

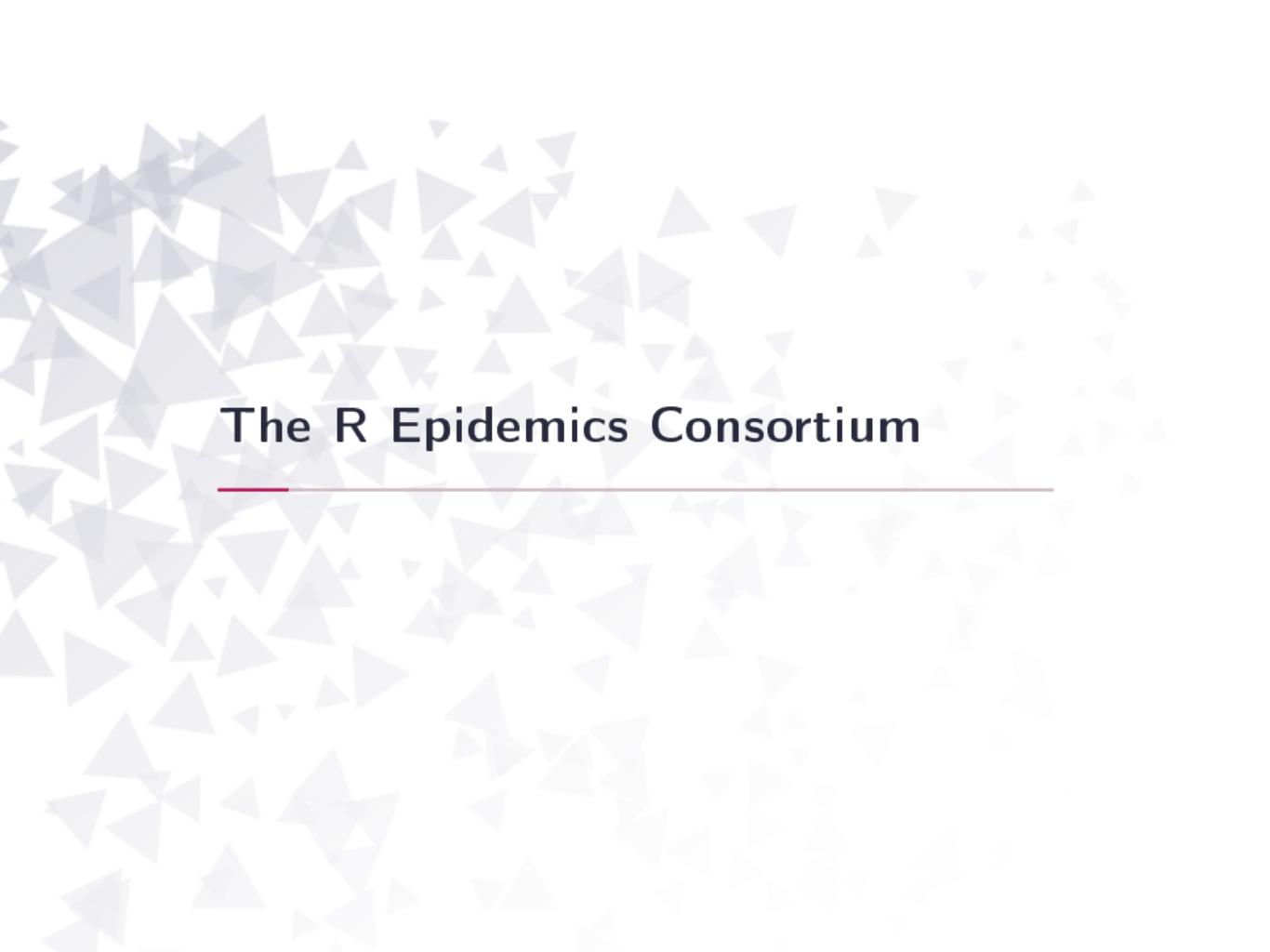
RECON

Challenges and opportunities in outbreak analytics

Thibaut Jombart

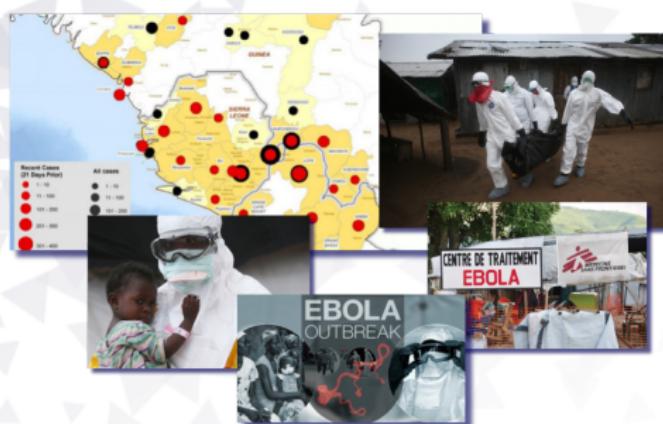
21 June 2018

Imperial College London
MRC Centre for Outbreak Analysis and Modelling



The R Epidemics Consortium

Lessons learnt from the Ebola response



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Lessons learnt from the Ebola response

WHO Ebola response team

Help improving situation awareness

