

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



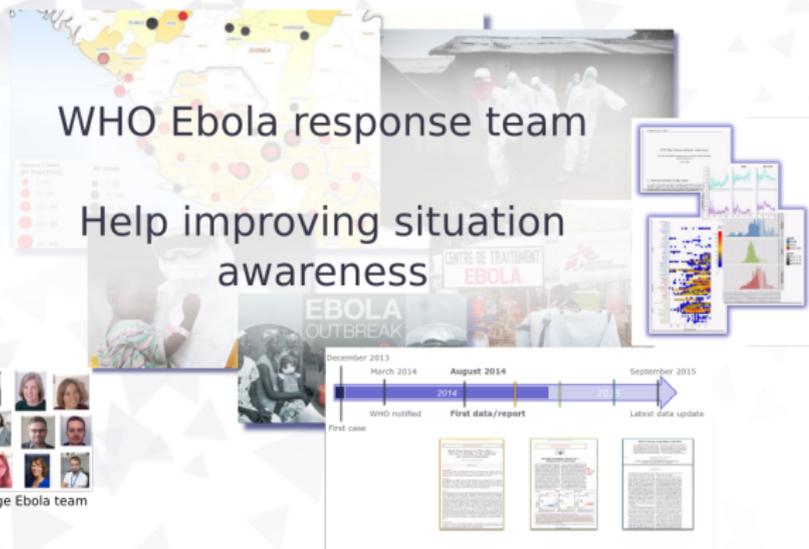
The R Epidemics Consortium

Lessons learnt from the Ebola response



Imperial College Ebola team

Lessons learnt from the Ebola response

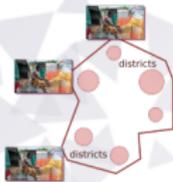


Lessons learnt from the Ebola response



Most **tools** for outbreak response analysis **were missing**.

Informing the response in 'real time'?

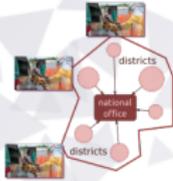


Affected countries



data collection

Informing the response in 'real time'?



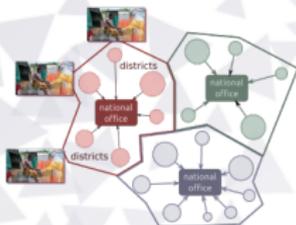
Affected countries

time (block = day)



data collection

Informing the response in 'real time'?



Affected countries

time (block = day)

