



## An introduction to the R Epidemics Consortium

---

Thibaut Jombart

8th October 2018

London School of Hygiene and Tropical Medicine  
Imperial College London

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.

**Where do we come from?**

---

# Lessons learnt from the Ebola response



# Lessons learnt from the Ebola response

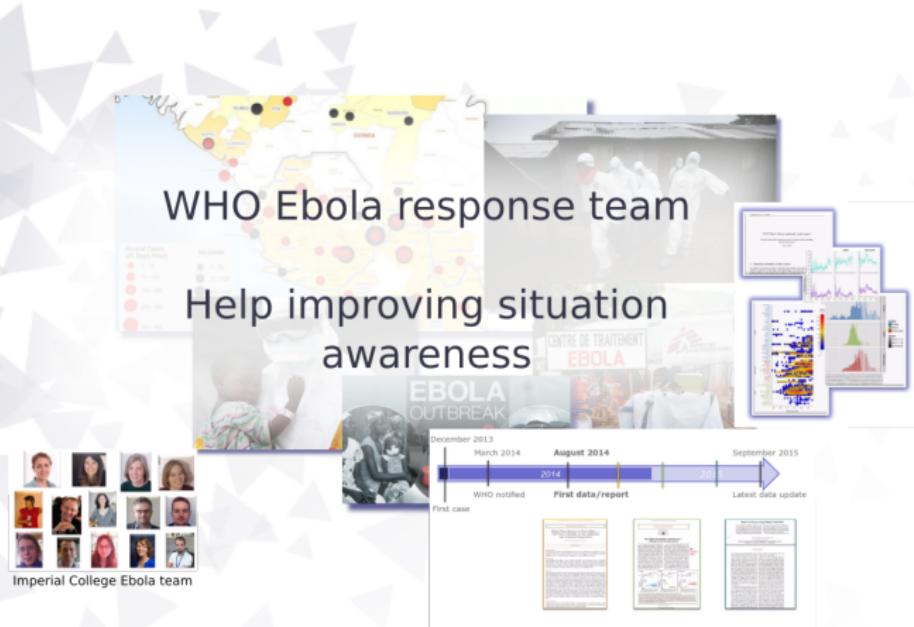


# Lessons learnt from the Ebola response

The image is a collage of various elements related to the Ebola response:

- A map of West Africa (Guinea, Sierra Leone, and Liberia) showing the locations of Ebola cases.
- A photograph of the "WHO Ebola response team" in protective gear.
- A photograph of a medical facility labeled "CENTRE DE TRAITEMENT EBOLA".
- A graphic titled "Help improving situation awareness" with a timeline from December 2013 to September 2015, marking the "First case", "WHO notified" (March 2014), "First data/report" (August 2014), and "Latest data update".
- A grid of three documents titled "Ebola Situation Report" for December 2013, March 2014, and August 2014.
- A photograph of a person in a patterned dress sitting at a table.
- A photograph of a person in a white lab coat.
- A photograph of a group of people in a meeting.
- A small grid of 16 portraits labeled "Imperial College Ebola team".

# Lessons learnt from the Ebola response



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

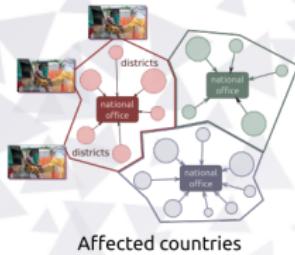
# Informing the response in 'real time'?