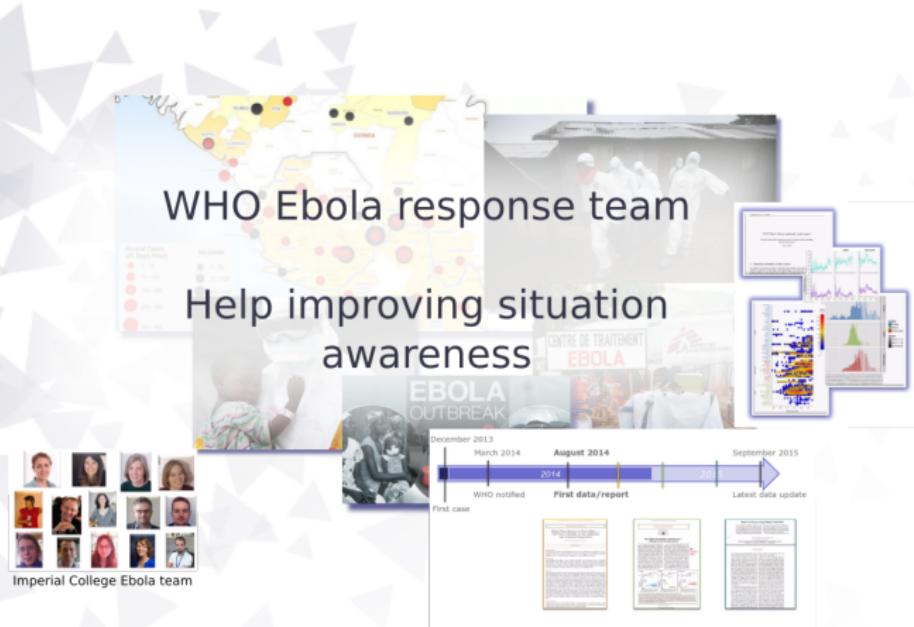
EBOLA OUTBREAK

December 2013 March 2014 August 2014 September 2015

First case WHO notified First data/report Latest data update

Imperial College Ebola team

Lessons learnt from the Ebola response



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

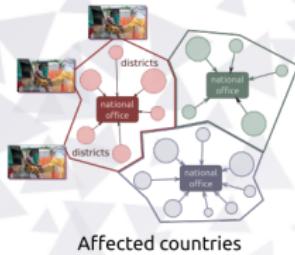
Informing the response in 'real time'?



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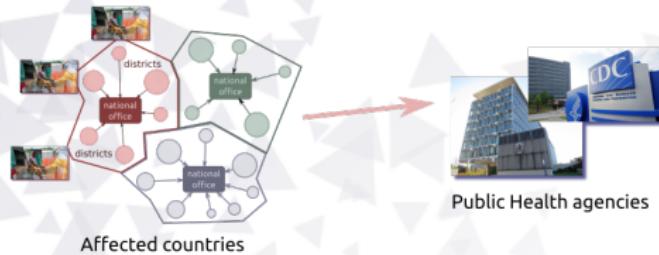