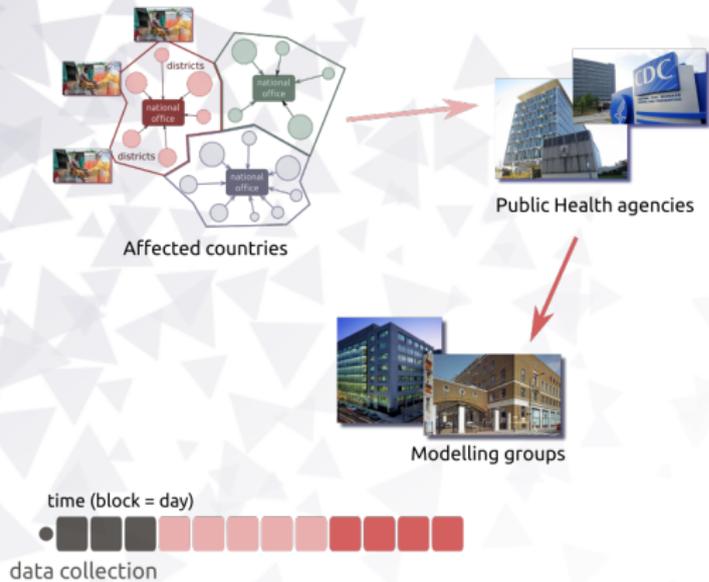


data collection

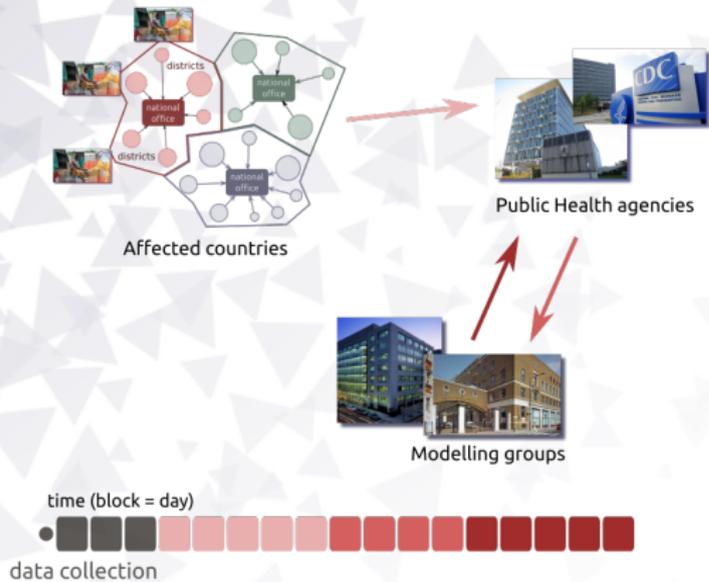
Informing the response in 'real time'?



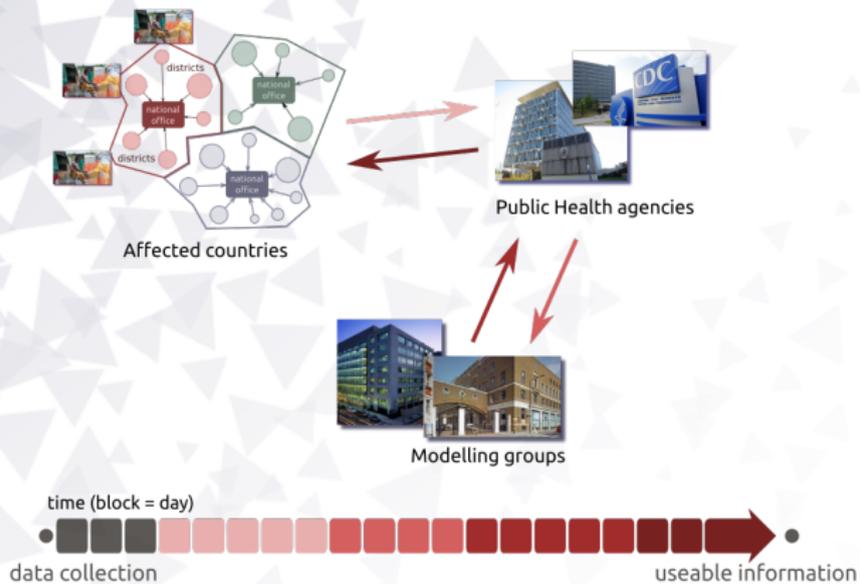
Informing the response in 'real time'?



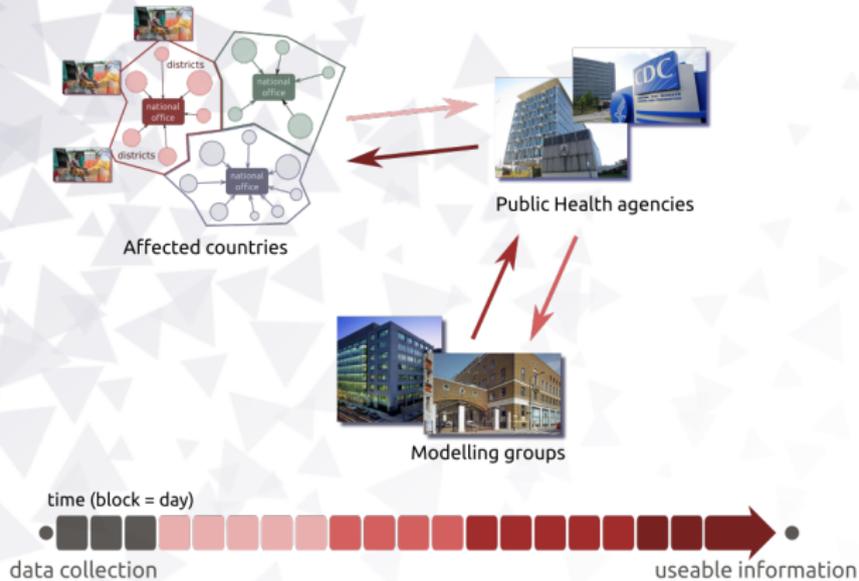
Informing the response in 'real time'?