# Informing the response in 'real time'?

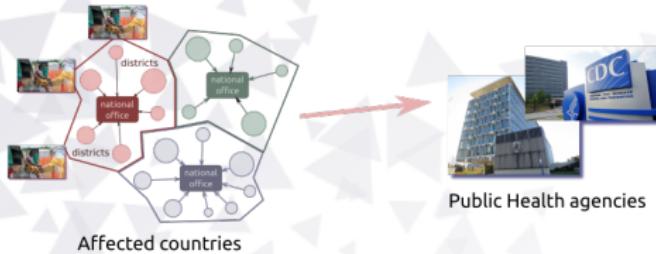


# Informing the response in 'real time'?

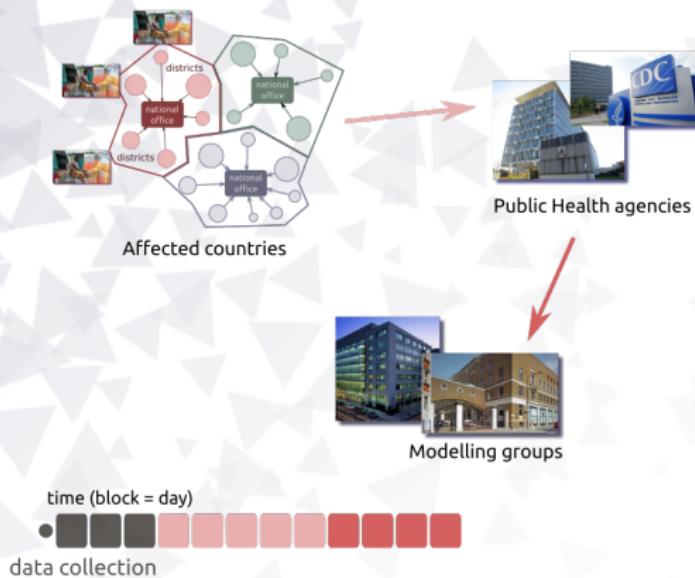


time (block = day)  
• data collection

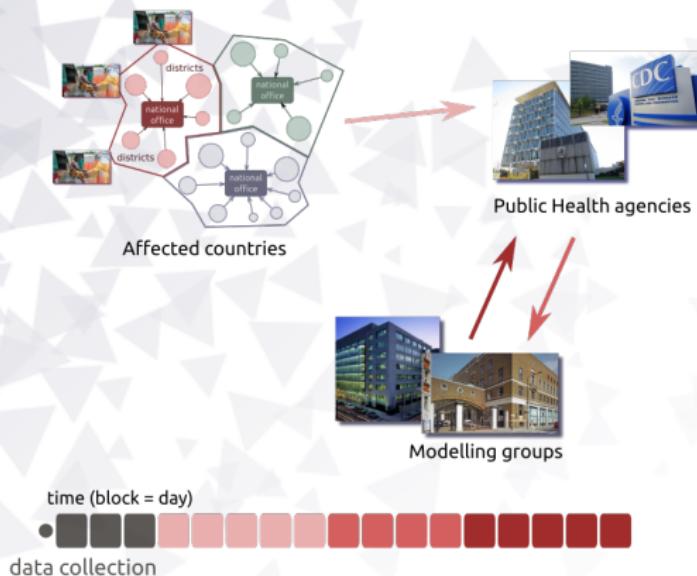
# Informing the response in 'real time'?



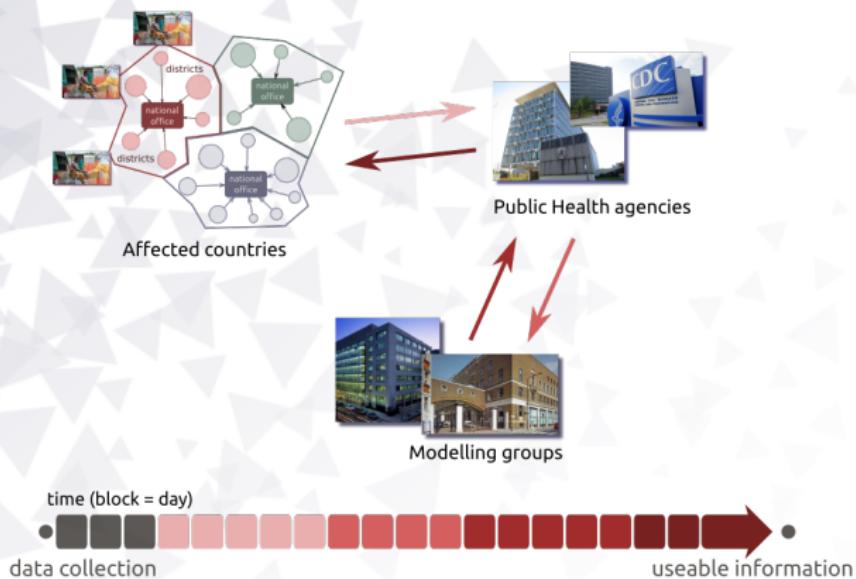
# Informing the response in 'real time'?



