

RECON

Challenges and opportunities in outbreak analytics

Thibaut Jombart

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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

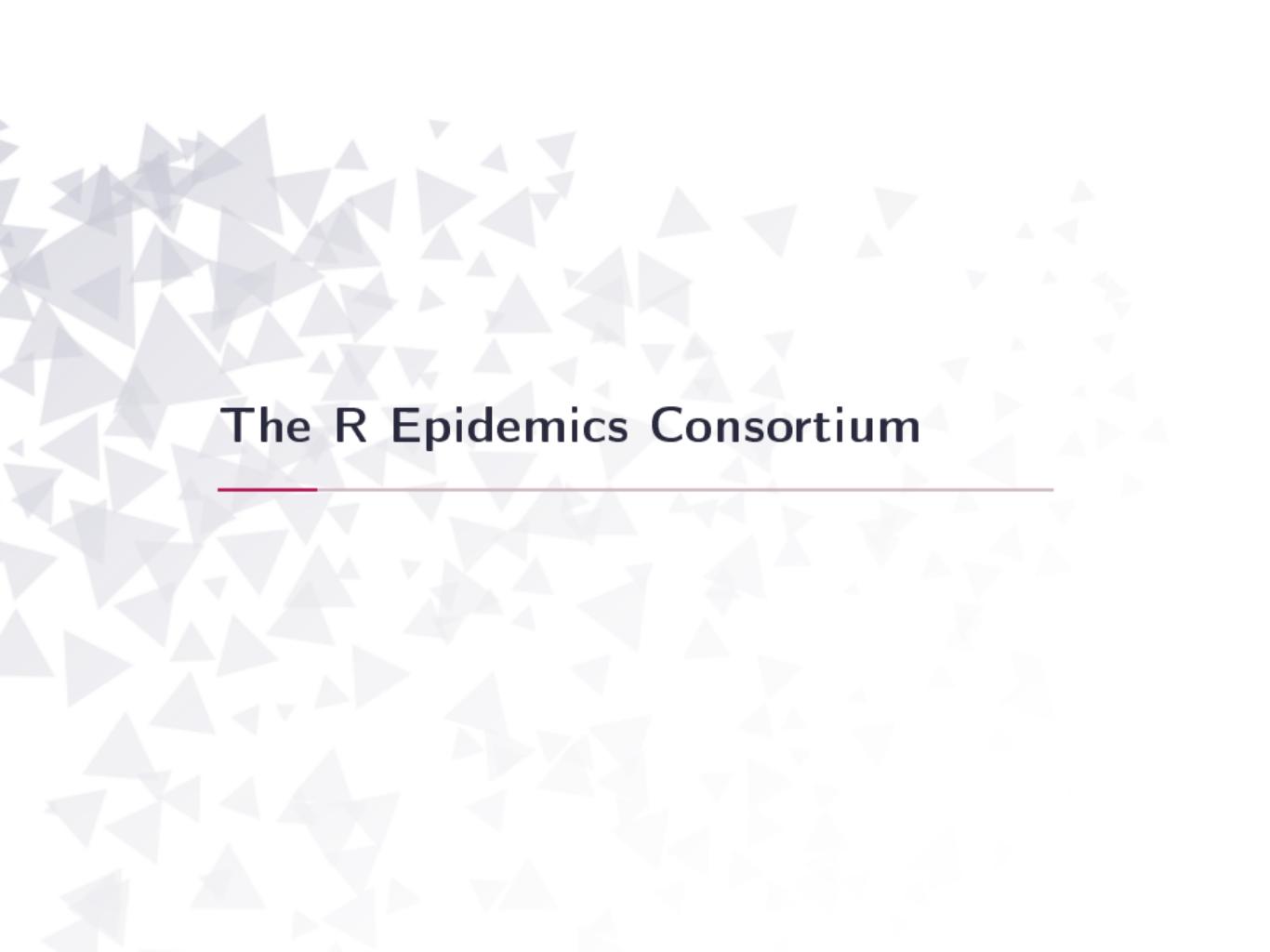


Dirk
Schumacher



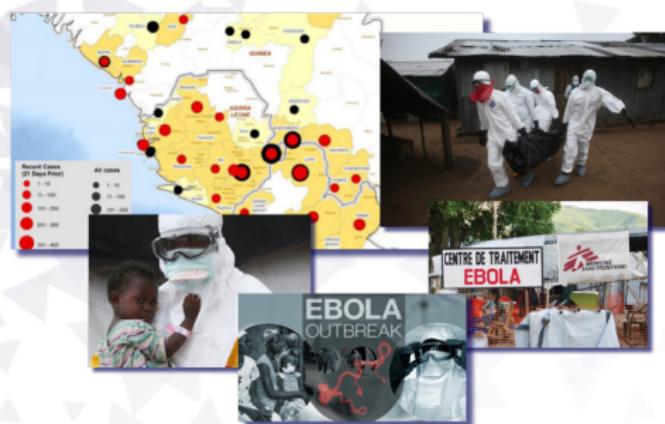
Centre for
Outbreak Analysis
and Modelling





The R Epidemics Consortium

