Background

The MOOD project aims to develop innovative tools and services for the early detection, assessment, and monitoring of current and future infectious disease threats across Europe in the context of continuous global, environmental, and climatic change. The MOOD project started in January 2020.

This meeting aims to reinforce and organize the interactions between future users of MOOD project outputs and MOOD researchers. During this meeting, the MOOD strategy and different axis of research will be presented and it will be an occasion for future end users to provide feedback and expectations.

The document provides the agenda, abstracts of the presentations, and questions from MOOD researchers.

Please, have a look at the abstracts and the questions before the meeting. The questions will be used for the discussions. If you have time to prepare answers for questions (max 2) on your favourite topic, it would ease the discussion.

At the end of the document, you will find the contact list of presenters. Please do not hesitate to contact them if you have any questions on their work.

Agenda

Time	Presentation title	Presenter/Moderator	Role and Institution
14:00 – 14:05	Global presentation of the MOOD project	Renaud Lancelot	MOOD Coordinator (Cirad, France)
14:05 – 14:15	Overview of user needs for innovation	Fanny Bouyer Timothée Dub	WP1 subtasks leaders (GERDAL, France) (THL, Finland)
14:15 – 14:30	Five case studies for showcasing data science driven solutions to address identified user needs	Wim Van Bortel	WP1 leader (ITM, Belgium)
14:30 – 14:45	*Discussion*	*Wim Van Bortel*	*WP1 leader (ITM, Belgium)*
14:45 – 15:00	Epidemiological data and covariates to support MOOD risk assessments	Luca Busani	WP2 subtask leader (ISS, Italy)
15:00 – 15:15	Innovative text-mining approaches for improving Event-based surveillance systems	Mathieu Roche	WP2 & WP3 subtask leader (Cirad, France)
15:15 – 15:45	*Discussion*	*Wim Van Bortel*	*WP1 leader (ITM, Belgium)*
15:45 – 15:55	*Break*		
15:55 – 16:10	The analysis of surveillance data can contribute developing ways to diseases control	Jean Artois	WP4 subtask leader (ULB, Belgium)
16:10 - 16:25	Accessing and using Mood's innovative tools	Cedric Marsboom	WP5 leader (Avia-GIS, Belgium)
16:25 – 16:55	*Discussion*	*Wim Van Bortel*	*WP1 leader (ITM, Belgium)*
16:55 – 17:05	Conclusion	Fanny Bouyer	WP1 subtask leader (GERDAL, France)

List of MOOD Work packages

- WP1. Interface with stakeholders for innovation (leader: Wim Van Bortel, ITM, Belgium)
- WP2. Disease intelligence (leader: Annapaola Rizzoli, FEM, Italy)
- WP3. Data standardisation and integration (leader: Maguelonne Teisseire, Inrae, France)
- WP4. Modelling (leader: Vittoria Colizza, INSERM, France)
- WP5. Development of MOOD platform (leader: Cedric Marsboom, Avia-GIS, Belgium)
- WP6. Dissemination of information and impact assessment (leader: Tomislav Hengl, OpenGeoHub, Netherlands)
- WP7. Project management (leader: Renaud Lancelot, Cirad, France)

Abstracts of presentations

Overview of user needs for innovation

The work presented is an assessment of users' problems, needs and pathways for the prioritization of innovations that could be designed by the MOOD consortium. The co-conception process of MOOD implies a participatory assessment of the users needs. It was based on the crossed socio-technical analysis of interviews and workshops with users working in epidemic intelligence (EI) in Public and Veterinary Health agencies in the five case study countries (Serbia, Italy, Spain, France and Finland) and at the ECDC. Overall the analysis highlights that the users want to review their EI strategy in order to enhance their preparedness for new and emerging disease outbreaks and adapt their routine in order to manage an increasing amount of data. The identified paths of solutions aim to ease risk detection and risk assessment through visualization, web scraping and predefined analytical tools. The developments in monitoring of social medias could enable the early warning and the preparedness of the countries. Users also want to have an easier data acquisition process (timely, validated and standardized) for international epidemic intelligence, and to have better indicator-based surveillance (IBS) dataflows at national level respecting data protection and homogenous information for epidemiological analysis. They expressed the need of harmonization of data processing for risks assessment in order to be able to compare their results. Users also highlighted the preference to have a partial automatization of analysis in order to keep control on the data, inputs and to be able to adapt parameters to versatile objectives.
The paths of work identified are characterized by the wish to have a more holistic and integrated approach for zoonosis and AMR, the need for harmonization between agencies and sectors while keeping the flexibility and the exploration for a complementary role of event based surveillance to support indicator based surveillance. The validation and precise definition of the diversity of flexible tools will continue during the iterative process of co-conception "the learning loops" (2021-2022), as well as the strategic choices (feasible by MOOD) and concrete proposals of tools and services.

