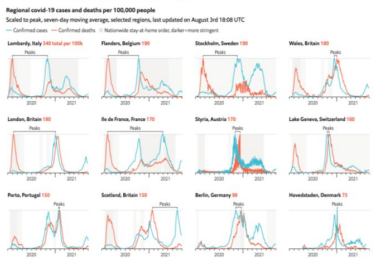
Pagination Patterns

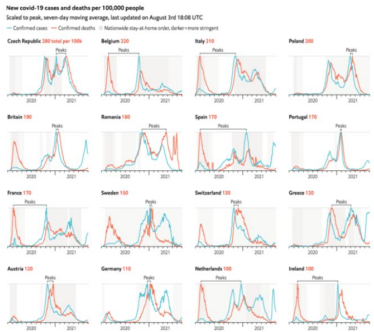
Pagination: Scroll

Overflow









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The latest on the coronavirus

- Does America face a growth slowdown? (Jul 22nd)
- India's economy is suffering from long covid (Jul 22nd)
- How common is long covid? (Jul 21st)
- Which covid-19 vaccine is the most widely accepted for international travel? (Jul 20th)
- To follow The Economist's coverage of the pandemic, visit our coronavirus hub

Europeans and their governments will be hoping that vaccines, developed in record time, as well as lockdowns will help to reduce infections. More than 30 countries have active inoculation programmes, which make use of three main vaccines, developed by Pfizer/BioNTech, Moderna, and AstraZeneca/Oxford University. So far 1.4m shots have been administered. Britain, which on December 8th was the first country in the world to begin vaccinations, has now given jabs to more than one person in 20.

Although vaccination programmes offer hope that life can return to normal, they remain nascent. In the meantime, to assess how European countries are coping with suppressing the virus, The Economist has assembled data on covid-19 cases and deaths for 39 countries, and for 173 sub-national areas for which data are available. We present the total number of deaths per 100,000 in the population. We also break down the infection and death rates for the past seven days to give a better sense of where the virus is most active.

A different way of visualising these data is shown below, in time series for deaths and infections in 16 countries. To facilitate country-by-country comparisons, we have smoothed both variables using a seven-day moving average and indexed them so that each curve peaks at 100. Just three of the countries in our selection —Ireland, Spain and Sweden—have so far recorded fewer deaths during the second wave than the first. Largely because testing regimes have improved, all 16 have recorded far higher infection peaks than in the spring.

In the charts below, we use the same presentation format as ones above, but for 12 selected sub-national areas. The shape of these curves is very similar to that of the national ones, yet there are important discrepancies. For example, after battling a severe outbreak of infections in the autumn, Britain's North West is now in effect in its third wave of the pandemic.

The table below presents the complete data for deaths and cases over the past week for each of the countries and regions that we are tracking. (You can sort each column by clicking on its header.) These figures are updated twice a day.

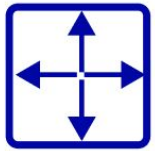
Region	Country	Population, '000	Cases last week per 100k	Deaths last week per 100k
Balearic Islands	Spain	1,188	831 ↑	1 ↓
Corsica	France	335	674 ↑	0 =
La Rioja	Spain	314	647 ↑	5 ↑
Navarre	Spain	650	633 ↓	1 ↑
Catalonia	Spain	7,566	626 ↓	1 ↑
Madrid	Spain	6,642	592 ↑	0 ↑
Basque Country	Spain	2,178	588 ↑	1 ↑
Provence-Alpes-Côte d'Azur	France	5,031	574 ↑	0 ↑
Aragon	Spain	1,321	572 ↓	3 ↑
Galicia	Spain	2,700	530 ↑	1 ↑
Andalusia	Spain	8,427	520 ↑	1 ↑
Valencia	Spain	4,975	512 ↑	1 ↑
Cantabria	Spain	582	501 ↑	1 ↑
Castile and León	Spain	2,408	499 ↓	2 ↑
Extremadura	Spain	1,065	472 ↑	1 ↑

Show all regions

As ever, some caution is required when interpreting these statistics. Differences in the amount of covid-19 testing and occasionally in the recording of deaths means that direct comparisons between one country's statistics and another's can be tricky. For an all-encompassing measure of covid-19's toll, see our excess-death mortality data, which compare overall death rates in each country with the historical average. However, excess-mortality data are often incomplete and are released with a delay of several weeks or more. Subnational data thus provide useful and timely information on the progress of the pandemic.

