

# Workshop 1

## Data and dashboards in the context of AMR

Bernard Hernandez  
b.hernandez-perez@imperial.ac.uk  
Department of Medicine  
Imperial College London  
<https://bahp.github.io/portfolio-academic/>

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# Academic journey...

- **Rey Juan Carlos University (URJC), Madrid, Spain**

- B.Sc. in Telecommunications

- B.Sc. in Computer Science



- **Royal Institute of Technology (KTH), Stockholm, Sweden**

- M.Sc. in Machine Learning



- **Imperial College London (ICL), London, United Kingdom**

- Ph.D. in Computer Science and Healthcare

- Research Assistant

- Postdoctoral Research Associate

- Postdoctoral Research Fellow



# Dashboard design workshop structure

## Talk: Introduction to dashboard design patterns

- Speaker: Bernard Hernandez, Imperial College London
- Talk (~20 min), Q&A (~10 min)

## Discussion: Existing examples of AMR dashboards

- Showcase 2/3 examples of existing AMR dashboards
  - Discuss data needs, features, design choices, and challenges
- Discussion (~30 min)

## Hands-on activity: Dashboard design challenge

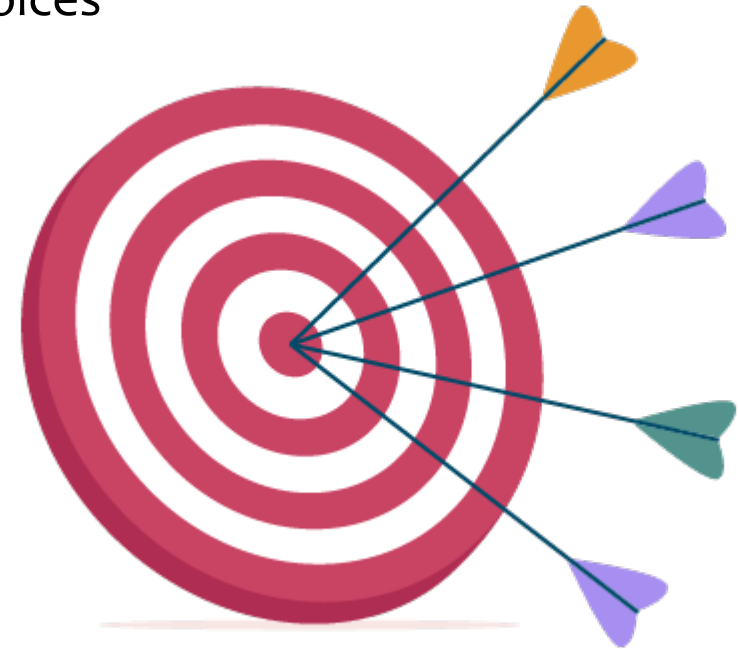
- Divide participants in N groups (5-10 min)
  - Discuss data and information to display (15-20 min)
  - Design their own AMR dashboard (sketch) (20-30 min)
  - Presentation, discussion and feedback (15 x N min)
- Activity (~90 min)



# Aim of the workshop

## Goals

- **Learn** about design guidelines around dashboards
- Understand **design decisions** and trade-offs
- Make **deliberate design** decisions and reflect on these choices
- **Design your own dashboard** in the form of sketches
- **Discuss** your design with peers and learn from others



# The prerequisites...

## Prerequisites

- This workshop **does not require** any specific skills!
- Ideally, you **have an idea** for some sort of project:  
Some **data/topic** you want to design a dashboard for.

Some **context** for the dashboard:

Who is the dashboard for?

How is the dashboard going to support people?

Where do people see (and interact) with the dashboard?



# Workshop 1.1: Talk

## Introduction to dashboard design patterns



**Bernard Hernandez**

Research Fellow  
Centre for Antimicrobial Optimization  
Department of Infectious Diseases  
Imperial College London

# What is a dashboard?

## Definition

A dashboard presentation is the **visual representation** of the metrics, key performance indicators (KPIs), market trends, customer behaviour, and the most important information of various organizational departments or a specific process or project in a concise, unified, and **easy-to-understand** manner for the purpose of data analysis and making **informed choices and actions**.

- Promote better decision-making
- Improves accountability
- Facilitates collaboration and keeps teams aligned
- Enable timely decisions
- Surface early warnings
- Evaluation of progress
- Surveillance

Let's focus on those within **healthcare** and/or **daily clinical practice**.



# Designing an effective dashboard...

## User needs and considerations

- What will users do with the **data**?
- What **decisions** will users make based on the dashboard?
- How will they **interact** with the data?
- Do they want to **explore** the data?
- Do they need the **story** told to them?
- What **trends** do they need to understand?
- What **context** do they need to understand the data?
- Will users have the **time** to get insight out of dashboards?





# What is the development process?

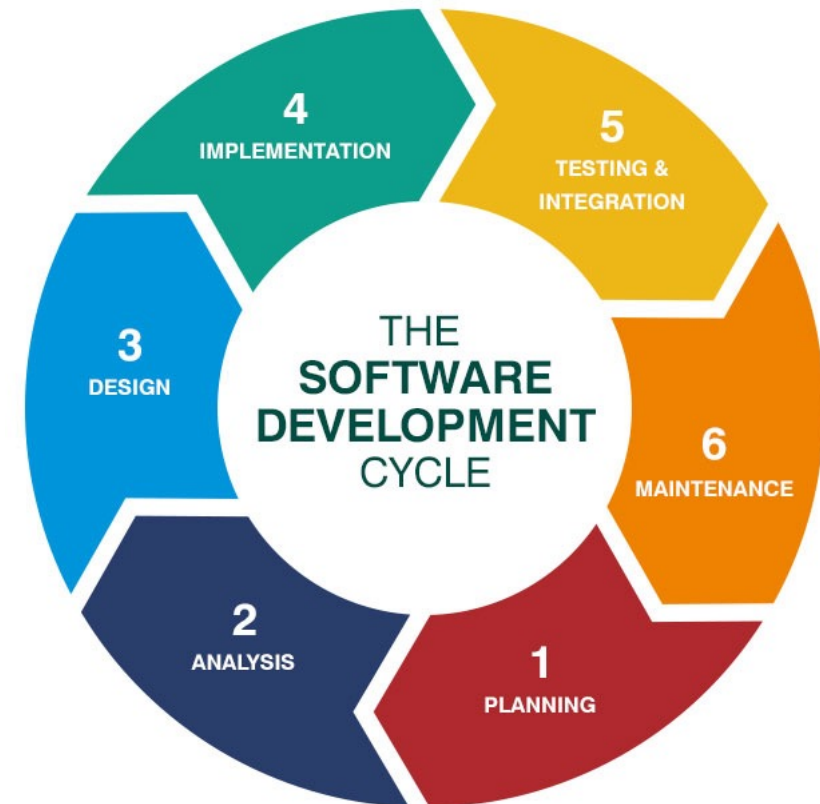
## Software Development Lifecycle

1. Brainstorming & Goals
2. Requirement Analysis & Plan
3. Design & Architecture
4. Coding & Implementation
5. Testing & QA
6. Deployment
7. Maintenance & Feedback
8. Retirement

Private beta – limited access for selected users

Public beta – open to wider user participation

Live – fully operational for general use



# Before you start ...

## Avoid duplication

Your institution may already be publishing dashboards. Research the scope of your current dashboards to avoid duplication. Duplication can be **confusing for users**.

## Check your organization standards and guidance

Your institution may have their own **standards and guidance** for who designs and builds digital products. Make sure you find out before you start, and work with those teams.

## Invite people with a wide range of skills

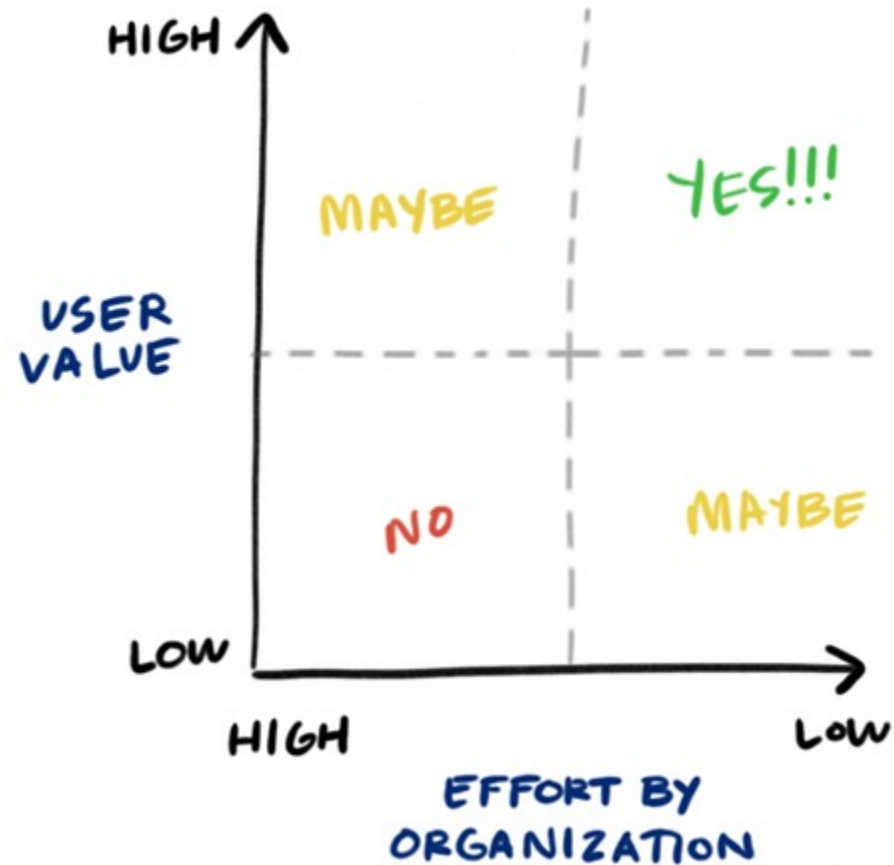
Analysts  
Data visualisation designers  
Web content/service designers  
Communication professionals