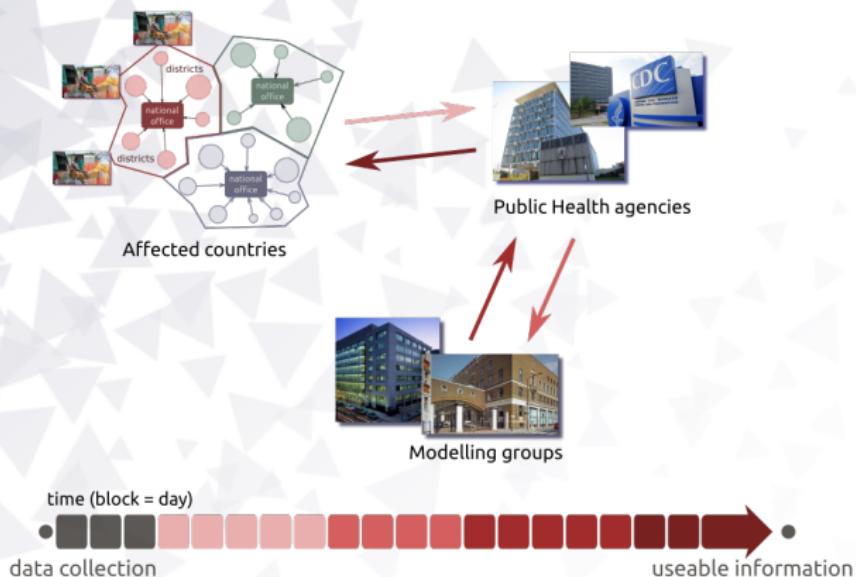
# Informing the response in 'real time'?



# Informing the response in 'real time'?

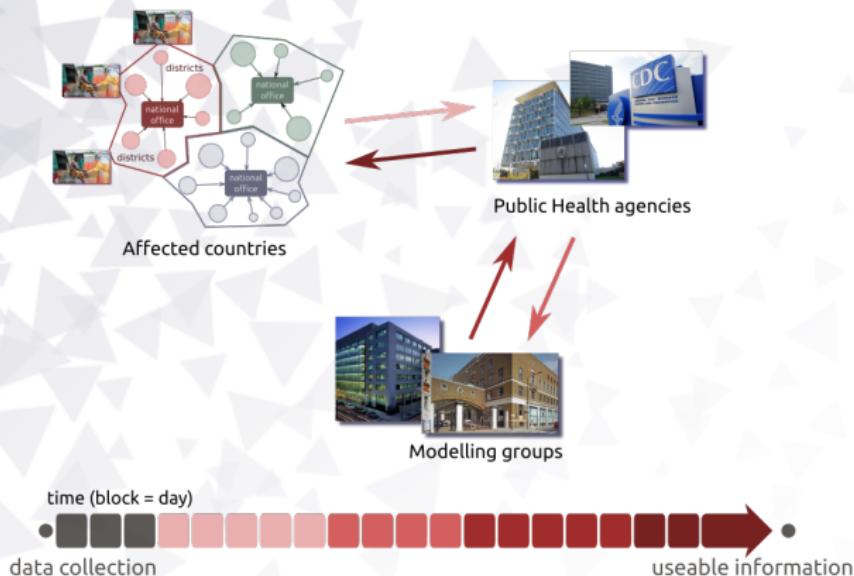


# Informing the response in 'real time' ?



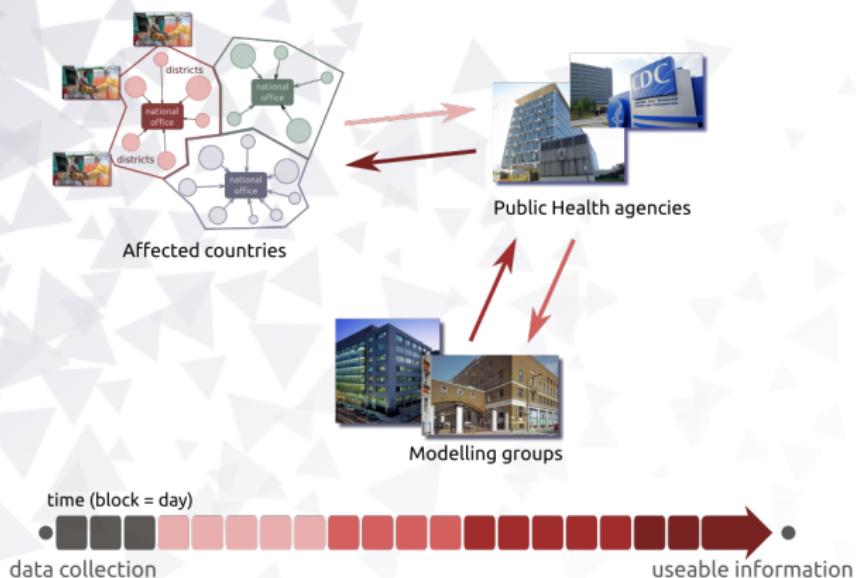
- good **tools** will shorten only some delays