Lessons learnt from the Ebola response



Lessons learnt from the Ebola response



Lessons learnt from the Ebola response

WHO Ebola response team

Help improving situation awareness

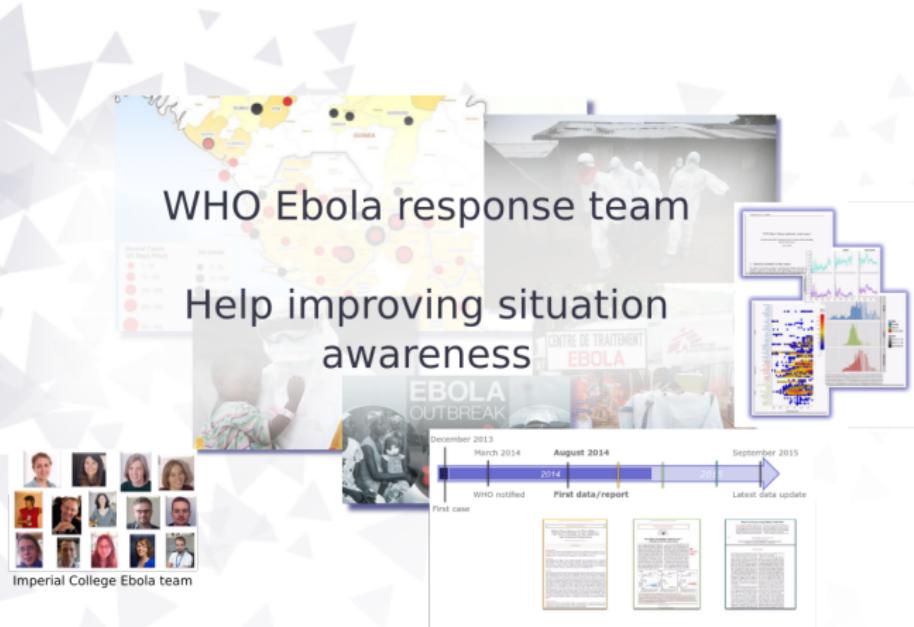
Imperial College Ebola team

Timeline: December 2013, First case; March 2014, WHO notified; August 2014, First data/report; September 2015, Latest data update.