Informing the response in 'real time'?

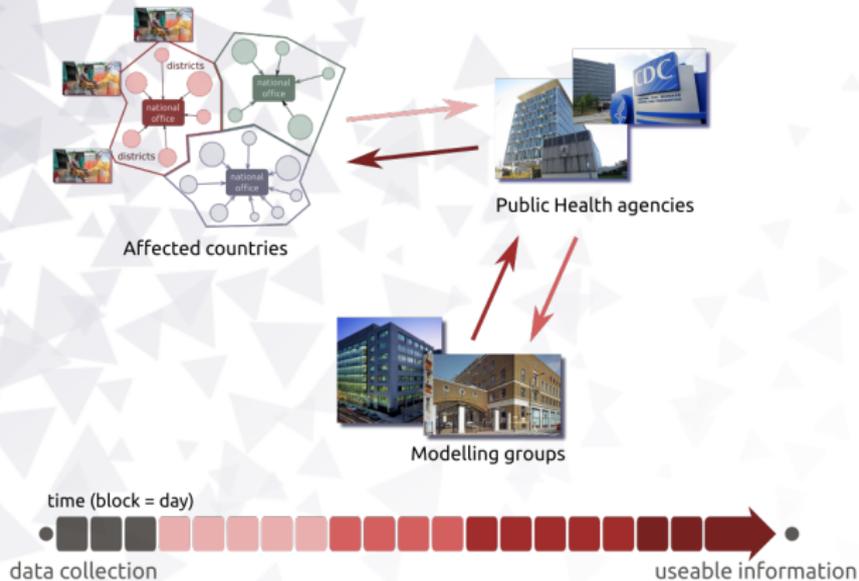


Informing the response in 'real time'?



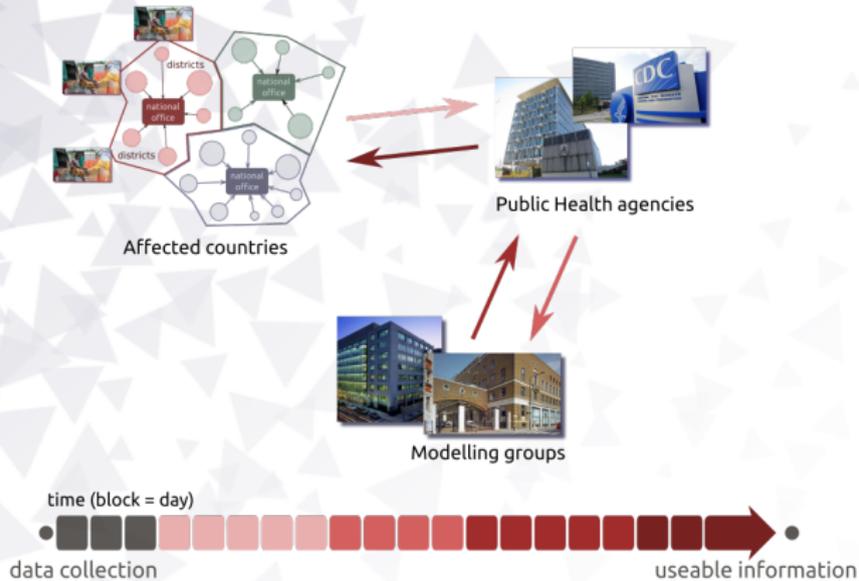
- good **tools** will shorten only some delays