# 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?



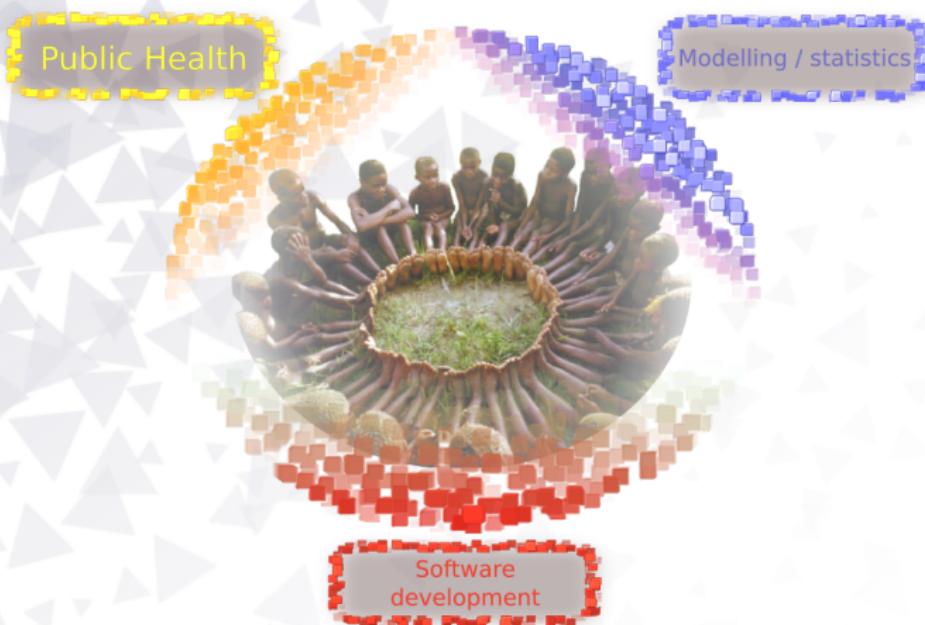
# Who do we need to develop outbreak analytics tools?



# 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



A word cloud visualization representing the themes and technologies discussed during the hackathon. The words are arranged in a cluster, with larger and more central words indicating greater frequency or importance. The words include:

- functional incubation
- userfriendly secure dictionary
- systems testing automated continuous
- rppt efficiency collection series
- parsing secured bias number repository
- outbreaks fast
- code integration gui
- reporting vhl tools
- unit data peak
- situation anonymised
- epidemian contact delay
- epiinfo clean time
- contact tracing interface tree
- symptoms outbreaker fellow
- linelist automation
- tracing shiny
- epicontacts cdc
- automation edc
- incidence ggplot clusters rates
- cleaning bayesian sitemanager
- dashboard parallel reliable
- parameters contacttracing
- genomics epidemics
- distribution distribution
- curacation model
- encripted
- mutations
- lineplots
- exposure period

# 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  
epidemiology security peak  
situation anonymised  
opensource contact  
epiinfo delay  
clean compiled  
outbreaker interface tree  
symptoms interface  
lineelist fellow  
tracing shiny  
automation cdc  
epicontacts edc  
ggplot cleaning  
dashboard clusters rates  
parallel reliable  
parameters contacttracing  
epidemics genomics  
distribution

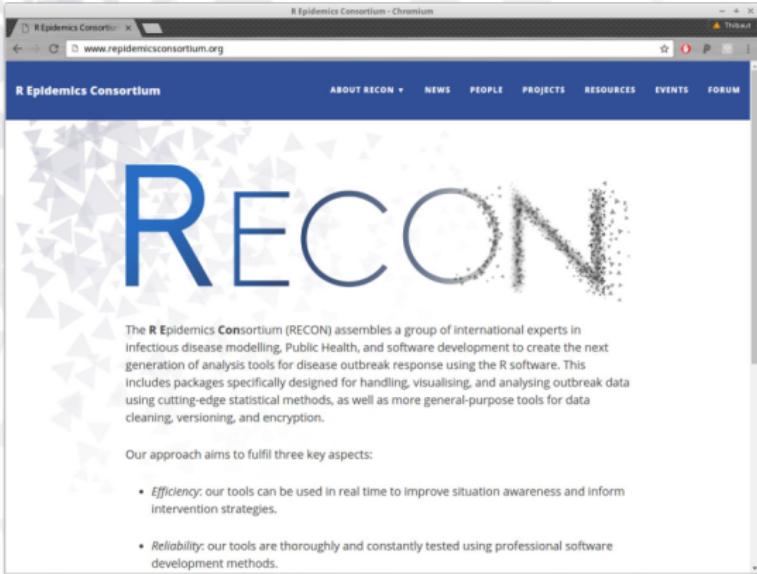
**RECON**  
[The R Epidemics Consortium]

