28 April 2023

From spreadsheets to operational outputs

Case studies in enabling human, animal and environmental health intelligence

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What we'll cover…

1. Challenges: from data streams to intelligence
2. Dashboarding capabilities (R Shiny)
3. Case studies

Get inspired!

Thank you!

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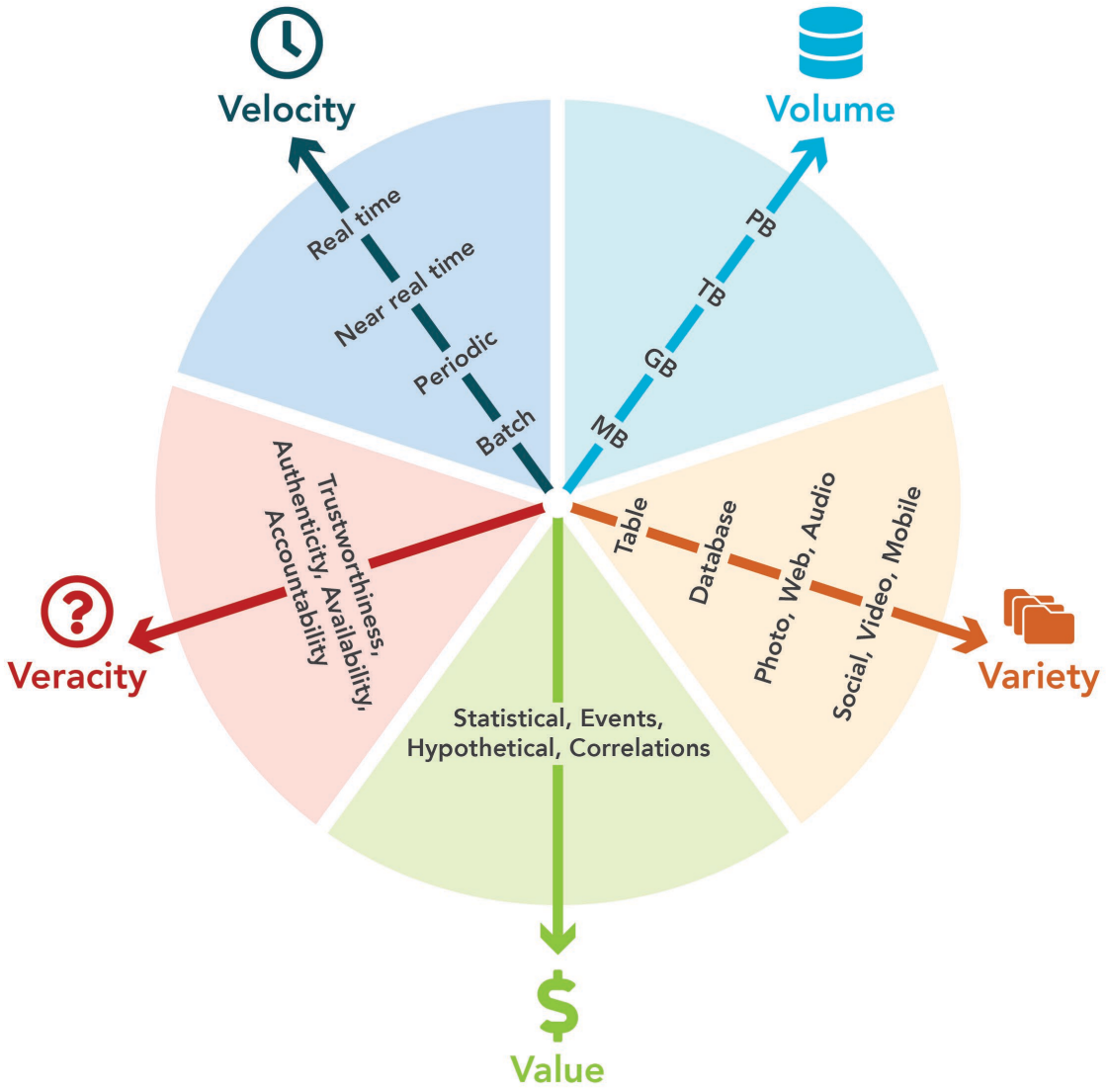
From data streams to intelligence

What has changed?

More and more data and we are struggling to use it well.

The Internet has changed the way we receive and process information.

From Surveillance to Intelligence to Decision Advantage



The challenge

Surveillance
(CDC Definition)

The ongoing, systematic collection, analysis, and interpretation of health-related data essential to planning, implementation, and evaluation of public health practice.

Bridging the GAP

What decision makers are increasingly looking for:

Intelligence

The ability to read and respond effectively to a situation'. It's all about how you can gather together data in order to make faster, clearer decisions.

Decision advantage

Decision advantage when intelligence enables a decision-maker to better understand and address an issue.

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Some comments…

“What is the best way to provide insights into my data?”

“Our data is not in the format right right now to produce meaningful insights”

“I’m not a data scientist or programmer – how easy is it to get started?”

“How long does it take to develop a dashboard?”

Many tools!

Out-of-the box (point and click)

- Tableau, PowerBI, Qlik

Programming (scripted)

- R / Python (open-source), SAS, SPSS
- HTML, CSS, JavaScript
- JavaScript frameworks: Angular, React, VueJS
- Java, ASP.NET, PHP, C, C++

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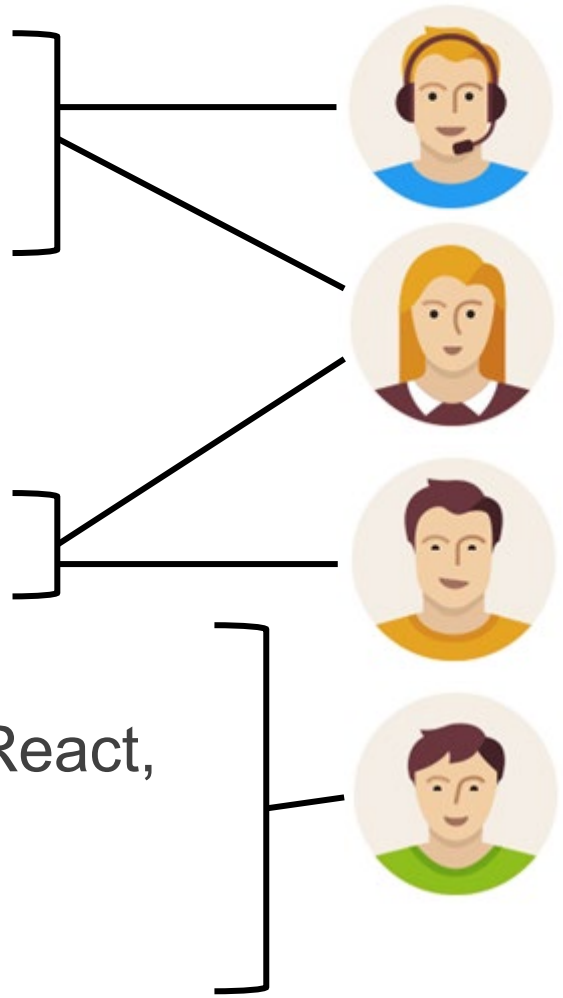
Who is using it?