Centre de Traitement EBOLA

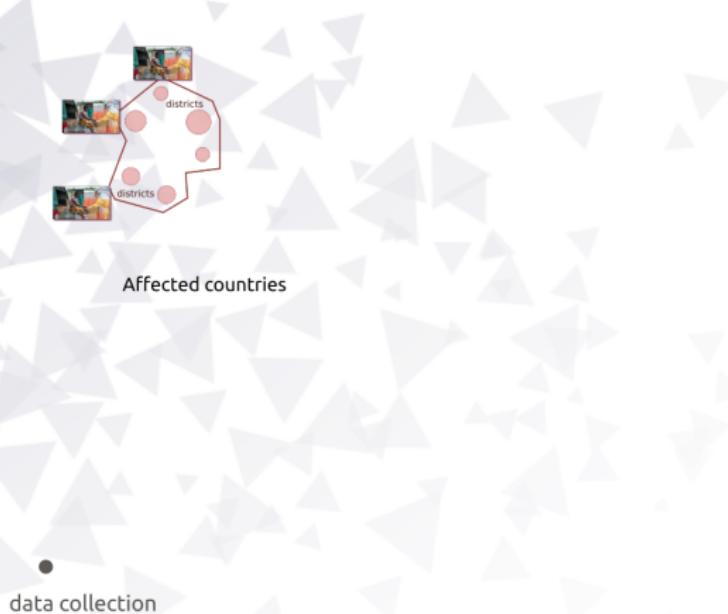
EBOLA OUTBREAK

Lessons learnt from the Ebola response



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

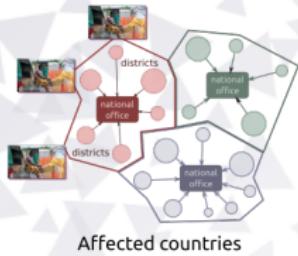
Informing the response in 'real time'?



Informing the response in 'real time'?



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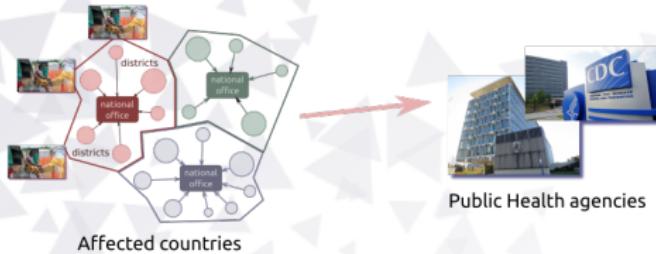
Affected countries

time (block = day)

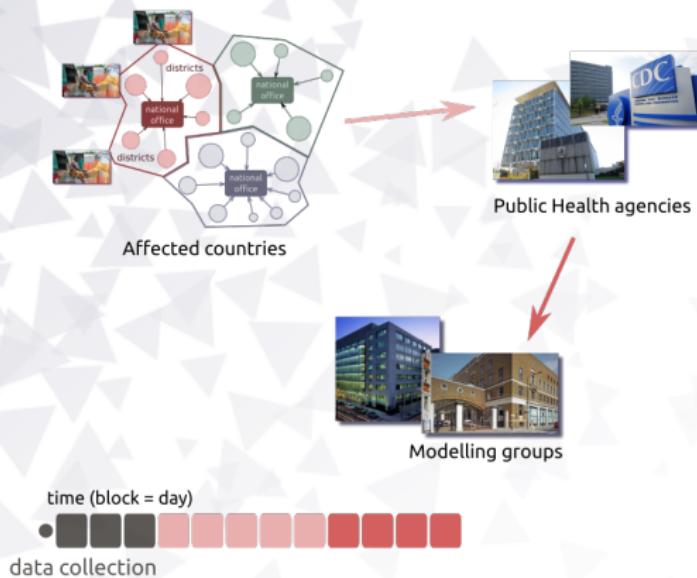


data collection

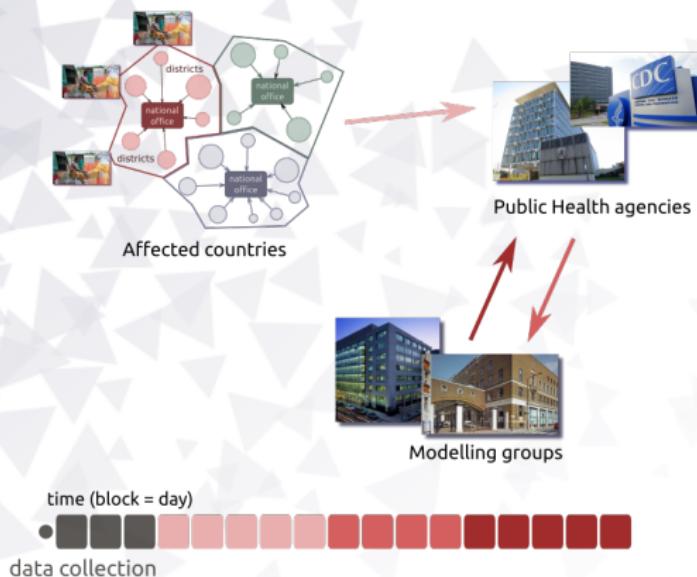
Informing the response in 'real time'?