# 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 displaying the RECON website at [www.repidemcisconsortium.org](http://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 title "RECON" 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 states that their approach fulfills 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 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.

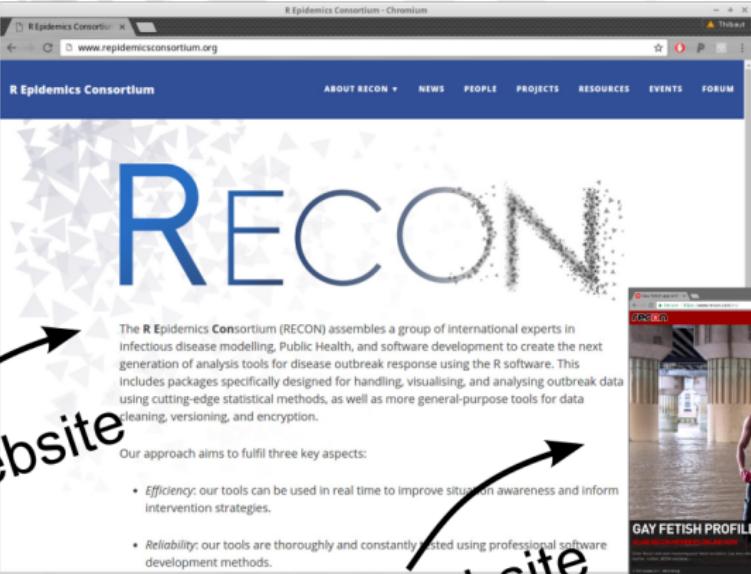
Our approach aims to fulfil three key aspects:

- *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, 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 in white.



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

## RECON in a nutshell

---

## The first 2 years



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

- started as informal network **6th September 2016**

## The first 2 years



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

- started as informal network **6th September 2016**
- 2 years later: **~100 members, 30 countries, 60 institutions**

## The first 2 years



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

- started as informal network **6th September 2016**
- 2 years later: **~100 members, 30 countries, 60 institutions**
- **~ 9 packages released, ~ 15-20 under development**

## The first 2 years



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

- started as informal network **6th September 2016**
- 2 years later: **~100 members, 30 countries, 60 institutions**
- **~ 9 packages released, ~ 15-20 under development**
- public forum, blog, online resources

## Recent changes

RECON

*www.repidemicsconsortium.org*

- as of 19 September 2018: non-governmental organisation

## Recent changes

The logo consists of the word "RECON" in a large, bold, blue sans-serif font. The letter "O" is unique, containing a smaller, grey, 3D-style geometric model of a molecule or virus particle.

*www.repidemicsconsortium.org*

- as of 19 September 2018: **non-governmental organisation**
- **not-for-profit, incorporated association** registered in France

## Recent changes

The logo consists of the word "RECON" in a large, bold, blue sans-serif font. The letter "O" is unique, composed of numerous small, dark grey dots that radiate outwards, creating a sense of motion or dispersion. The background features a subtle, light grey geometric pattern of overlapping triangles.