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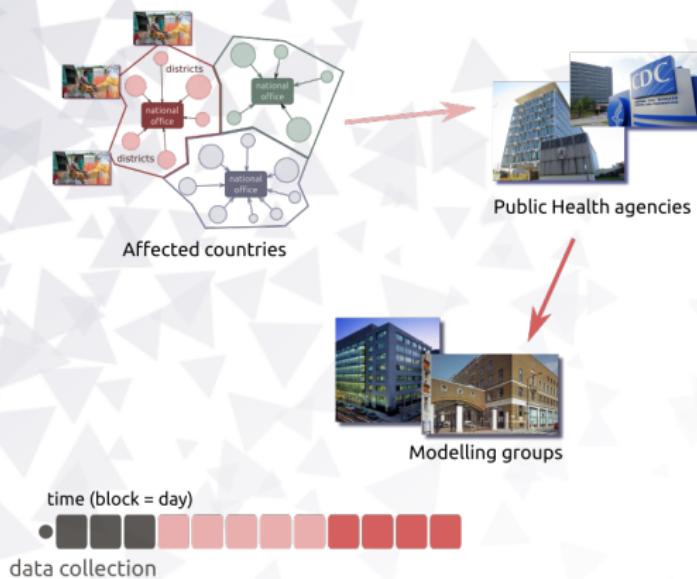