Five case studies for showcasing data science driven solutions to address identified user needs related to improving epidemic intelligence in Europe

The MOOD project aims to develop products and services to enhance outbreak detection, assessment and monitoring in Europe. To obtain useful and practical products, MOOD is collaborating closely with users. During the first project year we organised up to 28 in-depth interviews with users. These interviews helped to identify difficulties and problems users experience in their daily practice of outbreak detection and monitoring. Further, we organised several follow-up workshops with these users. Each workshop was dedicated to specific priority issues of the users and the research activities planned to answer them, and aimed at clarifying the difficulties, validating the problems to solve and discussing potential solutions.

The input from the users led to the identification of five priority diseases namely avian influenza, tick-borne encephalitis, West Nile virus, antimicrobial resistance and COVID-19. These diseases will function as case studies for showcasing data science driven solutions that can help address identified user needs. A roadmap per case study is being developed. Through these case studies, we also aim to create favourable conditions for a direct interaction between users and MOOD partners. Reviewing questions, concerns and solutions in an early stage of the development of the MOOD project should lead to products that are more adapted to the daily epidemic intelligence practices of the users.

The first step of this collaborative work is to identify and share the expectations from both parties, in terms of product development ranging from the idea to the production of the final prototypes. We call this process the "learning loops".

During this talk the case studies will be briefly introduced so users can express their potential interest to be involved in the case studies.

Key words: avian influenza, tick-borne encephalitis, West Nile virus, antimicrobial resistance, COVID-19, case study, user interaction

Questions:

- Which case studies would you like to follow up?
- How would you prefer to interact with the MOOD project?

Epidemiological data and covariates to support MOOD risk assessments

The "traditional" epidemiological data include official surveillance data, monitoring activities and "ad hoc" surveys in the domains of human, animal and environmental health. Traditional (indicator-based) surveillance data were retrieved by a subgroup of partner institutions and their national networks to set the data collection system and the feasibility. This information also included the identification of data owners and description of data availability.

For risk assessment and risk mapping, together with epidemiological data, sets of covariates like climate, vegetation, demography, topography, land use, agriculture etc. are essential. Many of these covariates are very complex and MOOD is processing these data to provide summary driver datasets, some specific for each disease, and set of 'superstar' covariates relevant for a range of diseases, to include in MOOD analytical tools and make them available to users. Descriptions of the covariate effects will be set out in the disease intelligence.

A priority list of pathogens has been defined for the first part of the project, to maximize the resources and focus on priority diseases for epidemic intelligence practitioners, taking also into account suggestion from other WP leaders. The diseases identified were:

- West Nile
- Tick-borne encephalitis
- Influenza A (including the animal variants – birds and pigs at least

The search of specific disease-covariates will be also performed for Disease X and COVID-19.

Keywords: epidemiological data, surveillance, risk assessment, human, animal and environment, covariates, climate, environment

Questions:

- According to your experience, what kind of data sources should be integrated to have added values in your surveillance and risk assessments?
- Are you satisfied with the types of covariate data we plan to offer you and the way we intend to provide them?

Innovative text-mining approaches for improving Event-based surveillance systems

In addition to official epidemiological and covariate data sources listed in the previous section, disease outbreak detection and monitoring rely onsources originating from digital media and other unofficial outlets. Manually extracting relevant information from unofficial sources is time-consuming. The Platform for Automated extraction of animal Disease Information from the web (PADI-web) is an automated bio-surveillance system devoted to online news source monitoring for the detection of emerging and new animal infectious. The tool automatically collects news via customised multilingual queries, classifies them with machine learning approaches and extracts epidemiological information. To expand and improve the usability of this tool for MOOD users, we have identified a need for innovative improvements that will be presented during this section of the user need workshop. These improvements concern among others issues related to: (i) How to take into account data quality for extracting relevant information in media data? (ii) How to highlight topic/sentiment according to spatio-temporal criteria with social media data? We will present two study cases to illustrate PADI-web's potential and areas for innovation: COVID-19 and Avian Influenza.

