From disconnected elements to a harmonious ecosystem

The Epiverse-TRACE project

Hugo Gruson

Senior Research Software Engineer, data.org

Piping system on a chemical tanker, by Hervé Cozanet, CC BY-SA.

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Lots of data wrangling is required to:

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Secondary goals:

- Spread good practices in software development
- Advocate for the development of RSE career paths

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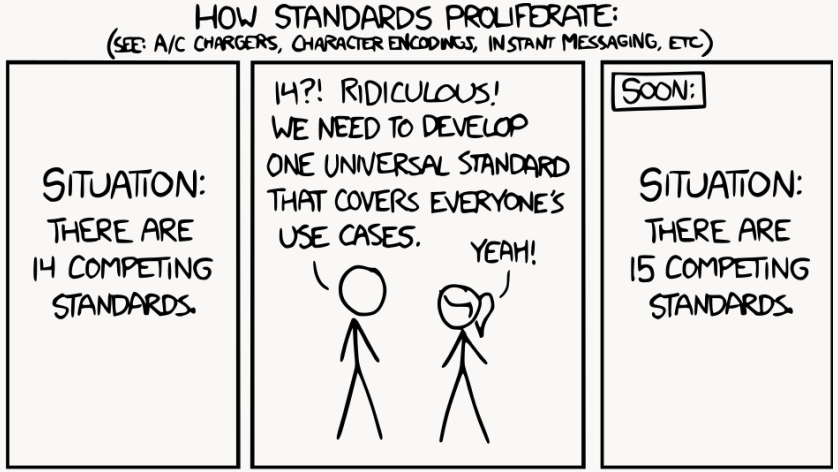

XKCD 927: *Standards*, by Randall Munroe, CC BY-NC

Diversity is good but we also need interoperability!

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Our goal:

- Keep the diversity
- Buy-in from the community
- Collaborate to existing projects
- Be good open-source citizens

Create compatibility layers, not “one standard to rule them all”

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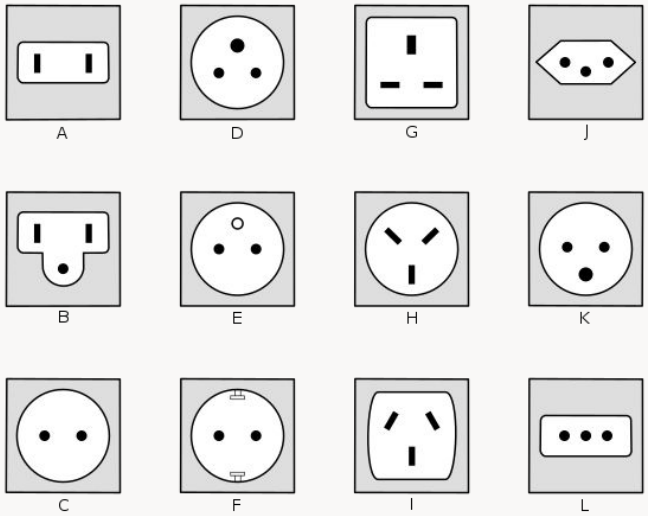

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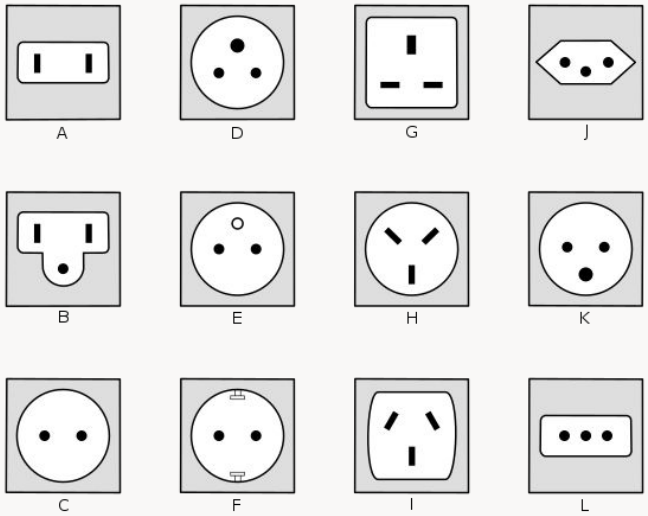

