SYLVA
Observing life in air

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1st Stakeholder Workshop and Stakeholder Training Package

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Abbreviations

SYLVA	A system for real-time observations of aeroallergens
EUMETNET	Grouping of European Meteorological Services

Executive summary

The SYLVA Stakeholder Workshop is aimed at bringing together all major stakeholders for the duration of the project. With their input, SYLVA will co-create and test various products and services to meet their needs. As a first step, a group of representatives from various European and international organisations was brought together for the first SYLVA stakeholder workshop. The event took place in Brussels, Belgium, on 13 September 2023 and was attended by 20 participants.

Additionally to the stakeholder workshop, a training package has been developed for more technical stakeholders, i.e. those who will make use of SYLVA technologies and IT infrastructure. This first training package of four is focused on developing and producing datasets to train the machine learning algorithms upon which the real-time monitors are based.

This deliverable is part of the SYLVA workflow, being the first series of stakeholder workshops and training packages planned throughout the project. Two stakeholder workshops are planned for 2024 and 2025 (Tasks 4.4 and 4.5). The other two training packages will follow on from these workshops, tackling a new subject each time, including the use of the data produced from the Pilot Demonstrations and the holding of webinars for users.

1   First SYLVA Stakeholder Workshop

The SYLVA Stakeholder Workshop is aimed at bringing together all major stakeholders for the duration of the project. With their input, SYLVA will co-create and test various products and services to meet their needs. As a first step, a group of representatives from various European and international organisations was brought together for the first SYLVA stakeholder workshop. The event took place in Brussels, Belgium, on 13 September 2023 and was hosted by the Sciensano Institute. It was jointly organized with the EUMETNET AutoPollen Programme.

Twenty participants took part in the workshop, representing a diverse range of organisations from the Food and Agriculture Organization to the European Space Agency (see Annex 1 for the list of participants).

The day began with a welcome coffee from 9:30 onwards, and at 10:00, the main programme started with two general introduction presentations (see programme in Annex 2). The first focused on the EUMETNET AutoPollen Programme, which has many synergies with SYLVA, while the second presentation provided an overview of the main goals of SYLVA. These two presentations provided context for the participants and a basic understanding of what will be made possible through both projects.

After a round of introductions from each participant, the more interactive part of the event was introduced. Participants were split into four main stakeholder themes: health, research, agriculture and forestry, and forecasting. The first task for each group was to outline a product or service that would meet some of each group's needs, without taking into consideration any restraints whether they be technical, financial, or legislative. The second task focused on concretizing each product or service taking into account realistic limitations all the while expecting further developments in the coming five years.

1.1   Public Health

The group focused on public health provided input on what allergy-sufferers really need rather than specifically designing a service for them. They indicated that much of the health care system needs to be adapted to the high temporal resolution information that is now available – instead of daily averages upon which most things are still based, for example, exposure, symptom thresholds, etc., all need to be adapted to hourly levels. It was highlighted that it was essential to involve end-users in their own care, perhaps using specifically-designed apps, some of which exist already. The group also suggested that it was important in certain cases for information to be available about invasive species, e.g., ragweed, which may become more prevalent in particular regions as global warming advances and biodiversity changes.

1.2   Forecasting

The forecasting group focused on three different timescales: hourly (i.e., nowcasting), daily (typical existing forecasting), and seasonal. Nowcasting depends very heavily on assimilation techniques and provides information up to a day ahead. While this information would be useful, techniques used to date rely on high spatial resolution observations, for example, tens of stations in a single city, which do not yet exist for bioaerosol monitoring. On the more traditional forecasting timescale of days, producing such forecasts with offline models is cheap and easy, with forecasts being provided with lead times up to 4 days in advance (at up to hourly temporal resolution, if necessary). These models can integrate real-time measurements – this is currently the case with the online COSMO-ART model for Switzerland – and this process has proven very successful in terms of improving forecasts. Information is provided at spatial scales of 1-9 km and thus provides good regional detail. Seasonal forecasting, on the other hand, remains challenging for Europe. Information about whether a season will be higher or lower than average is particularly useful to allergy sufferers and certain information can be provided to end-users. However, only Birch forecasts for several months in advance have proven skilful over Europe and more research is required to ensure more accurate information can be provided to end-users.