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

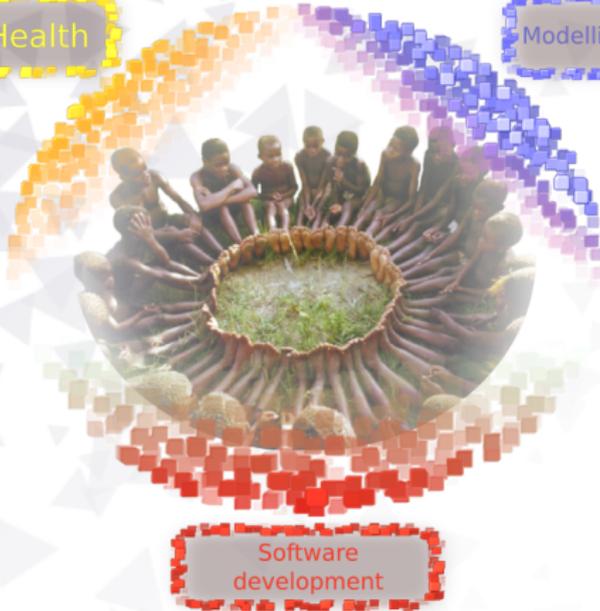


Who do we need to develop outbreak analytics tools?

Public Health

Modelling / statistics

Software
development



Who do we need to develop outbreak analytics tools?



How do we bring these people together?

From a hack to a pack



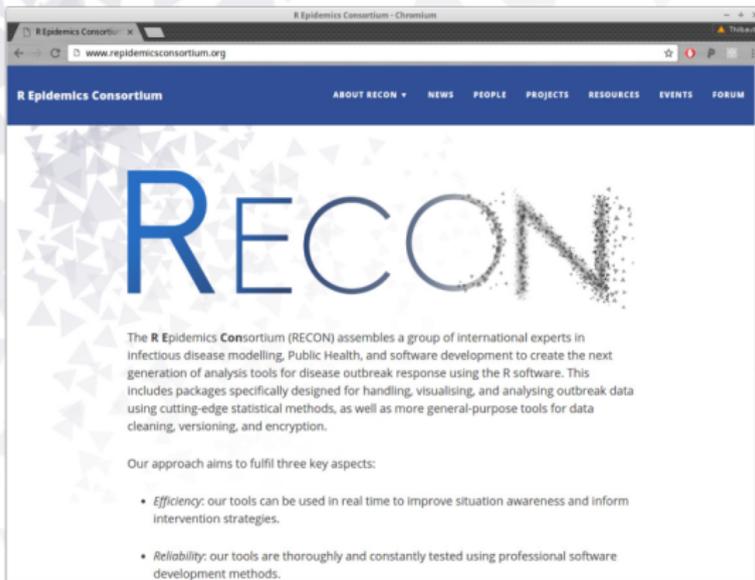
Hackout 3, summer 2016, Berkeley

From a hack to a pack



RECON: the R Epidemics Consortium

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



The screenshot shows the RECON website homepage. At the top, there is a navigation bar with the following links: ABOUT RECON, NEWS, PEOPLE, PROJECTS, RESOURCES, EVENTS, and FORUM. The main heading is "RECON" in large blue letters, where the "O"s are filled with a pattern of small grey dots. Below the heading, there is a paragraph of text describing the consortium's mission. Underneath, it states "Our approach aims to fulfil three key aspects:" followed by a bulleted list of two points: "Efficiency" and "Reliability".

