

The logo for RECON, with 'RECON' in a blue sans-serif font and 'N' in a grey, pixelated font. The background features a pattern of light grey triangles of various sizes.

# RECON

## Challenges and opportunities in outbreak analytics

---

Thibaut Jombart

22-23 March 2018

Imperial College London

MRC Centre for Outbreak Analysis and Modelling

# Thanks to:



Amrish  
Baidjoe



Julie  
Middleton



James  
Hayward



Rich  
FitzJohn



Neil  
Ferguson



Susannah  
Fisher



Zhian  
Kamvar



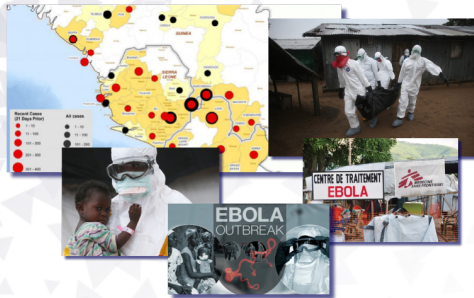
Dirk  
Schumacher



# The R Epidemics Consortium

---

# Lessons learnt from the Ebola response





# Lessons learnt from the Ebola response



# Lessons learnt from the Ebola response



## Lessons learnt from the Ebola response



Most tools for outbreak response analysis were missing.

# Informing the response in 'real time'?



Affected countries

data collection

# Informing the response in 'real time'?



Affected countries

time (block = day)



data collection

# Informing the response in 'real time'?



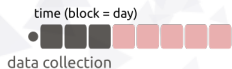
Affected countries

time (block = day)