Healthcare professionals  
Stakeholders

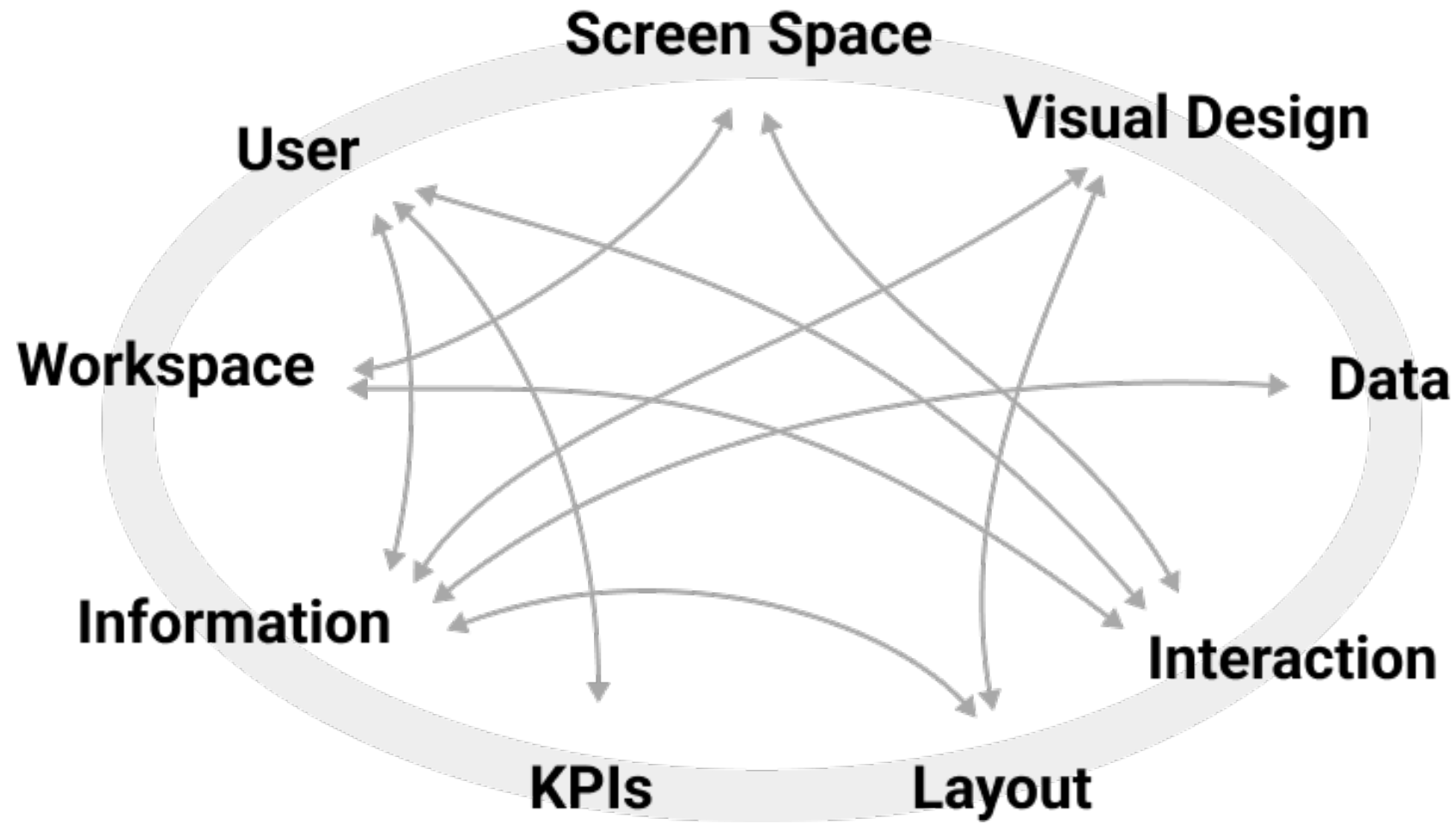
**Your TARGET AUDIENCE!**



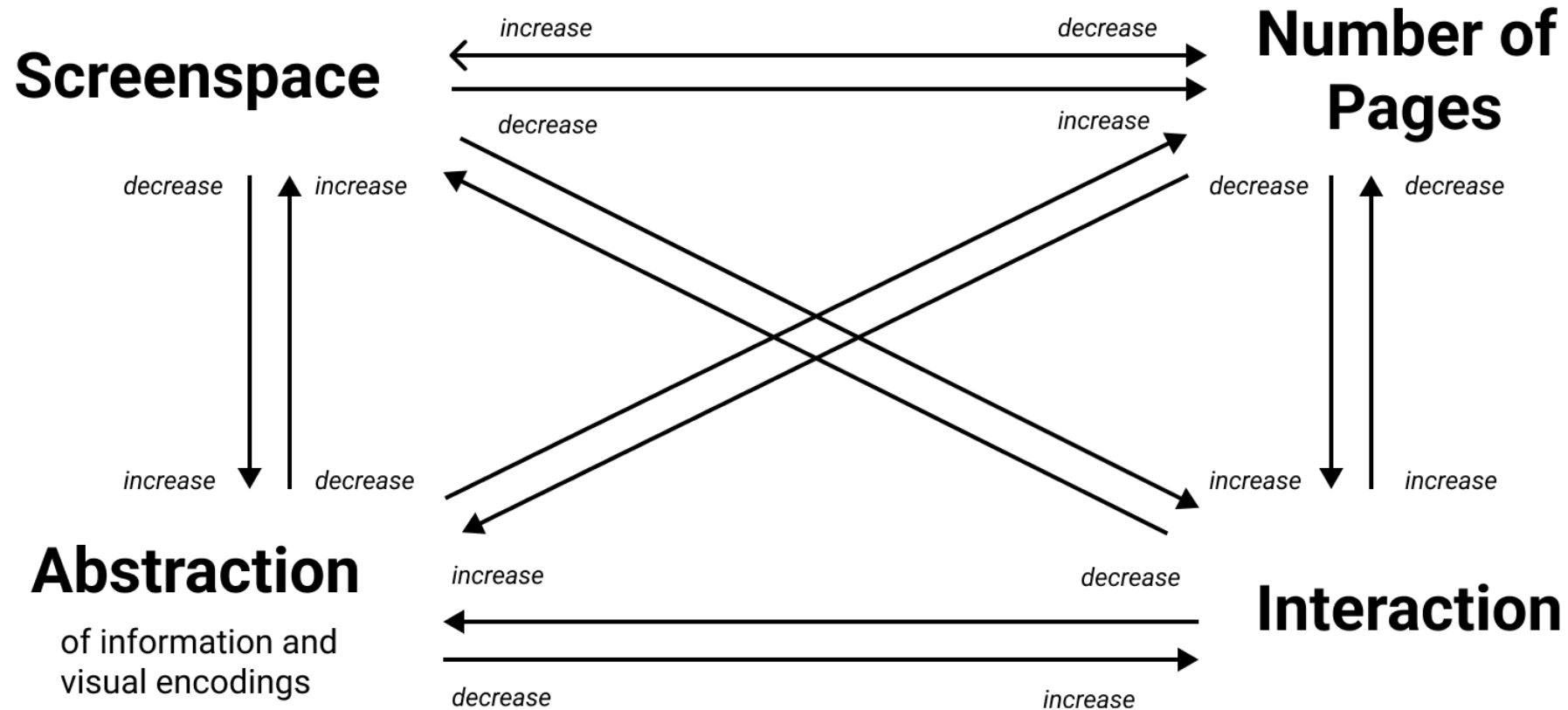
# Strategic planning: assessing effort and value



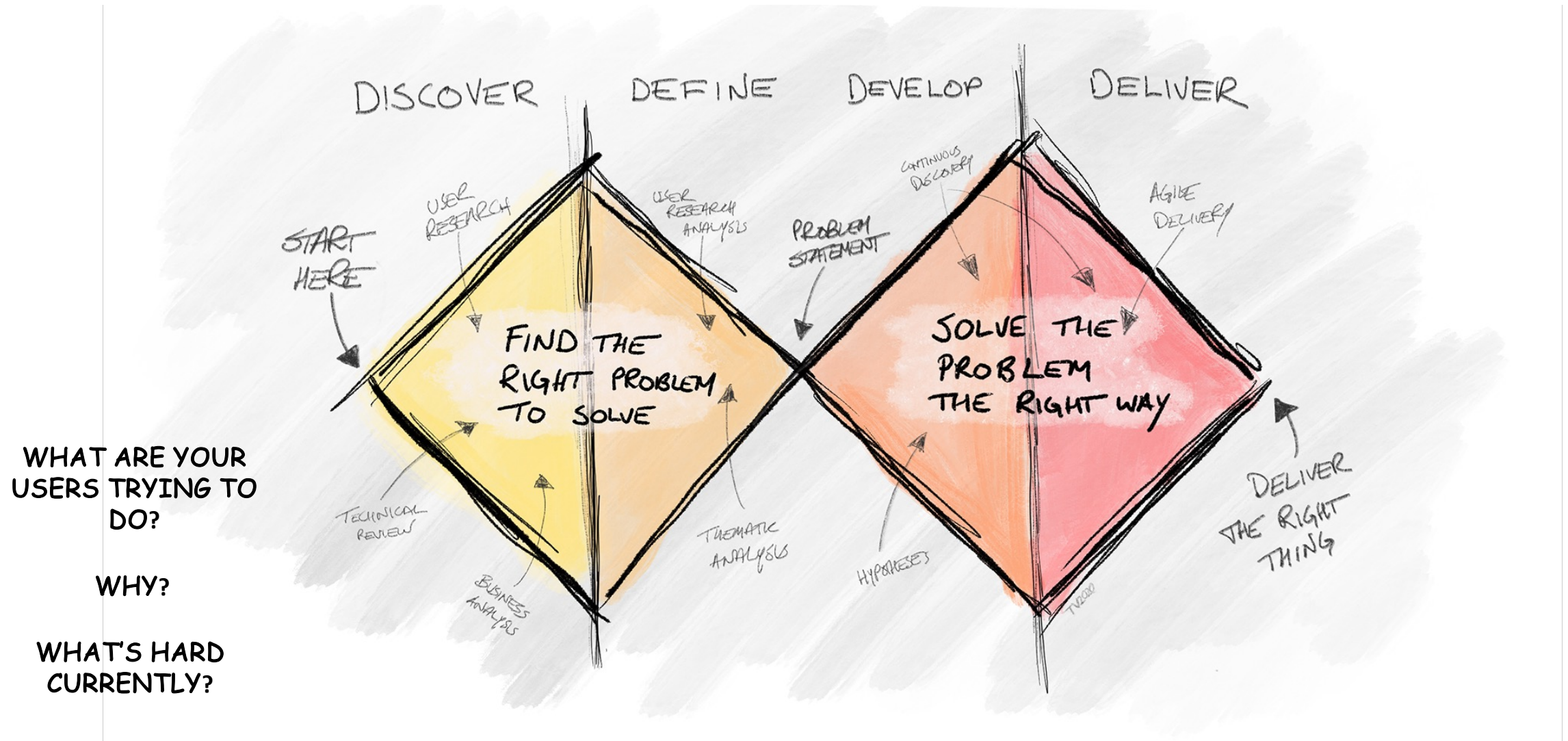
# What am I designing for?



# Trade-offs in dashboard design



# Design thinking process: The double diamond



# Some useful design guidelines...

## 1. Don't overwhelm viewers

2. Avoid visual clutter

3. Avoid poor visual design

## 4. Carefully chose metrics

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

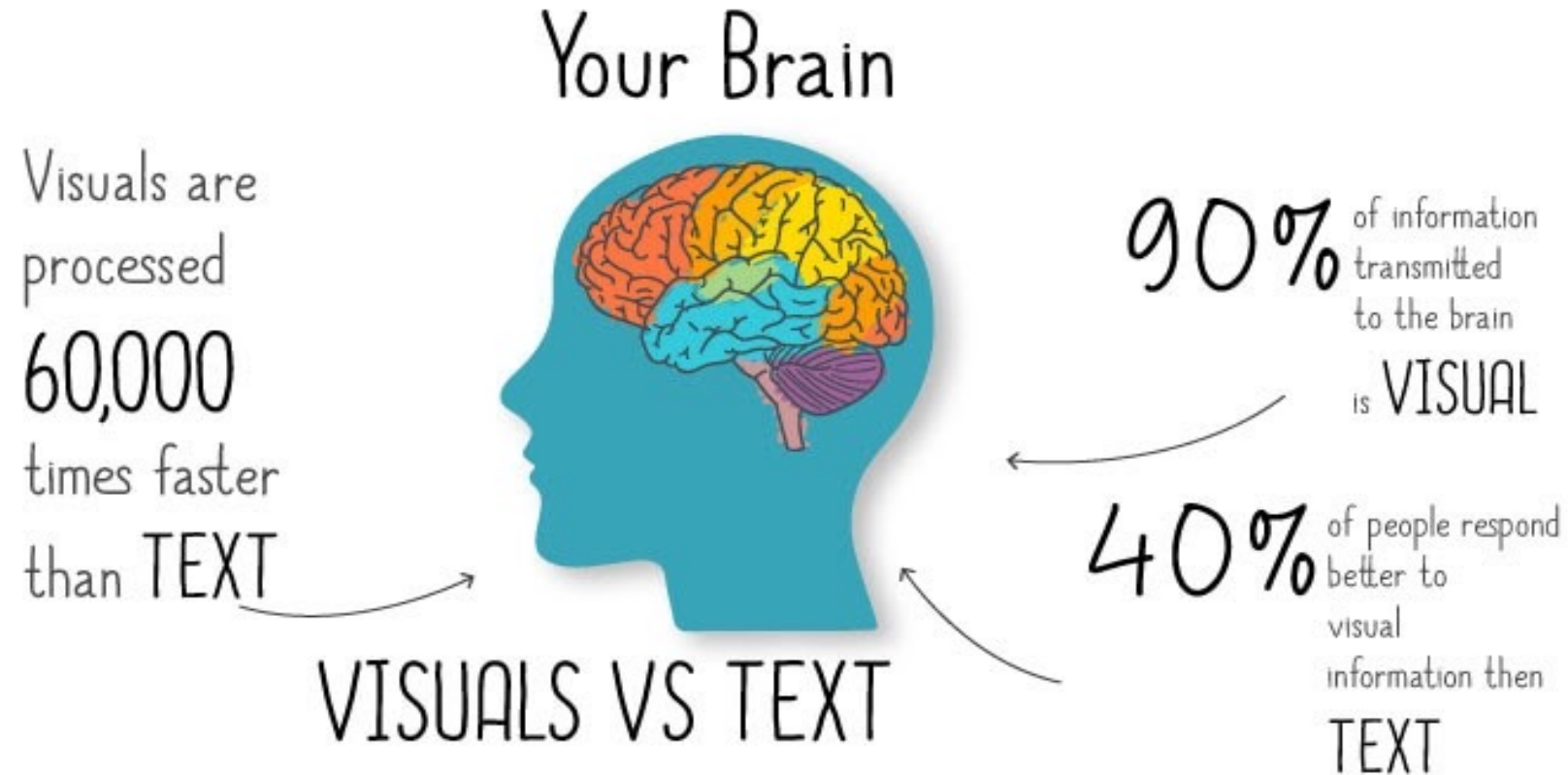
## 18. Context is very important

## 19. State your metadata

20. Use color carefully

And more!