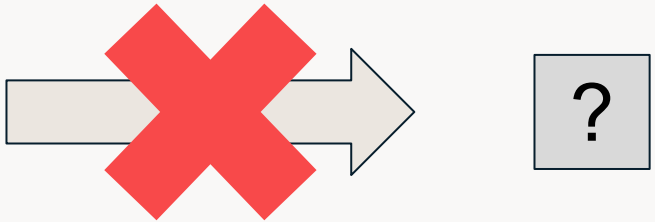

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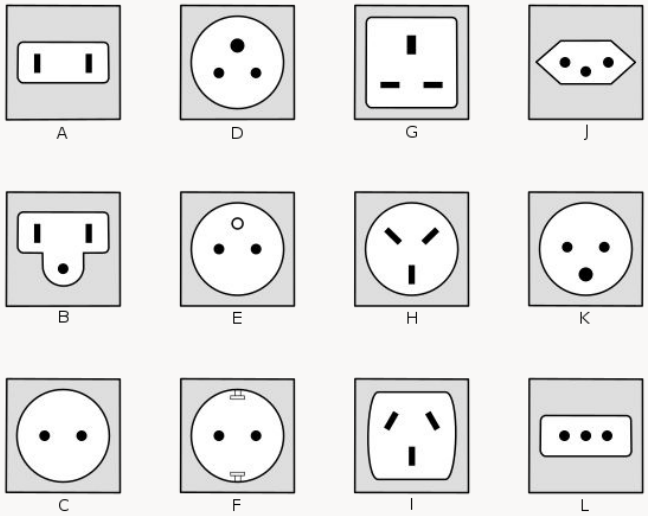

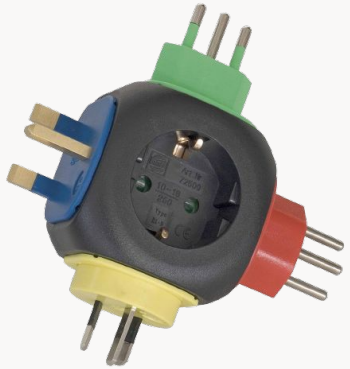

Reisestecker mit austauschbaren Adaptern für verschiedene Länder, by Cephira, CC BY-SA