RECON

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

- as of 19 September 2018: **non-governmental organisation**
- **not-for-profit, incorporated association** registered in France
- **new remit:** free analytics resources to respond to outbreaks, health emergencies, humanitarian crises

## Recent changes



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

- as of 19 September 2018: **non-governmental organisation**
- **not-for-profit, incorporated association** registered in France
- **new remit:** free analytics resources to respond to outbreaks, health emergencies, humanitarian crises
- **new membership:** now only active contributors

## Recent changes



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

- as of 19 September 2018: **non-governmental organisation**
- **not-for-profit, incorporated association** registered in France
- **new remit:** free analytics resources to respond to outbreaks, health emergencies, humanitarian crises
- **new membership:** now only active contributors
- **activities:** software, training, deployment

# RECON packages

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



# 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

# 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

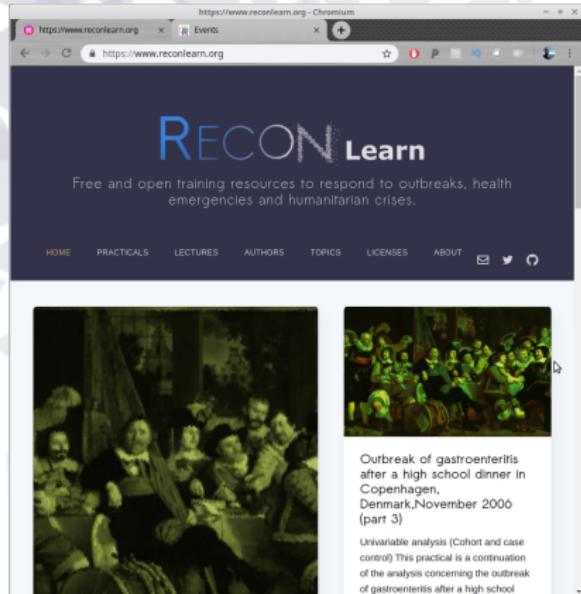
# *reconlearn.org*: training resources for epidemics analysis



- repository for free, open training material

<https://reconlearn.org>

# *reconlearn.org*: training resources for epidemics analysis



- repository for free, open training material
- lectures, practicals, case studies, code gists

<https://reconlearn.org>

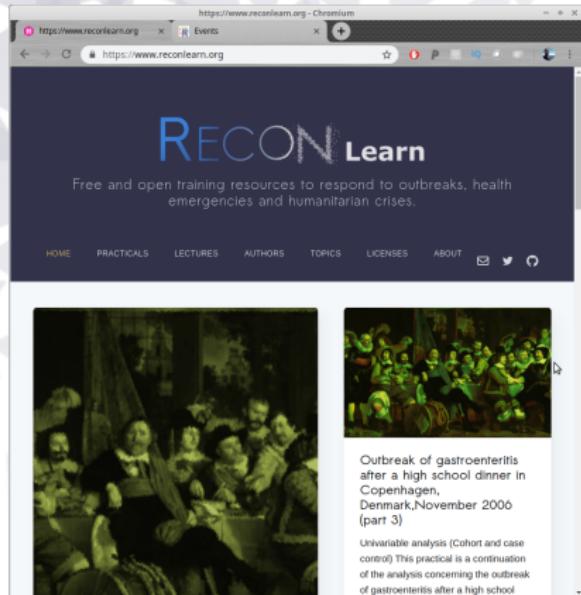
# *reconlearn.org*: training resources for epidemics analysis



- repository for free, open training material
- lectures, practicals, case studies, code gists
- emphasis on community contributions

*<https://reconlearn.org>*

# *reconlearn.org*: training resources for epidemics analysis



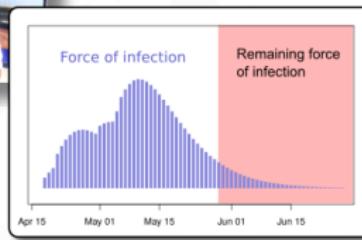
- repository for free, open training material
- lectures, practicals, case studies, code gists
- emphasis on community contributions
- podcast: **Rtips** on YouTube

<https://reconlearn.org>

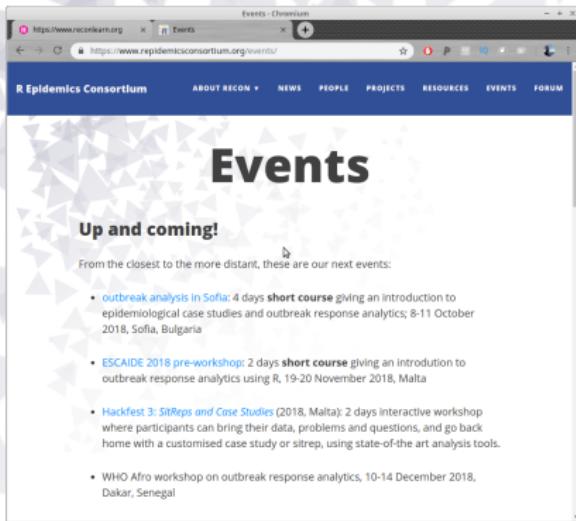
# Supporting outbreak response in the field: Ebola outbreak in Likati (DRC) 2017