# Cognitive process: The power of visuals!





# Dashboard types

## I. Operational dashboards

Present **critical information that's time-relevant**. For example, in web analytics, could include information like active users on the site, top social referrals, and page views per minute.

## II. Analytical dashboards

Present **key data reflected against previous performance**. They should be data-centric. Should minimize graphical elements.

## III. Strategic dashboards

Are used to indicate **performance against a set of key performance indicators (KPIs)**. It should reflect how the user is performing against their strategic goals.



# Steps to create a dashboard

## I. Define the goal/purpose

This step ensures that the dashboard **serves its intended audience** effectively and meets the specific needs related to the corresponding domain (AMR).

### Monitoring and Identify Trends

- Infection rates
- Resistant pathogens
- Antimicrobial Usage

### Enhancing clinical decision-making

- Resistance patterns and recommendations
- Reduce inappropriate antibiotic use
- Improve patient outcomes

### Informing Public Health actions

- Provide data to guide interventions
- Support outbreak detection and response
- Understand socio-economic factors

### Promoting Research and Innovation

- Identify research gaps
- Support development of new antimicrobials
- Foster collaborative research

### Facilitating Education and Awareness

- Healthcare professional training
- Public awareness campaigns
- Advocate for policy changes

### Strengthening infrastructure

- Enhancing laboratory capabilities
- Expanding hospital coverage
- Building surveillance networks

Purpose

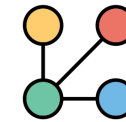
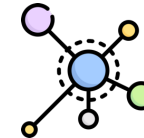


# Steps to create a dashboard

## I. Choose the metrics relevant to the goal

Choosing the **right metrics** is essential to ensure that the dashboard addresses the previously defined goals and provides valuable insights.

- Prevalence (%) (e.g., pathogen prevalence)
- Incidence rates (number per 100.000 inhabitants)
- Mortality rates (number per 100.000 inhabitants)
- Length of stay and readmission rates
- Geographical distribution (e.g., regions)
- Categories (e.g., MDR, genomic characterization, ...)
- Defined Daily Doses (DDD) per 1000 inhabitants
- Coverage (e.g., vaccination)
- Compliance (e.g., adherence to infection control)
- Healthcare access (e.g., hospitals per 10.000 inhabitants)
- Socio-economic impact (e.g., cost burden)



Purpose

Metrics

**TREND:** Changes of all the previous metrics over time.

# Step to create a dashboard

## III. Present the data

Present your **data in an organized manner**, and group them into relevant categories to facilitate the **cognitive analysis** by the audience.

**TIP:** Define your components so that they are reusable!

**TIP:** Consider easy to understand visual representations.

Mhfg Helvetica

Mhfg PT Sans

Mhfg PT Sans

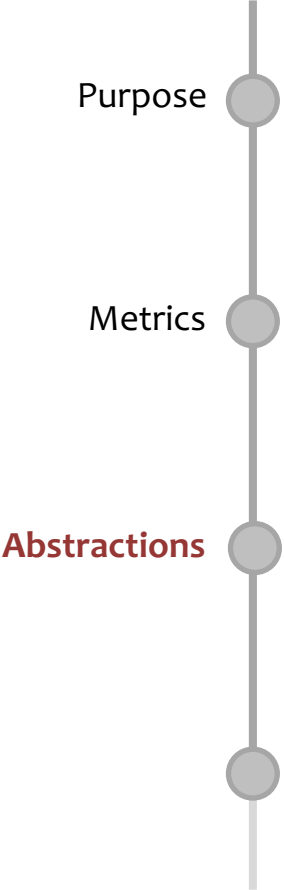
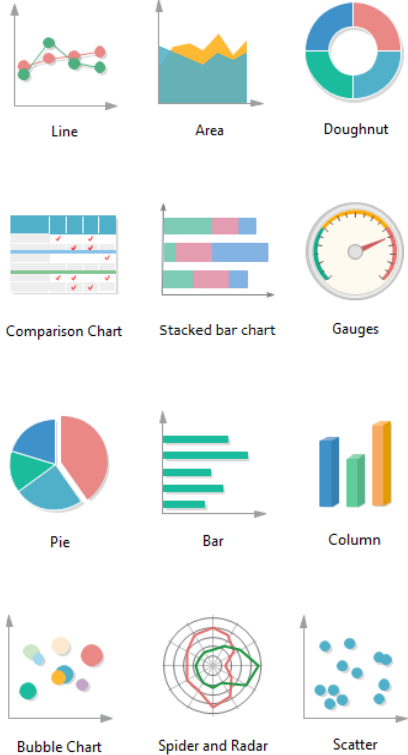
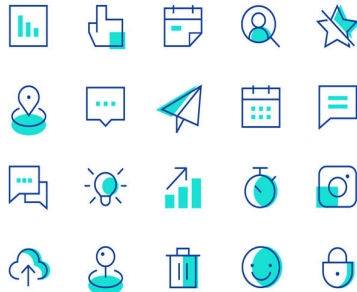
Mhfg Times

Mhfg Avant Garde

Mhfg Shelby

Mhfg scrabble

48 pt  
60 pt  
72 pt  
84 pt



Font style

Font size

Color palette

Iconography

Figures / Charts

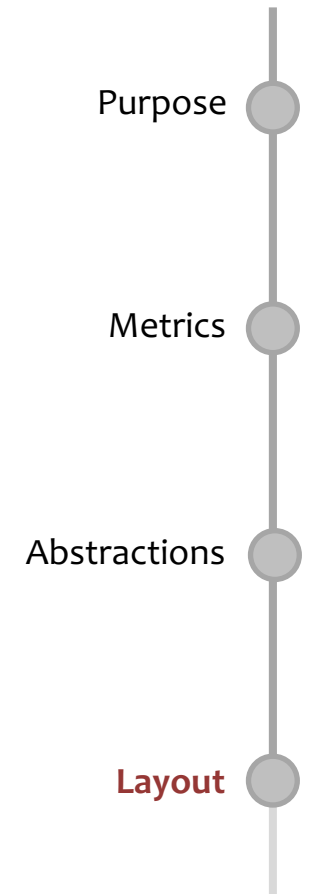
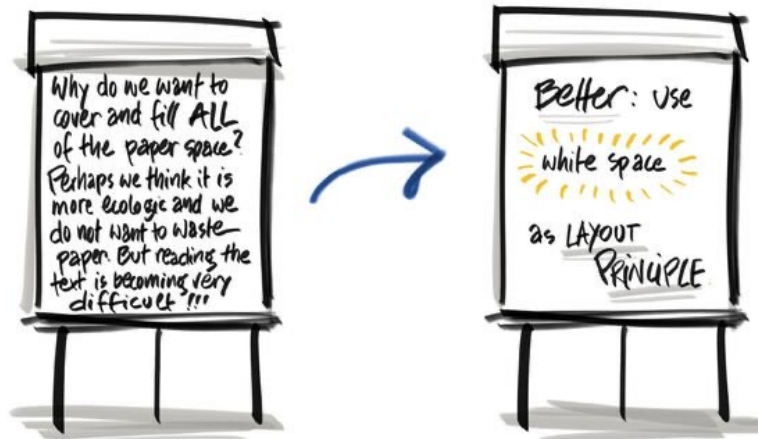
# Steps to create a dashboard

## IV. Choose the right layout

Usually, the audience reads the information presented on a screen or page from left to right and/or top to bottom. Gain insights into where your audience will likely look first and accordingly place your data.

**TIP:** You can also follow the relevant UX design principles.

**TIP:** Use white space as a layout principle



# Tips to ace dashboard storytelling

## I. Make it **audience-centric**



Put yourself in your audience's shoes to outline your story according to their goals. The better you know the audience, the more effectively you will meet their expectations.

## II. Keep it **simple**



Craft a clear and understandable narrative that flows logically. Use a structured format, like "cause-and-effect" or "problem-solution-benefit" as to provide guidance to your audience.

## III. Provide **context**



Without context, data is just a bunch of numbers. The context is like an anchor in your data story that keeps the audience engaged and motivates them to act on your message.

## IV. Make it **interactive**

Make them interesting and more informative by adding interactivity. Adding interactive elements is important if your dashboard has a broad target audience. It also hands power to the user!



## V. Strike a **words/visuals balance**

Too much content or too much visuals – both are detrimental to your dashboard. Use different alignments, fonts, colors, and sizes for visuals and text to create a hierarchy.



## III. Avoid too much scrolling

Avoid too much scrolling. Specially, avoid horizontal scrolling. Remember to think about how the dashboard looks on different devices like phones or tablets.



# Other things to consider...

## I. Responsive design

Design your dashboard to adapt seamlessly to different screen sizes and devices, ensuring users have a consistent and accessible experience whether they are on a desktop, tablet, or smart-phone.



## II. Centralize repository / prioritize data security

If necessary, implement robust security measures to safeguard the data displayed on your dashboard if necessary. This includes data encryption, user authentication.



## III. Ensure high performance

Optimize your dashboard to load quickly and perform efficiently even with large datasets. This involves using efficient queries, caching frequently accessed data, and optimizing visual elements to ensure a smooth and responsive user experience.



# Useful links, software packaged and tools

## I. From **scratch**

Involves using web technologies and data visualization libraries. **Pros:** maximum customization. **Cons:** time-consuming and programming knowledge required.



## II. Using **generic** frameworks

These tools provide pre-build functionalities and drag-and-drop interfaces. **Pros:** fast development, user friendly and accessible for non-developers. **Cons:** Limited customization options and can be expensive.



## III. **Domain specific** frameworks

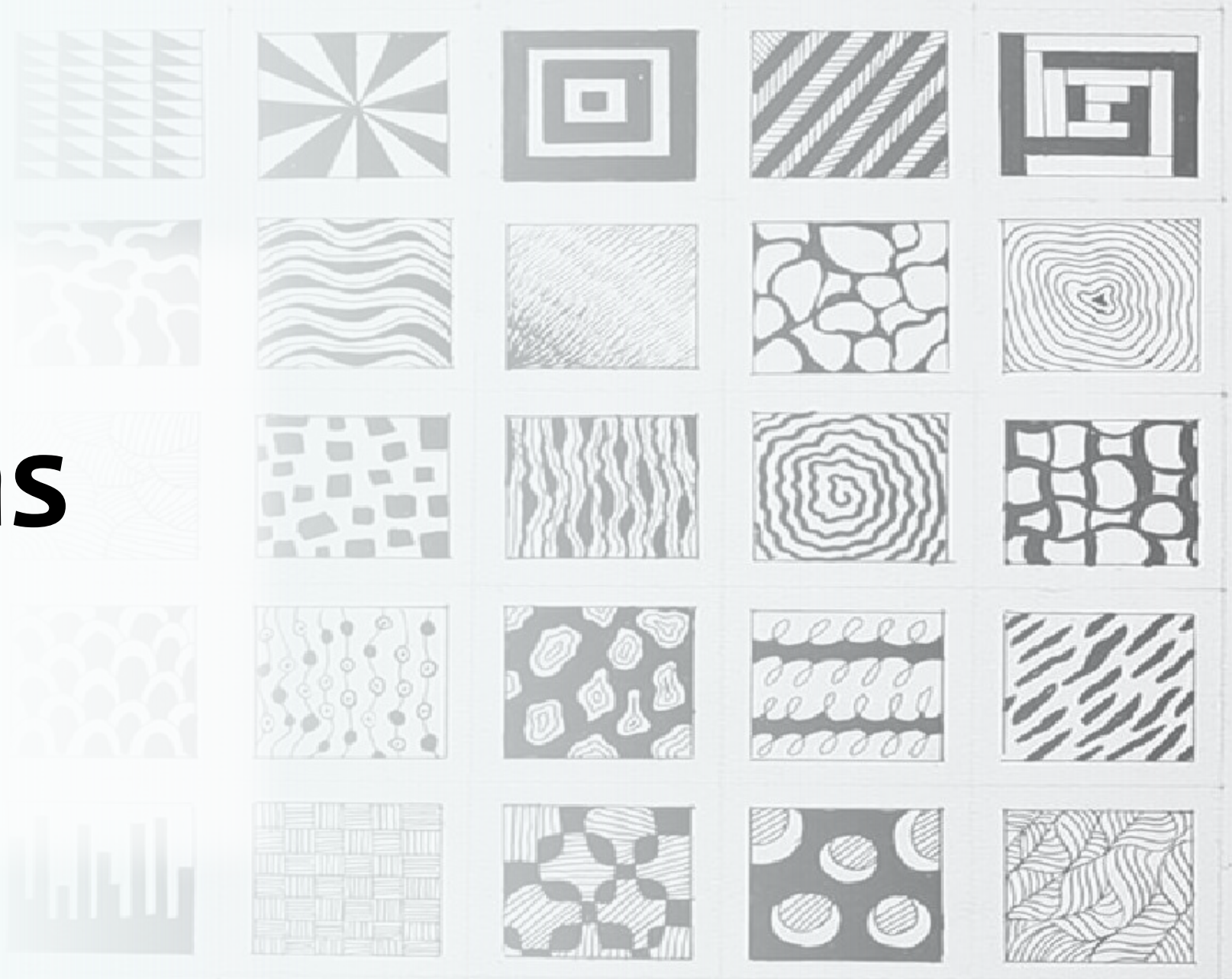
These are tools designed for specific industries or use cases. **Pros:** Highly relevant features and analytics tailored to certain domains. **Cons:** Lack of flexibility for broader applications outside domain. May required domain-specific knowledge to use.