Out-of-the box (point and click)

- Tableau, PowerBI, Qlik

Programming (scripted)

- R / Python, SAS, SPSS
- HTML, CSS, JavaScript
- JavaScript frameworks: Angular, React, VueJS
- Java, ASP.NET, PHP



Business user

Analyst
Data scientist

Researcher

Programmers

Why we use open source

Reproducibility

Validated environment

Resiliency

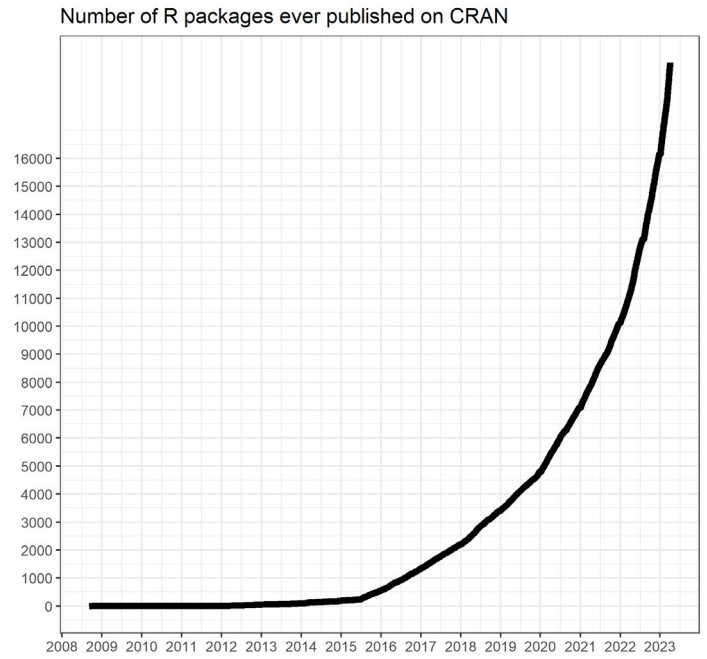
No vendor lock-in

Participation

Community vs single vendor

Accessibility

Free access for anybody



The R toolset

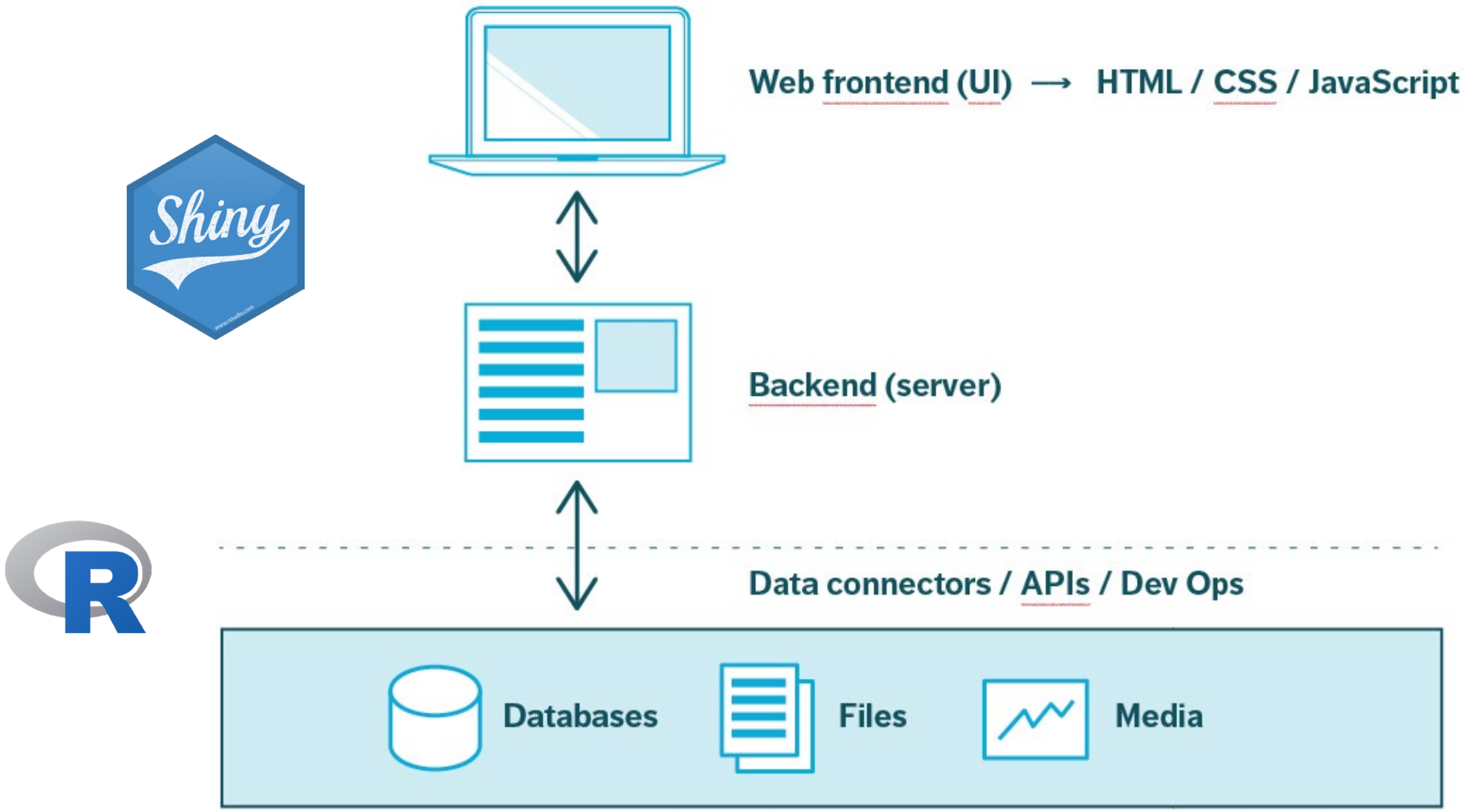
R

- ETL – extract, transform, load
- Model creation, data analytics and science, data visualisation
- Base R, R packages