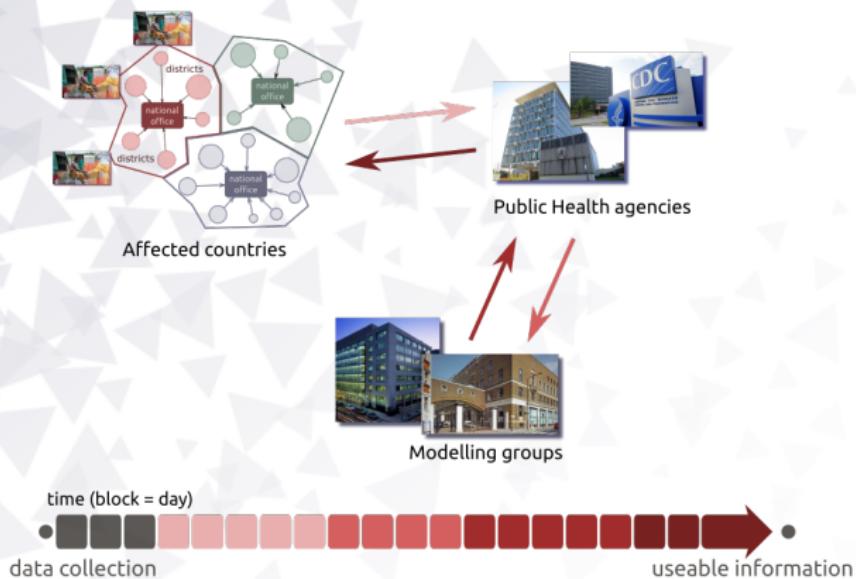
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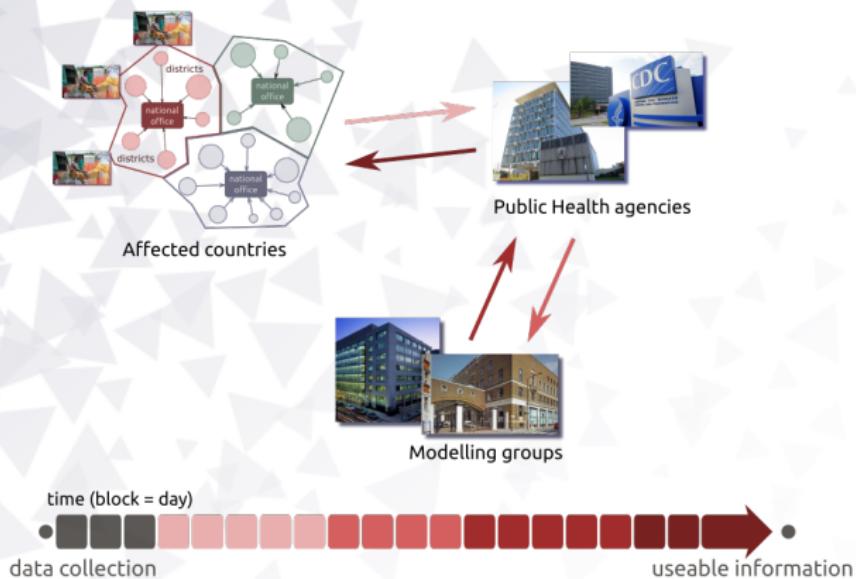
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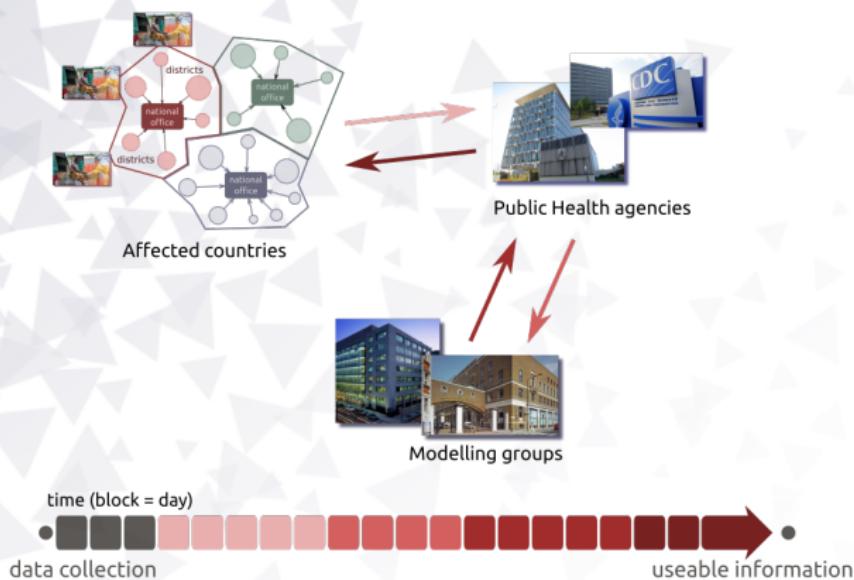