Keywords: Text Mining, Information Retrieval, Health Surveillance, Web monitoring, Data quality, Social media

Questions:

- How are official and unofficial information/data combined or merged in your national surveillance and risk assessment activities? (manually, automatically with dedicated tools, if not done, why?)
- Are there well-known criteria to identify source quality? (e.g. newspapers to highlight, newspapers to reject, information provided by specific countries/locations not reliable, etc.). Are criteria/list available?

Disease-specific and generic methods for the development of diseases control methods

The growing potential impact of climate and environmental changes on infectious disease outbreaks highlights the increased urgency for updating and improving our knowledge and monitoring activities on changes in environmental exposures (e.g. distribution of vectors and wild reservoirs). Analytical techniques that allow the combined analyses of epidemiological and co-variate data are increasingly employed by the scientific and public/veterinary health community, intended for surveillance and risk assessment activities.

In the light of the current COVID-19 crisis in Europe and elsewhere, it has become crucial to reinforce the integration of research results into public and veterinary health policy and practice. From a public health perspective, MOOD project modellers were at the forefront of the fight against COVID-19 and have interacted directly with decision-makers to help inform the COVID-19 response of national governments. Moreover from an animal health perspective, the avian influenza viruses have been at the origin of devastating outbreaks during the past winter, while the rapid evolution of pathogens (drug-resistant strains and vaccine escape variants) raise questions about the long-term sustainability of the current animal production systems. Against this background, MOOD's modellers are developing solutions and tools aimed at helping end users to face outbreaks, in the heat of the moment but also in the longer term. They are developing disease-specific and generic methods for analysis and modelling to detect space-time anomalies, monitor diseases (endemic vs epidemic) and assess risk of disease emergence

(importation/introduction and spread in Europe), using early mentioned and collected official and unofficial data sources. The key objective of this user's consultation meeting is to present, evaluate and potentially adapt the models on the chosen disease systems according to the end-user needs as part of the ongoing process of cooperation between MOOD's modellers and end users.

Keywords: space-time anomalies, monitor diseases, risk of importation/introduction, hazard mapping, risk of spread

Questions:

- Disease modelling may be tricky to address for non-specialists. What difficulties did you encounter (terminology used, technical jargon, results in an unreadable form, etc.) to exploit scientific studies at best?
- What do you think would help to improve the dissemination of scientific outputs? (Fast delivery of outputs into a peer-reviewed journal or in a preprint platform, accessibility to open access scholarly literature...)

Accessing and using Mood's innovative tools

Users have made it clear they would like access to disease and disease driver data. Finding the right data and extracting the right information can be difficult. Understanding the differences between data sets is not always straightforward and most academic developed tools are not intuitive to use. MOOD is providing a whole range of tools and data for end users to solve this problem. To provide easy access to both the tools and data, MOOD is building a web platform to provide this access to the users. MOOD would like to provide a platform that is intuitive and easy to use for the end-user. Therefore, the interaction with the user is crucial to provide this level of ease and intuitiveness. With this user meeting, we would like to start the conversation on how we can address your needs and concerns about such a platform. We will also talk about the different training opportunities related to MOOD and the sustainability path of the platform after the project ends.

Keywords: Data access, tool access, MOOD platform, Training

Questions:

- How would you like to access the data and tools?
- What type of training would you like to be available (tutorial, written guide, training school)?

Contact list

Name	Institution	Mail
Artois Jean	Université Libre de Bruxelles, Belgium	jeanarto@gmail.com
Bouyer Fanny	GERDAL, France	neptisliberti@gmail.com
Busani Luca	Istituto Superiore di Sanità, Italy	luca.busani@iss.it
Colizza Vittoria	INSERM, France	vittoria.colizza@inserm.fr
Dub Timothee	Finnish institute for Health and Welfare, Finland	Timothee.dub@thl.fi
Hengl Tomislav	OpengeoHub, Netherlands	tom.hengl@opengeohub.org
Lancelot Renaud	Cirad, France	Renaud.lancelot@cirad.fr
Marsboom Cedric	Avia-GIS, Belgium	cmarsboom@avia-gis.com
Rizzoli Annapaola	Fondazione Edmund Mach, Italy	annapaola.rizzoli@fmach.it
Roche Mathieu	Cirad, France	Mathieu.roche@cirad.fr
Teisseire Maguelonne	Inrae, France	maguelonne.teisseire@inrae.fr
Van Bortel Wim	Institute of Tropical Medicine, Belgium	wvanbortel@itg.be