R outputs

- Markdown, Quarto
- R Shiny for dashboards
- Data access: data connectors, Pins, RDS
- APIs: openCPU, Plumber

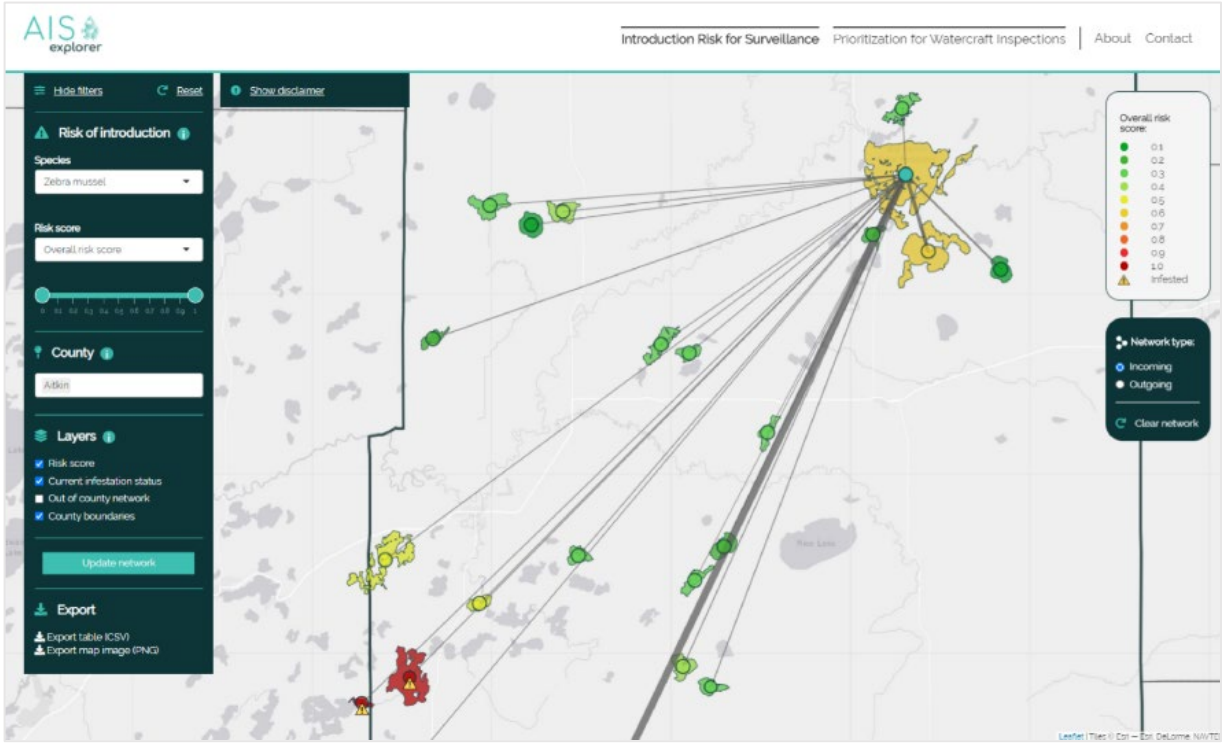
R Shiny ecosystem



R Shiny capabilities

It empowers people!

- Custom theming
- Extension with common web technologies
- It’s accessible and easy to get started
- It’s free



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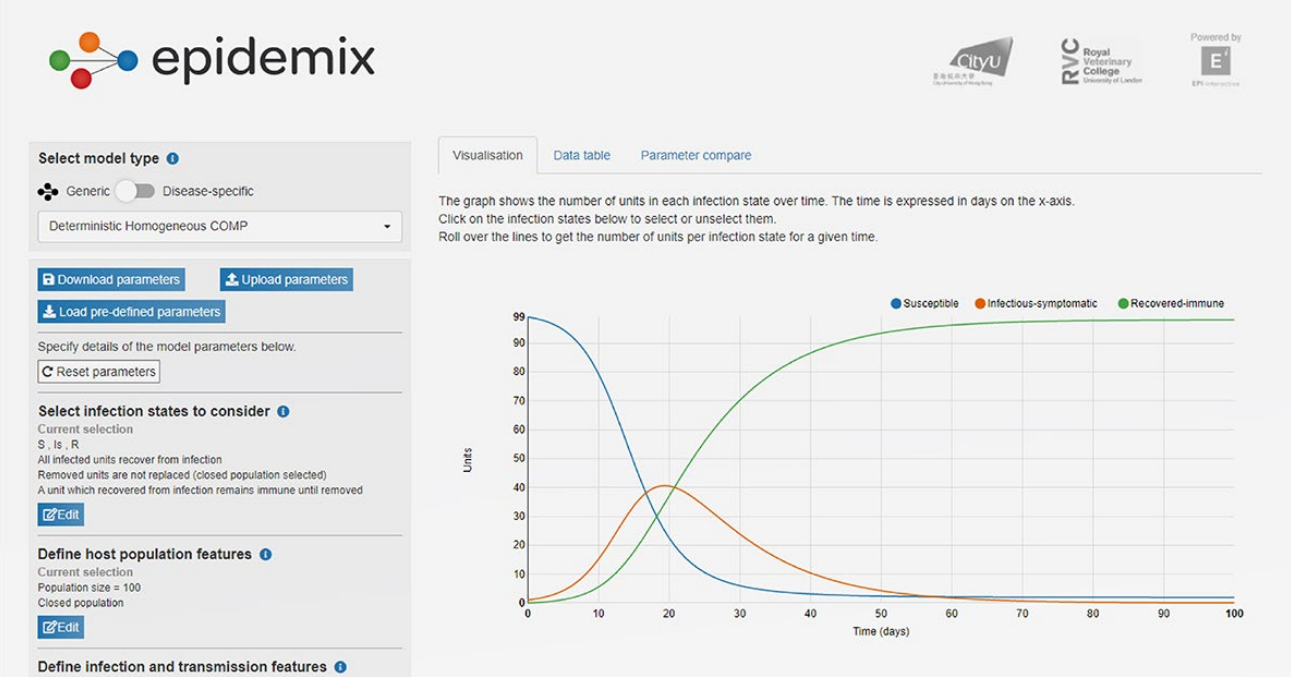
From R to R Shiny

Natural transition from R to R Shiny!