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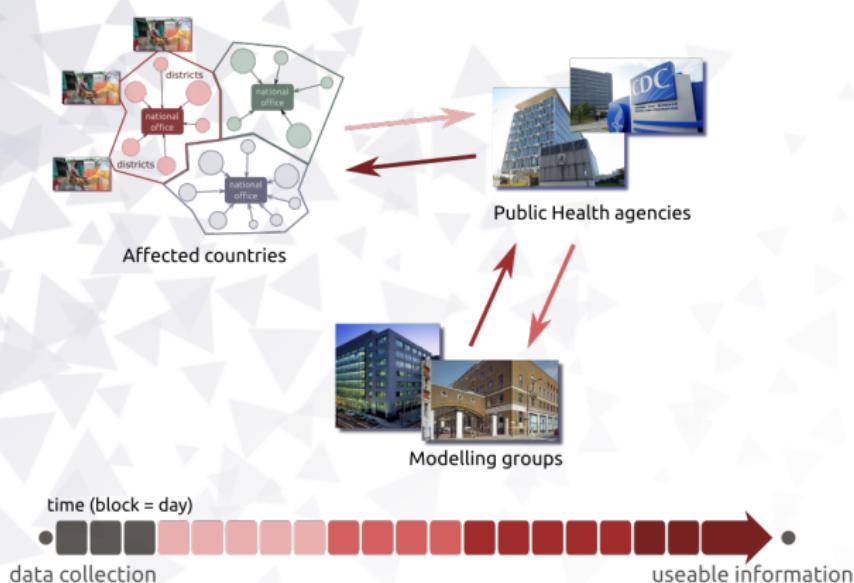
- good **tools** will shorten only some delays

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?