1. **Microreact:** <https://microreact.org/>
2. **Data-flo:** <https://data-flo.io>
3. **Pathogenwatch:** <https://pathogen.watch>



# Design Patterns



# Dashboard genres

## Static

Non interactive and flat structure.

## Magazine

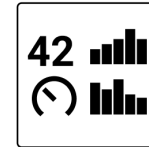
The text goes beyond the basic meta information and provides **storytelling**. These are typically created by news agencies and similar media outlets.

## Infographic

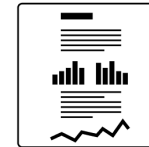
Include **decorative graphical elements** and use non-meta information to annotate and embellish the data. Focus on story telling for static datasets (snapshot).

## Embedded (mini)

These concise miniature dashboards only occupy a **small area** on the screen and usually come with a range of interactive features for navigation and/or to parametrize content.



Static



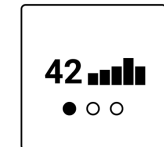
Magazine



Infographic



Mini



Slideshow



Repository



Analytical

























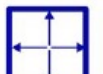
















## Analytic

These type uses **complete visualisations**. Many of the elements are fully interactive, providing for various exploration and navigation strategies. Often multiple pages.

## Repository

List **multitude of charts** on a single website with overflow page structure which makes proper analytics difficult. Offer extensive metadata information.

# Dashboard design patterns: cheat sheet

Content Dashboard Design Patterns			Composition Dashboard Design Patterns				
Data	Meta Data	Visual Representation	Page Layout	Screenspace	Structure	Interaction	Color
<p><b>Less Data</b></p>  <p>Single value</p>  <p>Derived values</p>  <p>Thresholds</p>  <p>Filtered</p>  <p>Aggregated</p>  <p>Detailed Data</p> <p><b>More Data</b></p>	 <p>Data Source</p>  <p>Disclaimer</p>  <p>Data Description</p>  <p>Update Information</p>  <p>Annotations</p>	<p><b>More Detail</b></p>  <p>List</p>  <p>Table</p>  <p>Detailed Visualization</p>  <p>Miniature Chart</p>  <p>Progress Bars &amp; Gauge</p>  <p>Trend arrow</p>  <p>Pictogram</p>  <p>Number</p> <p><b>Less Detail</b></p>	 <p>Open</p>  <p>Table</p>  <p>Stratified</p>  <p>Grouped</p>  <p>Schematic</p>	 <p>Screenfit</p>  <p>Overflow</p>  <p>Detail on demand</p>  <p>Parameterization</p>  <p>Multiple pages</p>	 <p>Single Page</p>  <p>Parallel</p>  <p>Hierarchic</p>  <p>Open</p>	 <p>Exploration</p>  <p>Navigation</p>  <p>Personalization</p>  <p>Drilldown</p>	 <p>Distinct</p>  <p>Data Encoding</p>  <p>Semantic</p>  <p>Emotive</p>

# Design patterns: Data Information

## I. Data

This group captures the type of information shown in a dashboard. It ranges from the presentation of raw data to several levels of **abstractions**.



Single value



Thresholds  
& Filters



Derived  
values



Aggregated



Detailed  
data

1

### Individual value

Specific data points in a dataset such as the **most recent**, the **highest** or the **lowest** value.

### Derived value



Includes information derived from the data such as a calculated **trend** (8% up) or **prevalence** (incidence value per fixed population).

### Thresholds & Filters



Show a **subset** of the original dataset (e.g., the last 14 days) or using a threshold to make a judgement (e.g., those with high incidence)

### Aggregated

Result of bringing together numerous data points into a new and more concise datapoint. For example, the data values of single region are aggregated to show the **mean** for the whole country.



### Detailed

Offers a more complete representation of the data often showing the raw data. For example, showing all the points in a **time-series**.



# Design patterns: Metadata

## I. Metadata

Provides additional information to **provide context**. You need to think where the data is coming from. You should also think about what the data can and cannot be used for. Avoid misleading or incorrect stories.

### Data source

Identifies **where the data comes from**, and often includes links and explanations about how the data was collected and analyzed.

### Data description

Identifies **what data is showing** and includes a high-level description of the data. It might also include the range of dates considered.

### Update information

Identifies **when was the last update** (or next).



Data  
Source



Data  
Description



Update  
Information



Disclaimer



Annotations

### Disclaimer

Indicates **specific assumptions** in the data processing, decision in data visualization and any additional context for the data and its presentation.

### Annotations

Extra **graphical embellishments** added to the dashboard to highlight specific points, changes, or developments in the data. It might include links to definitions, guidance, methodology, ...

# Design patterns: Interactions

## III. Interactions

These are common interaction approaches found within dashboards. Interaction can exist through interactive data, user interface elements, and window-level interactions (e.g., scrolling).

### Exploration

Allows users to **explore data elements** and relations between them. Interactions can include brushing and linking interactions that link data across different views or detail-on-demand interactions through pop-ups or tooltips.

### Navigation

It is used to **direct users through information** and can occur between different components or pages (tabs, links, transitions). It can in a particular sequence (constrained) or allow free navigation (unconstrained)



Exploration



Navigation



Personalization



Filter &  
Focus

### Personalization

It allows user to **reconfigure the information** shown within the dashboard. For example, adding new graphs, resizing elements or reordering elements.

### Filter and focus

Allows users to find or **focus on specific data**. For example, by searching for specific data values, or periods of data. These interactions are facilitated by user interface elements such as checkboxes, text fields, buttons, range sliders, ...

# Design patterns: Structure

## III. Structure

Describes how a dashboard organizes information across multiple pages, and the implied relationship between those pages. It influences user navigation.

### Single page

Presents all information **in one page**.

### Open

**Less rigid** relationship between pages.

### Parallel

Information is distributed across multiple pages, all considered to be at the **same level** with no hierarchical relationship. For example, each page represents different faces of the data.



### Hierarchical

Information is distributed across multiple pages, with a **structured relationship** (hierarchy). For example, the levels Country -> State -> Towns

### Semantic

Information distributed across multiple pages, whose relationships are determined by the **semantics of the information** being shown. For example, a dashboard for an organization -> Divisions -> Results

# Design patterns: Layout

## III. Page layout

It describes how the widgets<sup>1</sup> are laid out and sometimes implicitly grouped together in a dashboard view. Note that combinations can be used.

### Open

Widgets of different sizes and aspects ratios are laid out with **no apparent rules**. There is no strong semantic association with the location or adjacency of the widgets.

### Table (grid)

Widgets are **aligned into columns and rows**, each with a specific semantic and inducing a repetition of information and visual encodings. Rows/columns can represent faces of the data.



Open



Grid



Schematic



Stratified



Grouped

### Schematic

Widgets alignment is informed by an **external property** such as a physical layout (floor map), or geographic location.

### Stratified

These emphasize a **top-down ordering** of widgets and their information. For example, from general, to specific information. Indicators -> Trends -> Details





### Grouped

Group various widgets with a specific relation.

1. Widget: Defines the small unit of information on the screen.  
 2. Dashboard design patterns – <https://github.com/dashboarddesignpatterns/dashboarddesignpatterns.github.io>



# Demo: Gentellela alela

-  Schematic
-  Overflow
-  Multiple pages
-  Hierarchic

 Aggregated Number

42

 Detailed data

Detailed

 Navigation



Trend arrow



Derived value



Filter & Focus



List



Progress bar



Gauge

**Widget:**  
Minimum display unit

# Workshop 1.2: Discussion

## Existing examples of AMR dashboards



**Bernard Hernandez**

Research Fellow  
Centre for Antimicrobial Optimization  
Department of Infectious Diseases  
Imperial College London

# List of some AMR dashboards

## I. WHO GLASS

The World Health Organization (WHO) Global Antimicrobial Resistance and Use Surveillance System (GLASS) provides a standardized approach for collection, analysis and sharing of AMR data.  
Scope: Global



## II. CDC AR&PSP

The Centre for Disease Control and Prevention (CDC) Antimicrobial Resistance & Patient Safety Portal (AR&PSP) dashboard offers data on AMR, hospital-acquired infections and patient safety.

Scope: United States



## III. EARS-Net

The European Antimicrobial Resistance Surveillance Network (EARS-Net) collects data on AMR from clinical isolates and offers annual reports, interactive maps and trend analysis tools.

Scope: Europe



## IV. UKHSA AMR data

The United Kingdom Health Security Agency (UKHSA) AMR data provides detailed surveillance data on antimicrobial resistance with trends and patterns.

Scope: United Kingdom



1. **WHO GLASS:** <https://www.who.int/initiatives/glass>
2. **CDC AR&PSP:** <https://arpsp.cdc.gov/>
3. **EARS-Net:** <https://www.ecdc.europa.eu/en/about-us/networks/disease-networks-and-laboratory-networks/ears-net-data>
4. **UKSHA AMR data:** <https://fingertips.phe.org.uk/profile/amr-local-indicators>

# List of some AMR dashboards

## V. AMRSNET

The Africa CDC AMR Surveillance Network aims to strengthen AMR surveillance and response by providing data and reports on AMR trends and patterns.

Scope: Africa



## VI. AURA

The Antimicrobial Use and Resistance in Australia (AURA) surveillance system provides comprehensive data on AMR trends, usage data and resistance. It is provided by the Australian Commission on Quality in Health Care (ACSQHC).

Scope: Australia



## VII. PAHO/WHO Regional AMR

The Pan American Health Organization (PAHO) regional AMR surveillance dashboard provides reports and resources for health professionals. See also ReLAVRA for Latin America.

Scope: America



## VIII. WPRO AMR surveillance

The WHO Western Pacific Region (WPRO) AMR surveillance system provides aggregated data on AMR trends and patterns. See SEARO AMR surveillance for south-east Asia.

Scope: Asia

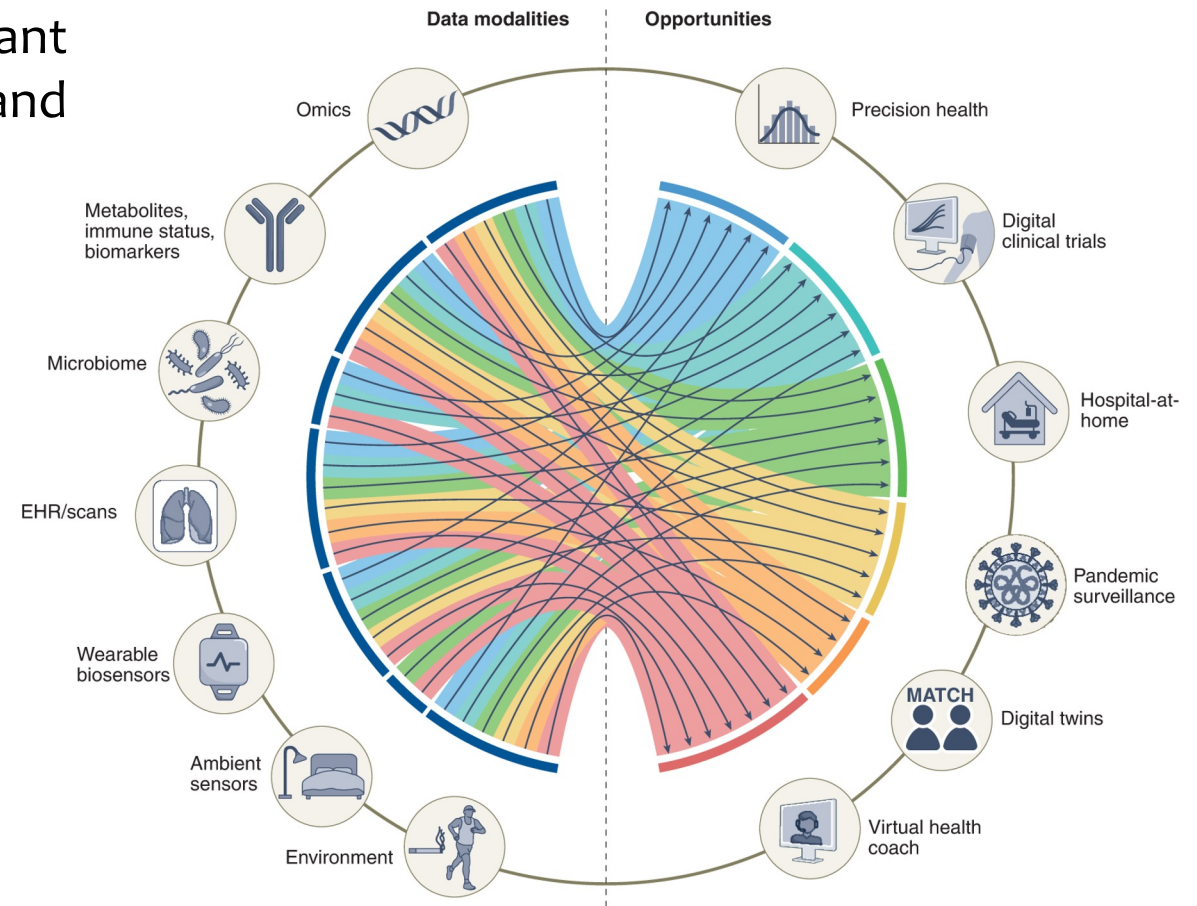


1. **AMRSNET:** <https://africacdc.org/download/africa-cdc-framework-for-antimicrobial-resistance/>
2. **AURA:** <https://www.safetyandquality.gov.au/our-work/antimicrobial-resistance/antimicrobial-use-and-resistance-australia-aura>
3. **PAHO/WHO Regional AMR:** <https://www3.paho.org/data/index.php/en/mnu-topics/antimicrobial-resistance.html>
4. **WPRO:** <https://data.wpro.who.int/>
5. **WHO SEARO AMR surveillance:** <https://www.who.int/southeastasia/health-topics/antimicrobial-resistance>