[Epidemix.app]

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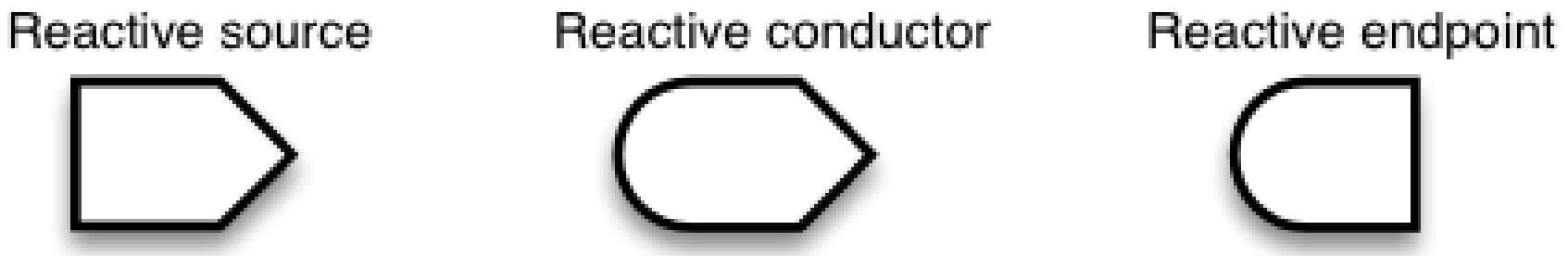
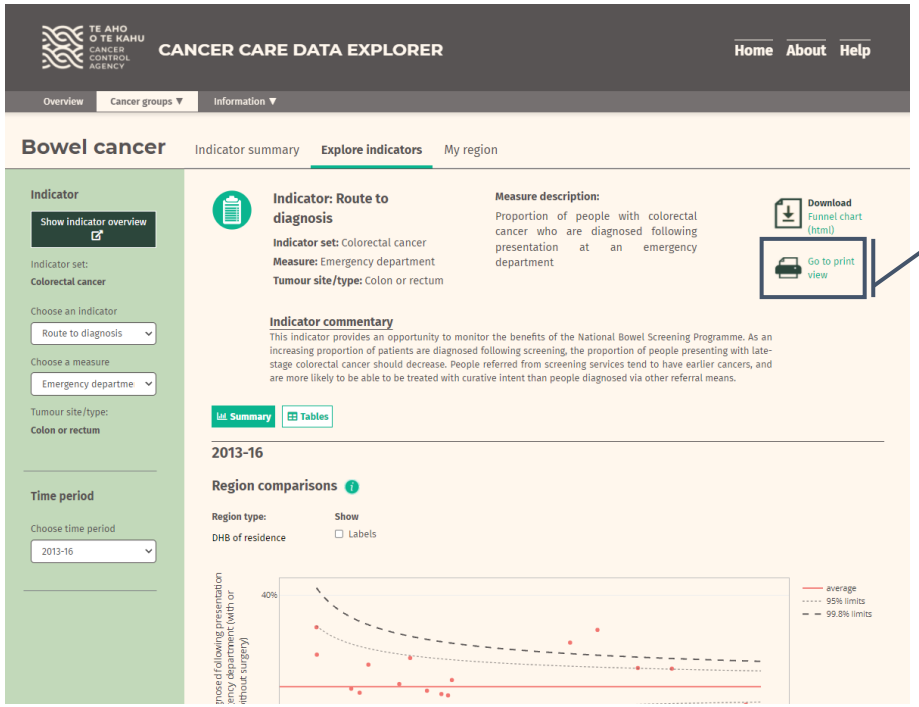
Reactive programming

- R Shiny is purpose built for dashboards
- Use of reactive programming
- Isolate behaviour