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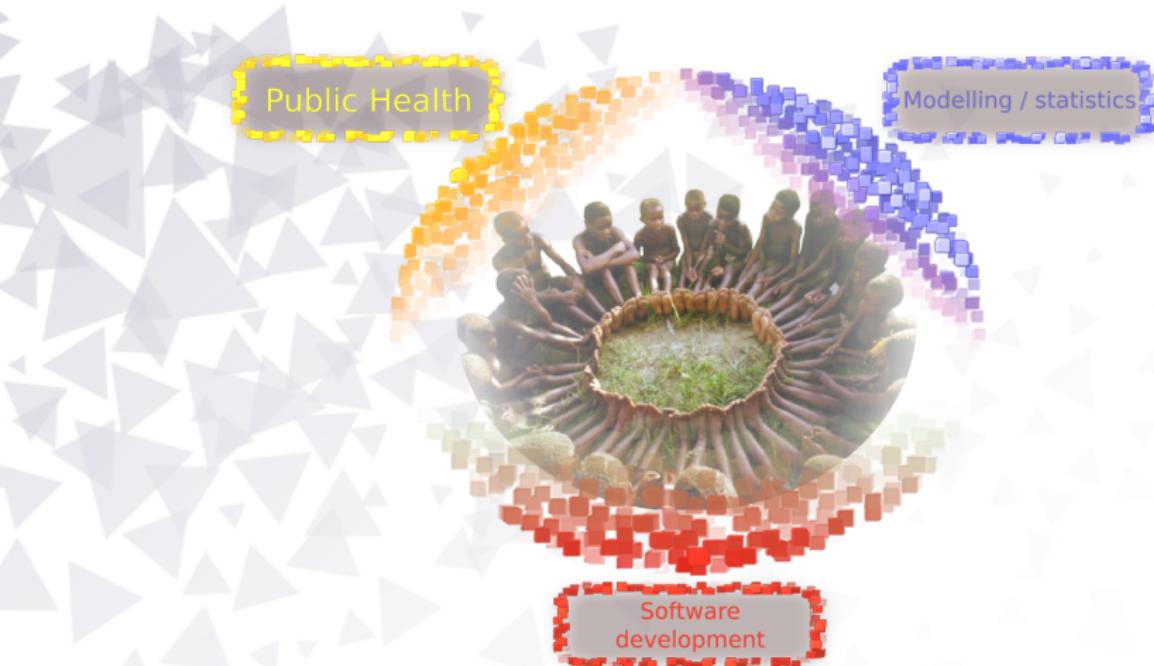
Public Health



Who do we need to develop outbreak analytics tools?



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]

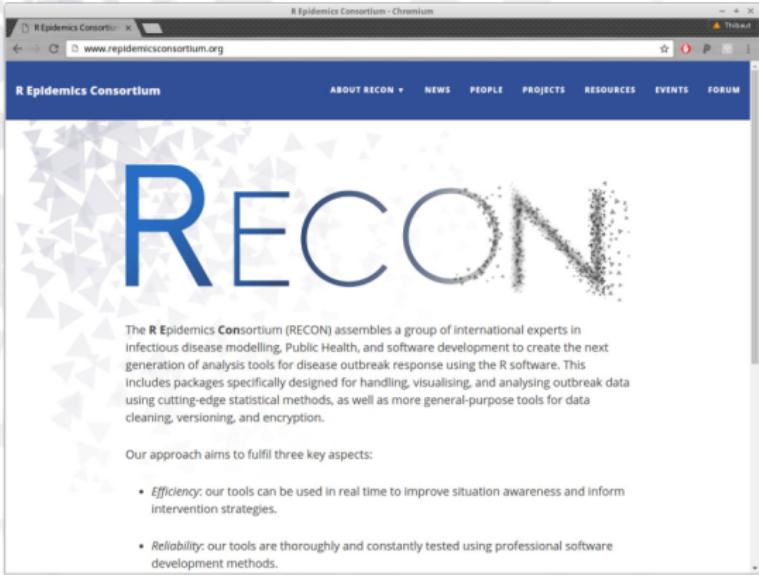


From a hack to a pack



RECON: the R Epidemics Consortium

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



The screenshot shows a web browser window for the "R Epidemics Consortium - Chromium" browser. The URL in the address bar is www.repidemcisconsortium.org. The page has a dark blue header with the "RECON" logo and navigation links for ABOUT RECON, NEWS, PEOPLE, PROJECTS, RESOURCES, EVENTS, and FORUM. The main content area features a large, stylized "RECON" title where the letters are composed of small dots or icons. Below the title is a paragraph describing the consortium's mission to assemble international experts for infectious disease modelling, Public Health, and software development. It highlights the use of R software and cutting-edge statistical methods. A section below lists three key aspects: Efficiency, Reliability, and Transparency.