time (block = day)
• data collection

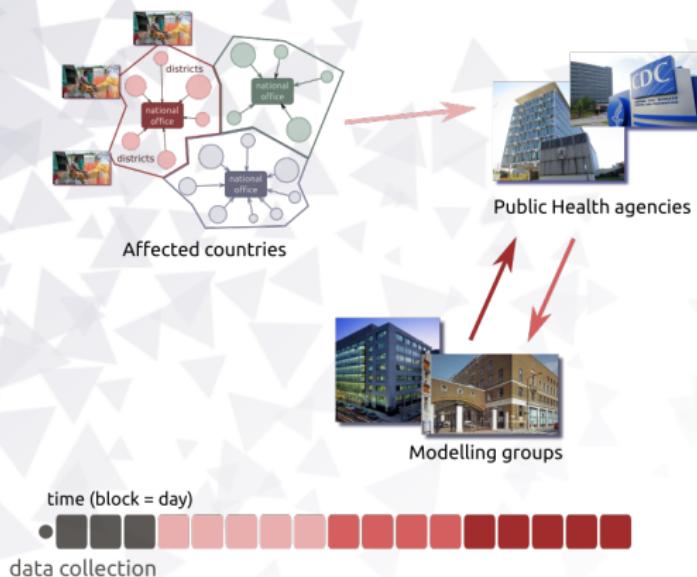
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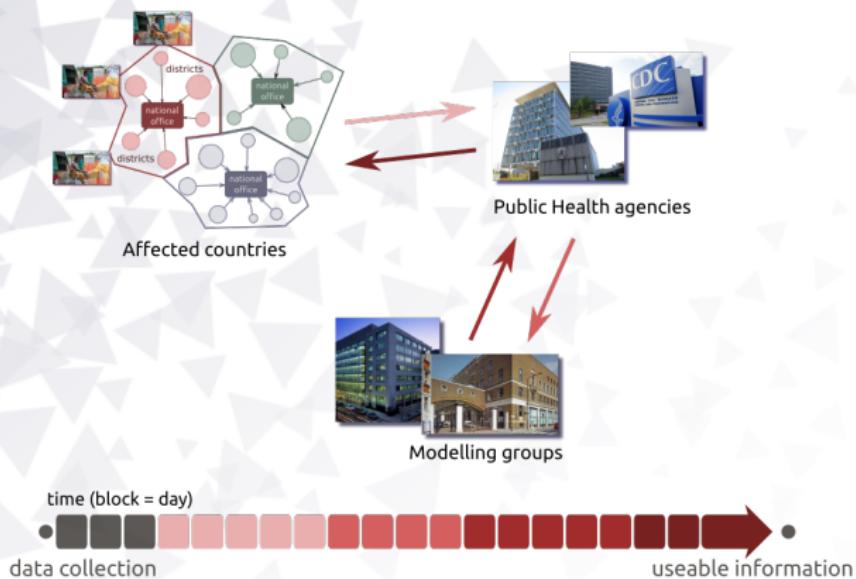
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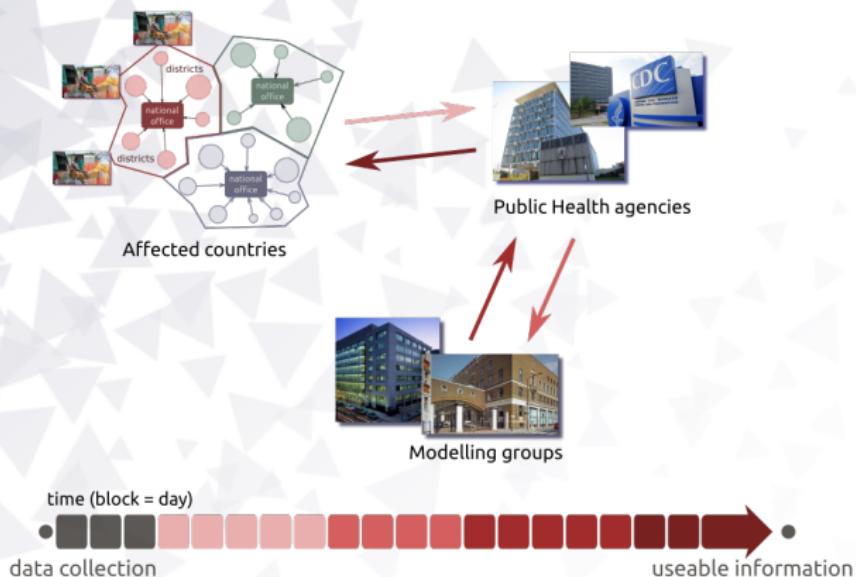
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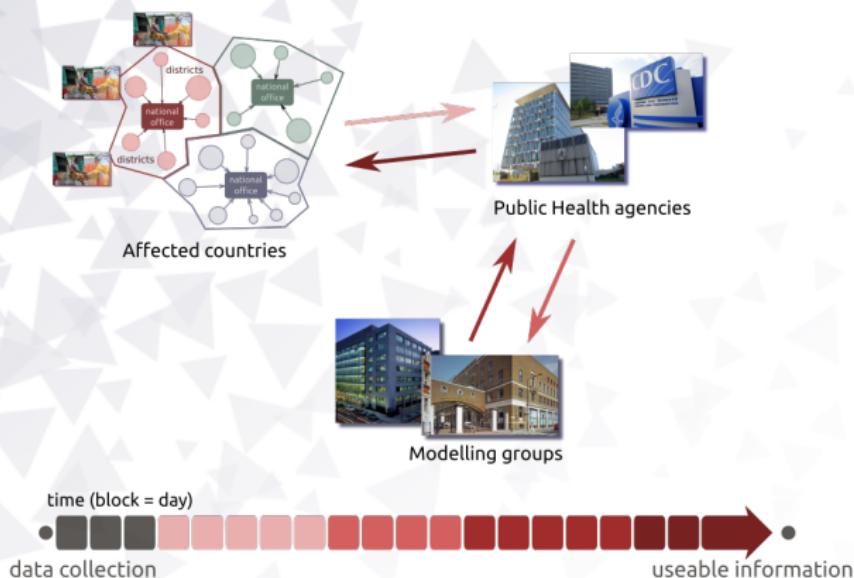


