MOnitoring Outbreak events for Disease surveillance in a data science context

HORIZON 2020 PROJECT, GRANT AGREEMENT N°874850

TIMOTHEE DUB, FINNISH INSTITUTE FOR HEALTH AND WELFARE

ONE HEALTH IN PRACTICE IN SOUTHEAST ASIA, CAPITALISATION COLLOQUIUM

26/04/2023

cirad
AGRICULTURAL RESEARCH
FOR DEVELOPMENT

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SOCIETY
FOR INFECTIOUS
DISEASES

INSTITUT ZA JAVNO ZDRAVLJE SRBIJE
„Dr Milan Jovanović Batut"

ISTITUTO SUPERIORE DI SANITÀ

OpenGeoHUB
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KU LEUVEN

ERGO
Environmental Research Group Oxford

SIB
Swiss Institute of
Bioinformatics

mundialis

thl

Instituto de Salud Carlos III

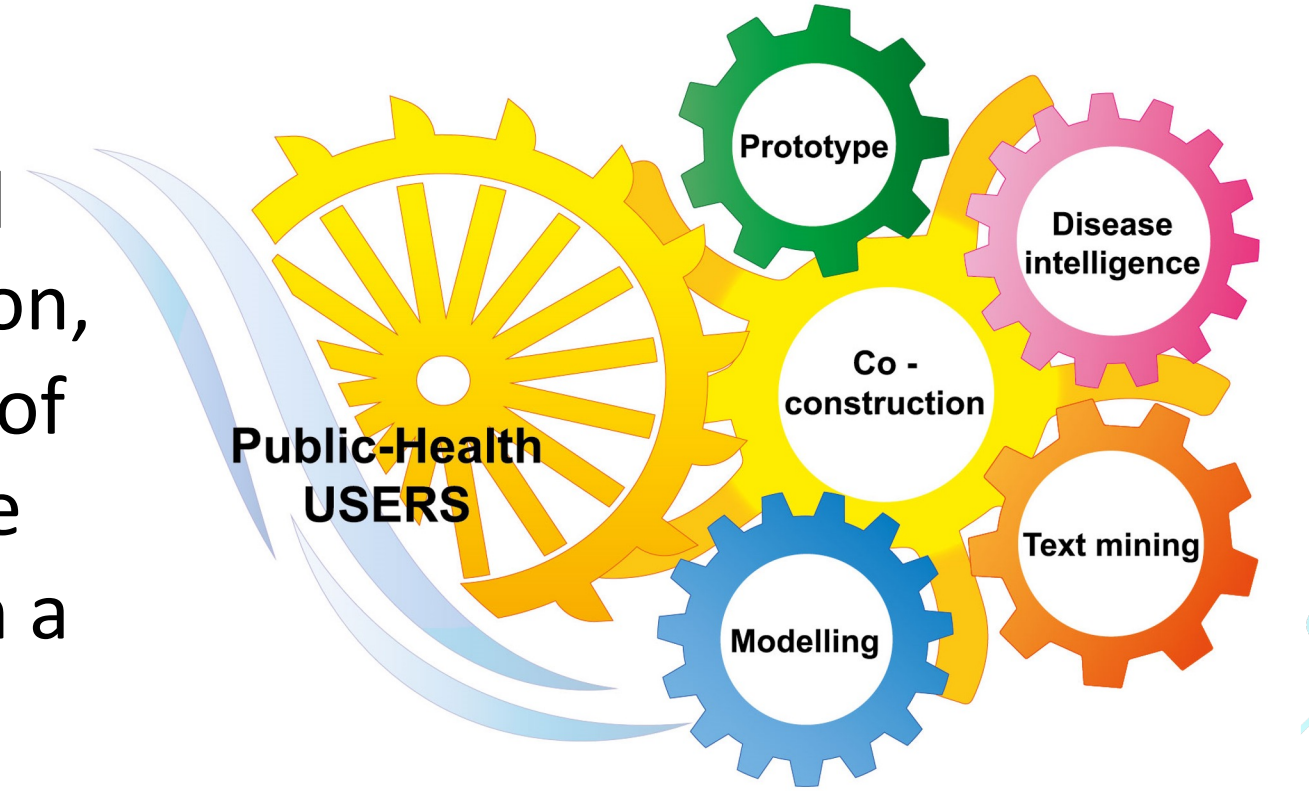
gerdal

anses

GOALS

H2020 project duration: 2020-2023

Develop innovative tools and services for the early detection, assessment, and monitoring of infectious disease emergence from multi source Big Data in a “One Health” context