Building an interoperable ecosystem

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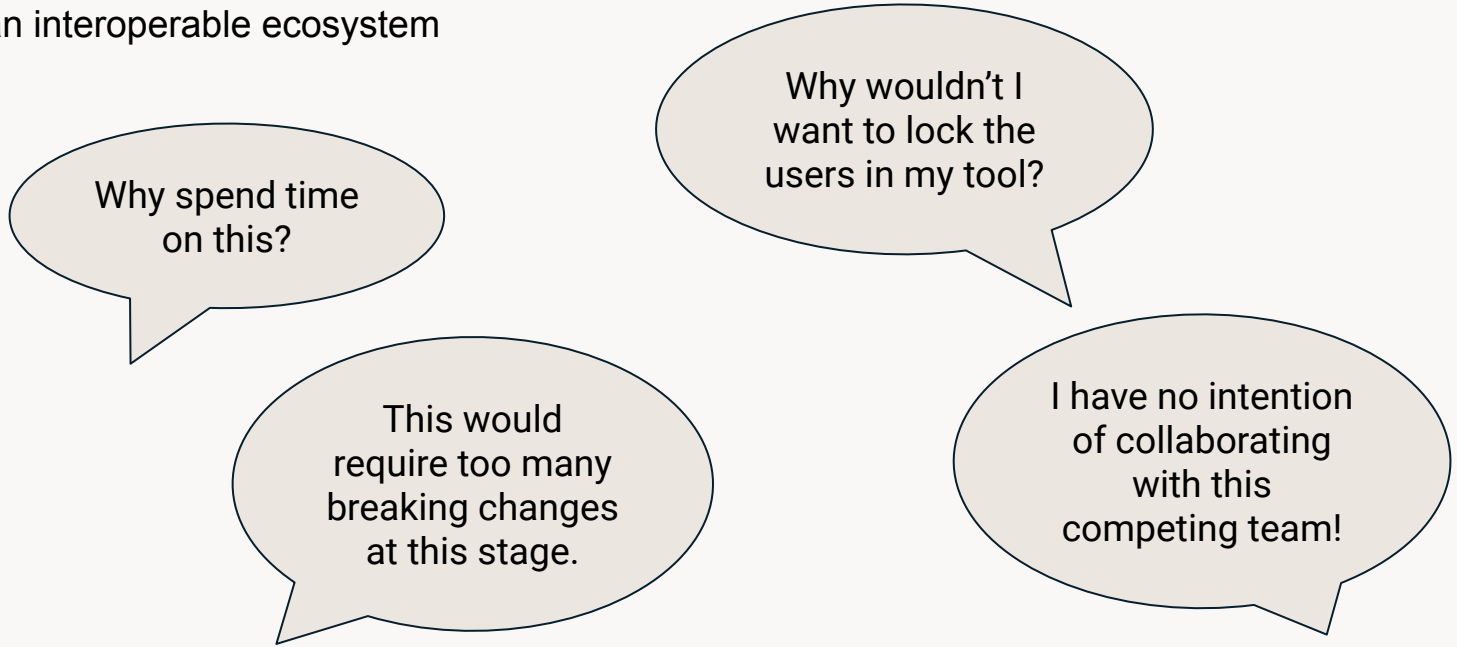

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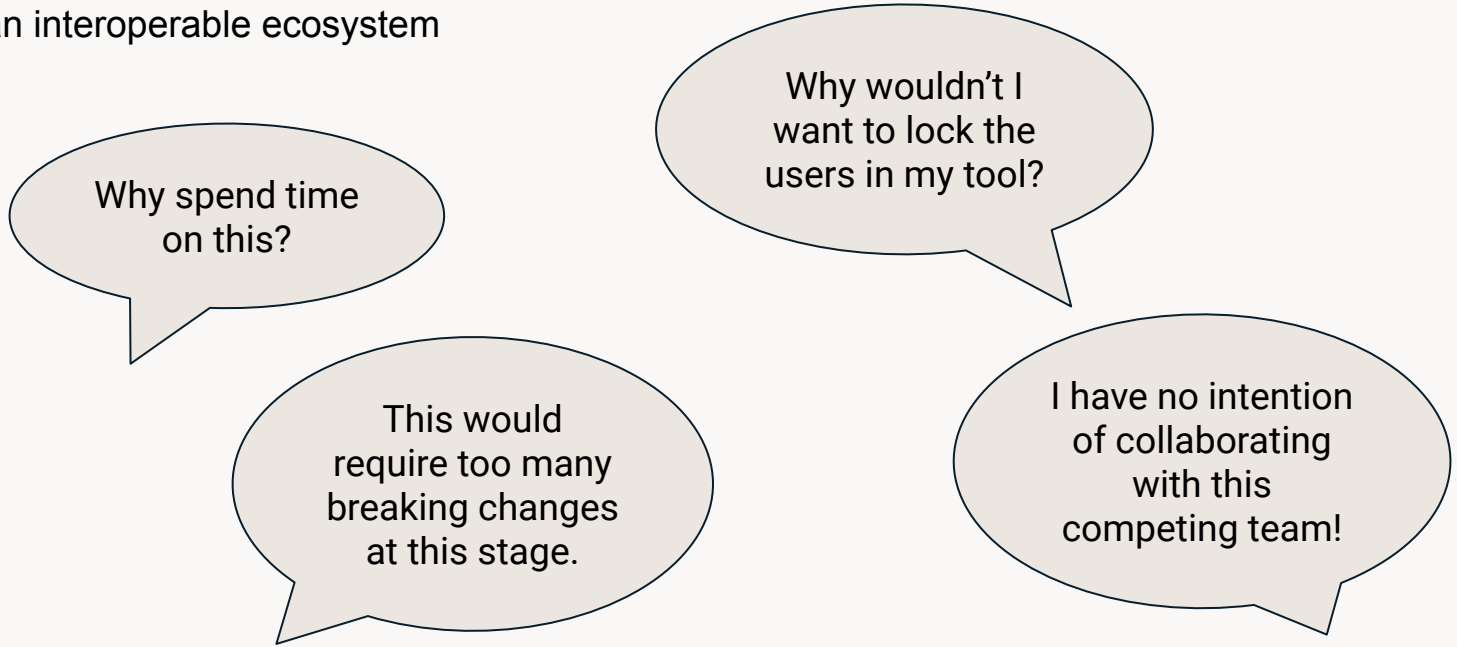
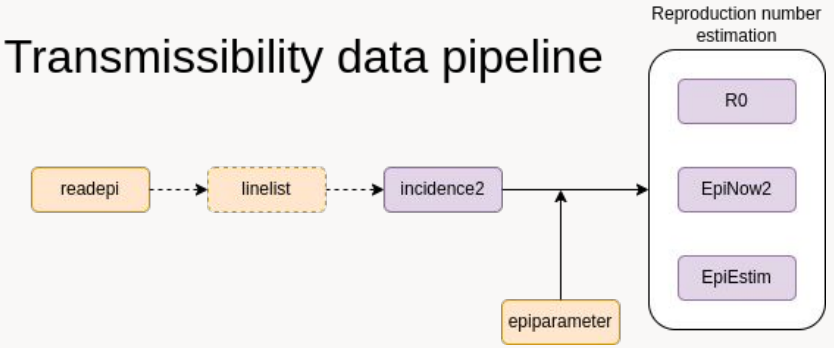