- 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



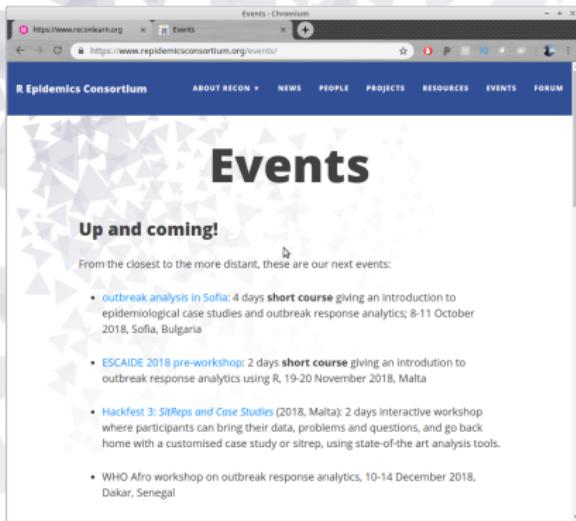
The screenshot shows a web browser window with the title 'Events - Chrome' at the top. The address bar contains the URL <https://www.reconlearn.org/events/>. Below the address bar is a navigation menu with links: R Epidemics Consortium, ABOUT RECON, NEWS, PEOPLE, PROJECTS, RESOURCES, EVENTS, and FORUM. The main content area has a large, bold heading 'Events'. Below it is a section titled 'Up and coming!' with a sub-section header 'From the closest to the more distant, these are our next events:'. A list of five upcoming events follows:

- outbreak analysis In Sofia: 4 days **short course** giving an introduction to epidemiological case studies and outbreak response analytics; 8-11 October 2018, Sofia, Bulgaria
- ESCAIDE 2018 pre-workshop: 2 days **short course** giving an introduction to outbreak response analytics using R. 19-20 November 2018, Malta
- Hackfest 3: *SitReps and Case Studies* (2018, Malta): 2 days interactive workshop where participants can bring their data, problems and questions, and go back home with a customised case study or sitrep, using state-of-the art analysis tools.
- WHO Afro workshop on outbreak response analytics, 10-14 December 2018, Dakar, Senegal

- **hackathons:** code-focussed workshops (Hackout 1-3, RECON Hackfests)

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

# RECON events



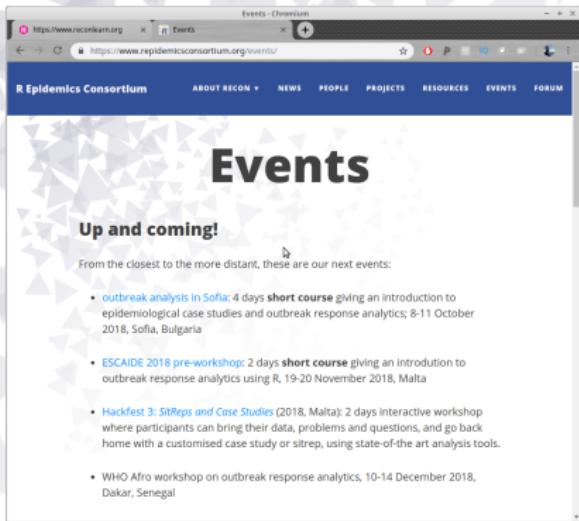
The screenshot shows a web browser window with the URL <https://www.reconlearn.org/events/>. The page has a header with the RECON logo and navigation links for About RECON, News, People, Projects, Resources, Events, and Forum. The main content area features a large title "Events" and a section titled "Up and coming!". Below this, there is a list of upcoming events:

- outbreak analysis In Sofia: 4 days **short course** giving an introduction to epidemiological case studies and outbreak response analytics; 8-11 October 2018, Sofia, Bulgaria
- ESCAIDE 2018 pre-workshop: 2 days **short course** giving an introduction to outbreak response analytics using R, 19-20 November 2018, Malta
- Hackfest 3: *SitReps and Case Studies* (2018, Malta): 2 days interactive workshop where participants can bring their data, problems and questions, and go back home with a customised case study or sitrep, using state-of-the art analysis tools.
- WHO Afro workshop on outbreak response analytics, 10-14 December 2018, Dakar, Senegal