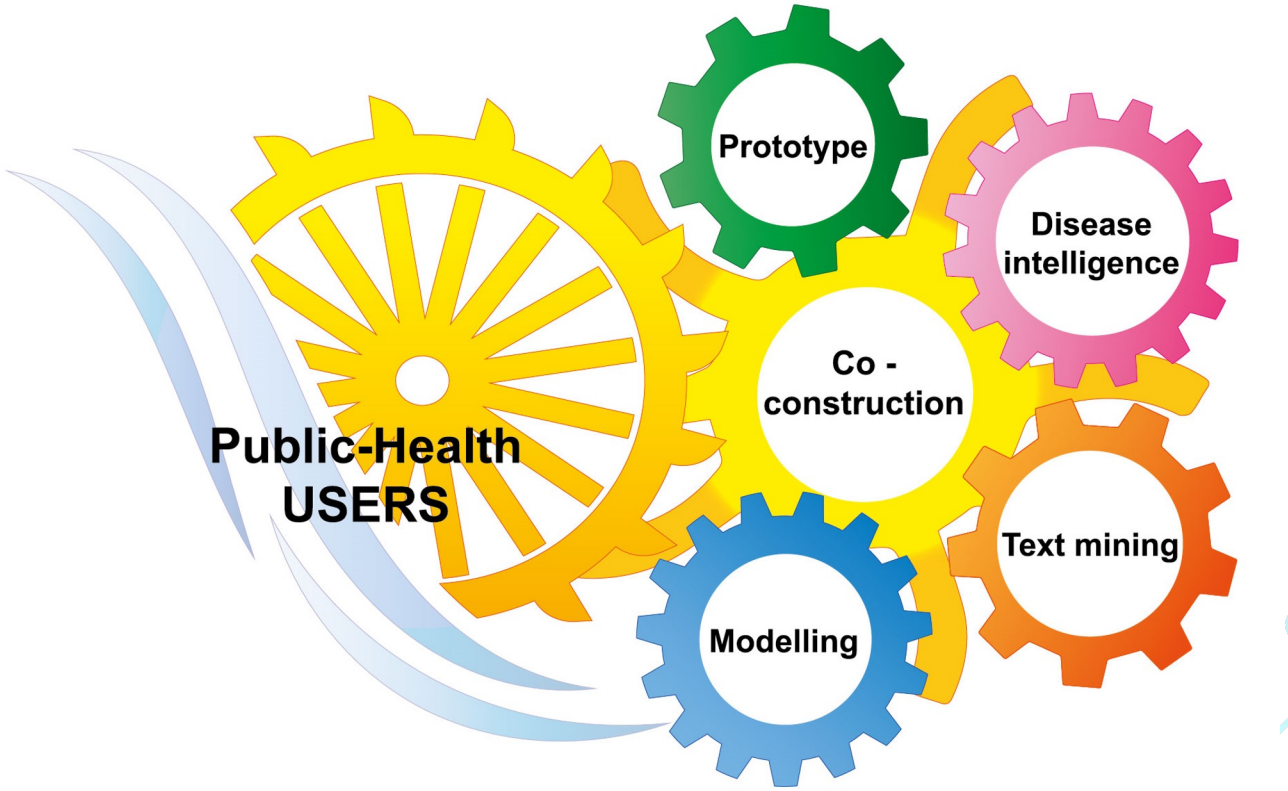


MOOD'S ORIGINALITY

Approach

Co-conception of tools and services based on end-user needs at national and supra-national public /animal health agencies

From user needs to research & development for improved epidemic intelligence and disease surveillance in Europe and beyond



THE MOOD PLATFORM

A new platform to enhance detection, monitoring and follow-up of disease emergence in Europe

THE MOOD PLATFORM

1. Data & covariates access

2. Event-based Surveillance data (EBS)

3. Disease risk mapping

THE MOOD PLATFORM

1. Data & covariates access

2. Event-based Surveillance data (EBS)

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Generic modules

Disease specific module

A MODEL-DISEASE APPROACH

	HPAI	TBE	COVID-19	WNV	AMR	TU-LEPT	CHI-DEN-ZI
1. Covariates access	✓	✓	TO BE CONFIRMED	✓	TO BE CONFIRMED	✓	✓
2. Epi Data Explorer	✓	✓	✓	✓	✓	✓	✓
3. Disease risk mapping	✓	✓	TO BE CONFIRMED	✓	✓	TO BE CONFIRMED	✓