Interoperability is a socio-technical problem.

It's difficult to do right and not rewarded at all in career development.

Developing community buy-in

1. Write the pipelines



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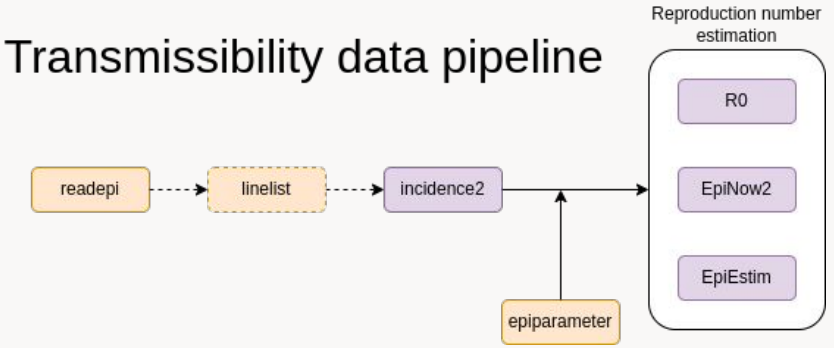

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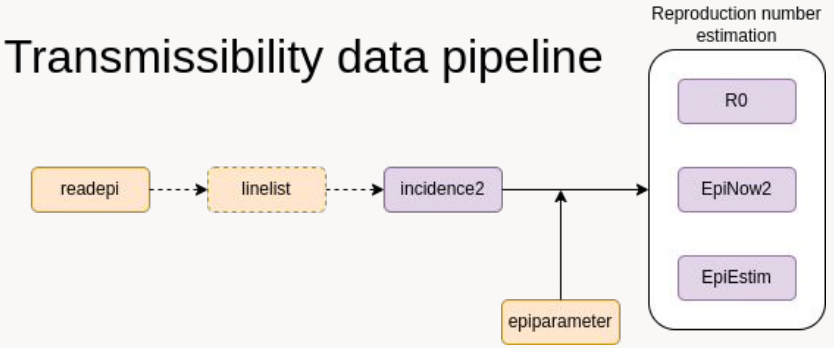