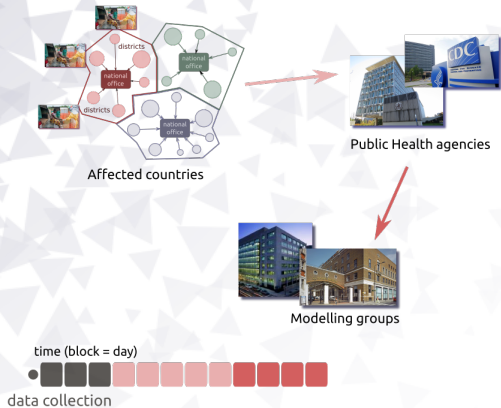


data collection

# Informing the response in 'real time'?

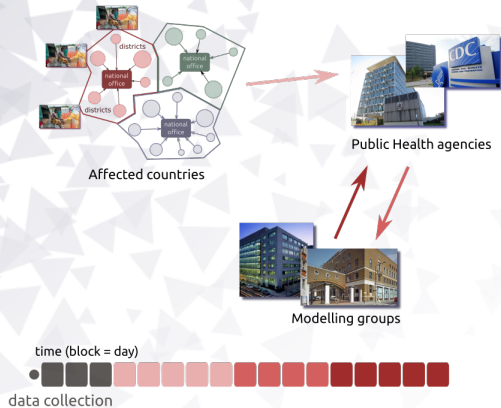


# Informing the response in 'real time'?

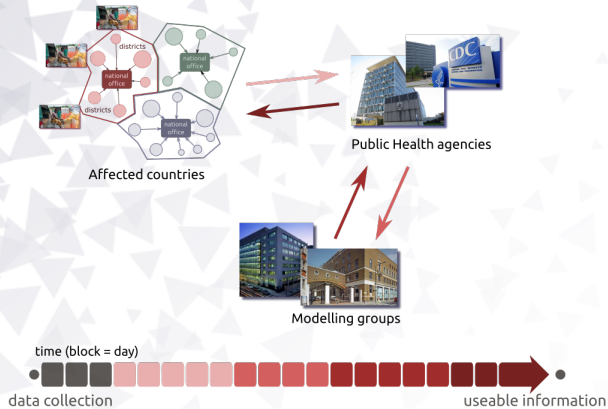




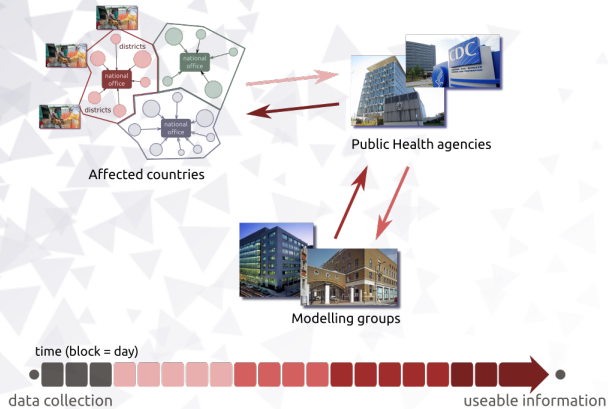
# Informing the response in 'real time'?



# Informing the response in 'real time'?

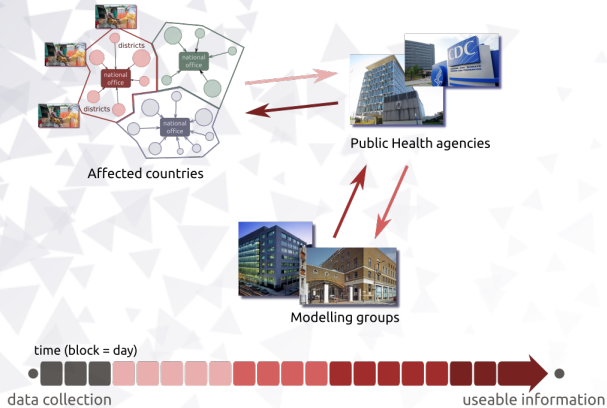


# Informing the response in 'real time'?



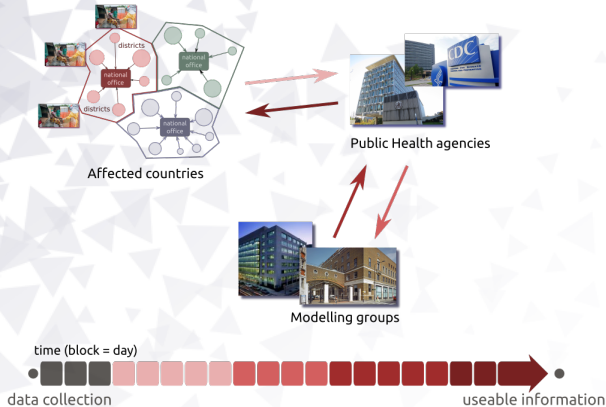
- good **tools** will shorten only some delays

# Informing the response in 'real time'?



- good **tools** will shorten only some delays
- potential for **embedding analysts** in response teams

# Informing the response in 'real time'?



- good **tools** will shorten only some delays
- potential for **embedding analysts** in response teams
- two-way road: lots to **learn from the field** for analysts