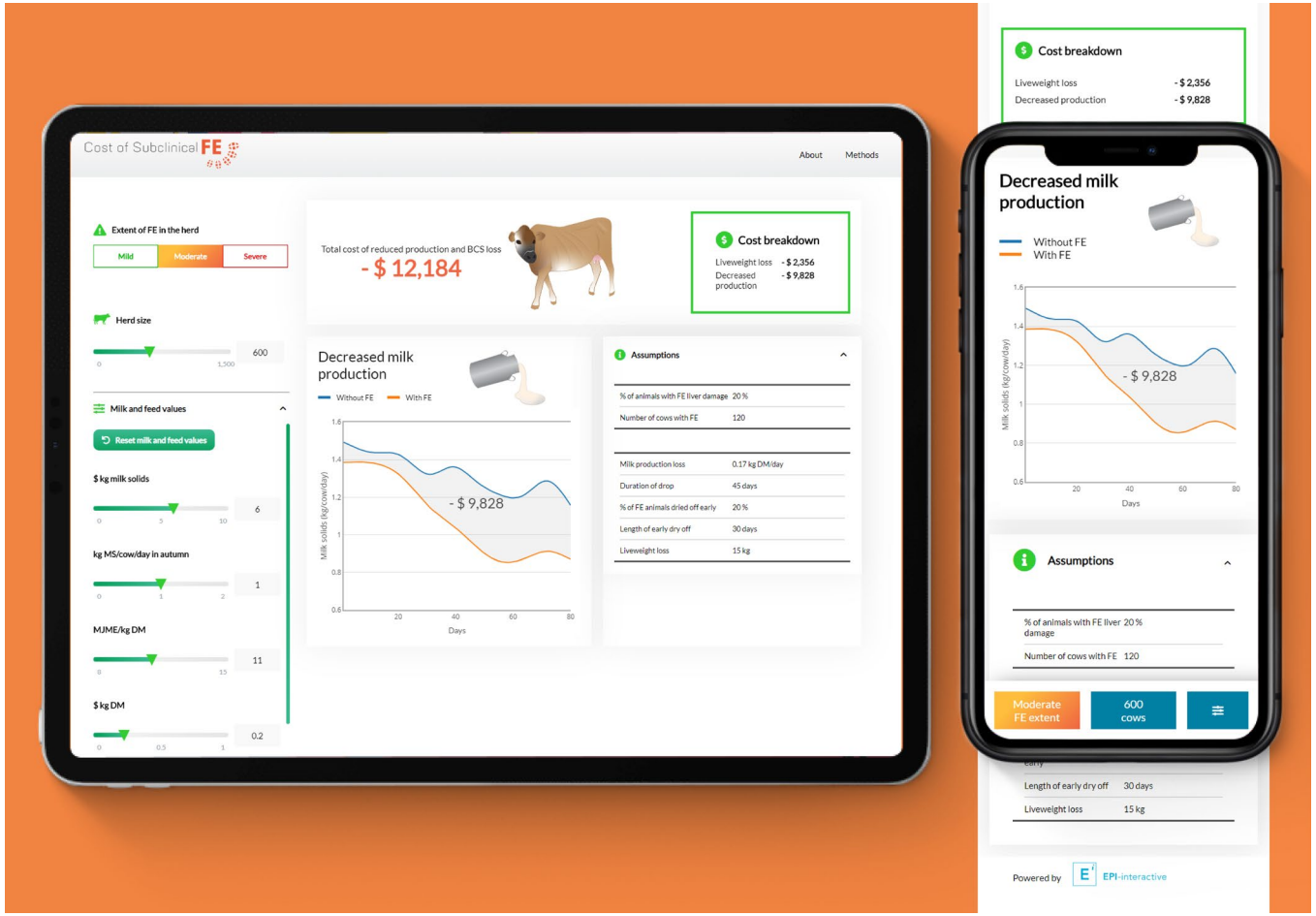
Automated reporting

- Self-service PDF reporting



Mobile support

- In-built responsiveness
- Built with Bootstrap



Case study: WHO GLASS

Insights into a global health issue

The challenge

GLASS: Global antimicrobial resistance and surveillance system

Annual report
https://www.who.int/publications/i/item/9789240062702

1. Standardised and reproducible way to generate GLASS visualisations for the report

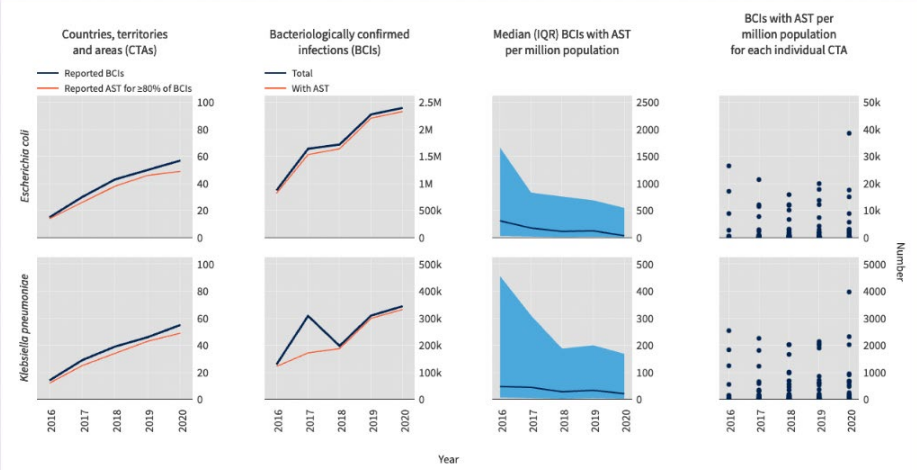
2. Complimentary dashboard

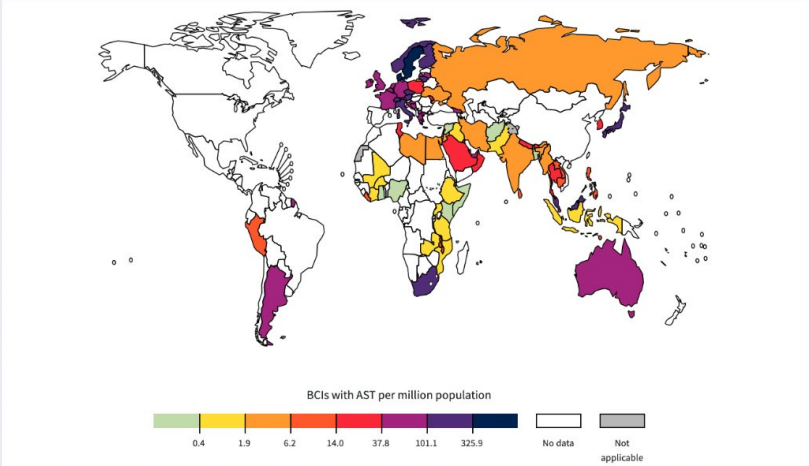
GLASS Dashboard – AMC data

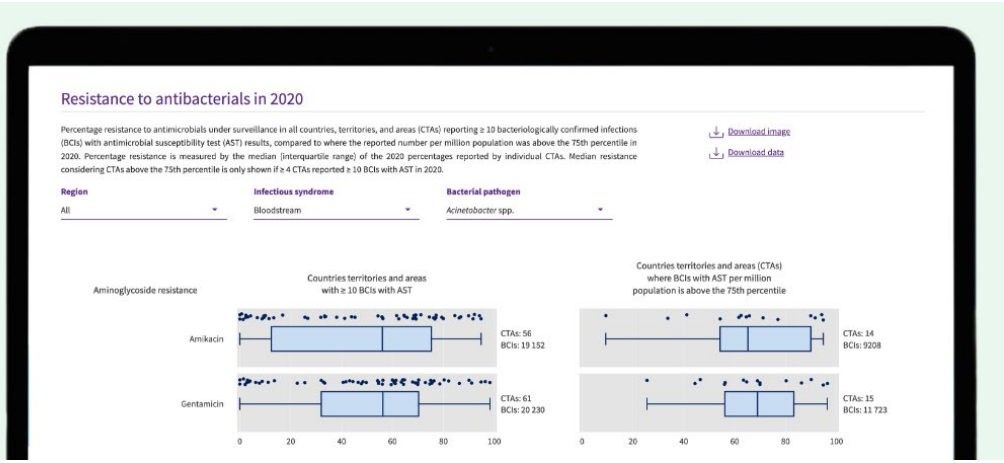
https://worldhealthorg.shinyapps.io/glass-dashboard/