# Key considerations for data integration in dashboards

**Choosing** your **data wisely** is extract relevant metrics and facilitate both **implementation** and **adoption**.

- Clinical Relevance
- Data availability
- Quality of Data
- Frequency of Data Updates
- Cost of Data Collection
- Resource requirements
- Turnaround time
- Robustness to Missing Data
- Preprocessing requirements
- Clinical workflow integration
- Interoperability with Existing Systems
- Ethical and Legal considerations
- Setting (e.g., LMIC, ICU, ...)



Acosta et al – Multimodal biomedical AI – Nature medicine (2020)

# Example 1: UKHSA COVID-19 data dashboard

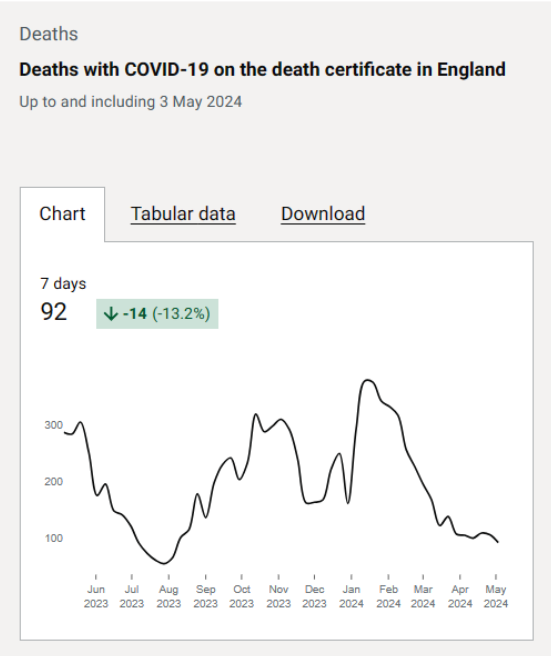
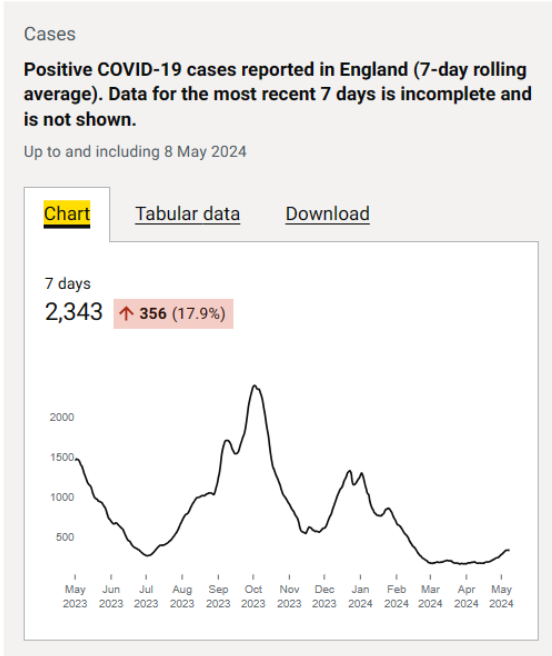
## Dashboard type

### COVID-19

Summary of data. For more detailed data, go to the [COVID-19 page](#).

Cases	Deaths	Healthcare	Vaccines	Testing
Weekly Up to 8 May 2024	Weekly Up to 3 May 2024	Patients admitted Up to 28 Apr 2024	Autumn booster uptake Up to 15 Feb 2024	Virus tests positivity Up to 4 May 2024
2,343	92	1,596	69.3%	9.2%
7 days Up to 8 May 2024	7 days Up to 3 May 2024	7 days Up to 28 Apr 2024		
↑ 356 (17.9%)	↓ -14 (-13.2%)	↑ 392 (32.6%)		

## Composition



## Content

# Example 1: UKHSA COVID-19 data dashboard

## Dashboard type

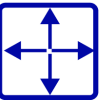


Static

## Composition



Stratified



Screen-fit

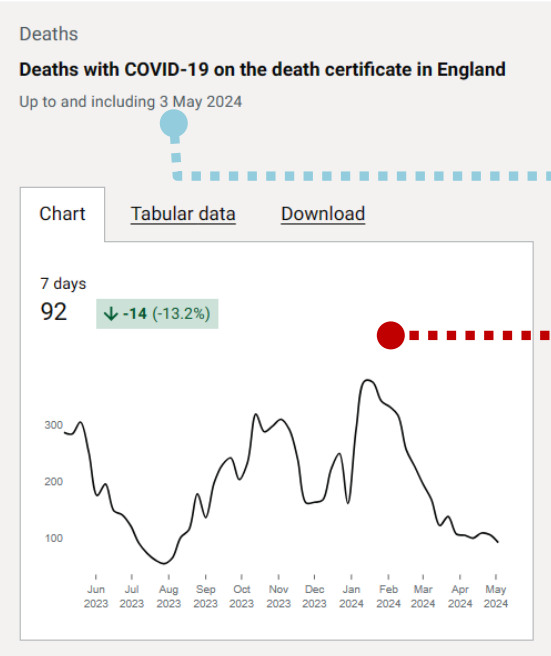
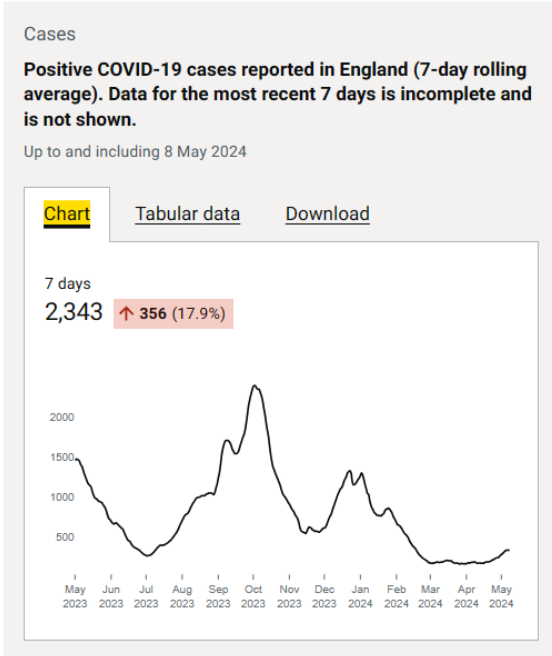


Single Page

## COVID-19

Summary of data. For more detailed data, go to the [COVID-19 page](#).

Cases	Deaths	Healthcare	Vaccines	Testing
Weekly Up to 8 May 2024 2,343	Weekly Up to 3 May 2024 92	Patients admitted Up to 28 Apr 2024 1,596	Autumn booster uptake Up to 15 Feb 2024 69.3%	Virus tests positivity Up to 4 May 2024 9.2%
7 days Up to 8 May 2024 ↑ 356 (17.9%)	7 days Up to 3 May 2024 ↓ -14 (-13.2%)	7 days Up to 28 Apr 2024 ↑ 392 (32.6%)		



## Content

42

Number



Derived values



Trend Arrow



Derived values



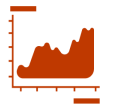
Thresholds & Filters



Annotations



Data Description



Detailed Visualisation

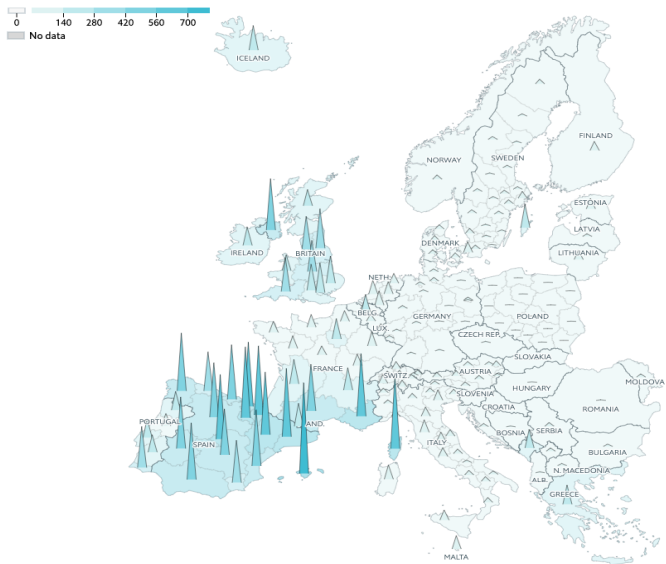


Detailed data

# Tracking the coronavirus across Europe

How countries and regions are coping with the covid-19 pandemic

Covid-19 in Europe  
Per 100,000 people, last updated on August 3rd



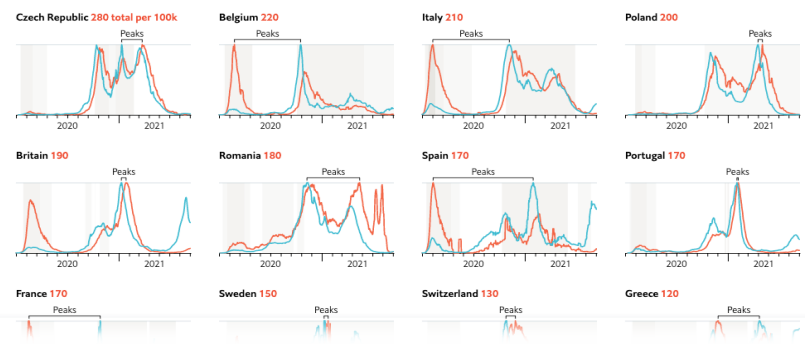
Country	Doses administered	Adults with first dose	Adults with second dose	Vaccinations per day per 100,000
Malta	760k	102.4%	98.1%	589.6
Iceland	470k	93.1%	88.1%	85.8
Denmark	7.38m	83.4%	63.6%	1,117.8
Ireland	5.87m	80.5%	67.2%	1,128.9
Britain	85.3m	80.5%	66.0%	358.7
Belgium	14.5m	80.2%	68.1%	1,015.6
Netherlands	19.8m	79.0%	57.7%	951.9
San Marino	45.6k	77.9%	77.9%	20.2
Spain	56.8m	77.5%	65.7%	941.8
Portugal	12.3m	77.1%	63.0%	971.1
Norway	5.41m	76.8%	38.8%	792.6
Finland	5.66m	76.3%	40.5%	799.1
France	74.1m	75.8%	57.7%	1,104.6
Sweden	10.6m	73.7%	48.1%	653.9
Andorra	82.3k	72.0%	50.4%	179.8

[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.