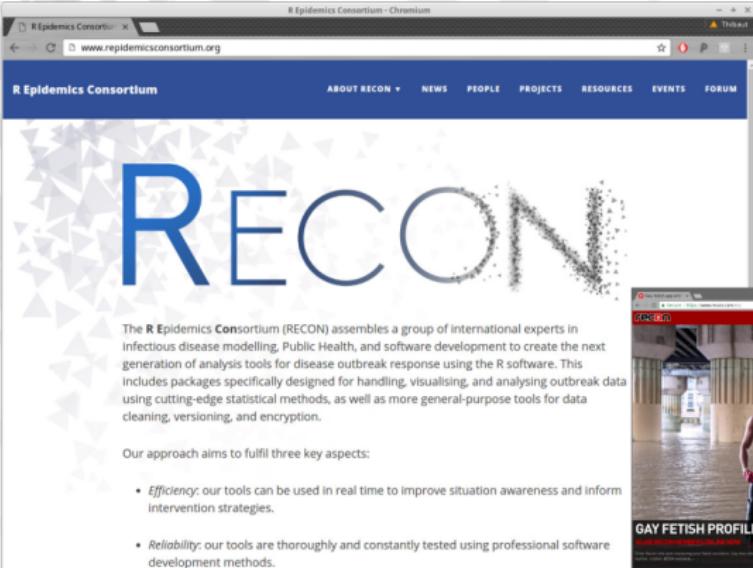
The R Epidemics Consortium (RECON) assembles a group of international experts in infectious disease modelling, Public Health, and software development to create the next generation of analysis tools for disease outbreak response using the R software. This includes packages specifically designed for handling, 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 homepage of the RECON website. The title "RECON" is prominently displayed in large blue letters, where the letter "O" is composed of a dense cluster of small dots. Below the title is a paragraph of text describing the consortium's mission. A sidebar on the left lists three key aspects: Efficiency, Reliability, and Transparency. To the right of the main content is a smaller window showing a different website for "GAY FETISH PROFILES FOR MEN".

RECON

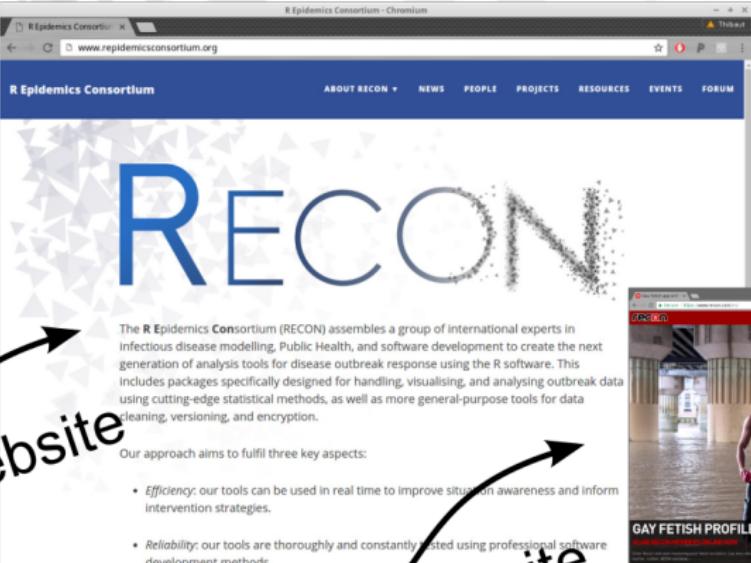
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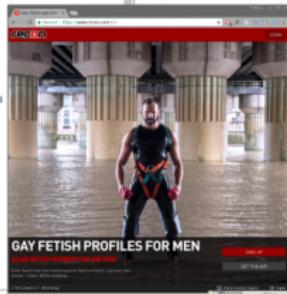
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Our website

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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.
- *Transparency:* our tools are open source and released under the GNU General Public License Version 3.