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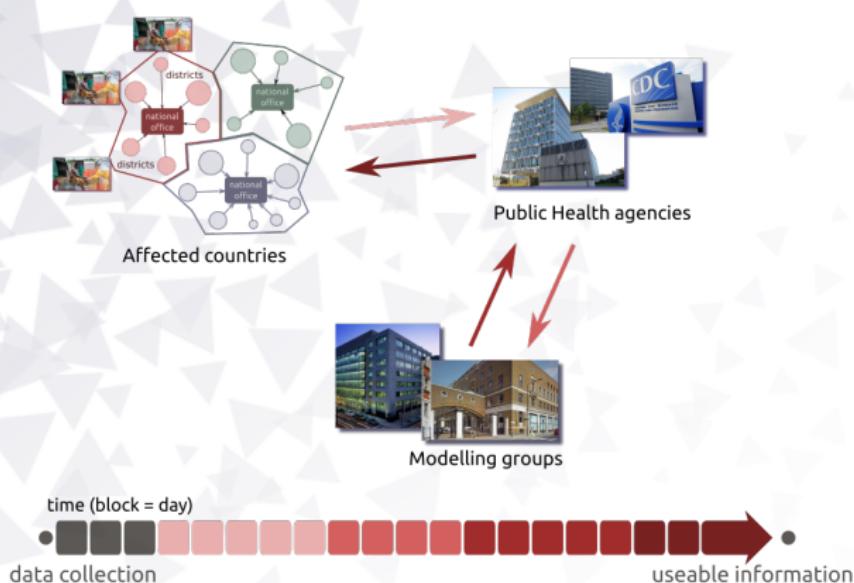
- good **tools** will shorten only some delays

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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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

functional
incubation
userfriendly secure dictionary
systems testing automated continuous
collection series repository
rpp efficiency number fast
secured bias outbreaks
parsing code integration
reporting gui
unit data delay
epidemiologist security peak
contact interface tree
epilist clean time
symptoms compiled
outbreaker interface
tracing shiny
automation fellow
epicontacts cdc
ggplot edc
clusters rates free
parallel contacttracing
parameters reliability
epidemics genomics
distribution

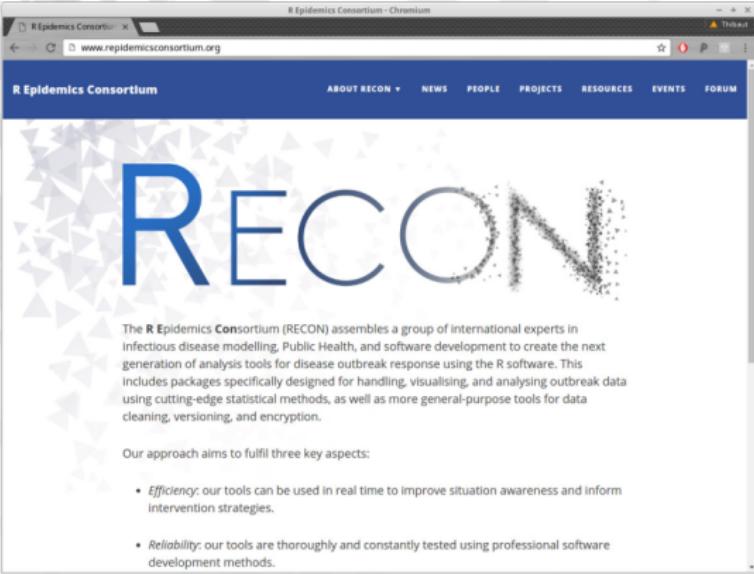
RECON
[The R Epidemics Consortium]

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. Below the title is a paragraph of text about the consortium's mission, followed by a section titled "Our approach aims to fulfil three key aspects:" with two bullet points.

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.

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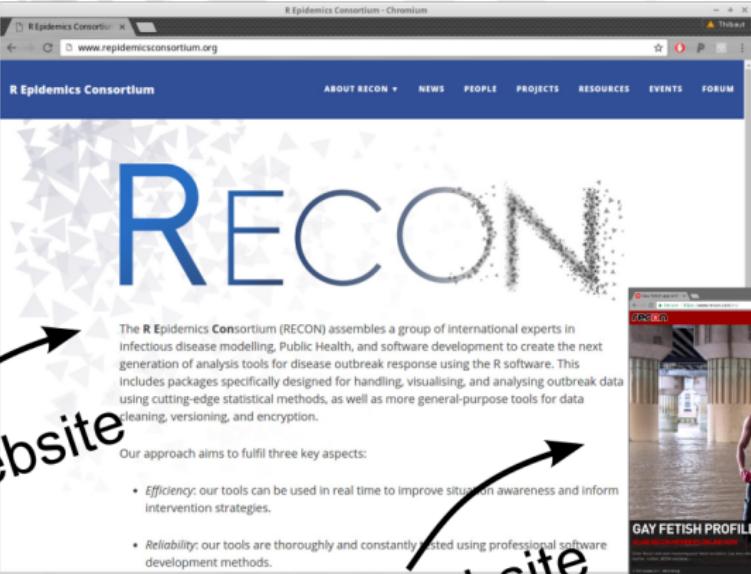
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RECON: the R Epidemics Consortium