1.3   Agriculture and forestry

The group focused on agriculture and forestry highlighted the importance of fungal spore pathogens for both agriculture and forestry. Instead of designing a specific product they provided ideas for research projects that would be highly beneficial to the agricultural sector, specifically one focused on Wheat Rust. This pathogen can affect large swathes of farmland and, when infected, can lead to very large crop losses. Little research has been carried out in Europe regarding the provision of accurate forecasts to farmers, particularly in terms of when to apply fungicides in a targeted manner. The group proposed a research project that would work together with farmers. In particular, those cultivating various wheat strains as well as groups with expertise in measurements and forecasting, to ensure full integration of all the main stakeholders involved in the production of wheat.

1.4   Research

For researchers the main need is data availability. To date, measurements of pollen and/or fungal spores have been very challenging (related to the need for specific equipment and expertise) to obtain and often have been costly. The group thus focused on designing a tool that would make data easily available, particularly in a machine-readable way, and in a format that is well known. The group suggested that data be made available through existing data portals, for example, EBAS or the newly-established Destination Earth platform. It should be possible for end-users to easily request the database for whichever spatial or temporal resolution they require. Furthermore, a data visualization tool would be very useful to more high-level end-users who may not have the time or skills to produce personal plots for their own purposes. A range of different data products were

suggested, from simple aerosol optical depths (required by satellite data producers) through to more specific information about each pollen or fungal spore taxa (which was more useful specifically to model developers). Ideally, data would also be available in the vertical (e.g. from Lidar measurements) – even if this were to be relatively basic information about the quantity of bioaerosols compared to the total aerosol loading. Furthermore, it would be useful to have information about sub-pollen particles since they are particularly important as ice or cloud nuclei. Finally, it is essential that any data provision service also makes available all necessary metadata.

2   Training Package – 1

The first SYLVA stakeholder training package is focused on producing datasets to train the machine learning algorithms that identify and count various bioaerosol particles. Meant for technical users of SYLVA technologies and infrastructure, the training package outlines a large number of aspects related to producing such datasets. This includes the initial collection of pollen or growth of fungal spores, their introduction into the various devices, as well as their storage. Where relevant, device specific information is provided.

The aim of the training package is to provide as much useful information as possible in a concise and clear way. To facilitate this, images and short video pieces have been used to supplement the text descriptions provided. Input was obtained from all SYLVA consortium members as well as from the EUMETNET AutoPollen community.

The aim of all the training packages is to provide updated information and guidelines so all of them will evolve during the lifetime of the project as expertise is gained and methods are refined. For this reason, an online and interactive format, which can be easily updated, was chosen for the training packages. The first training package can be accessed here: https://prezi.com/view/lU9P2N72FDjdiqwRkL2n/

To motivate the community to produce content relating to their own methods, a first video was produced in the form of a tutorial. More specifically, it shows the creation of a training dataset for *urtica pollen,* using the Swisens Poleno instrument. This video is accessible via the link : https://drive.google.com/file/d/1cxT40Ad8ScD48GbxhfdG-eDfPffiY-aE/view?usp=sharing

3 Conclusions

The first SYLVA Stakeholder Workshop was held in Brussels, Belgium, on 13 September 2023. The event was jointly organized with the EUMETNET AutoPollen Programme. Participants representing a wide range of different end-use sectors attended the event and many provided very positive feedback after the event. The input obtained from the brainstorming sessions will be useful to the continued development of SYLVA services and data products. Furthermore, the group was interested in remaining informed about SYLVA for the lifetime of the project and would be willing to participate in further Stakeholder Workshop activities.