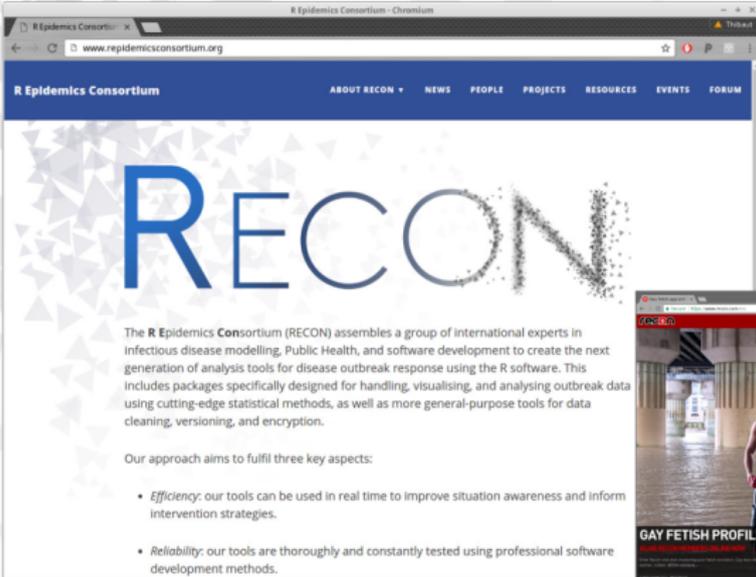
The R Epidemics Consortium (RECON) assembles a group of international experts in infectious disease modelling, Public Health, and software development to create the next generation of analysis tools for disease outbreak response using the R software. This includes packages specifically designed for handling, 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 .

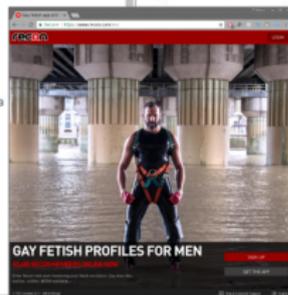


The screenshot shows the RECON website homepage. At the top, there is a navigation bar with the following links: ABOUT RECON, NEWS, PEOPLE, PROJECTS, RESOURCES, EVENTS, and FORUM. The main heading is "RECON" in large blue letters, with the "O" being a cluster of small grey dots. Below the heading, there is a paragraph of text describing the consortium's mission. This is followed by a sub-heading "Our approach aims to fulfil three key aspects:" and a bulleted list of three points: Efficiency, Reliability, and another point (partially obscured).

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.

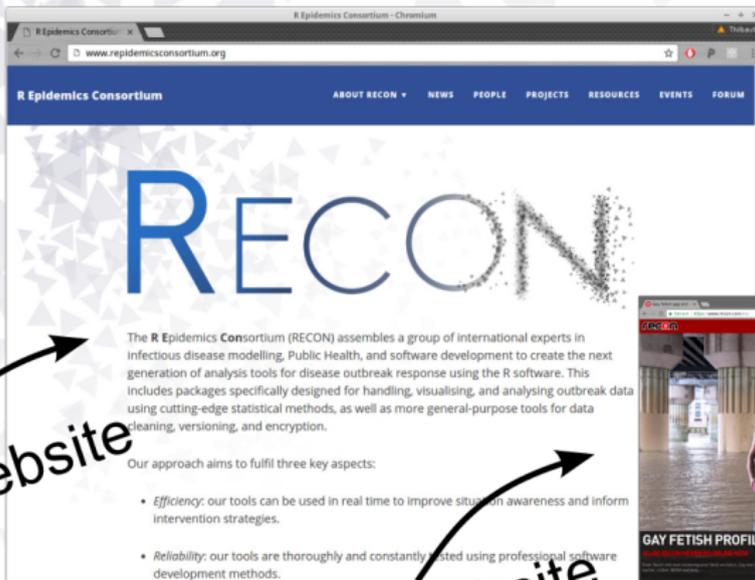
Our approach aims to fulfil three key aspects:

- *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

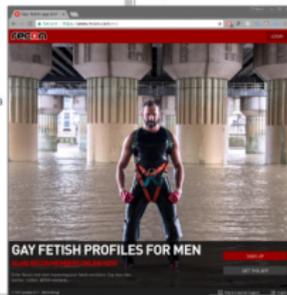
A taskforce to build a new generation of outbreak response tools in .