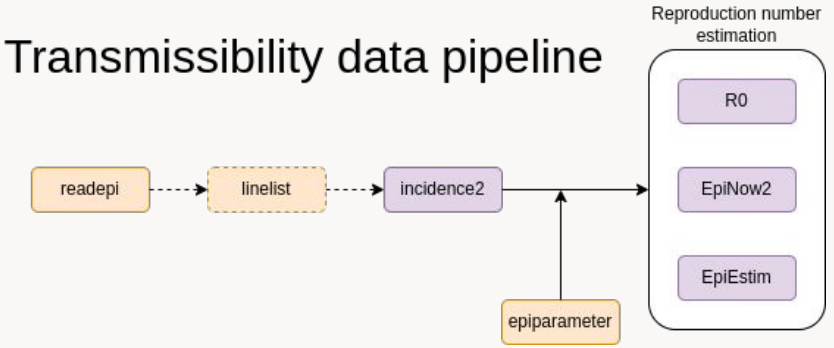

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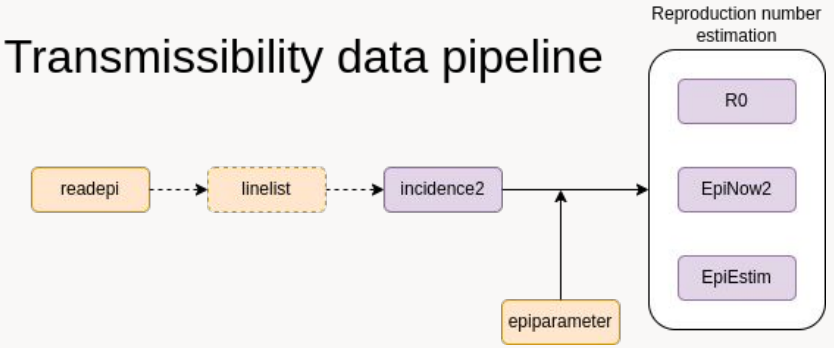

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    - neutral party, no bad blood
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3. Create a shared piece of underlying infrastructure to allow compatibility and simplify maintenance of shared tasks

Adding interoperability while minimizing breaking changes

Using R S3 object orientation to transparently operate the change.

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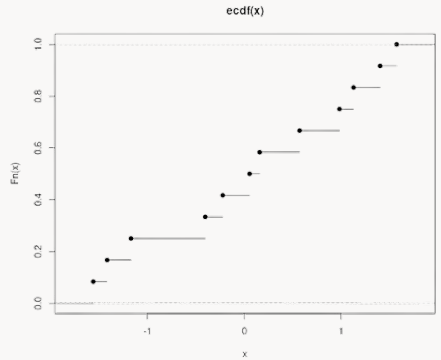
S3 is strange (like R):

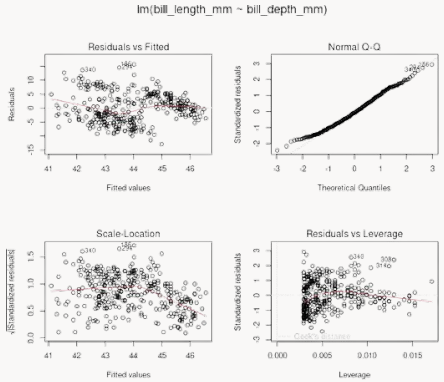
- "*S3 is informal and ad hoc, but there is a certain elegance in its minimalism: you can't take away any part of it and still have a useful OO system*." Hadley Wickham
- Mostly an advanced dispatch system based on the presence of the specific attribute
- Particularly useful because users don't need to understand anything about OO

Using R S3 object orientation to transparently operate the change.

```
fn <- ecdf(rnorm(12))
plot(fn)
```




```
m <- lm(bill_length_mm ~ bill_depth_mm, data = penguins)
plot(m)
```