GLASS Dashboard – AMR data

https://worldhealthorg.shinyapps.io/glass-dashboard/







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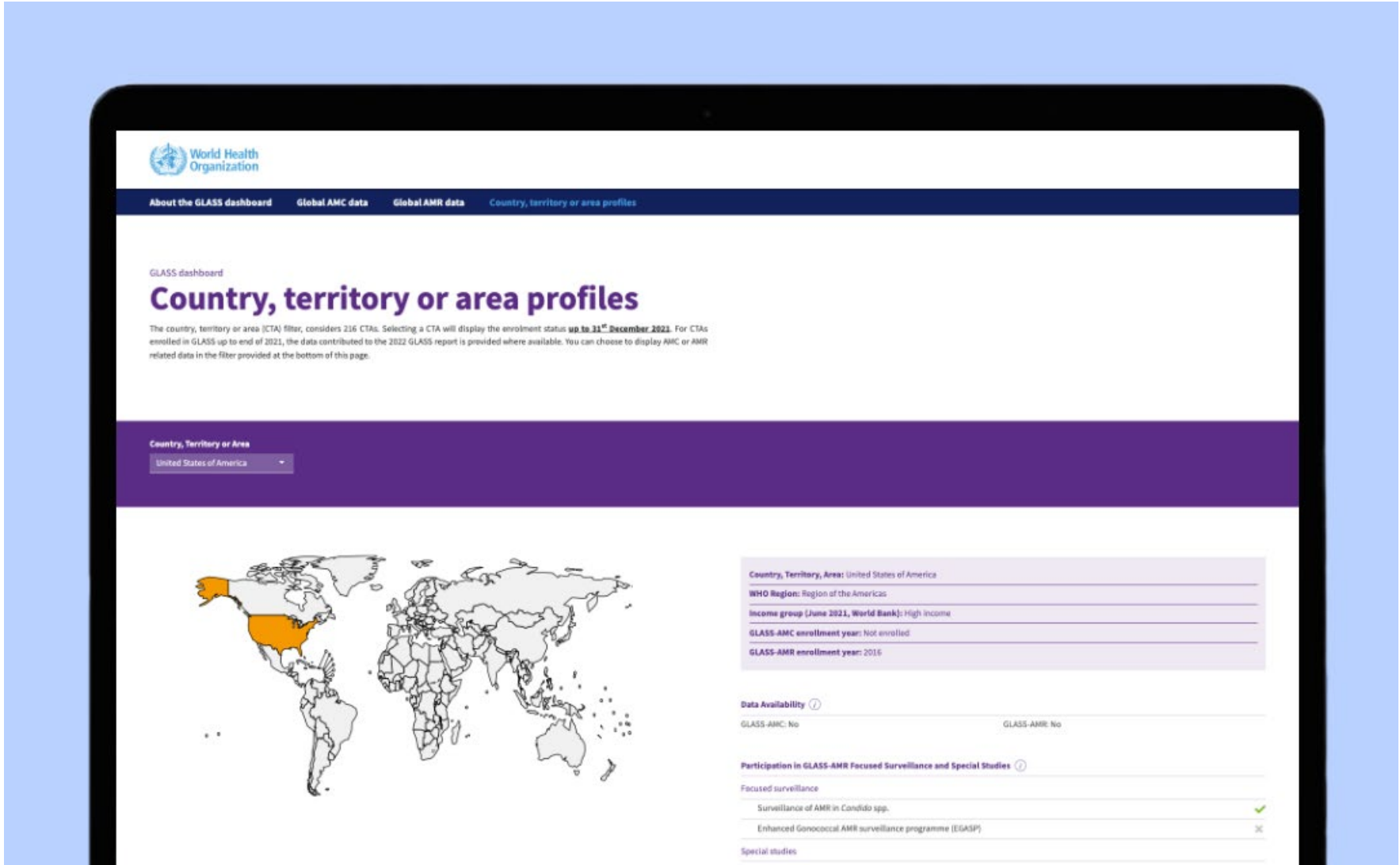
GLASS Dashboard – Country profiles



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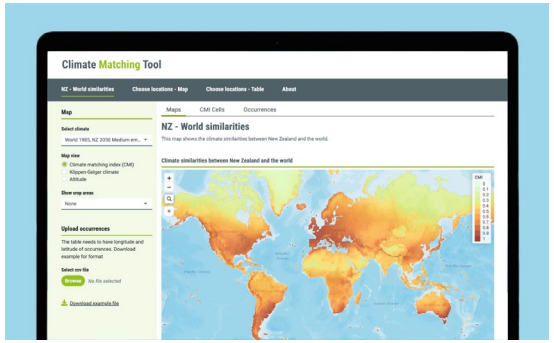
Case study: Climate Matching

Comparing current and future climates

The challenge

Pest risk analysts frequently ask if the climate of a pest risk analysis area could be suitable for the establishment of an organism of concern.

- Important for biosecurity and border protection
- Builds on multi-year research effort by AgResearch



Dashboard available at:
https://climate.b3nz.org.nz/

- Collaboration with AgResearch and B3
- Funded by Ministry for Primary Industries

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Climate similarities NZ - World

Map

Select climate

World 2070 High emissions, NZ 2...

Map view

- (•) Climate matching index (CMI)
- ( ) Köppen-Geiger climate
- ( ) Altitude

Show crop areas

Kauri

Upload occurrences

The table needs to have longitude and latitude of occurrences. Download example for format

Select csv file

Browse *lycorma_delicatula.csv*

Upload complete

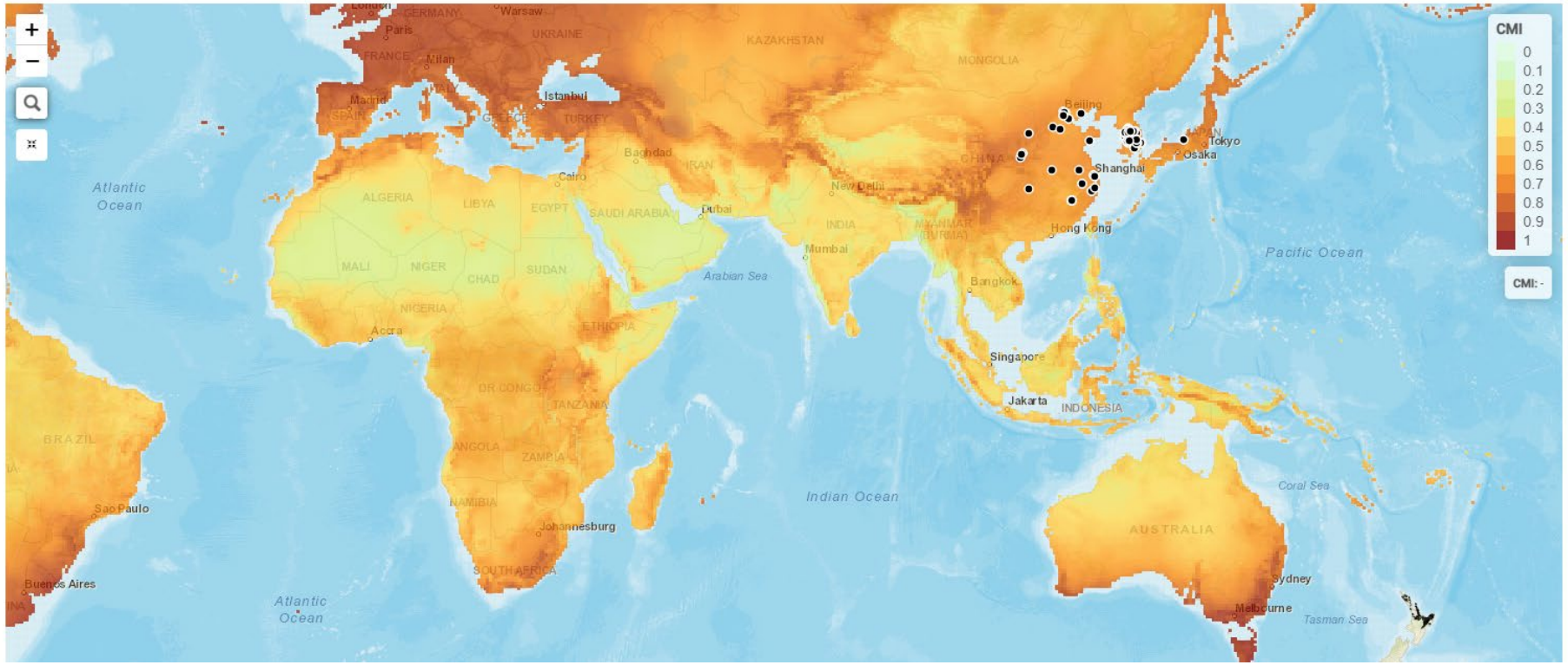
Download example file

Maps | CMI Cells | Occurrences

NZ - World similarities

This map shows the climate similarities between New Zealand and the world.