The screenshot shows the RECON website in a browser window. The URL is www.repidemicsconsortium.org. The navigation menu includes ABOUT RECON, NEWS, PEOPLE, PROJECTS, RESOURCES, EVENTS, and FORUM. The main heading is 'RECON' in large blue letters, with the 'N' composed of small grey dots. Below the heading, the text reads: '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 situational awareness and inform intervention strategies. Reliability; our tools are thoroughly and constantly tested using professional software development methods.'

Our website

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



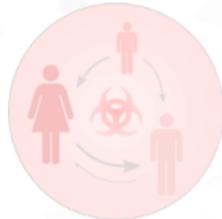
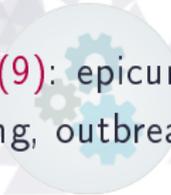
RECON

www.repidemicsconsortium.org

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

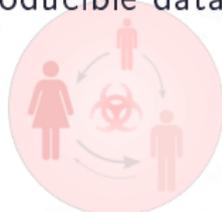
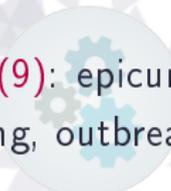
RECON packages

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



RECON packages

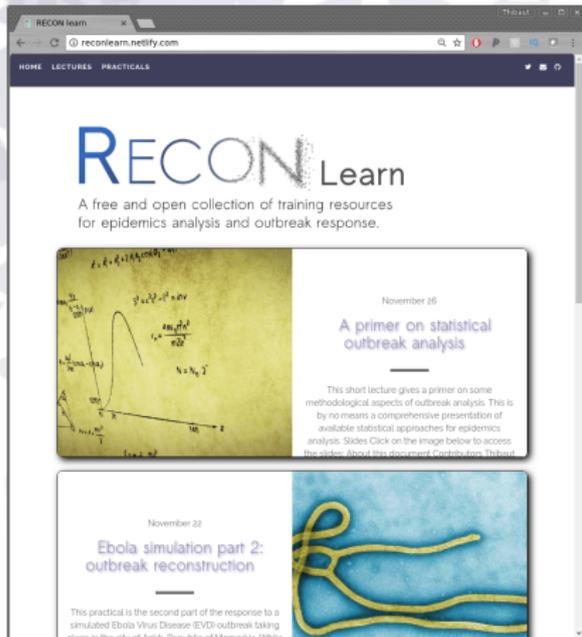
- **released (9)**: epicurves, contact data, transmissibility, forecasting, outbreak reconstructions
- **upcoming (~15)**: deployable systems (RECON deployer), population flows, outbreak clusters, reproducible data cleaning, GUIs



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

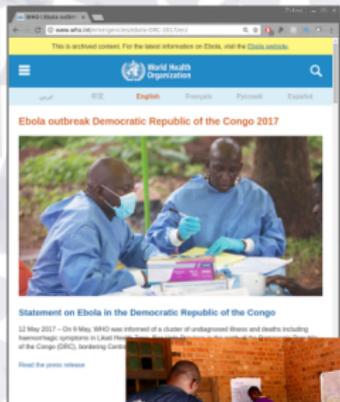


The screenshot shows the RECON Learn website interface. At the top, there is a navigation bar with 'HOME', 'LECTURES', and 'PRACTICALS'. The main heading is 'RECON Learn' with the tagline 'A free and open collection of training resources for epidemics analysis and outbreak response.' Below this, there are two featured resource cards. The first card, dated November 26, is titled 'A primer on statistical outbreak analysis' and features a background image of mathematical equations and a graph. The second card, dated November 22, is titled 'Ebola simulation part 2: outbreak reconstruction' and features a background image of yellow branching lines on a blue background.