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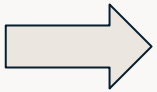

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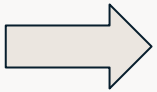

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Technical details & pitfalls at https://epiverse-trace.github.io/posts/s3-generic/

Examples & reception

Social contact data

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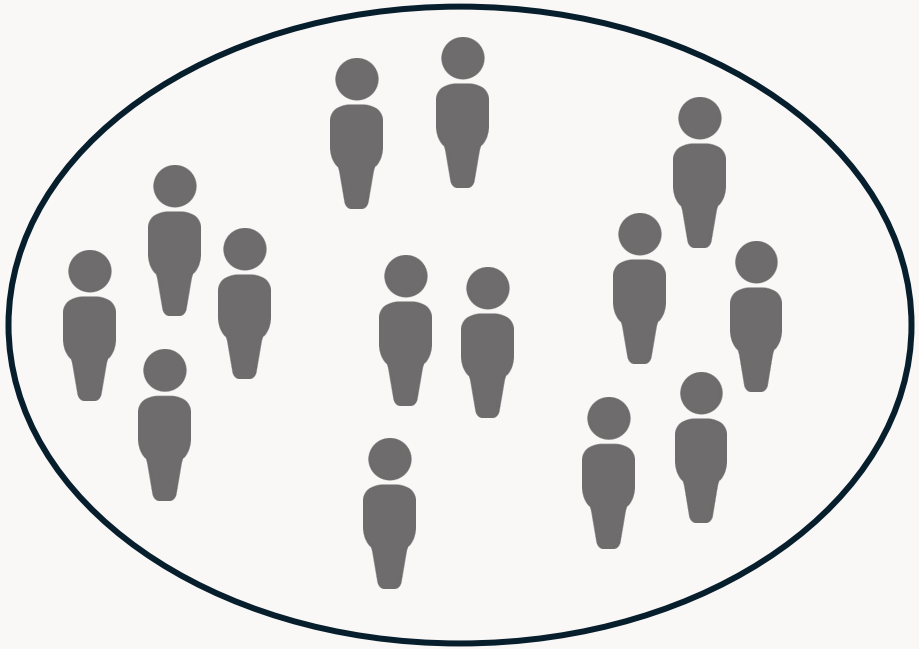

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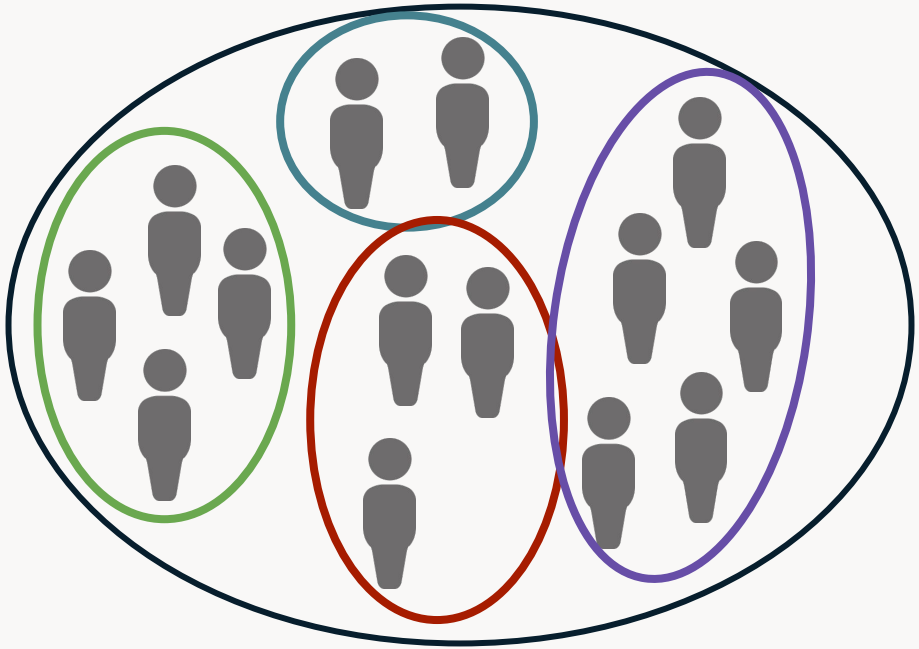