[www.repidemicsconsortium.org/  
events/](https://www.repidemicsconsortium.org/events/)

- **hackathons:** code-focussed workshops (Hackout 1-3, RECON Hackfests)
- **larger meetings:** RECON gathering March in London ( 80 people)

# RECON events



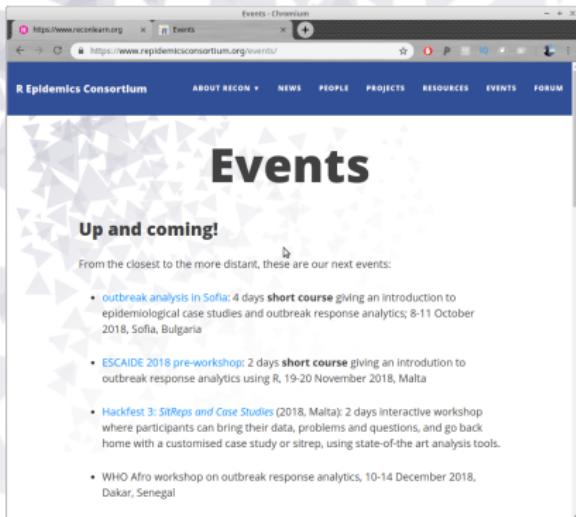
The screenshot shows a web browser window with the title 'Events - Chrome' at the top. The address bar contains the URL <https://www.reconlearn.org/events/>. Below the address bar, the page header includes the 'R Epidemics Consortium' logo and navigation links for 'ABOUT RECON', 'NEWS', 'PEOPLE', 'PROJECTS', 'RESOURCES', 'EVENTS', and 'FORUM'. The main content area features a large, bold heading 'Events' and a sub-section titled 'Up and coming!'. A text block below states: 'From the closest to the more distant, these are our next events:' followed by a bulleted list of upcoming events.

- outbreak analysis In Sofia: 4 days **short course** giving an introduction to epidemiological case studies and outbreak response analytics; 8-11 October 2018, Sofia, Bulgaria
- ESCAIDE 2018 pre-workshop: 2 days **short course** giving an introduction to outbreak response analytics using R, 19-20 November 2018, Malta
- Hackfest 3: *SitReps and Case Studies* (2018, Malta): 2 days interactive workshop where participants can bring their data, problems and questions, and go back home with a customised case study or sitrep, using state-of-the art analysis tools.
- WHO Afro workshop on outbreak response analytics, 10-14 December 2018, Dakar, Senegal

[www.repidemicsconsortium.org/  
events/](https://www.repidemicsconsortium.org/events/)

- **hackathons:** code-focussed workshops (Hackout 1-3, RECON Hackfests)
- **larger meetings:** RECON gathering March in London ( 80 people)
- **short courses:** Epidemics6, Bogota, CDC, and ...

# RECON events



The screenshot shows a web browser window with the URL <https://www.reconlearn.org/events/>. The page title is "Events". The header includes links for "ABOUT RECON", "NEWS", "PEOPLE", "PROJECTS", "RESOURCES", "EVENTS", and "FORUM". The main content area has a large heading "Events" and a sub-section "Up and coming!". Below this, there is a list of upcoming events:

- outbreak analysis In Sofia: 4 days **short course** giving an introduction to epidemiological case studies and outbreak response analytics; 8-11 October 2018, Sofia, Bulgaria
- ESCAIDE 2018 pre-workshop: 2 days **short course** giving an introduction to outbreak response analytics using R, 19-20 November 2018, Malta
- Hackfest 3: *SitReps and Case Studies* (2018, Malta): 2 days interactive workshop where participants can bring their data, problems and questions, and go back home with a customised case study or sitrep, using state-of-the art analysis tools.
- WHO Afro workshop on outbreak response analytics, 10-14 December 2018, Dakar, Senegal

- **hackathons:** code-focussed workshops (Hackout 1-3, RECON Hackfests)
- **larger meetings:** RECON gathering March in London ( 80 people)
- **short courses:** Epidemics6, Bogota, CDC, and ...

here and now!

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

# Previous participants survived!



**SPSS**

# Previous participants survived!



**SPSS**



MATLAB

# Previous participants survived!



SPSS®



MATLAB



sas

# Previous participants survived!



SPSS®



MATLAB



sas



STATA

# Previous participants survived!



SPSS®



MATLAB



R



Sas



STATA

And now,  
time for  
some



HAPPY?