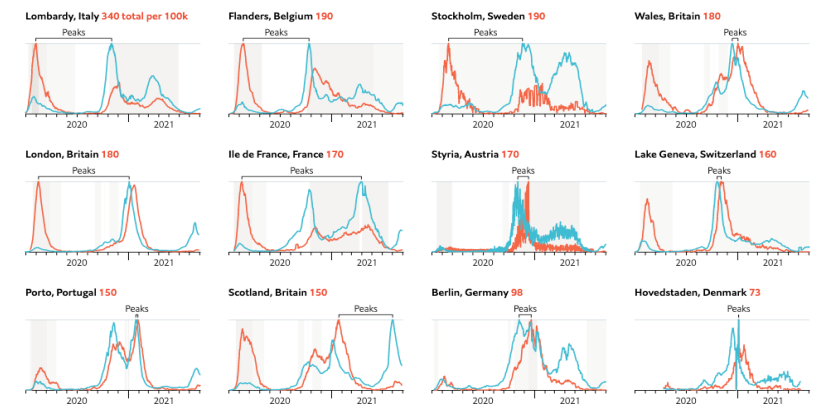
A different way of visualising these data is shown below, in time series for deaths and infections in 16 countries. To facilitate country-by-country comparisons, we have smoothed both variables using a seven-day moving average and indexed them so that each curve peaks at 100. Just three of the countries 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 August 3rd 18:08 UTC



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.

Regional covid-19 cases and deaths per 100,000 people  
Scaled to peak, seven-day moving average, selected regions, last updated on August 3rd 18:08 UTC



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](#)

- 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

# Example 2: Tracking coronavirus across Europe

<https://www.economist.com/graphic-detail/tracking-coronavirus-across-europe>



## Dashboard type



Magazine

## Composition



Grid



Overflow



Single Page

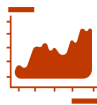
## Content



Table



Miniature Chart

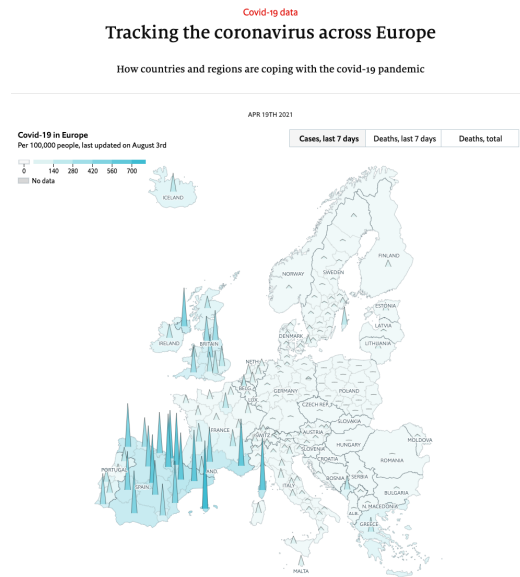


Detailed Visualisation

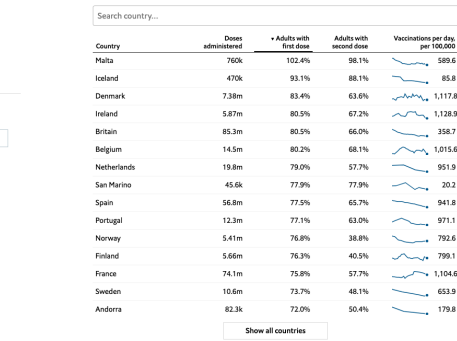


Annotations

Page 1a



Page 1b

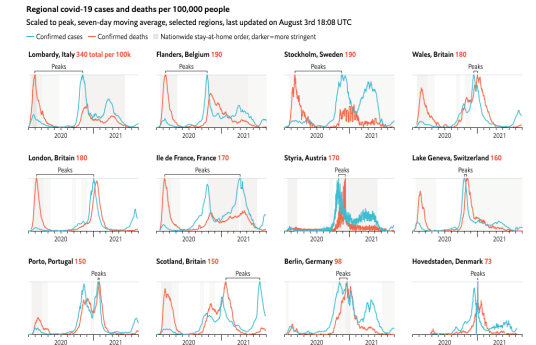


Although vaccination programmes offer hope that life can return to normal, they remain nascent. In the meantime, to assess how European countries are coping with suppressing the virus, The Economist has assembled data on covid-19 cases and deaths for 39 countries, and for 173 sub-national areas for which 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.

Page 1c

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.

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Extremadura	Spain	1,065	472 ↑	1 ↑

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.

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**
- 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 jobs to more than one person in 20.

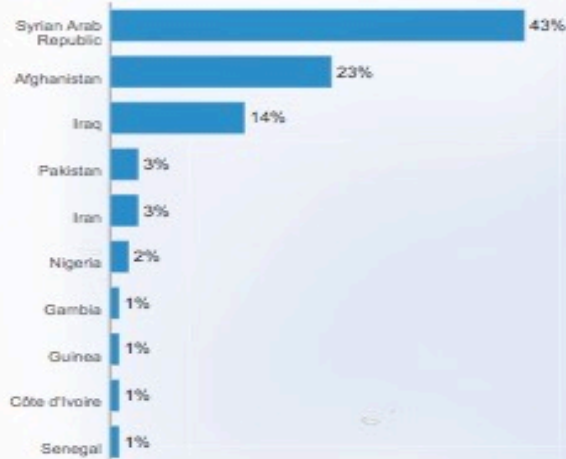
# Example 2: Tracking coronavirus across Europe

https://www.economist.com/graphic-detail/tracking-coronavirus-across-europe

Increasing numbers of refugees and migrants take their chances aboard unseaworthy boats and dinghies in a desperate bid to reach Europe. The vast majority of those attempting this dangerous crossing are in need of international protection, fleeing war, violence and persecution in their country of origin. Every year these movements continue to exact a devastating toll on human life.

### Top-10 nationalities of Mediterranean sea arrivals

Top-10 nationalities represent **92%** of the sea arrivals based on arrivals since 1 Jan 2016



# Example 3: Refugees emergency response

Dashboard type



Infographic

Composition



Open



Overflow



Parallel

Content

42

Number



Pictogram



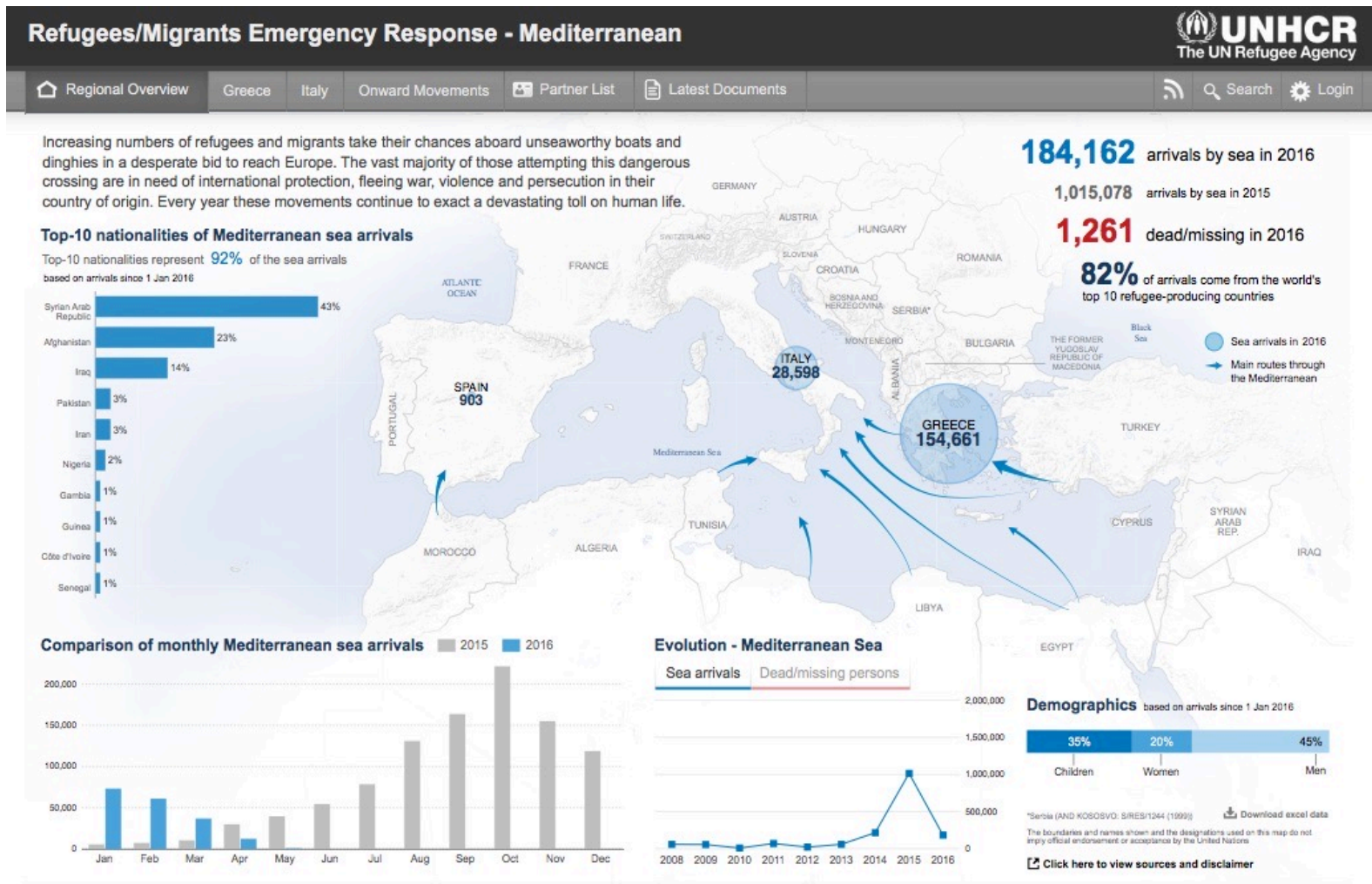
List



Miniature Chart



Annotations



Example 3: Refugees emergency response



Overview

Country/Area:

Western Pacific Region

Malaria incidence

1,852,585 Estimated cases | 2022  
1,015,796 Reported confirmed cases | 2022



Malaria deaths

3,631 Estimated deaths | 2022  
313 Reported deaths | 2022



% of confirmed cases

86.12 % | 2022



% of Plasmodium falciparum cases

36.5 % | 2022



Incidence rate

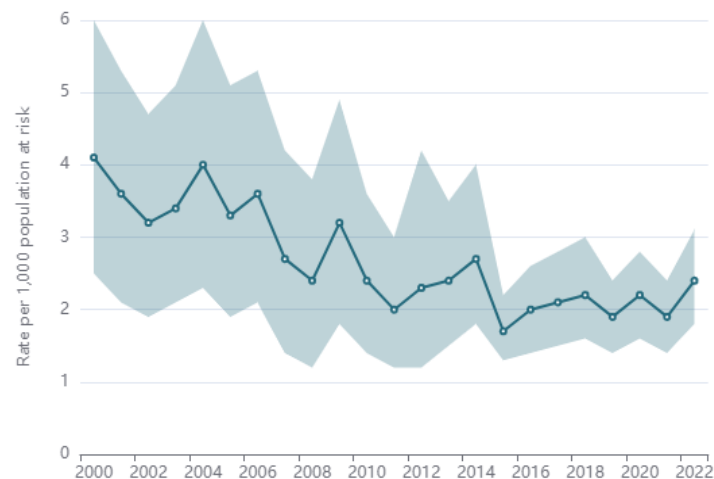
Incidence

Death rate

Death

Estimated rate of malaria incidence

Western Pacific Region



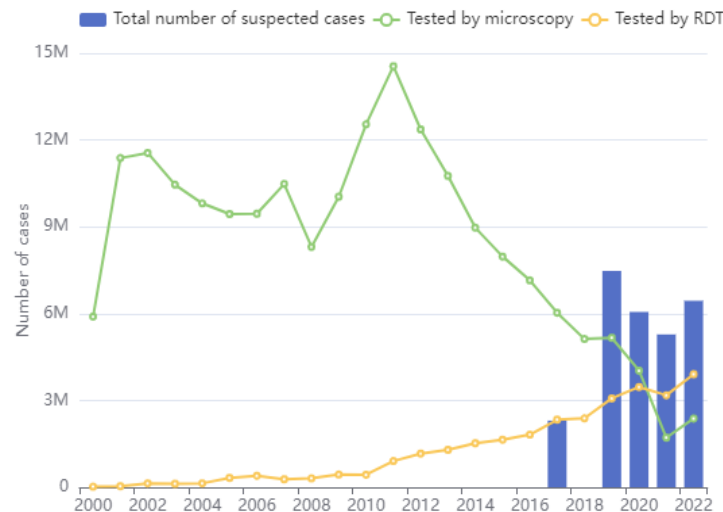
Testing

Positivity

ABER

Number of suspected cases tested

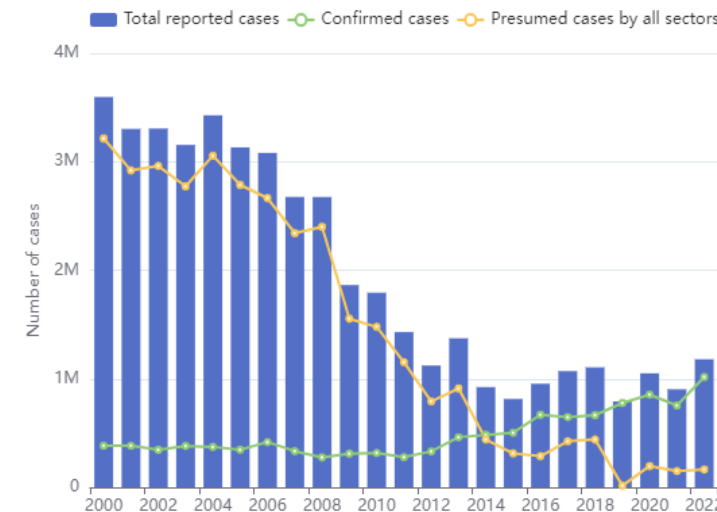
Western Pacific Region



Reported cases

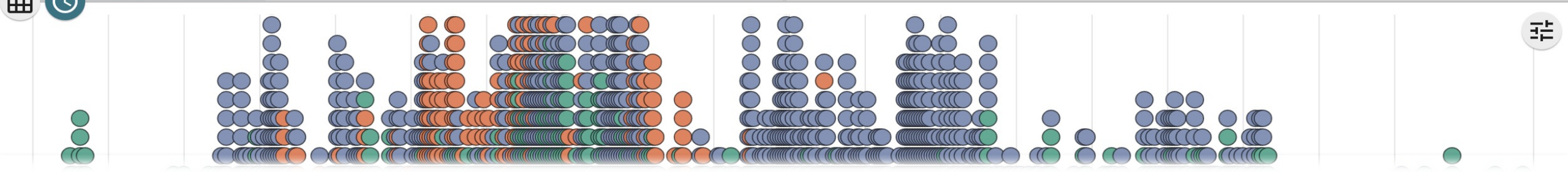
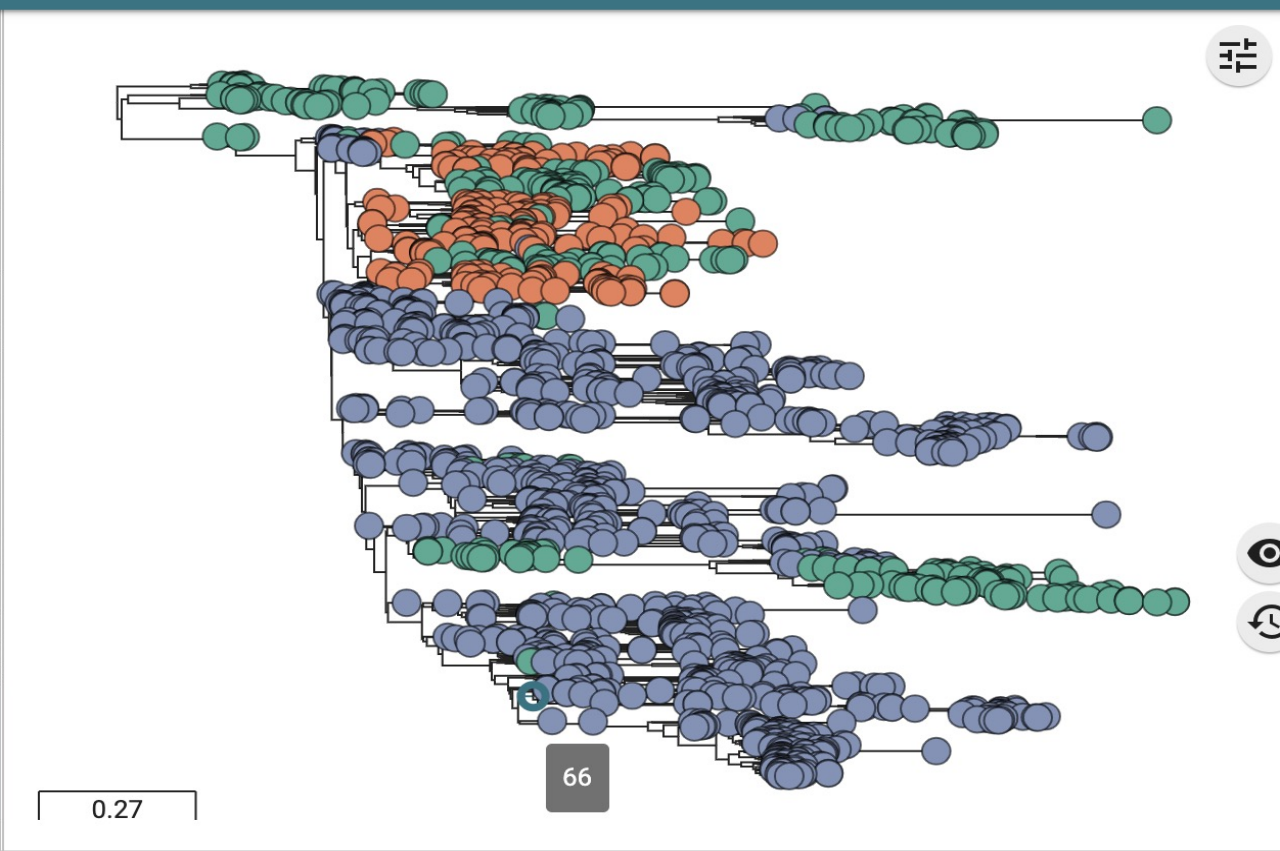
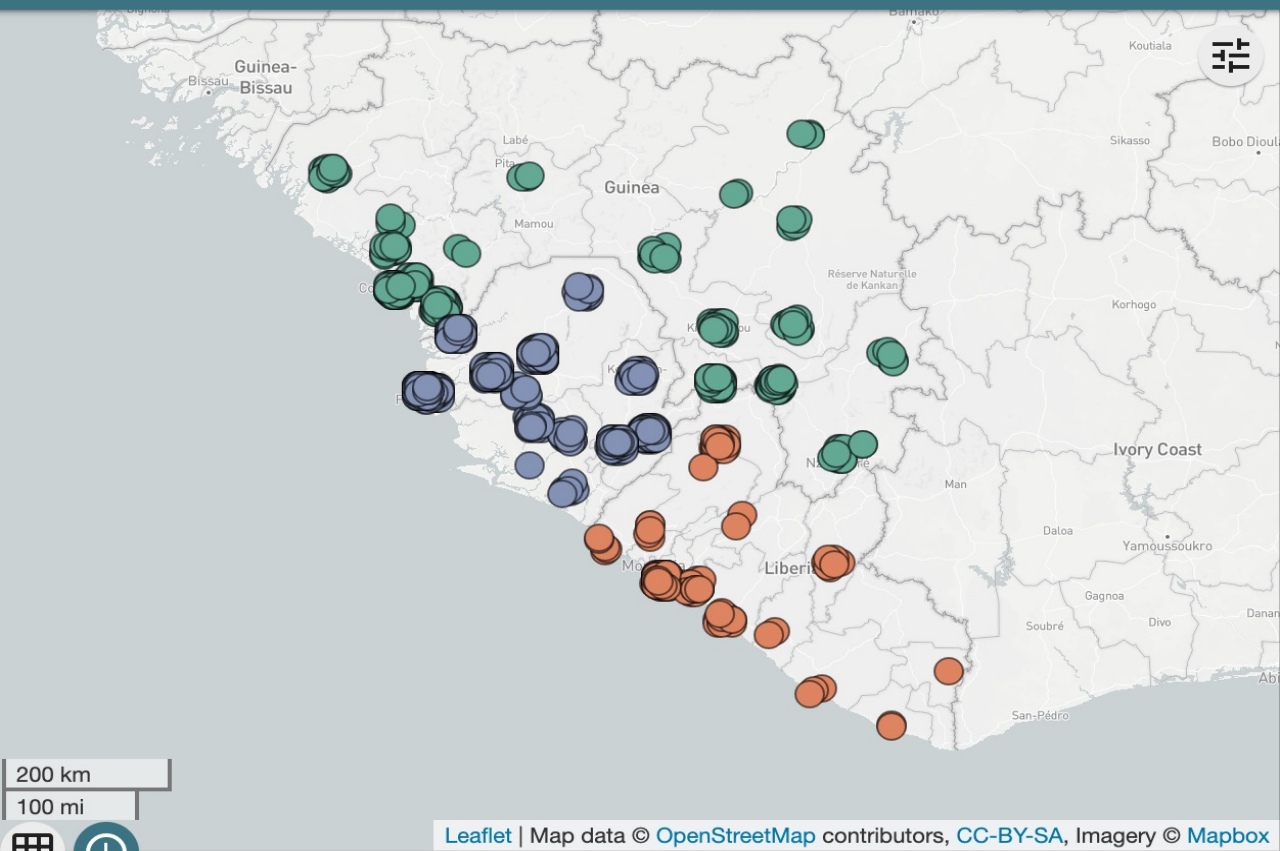
Number of reported malaria cases

Western Pacific Region



# Example 4: Malaria in the western pacific region

<https://worldhealthorg.shinyapps.io/malaria-dashboard-wpr/>



# Example 5: West African Ebola epidemic

<https://microreact.org/>

Search

List Map Stats

Viewing 16,086 of 73,038 genomes

65 Selected Genomes

- Klebsiella pneumoniae**
- Collection
- MLST - Pasteur
- K Locus
- O Locus
- Country
- Date
- Public



# Example 6: *Klebsiella pneumoniae* genomes

<https://pathogen.watch>

- Dashboard ^
- Personal
- Admin Site
- App
- Microbiology
- Pathology
- Geotagging
- CBR
- Inference
- Develop
- API v
- Adminer
- PgAdmin
- Flower

## Pathology

Laboratory test results ?



BLD999999

Processing

Blood Culture FBC  
 April 12, 2009, 10:35 a.m.

---

Full Blood Count  
**FBC** ^

**White Blood Cells** ▲ 250.0 10<sup>9</sup>0-500

**Red blood cell count** 52.0 x10<sup>6</sup>0-500

**Platelets** ▲ 232.0 10<sup>6</sup>0-500

**Neutrophils**

**Monocytes** 35.0 10<sup>6</sup>0-500

**Lymphocytes**

**Haemoglobin** 89.0 g/dL 0-500

**Haematocrits**

**Eosinophils**

**Basophils**

## Microbiology

Susceptibility test results ?



KSM455360

Completed

Blood Culture SAUR CPER ECOL  
 April 9, 2009, 6:30 a.m.

---

Staphylococcus Aureus  
**SAUR** v

Clostridium perfringens  
**CPER** ^

● Amikacin	Aug. 3, 2022, 1:44 p.m.	>
● Imipenem	Aug. 3, 2022, 1:44 p.m.	>
● Linezolid	Aug. 3, 2022, 1:44 p.m.	>
● Methicillin	Aug. 3, 2022, 1:44 p.m.	>
● Tetracycline	Aug. 3, 2022, 1:44 p.m.	>

# Example 7.1: Clinical Decision Support System (management)

<https://bahp.github.io/portfolio-academic/projects/epicimpoc> | <https://youtu.be/U-Qb8E4NLUQ>

### Decision Support

Past similar cases



#### Therapy 5 #5

Vancomycin	<b>92% match</b>
Methicillin	1 of 10 cases
Amikacin	

#### Therapy 8 #8

Fluconazole	<b>50% match</b>
Imipenem	1 of 10 cases

#### Therapy 1 #1

Amikacin	<b>13% match</b>
Amphotericin	1 of 10 cases
Azithromycin	
Co-Amoxiclav	

#### Therapy 4 #4

Meropenem	<b>75% match</b>
Linezolid	1 of 10 cases
Tetracycline	
Trimethoprim	

#### Therapy 9 #9

Meropenem	<b>42% match</b>
	1 of 10 cases

#### Therapy 3 #3

Imipenem	<b>7% match</b>
	1 of 10 cases

#### Therapy 6 #6

Amphotericin	<b>73% match</b>
	1 of 10 cases

#### Therapy 10 #10

Linezolid	<b>28% match</b>
Tetracycline	1 of 10 cases
Trimethoprim	

#### Therapy 2 #2

Erythromycin	<b>55% match</b>
Gentamicin	1 of 10 cases
Fluconazole	

#### Therapy 7 #7

Azithromycin	<b>20% match</b>
Gentamicin	1 of 10 cases

#### Case #5

May 29, 2011 — 8 days



Intubation

No tags

5 15 28 20 109

Vancomycin - 169.0 mg/L q3h - 7 days  
 Methicillin - 409.0 g/L q4h - 6 days  
 Amikacin - 1302.0 mg/L q6h - 2 days