Climate similarities between New Zealand and the world



CMI of uploaded locations

Map

Select climate

World 2070 High emissions, NZ 2...

Map view

- (•) Climate matching index (CMI)
- ( ) Köppen-Geiger climate
- ( ) Altitude

Show crop areas

Kauri

Upload occurrences

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Select csv file

Browse *lycorma_delicatula.csv*

Upload complete

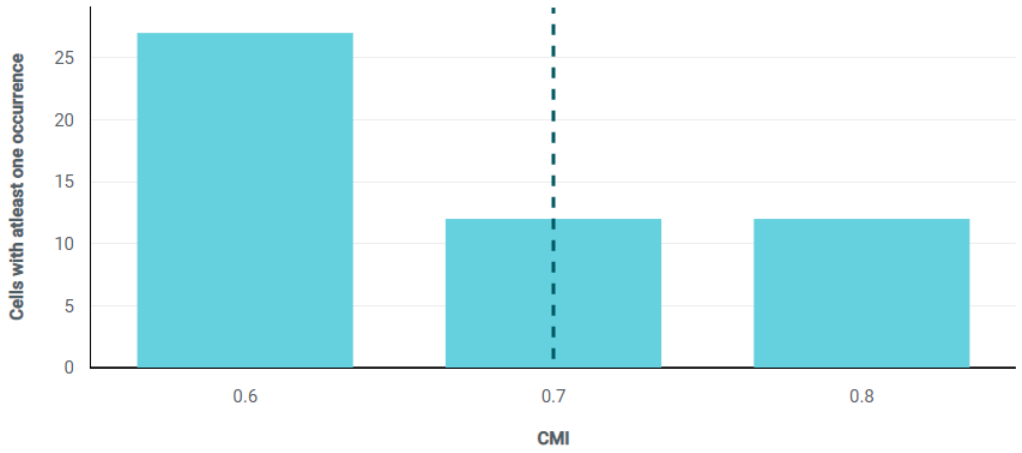
Download example file

Maps | CMI Cells | Occurrences

This feature can be used when uploading occurrences. This graph represents the frequency of climate matching index cells overlapping with unique occurrences. (i.e. if multiple occurrences coincided with a CMI cell, they were counted only once). This graph can be used when the user wants to eliminate the effects of spatial correlation/sampling bias on occurrences.

Barplot of CMI cells

Selected map is all NZ. The occurrences coincided with 51 CMI cells. The proportion of the 51 cells with CMIs >= 0.7 is 47.1%.



Download zip file of results

Zip file will contain the barplot (cmi_plot.png), its caption in a separate text file (cmi_caption.txt) and the plotted data (cmi_data.csv). In this dataset the uploaded occurrences will be filtered to one per climate cell.

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Compare individual climate stations

Select weather station and climate

Region: Asia

Country: Hong Kong

Station: Hongkong (HKG)

Climate: 1985

Select comparison climate

Climate: 2070 - High emissions

Map View

- (•) Default map
- ( ) Köppen-Geiger climate
- ( ) Altitude

Show crop areas

None

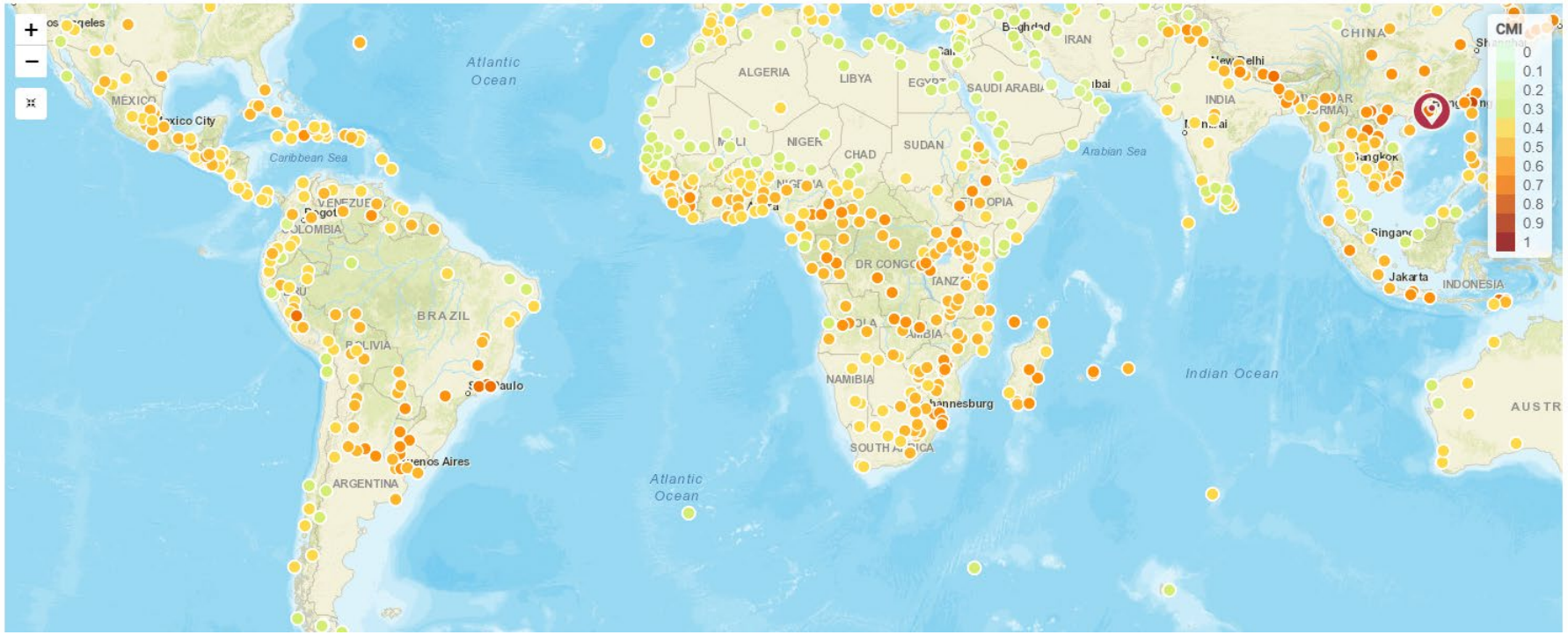
Upload occurrences

The table needs to have longitude and

Choose locations - Map

This map allows user to compare a weather station's climate against the rest of weather stations.