https://mood-h2020.eu/mood-case-studies/

COVARIATES ACCESS MODULE

One stop shop: https://mood-platform.avia-gis.com/

A wide range of **standardized** covariate data layers

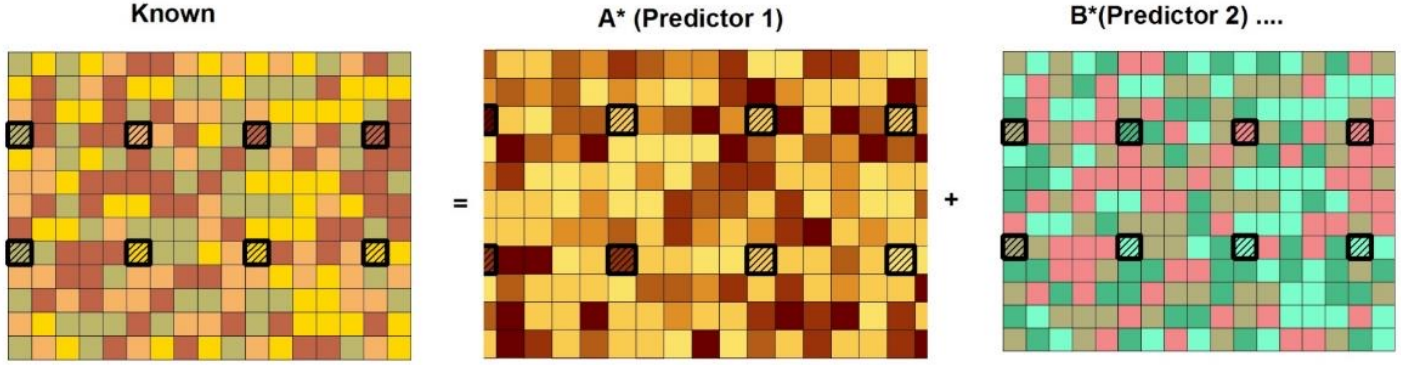
- Raster data
- Time series data

V0 ➔ V1

- View
- Compare
- Download

WHERE DOES THE DATA COME FROM?

Already available but not standardized and ready to use!



1) Convert all data maps to images with same pixel size (resolution). Then extract values for each data type at fixed sample points (hatched squares). NB one of these must be the 'known' values.

2) Calculate a 'regression equation' of the form: Known=Constant + A*(Predictor1) + B*(Predictor2) ... NB There can be several predictor variables in the equations.

3) Providing the equation is statistically significant (i.e. reliable), apply the right hand side of the equation to all the pixels in the images, not just the ones sampled.

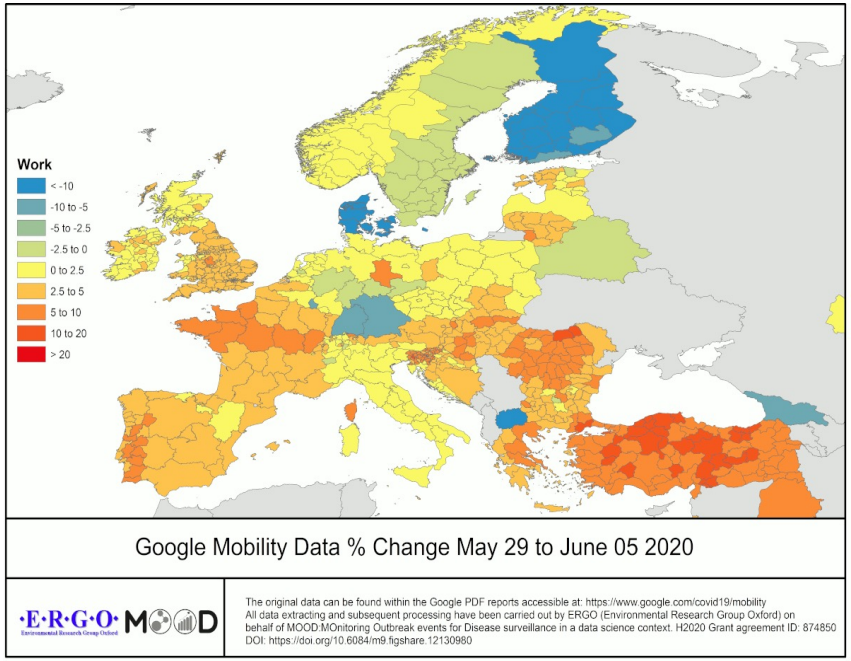
4) Repeat the process for each of a series of analysis zones (e.g. ecozones)