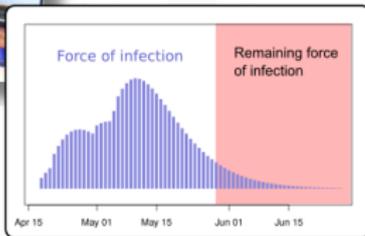
reconlearn.netlify.com

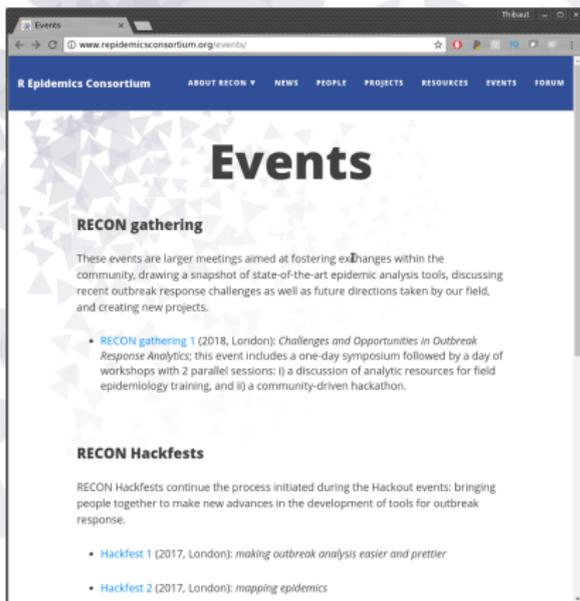
- repository for free, **open training material**
- lectures, practicals, case studies, code gists
- emphasis on **community contributions**
- podcast: **Rtips** on YouTube

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



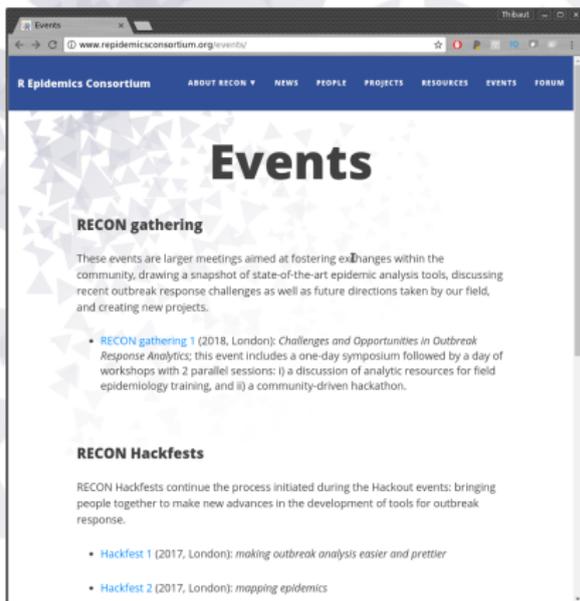
- Ebola outbreak April-May 2017
- small scale (8 confirmed / probable cases)
- challenging settings: remote, rural area (jungle), poor WASH
- statistical analysis part of sitrep, discouraged scaling up





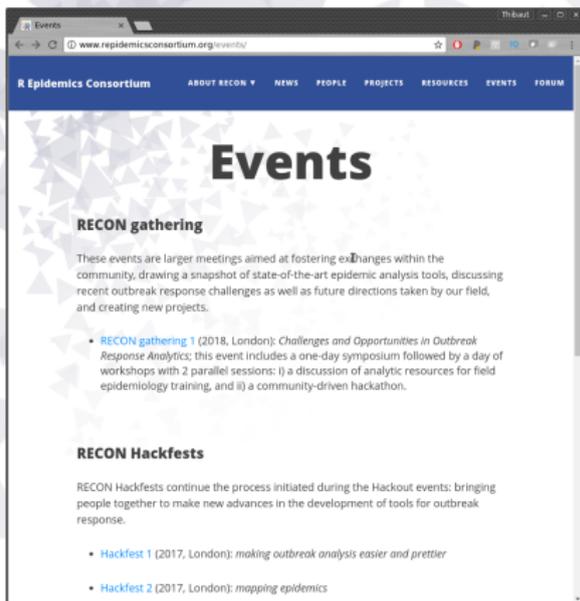
- **hackathons**: code-focused workshops (RECON Hackfest 1 and 2 in 2017)

*www.repidemicsconsortium.org/
events/*



- **hackathons:** code-focused 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-focused 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