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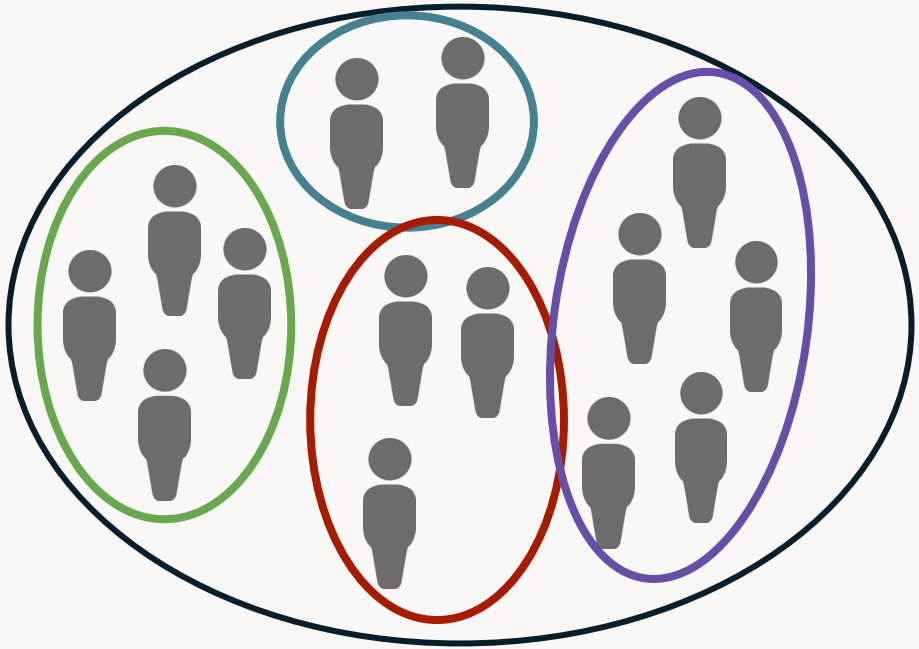

Quantify contact between groups

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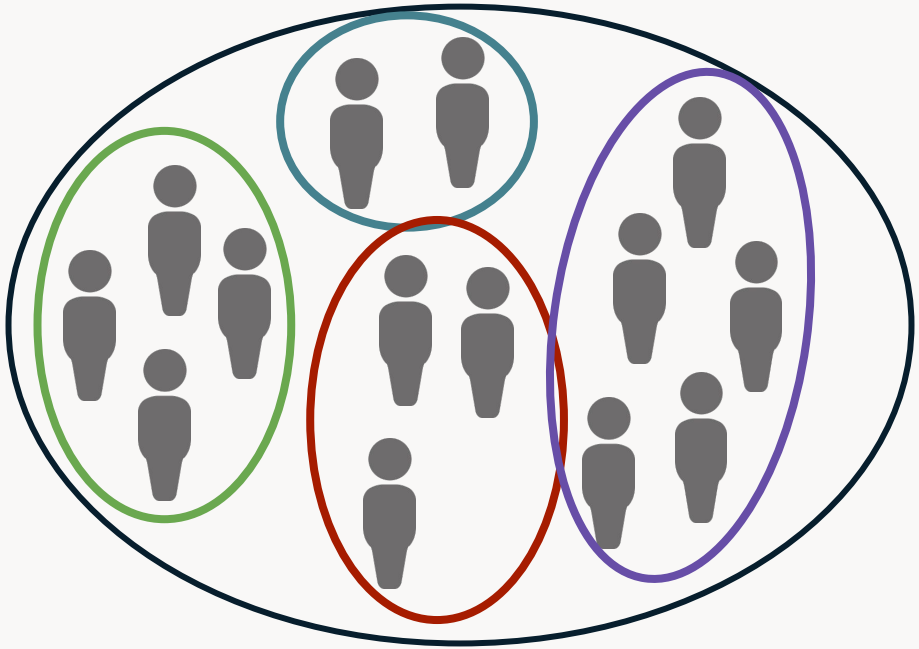