To keep up with our coverage of the pandemic, visit our coronavirus hub. Some of our covid-19 coverage is free for readers of The Economist Today, *our daily newsletter.*

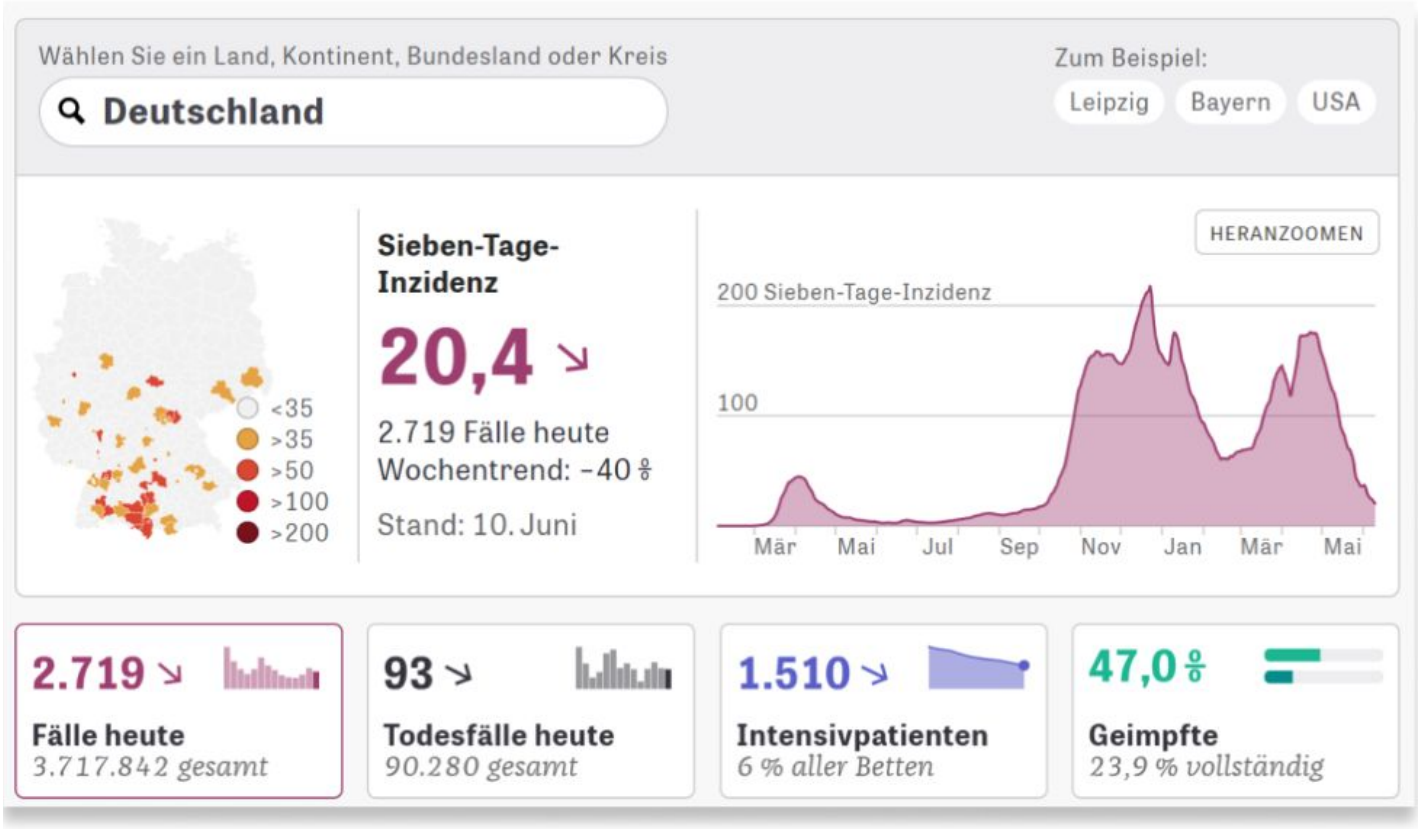
Pagination: Screenfit



Screenfit

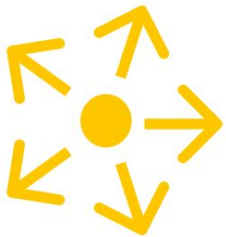
Mulitple pages

Parameter -ization



Pagination Patterns

Interaction Patterns



Exploration

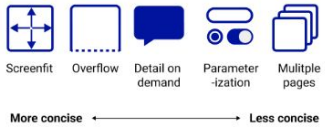
Navigation

Personal-
ization

Filter &
Focus

Worksheet 5: Screen space & Interaction

SCREEN SPACE
If you are running out of screenspace, how could you support navigation to the off-screen content, e.g., on other pages?



INTERACTION
Do you need interaction in your dashboard? What do you need interaction for? How can this interaction be supported in the UI?

Final mockup

Worksheet 6: Final Mockup

Create a detailed mockup of your dashboard, using your choices and exploration from the other worksheets. Create two versions if you cannot decide at this time.

Show and **tell**!