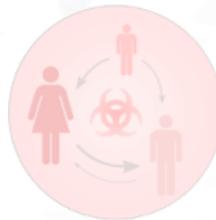
RECON

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



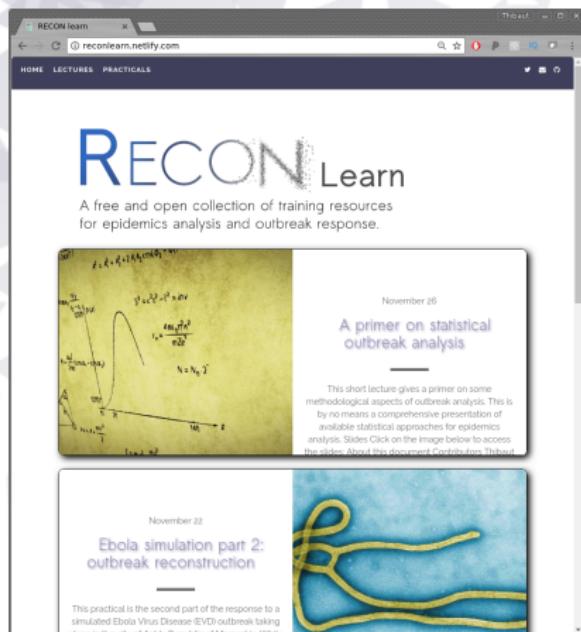
RECON packages

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- released (9): epicurves, contact data, transmissibility, forecasting, outbreak reconstructions
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- planned (?): automated reports, mapping, outbreak simulators

RECON learn: training resources for epidemics analysis



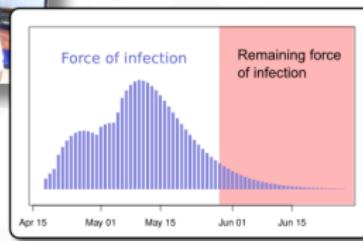
reconlearn.netlify.com

- 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



RECON events

The screenshot shows a web browser window with the URL www.repidemicsconsortium.org/events/. The page has a dark blue header with the 'Epidemics Consortium' logo and navigation links for About RECON, News, People, Projects, Resources, Events, and Forum. The main content area has a light grey background with a large, stylized geometric graphic of triangles. The title 'Events' is prominently displayed in a large, bold, dark font. Below it, a section titled 'RECON gathering' contains text about larger meetings aimed at fostering exchanges within the community. A bulleted list details the 'RECON gathering 1' event, including a one-day symposium followed by workshops with parallel sessions for analytic resources and epidemiology training, and a community-driven hackathon. Another section, 'RECON Hackfests', describes how they continue the process initiated during the Hackout events, bringing people together to make new advances in outbreak response. A bulleted list includes 'Hackfest 1' (making outbreak analysis easier and prettier) and 'Hackfest 2' (mapping epidemics).

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

*www.repidemicsconsortium.org/
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RECON gathering

These events are larger meetings aimed at fostering exchanges within the community, drawing a snapshot of state-of-the-art epidemic analysis tools, discussing recent outbreak response challenges as well as future directions taken by our field, and creating new projects.

- RECON gathering 1 (2018, London): *Challenges and Opportunities in Outbreak Response Analytics*; this event includes a one-day symposium followed by a day of workshops with 2 parallel sessions: i) a discussion of analytic resources for field epidemiology training, and ii) a community-driven hackathon.

RECON Hackfests

RECON Hackfests continue the process initiated during the Hackout events: bringing people together to make new advances in the development of tools for outbreak response.

- Hackfest 1 (2017, London): *making outbreak analysis easier and prettier*
- Hackfest 2 (2017, London): *mapping epidemics*

*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, ...

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- **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/*

The background of the slide features a large number of small, light-gray triangles of various sizes scattered across the entire area, creating a subtle geometric pattern.

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

This afternoon (1/2)



Session 2. Data analytics and modelling for outbreak response

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

This afternoon (2/2)



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?

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- 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