Quantify contact between groups

Used in mathematical modelling

Social contact data R packages

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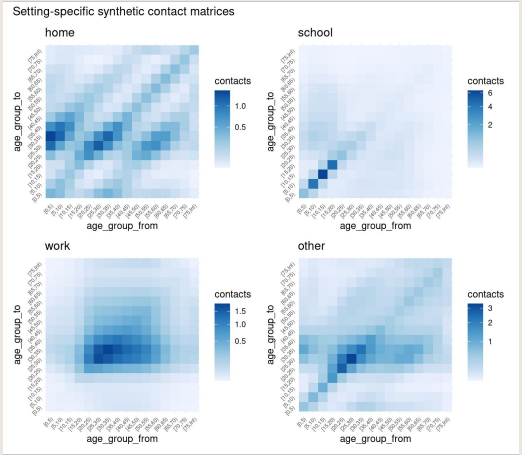
`socialmixr`

`contactdata`

Social contact data R packages

conmat



socialmixr

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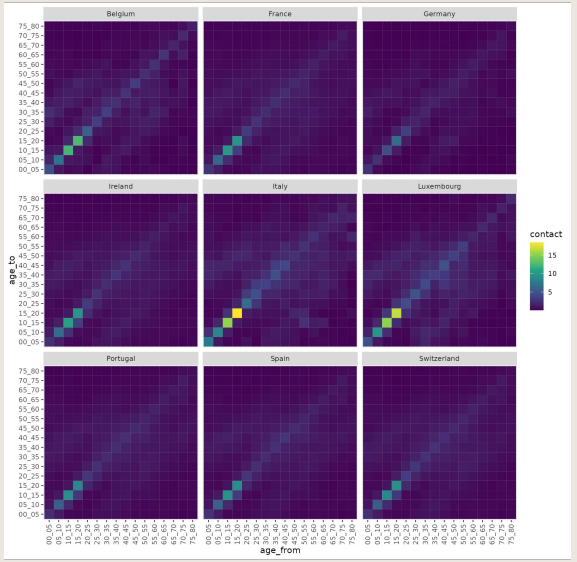

data.org

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Downstream tools interact with the same class of object, no matter the exact method they use

Conclusion

Problem statement

- Interoperability is hard, and seldomly encouraged
- Non-interoperable ecosystems generate frustration for users and duplicated developer efforts
- Some technical challenges but mostly a human problem

Looking to the future

- Think of software as tiny piece of a larger problem
  - Community
  - Interoperability
  - Sustainability
- Let’s collaborate more!
  - Split maintenance load over multiple maintainers
  - More coherent ecosystem for users
  - Fun!

Epiverse-TRACE Development Team

LSHTM / MRCG / UKHSA

- James Azam
- Bubacarr Bah
- Anna Carnegie
- Roz Eggo
- Sebastian Funk
- Pratik Gupte
- Adam Kucharski
- Joshua Lambert
- Edwin Van Leeuwen
- Karim Mané
- Tim Russell
- Carmen Tamayo
- Tim Taylor
- Andree Valle

UK Health Security Agency

PUJ / UniAndes

- Zulma Cucunubá
- Geraldine Gomez
- Julian Otero
- Jaime Pavlich-Mariscal
- David Santiago Quevedo
- Mauricio Santos-Vega
- Nicolás Torres
- Juan Daniel Umaña

Questions / Feedback?

Epiverse-TRACE

`epiverse-trace`

https://data.org/initiatives/epiverse

Hugo Gruson

`bisaloo`

https://hugogruson.fr