Weather stations' climate similarities (CMI)



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Compare multiple weather stations

Select climate group one

Location one

Region: Asia

Country: Hong Kong

Station: All stations

Location two

Region: Asia

Country: China

Station: Chu Chiang (CHN), Longzhou (CHN), Mei Tan (CHN), Nanjing (CHN), Naran Bulag (CHN), Qinglong (CHN), Baoji (CHN), Changsha (CHN), Chengdu (CHN), Kaba He (CHN), Kashgar (CHN)

Choose locations - Table

This table allows the user to compare multiple weather stations' climates.

Download csv file of comparison for all locations *(115MB)*

Download csv file of all climate stations coordinates

Weather stations climate similarities table (CMI)

Download csv file of results

Climate group one: 1985 **Sort:** Default

Climate group two: 1985

Group one / Group two	Baoji (CHN)	Changsha (CHN)	Chengdu (CHN)	Chu Chiang (CHN)	Hongkong (HKG)	Kaba He (CHN)	Kashgar (CHN)	Longzhou (CHN)	Madoi (CHN)	Mei Tan (CHN)	Nanjing (CHN)	Naran Bulag (CHN)	Qinglong (CHN)	Qionghai (CHN)
Battambang (KHM)	0.38	0.47	0.46	0.51	0.54	0.20	0.25	0.68	0.13	0.46	0.46	0.16	0.27	0.74
Kompong Cham (KHM)	0.34	0.44	0.42	0.53	0.60	0.18	0.23	0.63	0.12	0.42	0.41	0.15	0.25	0.82
Phnom Penh Pochentong (KHM)	0.35	0.46	0.43	0.49	0.50	0.19	0.24	0.64	0.12	0.43	0.43	0.15	0.26	0.71
Stung Treng (KHM)	0.35	0.41	0.44	0.51	0.64	0.18	0.23	0.63	0.13	0.40	0.41	0.15	0.26	0.78

Case study: Epidemix

Comparing current and future climates

Connecting science and policy

Professor Dirk Pfeiffer

Tierarzt, Dr.med.vet., PhD, MANZCVSc, DipECVPH, FHEA

City University of Hong Kong
Chow Tak Fung Chair Professor of One Health

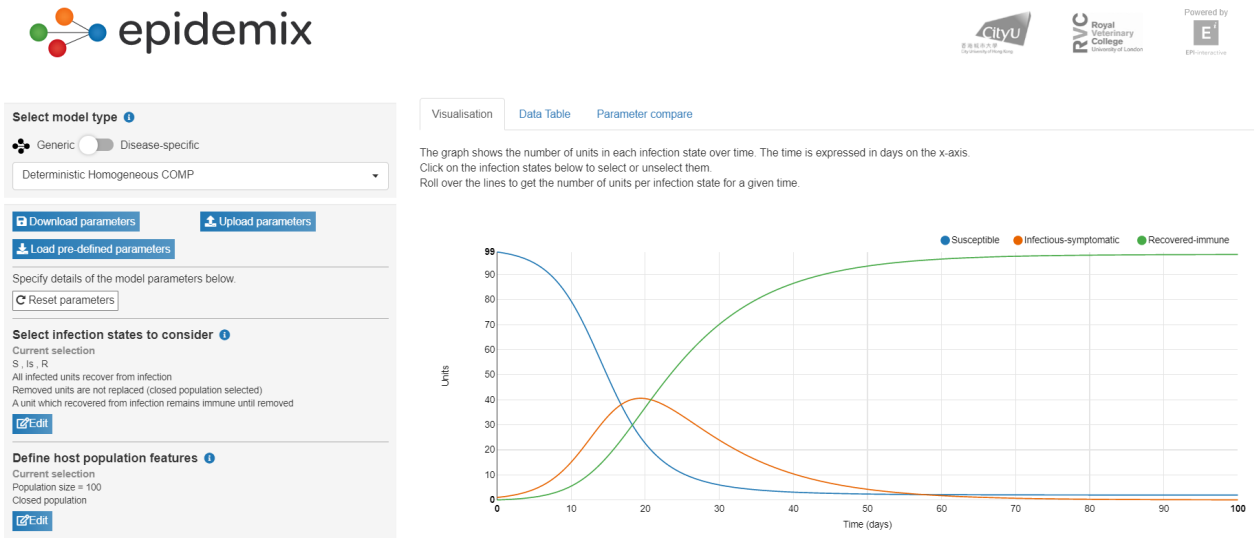
Dr Guillaume Fournié

DrVetMed MSc PhD

Royal Veterinary College, UK
Senior Research Fellow

Epidemix

https://www.epidemix.app/



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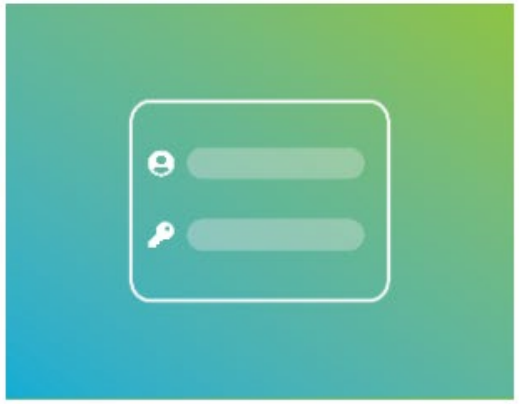
Epi-interactive GitHub

epi-interactive.github.io

Loading and Progress Indicators

User Authentication



Datatable Overlay

Custom Theming

Dynamic PDF Generator

Choropleth Grid

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R Exchange 2023

Our NZ event for R users is back!

For the third year running, we're supporting a local opportunity to connect with other users of R and related open-source software tools. Come and join us at this event to learn how to make the most of R in your work and your organisation.

Learn more and register at epi-interactive.com/events/r-exchange-2023

Questions?

- What are your challenges?
- What is your experience with dashboarding tools?
- Any stories to share?

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