#### Case #4

Nov. 13, 1984 — 20 days



Hospital

No tags

5 15 28 8 82

Meropenem - 681.0 mg/L q24h - 7 days  
 Linezolid - 420.0 g/L stat - 4 days  
 Tetracycline - 652.0 mg/L q1h - 6 days  
 Trimethoprim - 953.0 g/L q2h - 7 days

#### Case #6

April 2, 1992 — 16 days



Intubation

No tags

5 15 28 70 126

Amphotericin - 1256.0 g/L q8h - 6 days

#### Case #2

Aug. 3, 1985 — 13 days



Discharged

No tags

5 15 28 14 102

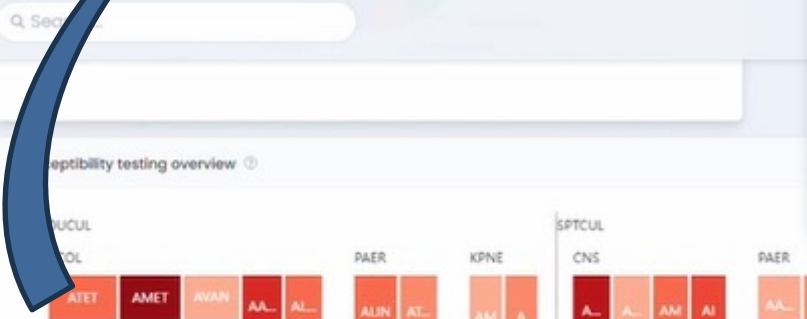
Erythromycin - 576.0 mg/L q4h - 2 days  
 Gentamicin - 479.0 g/L q6h - 3 days  
 Fluconazole - 360.0 mg/L q8h - 5 days

# Example 7.2: Clinical Decision Support System (CBR)

<https://bahp.github.io/portfolio-academic/projects/epicimpoc/>



- Dashboard
- Personal
- Admin Site
- App
  - Microbiology
  - Pathology
  - Geotagging
  - CBR
  - Inference
- Develop
  - API
  - Adminer
  - PgAdmin
  - Flower



Dr. Douglas Bennett #10      TPV816760 #10  
NHS1760785691      Blood Culture  
HOS1550044600      Oct. 21, 2016, 5:53 p.m.

**TPV816760** Completed  
Blood Culture  
Oct. 21, 2016, 5:53 p.m.

Coagulase Negative Staphylococcus  
CNS

Azithromycin	June 30, 2022, 3:46 p.m.
Fluconazole	June 30, 2022, 3:46 p.m.
Gentamicin	June 30, 2022, 3:46 p.m.
Linezolid	June 30, 2022, 3:46 p.m.
Meropenem	June 30, 2022, 3:46 p.m.
Methicillin	June 30, 2022, 3:46 p.m.

Pseudomonas Aeruginosa  
PAER

Imipenem      June 30, 2022, 3:46 p.m.

Detail      Edit

Resistance (SARI)      View All

Recent Activity

- Completed      22 hours, 26 minutes ago
- Received      5 years, 8 months ago
- Collected      5 years, 8 months ago
- Requested      22 hours, 26 minutes ago










































# Example 7.3: Clinical Decision Support System (microbiology)

<https://bahp.github.io/portfolio-academic/projects/epicimpoc> | <https://youtu.be/32pTOcXszyg>

# Workshop 1.3: Activity

Dashboard design challenge

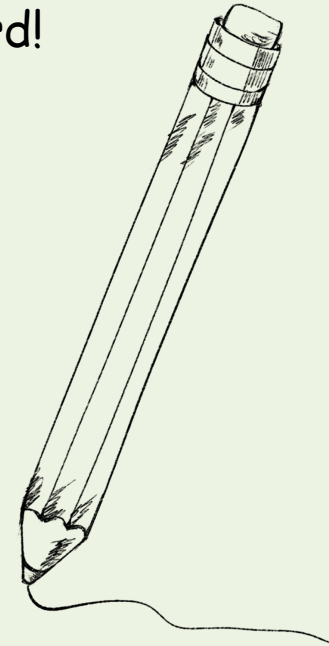
# Dashboard design patterns cheat-sheet

Content Dashboard Design Patterns			Composition Dashboard Design Patterns				
Data	Meta Data	Visual Representation	Page Layout	Screenspace	Structure	Interaction	Color
<p><b>Less Data</b></p>  <p>Single value</p>  <p>Derived values</p>  <p>Thresholds</p>  <p>Filtered</p>  <p>Aggregated</p>  <p>Detailed Data</p> <p><b>More Data</b></p>	 <p>Data Source</p>  <p>Disclaimer</p>  <p>Data Description</p>  <p>Update Information</p>  <p>Annotations</p>	<p><b>More Detail</b></p>  <p>List</p>  <p>Table</p>  <p>Detailed Visualization</p>  <p>Miniature Chart</p>  <p>Progress Bars &amp; Gauge</p>  <p>Trend arrow</p>  <p>Pictogram</p>  <p>42</p> <p>Number</p> <p><b>Less Detail</b></p>	 <p>Open</p>  <p>Table</p>  <p>Stratified</p>  <p>Grouped</p>  <p>Schematic</p>	 <p>Screenfit</p>  <p>Overflow</p>  <p>Detail on demand</p>  <p>Parameterization</p>  <p>Multiple pages</p>	 <p>Single Page</p>  <p>Parallel</p>  <p>Hierarchic</p>  <p>Open</p>	 <p>Exploration</p>  <p>Navigation</p>  <p>Personalization</p>  <p>Drilldown</p>	 <p>Distinct</p>  <p>Data Encoding</p>  <p>Semantic</p>  <p>Emotive</p>







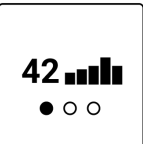
# Activities overview

- Activity 1: Data, Use & Genres (15 min)**
- Activity 2: Structure patterns (10 min)**
- Activity 3: Data & representation patterns (15 min)**
- Activity 4: Layout (10 min)**
- Activity 5: Screen space & interactivity (10 min)**
- Activity 6: Final mock-up (15 min)**

Grab a pencil and  
sketch your  
dashboard!



# Activity 1: Data, Use & Genres (15 min)

<p><b>DATA</b></p> <p>List and describe your data. What are the facets and/or dimensions in your data?</p>	<p><b>USE</b></p>	<p><b>GENRES</b></p> <p>Look at the genre patterns. Pick 1-3 genres and describe how they might fit your scenario.</p>
	<ul style="list-style-type: none"> <li>- Describe your <b>audience</b>.</li> <li>- What do they know about the data?</li>   <li>- Describe the <b>information, tasks, and decisions</b> your audience is performing.</li> <li>- What do they know about these tasks?</li> <li>- During which steps of their workflows?</li> <li>- During which situations do they need access??</li>   <li>- What are the <b>context &amp; devices</b> they engage with?</li> <li>- What else do they consult in the dashboard?</li> <li>- How frequently do they consult the dashboard?</li> </ul>	<div style="display: flex; flex-wrap: wrap; justify-content: space-around;"> <div style="text-align: center; margin: 5px;">  <p>Static</p> </div> <div style="text-align: center; margin: 5px;">  <p>Magazine</p> </div> <div style="text-align: center; margin: 5px;">  <p>Infographic</p> </div> <div style="text-align: center; margin: 5px;">  <p>Analytical</p> </div> <div style="text-align: center; margin: 5px;">  <p>Mini</p> </div> <div style="text-align: center; margin: 5px;">  <p>Repository</p> </div> <div style="text-align: center; margin: 5px;">  <p>Slideshow</p> </div> </div>

## Activity 2: Structure patterns (15 min)

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.

### PAGE STRUCTURE

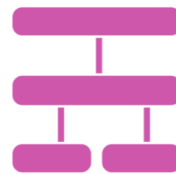
1. Does your dashboard need (or can) have multiple separate pages?
2. How would you **group information meaningfully** across these pages?
3. What information **must be shown together** on the same page?
4. Pick one page to continue the workshop with.



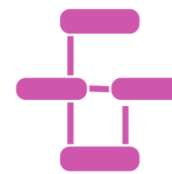
Single Page



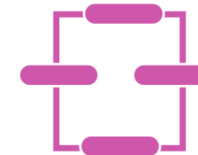
Parallel



Hierarchic



Open



Semantic

# Activity 3: Data & representation patterns (15 min)

List and describe your data.

Choose the visual representation for the data.

## DATA ABSTRACTION

Which level of abstraction would you choose for your data for the page you have chosen?



Detailed Dataset



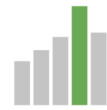
Aggregated Data



Thresholds & Filters

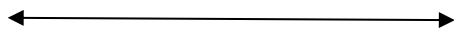


Derived Data



Individual Values

More Data



Less Data

## VISUAL REPRESENTATION

Which visual representations would you choose for the data and their abstractions?



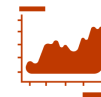
List



Pictogram



Table



Detailed Visualisation



Miniature Chart



Progress Bars

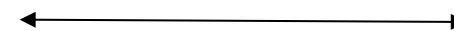


Trend arrow(s)



Numbers

More Detail



Less Detail

# Activity 4: Layout (15 min)

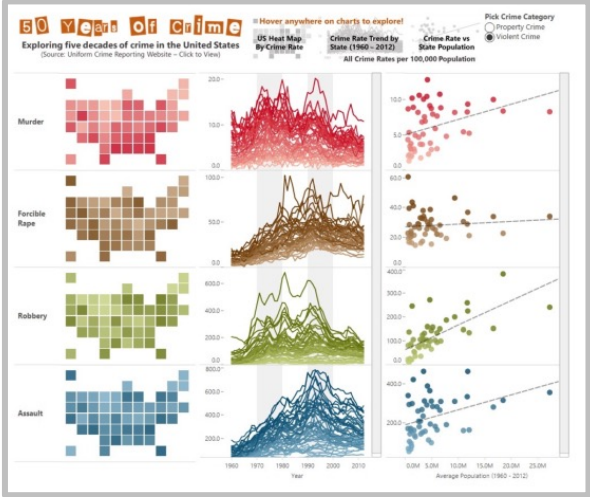
Look at the layout patterns. Which layout would make sense for your visualisations? Why?  
Use this page to experiment with different layouts. Use **post-its** to move components around easier.



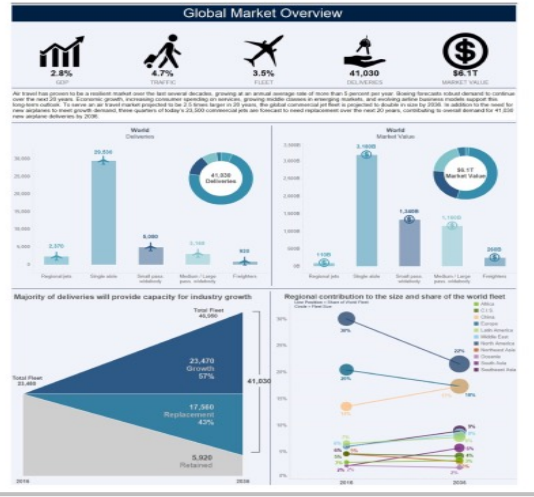
Open



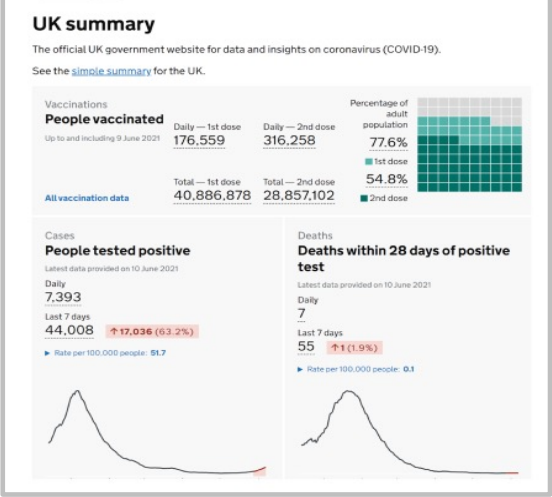
Grid



Stratified



Grouped



Schematic

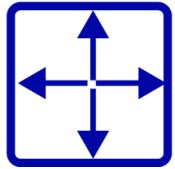


# Activity 5: Screen space & Interactivity (15 min)

Identify screen limitations and ways to interact with the dashboard

## SCREEN SPACE

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



Screen fit



Overflow



Detail on demand



Parametrization



Multiple pages

## INTERACTION

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



Exploration



Navigation



Personalization



Filter & Focus

## Activity 6: Final Mock-up (15 min)

Create a detailed mock-up of your dashboard, using your choices and exploration from the other worksheets.

Create two versions if you cannot decide at this time.

A large, empty rectangular box with a thin black border, intended for students to create a detailed mock-up of their dashboard. The box is currently blank.

Thank you!