From Willian Wint & Neil Alexander

Environmental Research Group Oxford

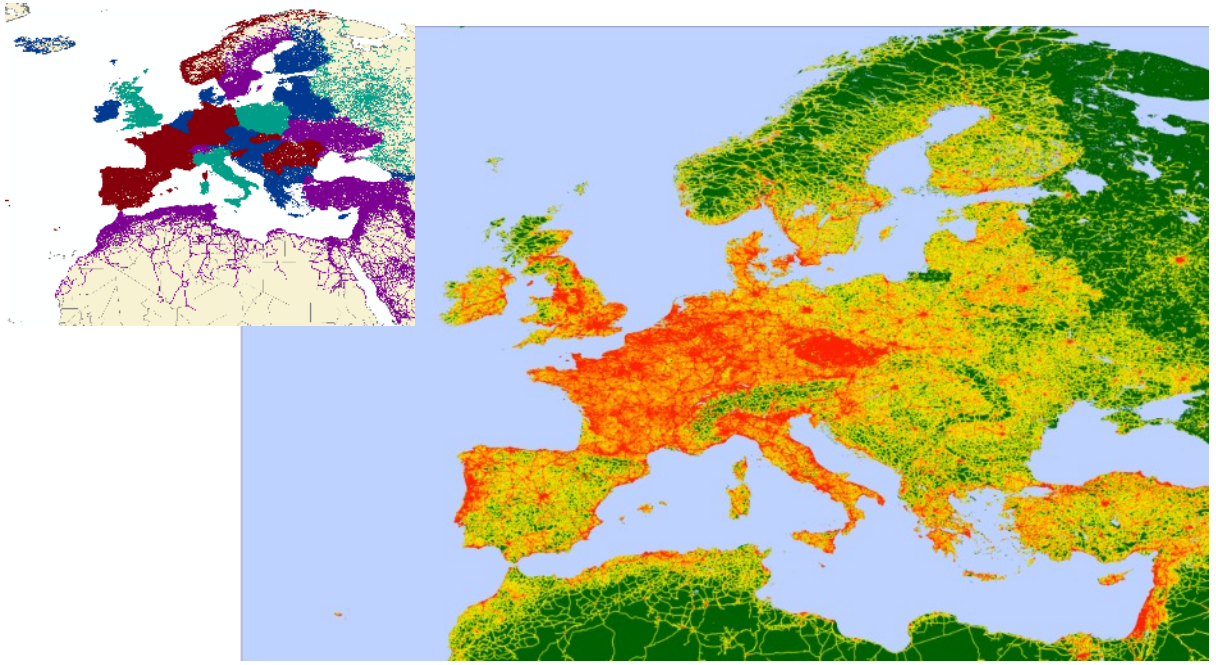
MOOD GENERATES NEW DATA

Examples of acquisition for COVID related work: As is often the case the 'raw data' need to be not only standardised but processed to meet user needs, going since March 2020.



75000 downloads from figshare

Accessibility: Trick is to convert to model friendly parameter – here road density, Could also be distance to… Global first surprisingly



Some obvious ones were missing in model friendly format:

Relative humidity

Wind

E·R·G·O Environmental Research Group Oxford

timothee.dub@thl.fi

Info | Settings

Global

No layers

Left

No layers

Right

No layers

View Timeseries data

- Temperature
- Vegetation index
- Precipitation
- Relative Humidity (RH)
- Infrared (MODIS Channel 3)
- Daylight
- Elevation (DEM)
- Hydrography
- Land Cover / Land use
- Host and vector distributions
  - Human population
  - Wildlife hosts
  - Vectors
    - Ixodes ricinus, probability presence/km
- Infrastructure

MOOD.Platform

https://mood-platform.avia-gis.com

Valtori Imported

timothee.dub@thl.fi

Info Settings

Global

Ixodes ricinus, probability presence/km

- 0.00%
- 10.00%
- 20.00%
- 30.00%
- 40.00%
- 50.00%
- 60.00%
- 70.00%
- 80.00%
- 90.00%
- 100.00%

Compare Left Compare Right

Hide Remove

Left

No layers

Right

No layers

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COVARIATES ACCESS MODULE

Version 2, pending

- Integration of more vector data
- **Downloadable data queries**
  - Data points or polygon
- Documentation of layers
- Processing methods
- Link with MOOD Epid Data Explorer tool

OUTREACH TO NON-EUROPEAN ACTORS

- **Current geographical scope of the platform = Europe.**
- **Substainability of the platform through a non-profit organisation**
  - Possibility to enlarge the scope
  - Maintain and add data in the future
- **Platform**
  https://mood-platform.avia-gis.com/
- **Demo**
  https://av.tib.eu/media/60352

STAYING IN TOUCH WITH MOOD

- Website
  https://mood-h2020.eu/
- Newsletter
  https://mood-h2020.eu/newsletter/
- Follow us on Twitter
  @MOOD_H2020
- Inquiries regarding the MOOD platform and further developments
  mood-coordination@cirad.fr

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