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, with the "O" composed of a grid of smaller dots. Below the title is a brief description of 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." A section titled "Our approach aims to fulfil three key aspects:" lists three bullet points: "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.", and "Scalability: our tools are designed to handle large amounts of data and can be scaled up or down as needed." A large black arrow on the left side of the slide points to this screenshot, with the text "Our website" written along its path.



RECON

www.repidemicsconsortium.org

- started 6th September 2016
- ~100 members
- ~ 30 countries, ~ 60 institutions
- ~ 9 packages released, ~ 15-20 under development
- public forum, blog, online resources

RECON packages

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



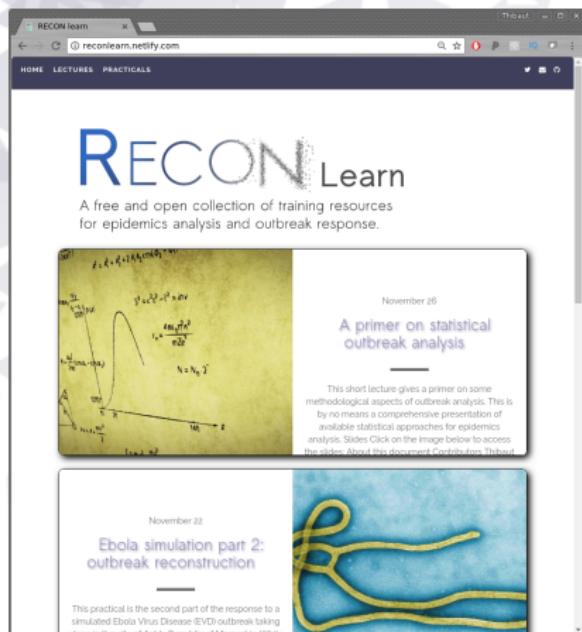
RECON packages

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- **upcoming (~ 15-20)**: deployable systems (RECON deployer), population flows, outbreak clusters, reproducible data cleaning, rmarkdown workflows, GUIs

RECON packages

- released (9): epicurves, contact data, transmissibility, forecasting, outbreak reconstructions
- upcoming (~ 15-20): deployable systems (RECON deployer), population flows, outbreak clusters, reproducible data cleaning, rmarkdown workflows, GUIs
- planned (?): automated reports, mapping, outbreak simulators

RECON learn: training resources for epidemics analysis



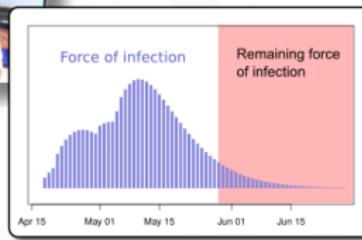
reconlearn.netlify.com

- 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



RECON events

The screenshot shows a web browser window with the URL www.repidemicsconsortium.org/events/. The page has a header with the R Epidemics Consortium logo and navigation links for Events, NEWS, PEOPLE, PROJECTS, RESOURCES, EVENTS, and FORUM. The main content features a large title 'Events' and a section titled 'RECON gathering'. It describes these events as 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. A bullet point lists 'RECON gathering 1 (2018, London): Challenges and Opportunities in Outbreak Response Analytics', which 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. Below this, there is a section titled 'RECON Hackfests' which continues the process initiated during the Hackout events: bringing people together to make new advances in the development of tools for outbreak response. It lists two events: 'Hackfest 1 (2017, London): making outbreak analysis easier and prettier' and 'Hackfest 2 (2017, London): mapping epidemics'.

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

*www.repidemicsconsortium.org/
events/*

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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.

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- Hackfest 1 (2017, London): *making outbreak analysis easier and prettier*
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*www.repidemicsconsortium.org/
events/*

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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:** RECON gathering March 22-23 in Paddington

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.

Some examples

Live demonstrations never work..

.. but let's try anyway.