# Who do we need to develop outbreak analytics tools?



# Who do we need to develop outbreak analytics tools?

Public Health



# Who do we need to develop outbreak analytics tools?

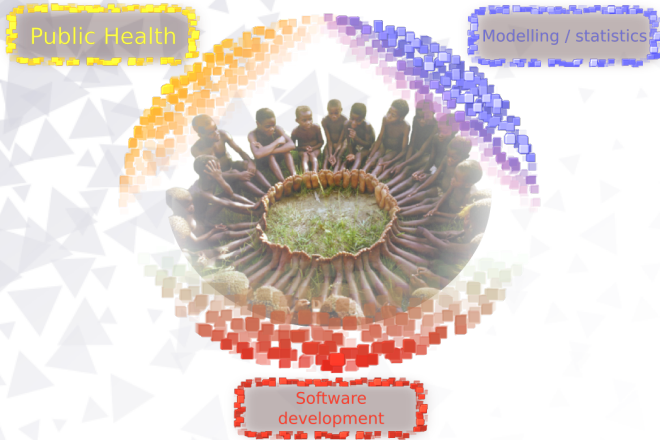
Public Health

Modelling / statistics

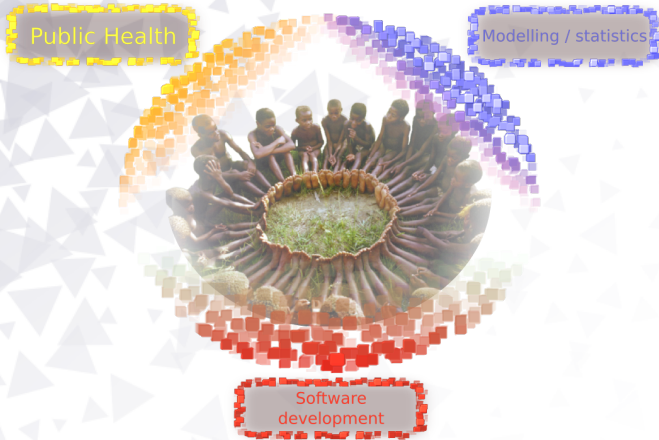




# Who do we need to develop outbreak analytics tools?



# Who do we need to develop outbreak analytics tools?



How do we bring these people together?

# From a hack to a pack



Hackout 3, summer 2016, Berkeley

# From a hack to a pack



Hackout 3, summer 2016, Berkeley



# From a hack to a pack



Hackout 3, summer 2016, Berkeley



RECON  
[The R Epidemics Consortium]

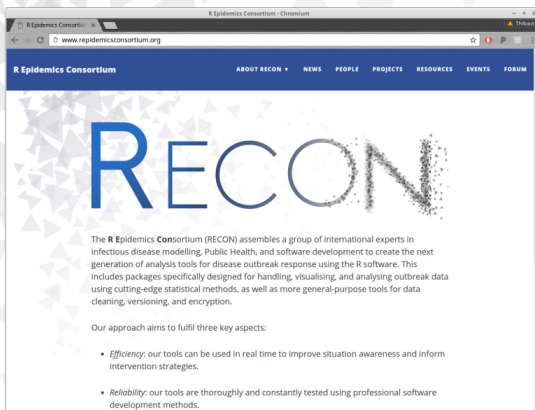


# From a hack to a pack



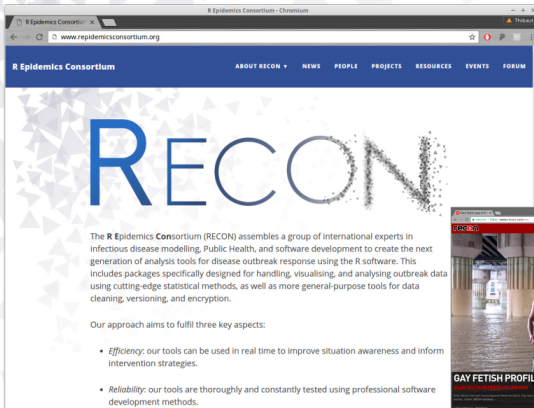
# RECON: the R Epidemics Consortium

A taskforce to build a new generation of outbreak response tools in .



# RECON: the R Epidemics Consortium

A taskforce to build a new generation of outbreak response tools in .



The screenshot shows the RECON website in a Chromium browser. The page has a blue header with the text "R Epidemics Consortium" and a navigation menu with links: ABOUT RECON, NEWS, PEOPLE, PROJECTS, RESOURCES, EVENTS, and FORUM. The main content area features the word "RECON" in large blue letters, with the "O" composed of small grey dots. Below this, a paragraph describes the consortium's mission: "The R Epidemics Consortium (RECON) assembles a group of international experts in infectious disease modelling, Public Health, and software development to create the next generation of analysis tools for disease outbreak response using the R software. This includes packages specifically designed for handling, visualising, and analysing outbreak data using cutting-edge statistical methods, as well as more general-purpose tools for data cleaning, versioning, and encryption." Below the paragraph, it states "Our approach aims to fulfil three key aspects:" followed by a bulleted list: "Efficiency: our tools can be used in real time to improve situation awareness and inform intervention strategies." and "Reliability: our tools are thoroughly and constantly tested using professional software development methods."