An initial series of training packages has been produced for SYLVA project members and users. This concerns the creation of reference datasets to train the automatic bioaerosol classification algorithms. The next training package will focus on cleaning up these training datasets. These different series of training packages are produced on an interactive platform that enables users to easily find and read the information and media they need.

Annex 1

Participant	Institute
Willie McCairns	EUMETNET
Carsten Skjoth	COST-ADOPT
Rita Sousa Silva	EFI (European Forest Institute)
Heike Vogel	GAeF (Gesellschaft für Aerosolforschung)
Nicolas Bruffaerts	Sciensano
Eline Vanuytrecht	EEA (European Environment Agency)
Javier Martin-Membiela	SYLVA EC project officer
Leone Magliocchetti Lombi	FAO (Food and Agriculture Organization)
Emma Marczylo	Public Health England
Edward Malina	ESA (European Space Agency) Atmospheric Science
Mikhail Sofiev	SYLVA
Bernard Clot	EUMETNET AutoPollen
Jules Gros-Daillon	EUMETNET AutoPollen
Fiona Tummon	EUMETNET AutoPollen
Jeroen Buters	SYLVA
Christophe Jacob	EUMETNET
Daniela Fritsch	EUMETNET
Evelyn Freney	CNRS
Paschalis Tziastas	DG RTD (DG for Research and Innovation)
Benoit Crouzy	MeteoSwiss

Annex 2

Automatic Bioaerosol Monitoring in Europe:

Horizon Europe SYLVA and EUMETNET AutoPollen Stakeholder Workshop 2023

10:00-16:00, 13 September 2023

Sciensano, Rue Juliette Wytsman 14, 1050 Ixelles, Belgium

Goals of the workshop
- Update stakeholders about the current status of the new Horizon Europe SYLVA project and the ongoing EUMETNET AutoPollen programme. Stakeholders will be informed on what is happening in terms of automatic monitoring across Europe (networks established, etc.), how automatic measurements are different from what has previously been available (1 to 3-hourly real-time data available online for free instead of daily means available a week later (often after paying a fee)
- For different end-use sectors (health, agriculture & forestry, forecasts): understand their need for information, sources for this information, how they see themselves using this information, potential impacts they foresee for the sector …
- Co-design ideas for products/services: find ways to see where stakeholder needs can be met with current capacity (data and forecasts) as well as what will be available in the near future
- Establish new or grow existing collaborations with relevant end-user groups to ensure continued dialogue on the use of real-time pollen and fungal spore information and to provide feedback on the impact of the provision of real-time services and products.
- Discuss ways forward towards a sustainable European monitoring network, particularly a strategy to include bioaerosols into EU regulations.

Programme

9:30-10:00: Reception Coffee

10:00-11:00: Introduction Presentations

Two presentations describing SYLVA and AutoPollen, aims of both, infrastructure established so far, what data is available, from where, examples of networks running, improvements to forecasts, etc.

11:00-11:30: Round of introductions

Each participant introduces themselves, who they represent, and what motivated them to come.

11:30-12:30: In an ideal world…

Participants grouped per end-use sector (health, agriculture, forecasting, research) and develop ideas of what products/services they would like in an ideal world with no limitations (financial, technological, political, or any other).

12:30-13:30: Lunch

13:30-14:30: …and making it a reality

In the same groups, participants brainstorm potential pathways to developing the product(s)/services(s) decided on in the first session.

14:30-15:00: Presenting solutions

Each group is asked to pitch their solution(s) to all participants.

15:00-15:15 Coffee break

15:15-15:45 Presenting solutions (cont'd)

15:45-16:00: Developing a road-map

Summary of main results. Brief discussion on how collaboration can be continued, how the potential solutions can be pushed forward (develop a timeline with tasks allocated to different organisations/institutes), what participants felt about the day, how they might want to continue being involved or kept up-to-date about activities, etc.