R Epidemics Consortium - Chromium

www.repidemicsconsortium.org

R Epidemics Consortium

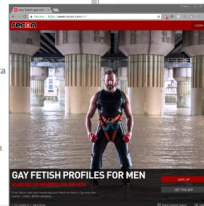
ABOUT RECON NEWS PEOPLE PROJECTS RESOURCES EVENTS FORUM

# RECON

The R Epidemics Consortium (RECON) assembles a group of international experts in infectious disease modelling, Public Health, and software development to create the next generation of analysis tools for disease outbreak response using the R software. This includes packages specifically designed for handling, visualising, and analysing outbreak data using cutting-edge statistical methods, as well as more general-purpose tools for data cleaning, versioning, and encryption.

Our approach aims to fulfil three key aspects:

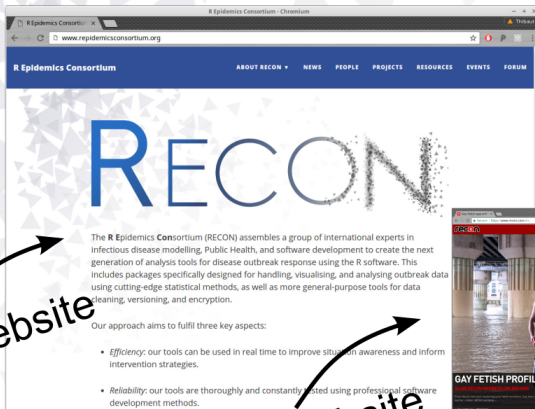
- *Efficiency*: our tools can be used in real time to improve situation awareness and inform intervention strategies.
- *Reliability*: our tools are thoroughly and constantly tested using professional software development methods.





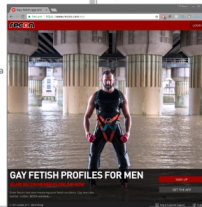
# RECON: the R Epidemics Consortium

A taskforce to build a new generation of outbreak response tools in .



Our website

Not our website  
(but I'm sure they're nice and friendly)



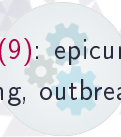


*[www.repidemicsconsortium.org](http://www.repidemicsconsortium.org)*

- started 6th September 2016
- ~70 members
- 20 countries, > 40 institutions
- ~ 9 packages released, 15 under development
- public forum, blog, online resources

# RECON packages

- **released (9)**: epicurves, contact data, transmissibility, forecasting, outbreak reconstructions



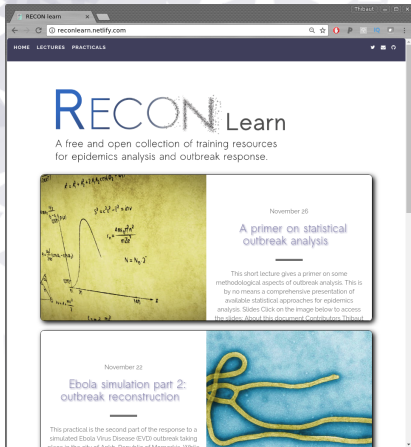
# RECON packages

- **released (9)**: epicurves, contact data, transmissibility, forecasting, outbreak reconstructions
- **upcoming (~15)**: deployable systems (RECON deployer), population flows, outbreak clusters, reproducible data cleaning, GUIs

# RECON packages

- **released (9)**: epicurves, contact data, transmissibility, forecasting, outbreak reconstructions
- **upcoming (~15)**: deployable systems (RECON deployer), population flows, outbreak clusters, reproducible data cleaning, GUIs
- **planned (?)**: automated reports, mapping, outbreak simulators

# RECON learn: training resources for epidemics analysis



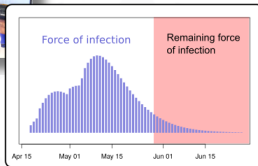
*reconlearn.netlify.com*

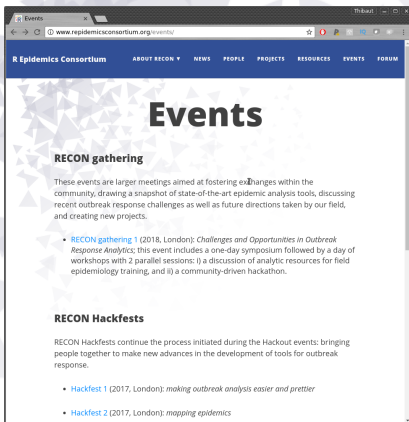
- repository for free, **open training material**
- lectures, practicals, case studies, code gists
- emphasis on **community contributions**
- podcast: **Rtips** on YouTube

# Supporting outbreak response in the field: Ebola outbreak in Likati (DRC) 2017



- Ebola outbreak April-May 2017
- small scale (8 confirmed / probable cases)
- challenging settings: remote, rural area (jungle), poor WASH
- statistical analysis part of sitrep, discouraged scaling up

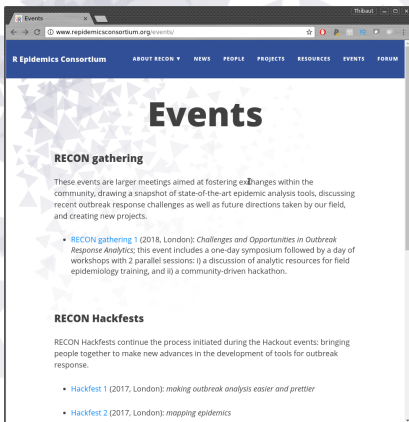




- **hackathons**: code-focussed workshops (RECON Hackfest 1 and 2 in 2017)

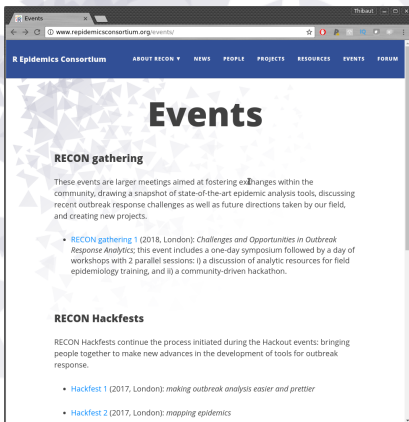
*www.repidemicsconsortium.org/  
events/*





- **hackathons**: code-focussed workshops (RECON Hackfest 1 and 2 in 2017)
- **short courses**: Epidemics6, Bogota, CDC, EPIET alumni network, PHE, WHO, MSF, ...

*www.repidemicsconsortium.org/  
events/*



- **hackathons**: code-focussed workshops (RECON Hackfest 1 and 2 in 2017)
- **short courses**: Epidemics6, Bogota, CDC, EPIET alumni network, PHE, WHO, MSF, ...
- **larger meetings**: here and now!

*www.repidemicsconsortium.org/  
events/*



**This meeting**

---



## Session 1. Outbreak response in the field

- Recent outbreak responses
- What are the questions, the constraints, and the challenges?
- Technical needs, methodological problems



## Session 2. Data analytics and modelling for outbreak response

- Statistics and modelling for informing outbreak response
- How to increase situation awareness?
- Potential and limitations



### Session 3. Looking ahead: new initiatives in outbreak response

- Impact of new technologies (e.g. DNA sequencing)
- Tomorrow's toolbox for field epidemiology
- Working better together: multidisciplinary response teams

## Parallel session 4a. Training and tools development: reflection and perspectives

- Current state of analytics in field epidemiology training
- What are the gaps? How can we help filling them?

## **Parallel session 4a.** Training and tools development: reflection and perspectives

- Current state of analytics in field epidemiology training
- What are the gaps? How can we help filling them?

## **Parallel session 4b.** Community-driven hackathon for epidemics analysis

- Community-contributed project fair
- A few hours to generate pilot results
- **Most promising projects will form our future RECON Hackfests**



# Making connections



Connecting questions and answers..

# Making connections



Connecting **questions** and **answers**.. often relies on **connecting the right people**.

# Making connections



Connecting **questions** and **answers**.. often relies on **connecting the right people**. Use this event to:

- **meet** people
- **exchange** experiences and viewpoints
- **start** new projects and collaborations