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ATMO ACCESS
Access to Atmospheric Research Facilities

Table of Contents

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1. Introduction

The concept of physical access to a single facility in a specific Research infrastructure (RI) has typically been the norm for transnational access (TNA) activities over the last decade. However, new and flexible approaches for providing access are required to allow RIs to deliver improved services that attract a wider range of users and stakeholders. WP6 addresses this need by designing and evaluating new mechanisms for accessing research facilities in the atmospheric domain of European RIs. In addition to physical access (in-person visit to a facility), both remote access (without a person visiting a facility) and virtual access (wide, free access provided through communication networks to resources and data that can be simultaneously used by an unlimited number of users) will be explored. These new access modalities and improved services will provide better support to users, allowing them to address key scientific questions and the related societal issues in a new way. WP6 will therefore provide additional options to the catalogue of services offered by the participating RIs and enhance their attractiveness with cross-RI services and opportunities not offered by single RIs. The enhanced access modalities will also facilitate cross-disciplinary research and technology development, while also fostering closer interactions between academics and industry.

2. Approach

This report outlines the first phase of the overall process adopted in ATMO-ACCESS, which focused on the development of a general approach for designing a framework to enable new access modalities to be delivered. The approach comprised a number of steps, as shown in Figure 1. Firstly, input from users and access providers was gathered and used to inform discussions during a virtual Stakeholder Workshop focused on TNA activities. All inputs and feedback were subsequently evaluated and used to create a foundation for working groups to be established with the aim of co-designing new TNA pilot studies in the three targeted areas already outlined in the proposal - international stakeholders, innovators in technology and public authorities.

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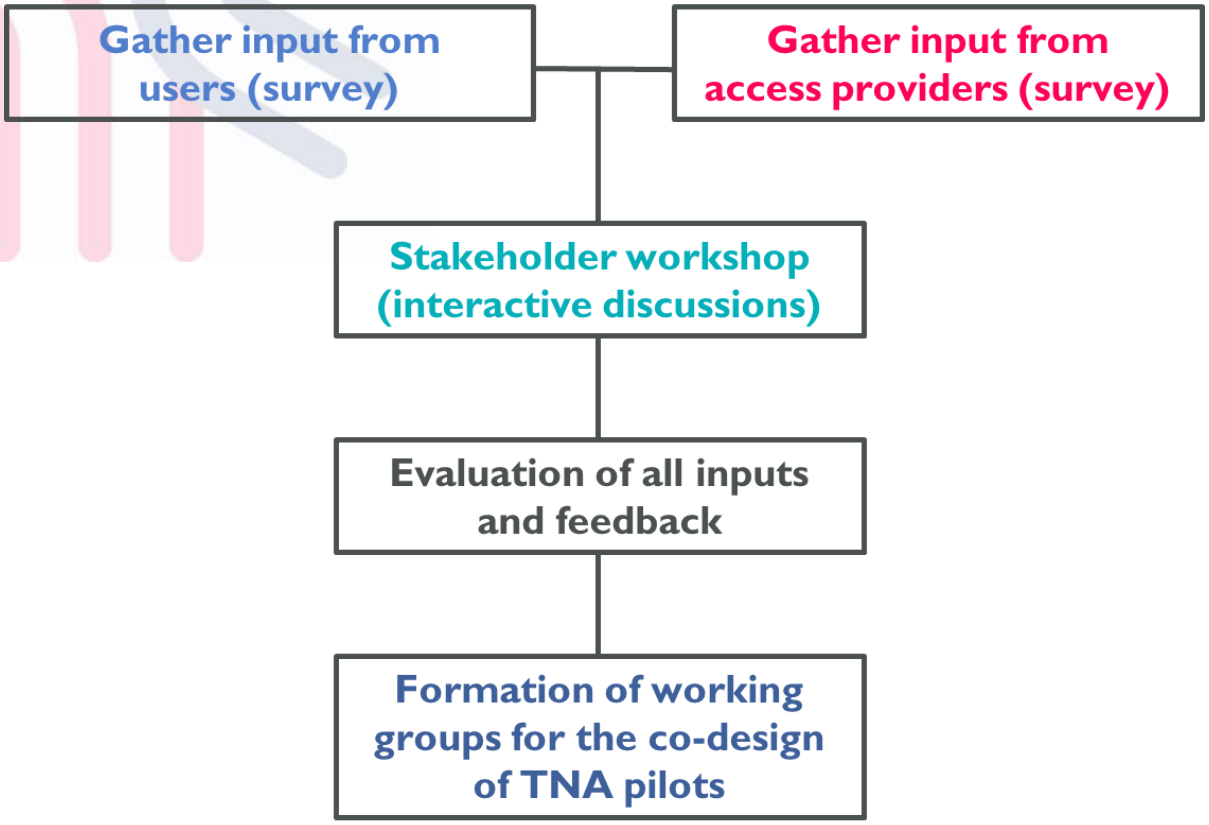

Figure 1. Outline of the general approach for the design of pilots incorporating new access modalities.

3. Input from Access Providers

A questionnaire (**Annex 1)** was issued to access providers to gather information on:

- The types of facilities and services being offered
- The pilot studies they are interested in
- The modes of access being offered
- The timing and duration of the access
- Potential users in each of the pilot areas

The questionnaire followed the General Data Protection Regulations (GDPR) and no individual data was shared, only aggregated results. All gathered information was compiled solely for purposes related to the ATMO-ACCESS project and elaborated so that no personal data would be traceable from the product. The individual answers and informed consent forms are stored at Google servers and the Finnish Meteorological

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Institute until the end of the project. All information and responses to the questionnaire are kept confidential. The questionnaire was launched online using the Google Forms platform.

Over 68 individuals representing the 43 access providers in ATMO-ACCESS were asked to complete the questionnaire. During the period from 23 July 2021 to 27 August 2021, the questionnaire was completed by 30 respondents. The responses provided a wealth of useful information and allowed us to start a list of access providers interested in each of the TNA pilots. The questionnaire also enabled the access providers to comment on the nature of the proposed pilots and put forward their own ideas in these areas. Valuable information was acquired on the types of facilities and data that are relevant to each of the TNA pilots and importantly, a large number of individuals, companies and organisations that might be interested in each of the pilots was identified. Overall, the questionnaire was very useful in identifying synergies and complementary capabilities that help develop improved and harmonised cross-RI services within the framework of ATMO-ACCESS.

4. Input from Users

Input from users was gathered via a number of sources. Firstly, the feedback reported in the ATMO-ACCESS *Report on the current user needs as related to the historically offered access ways* (Deliverable 2.1) was collected and analysed. The survey was addressed to the users of TransNational Access (TNA, physical and remote) and Virtual Access (VA) services offered by past INFRAIA projects (ACTRIS-IA, ACTRIS-2, EUROCHAMP-2, EUROCHAMP-2020, InGOS) as well as similar activities conducted outside the TNA/VA schemes. The report provides a useful assessment of the future needs of users and highlighted the following specific points:

- The workload associated with the application process could be reduced by using simplified and automated procedures. This was particularly emphasized for remote access activities provided by central laboratories related to calibration of instruments.
- Fair and clear policies on acknowledgment of user contribution by the TNA provider and/or resulting publications should be issued; for example, the work of young TNA users could be recognized by allocating a certain number of ECTS credits for providing the final report, etc. This could help strengthen collaborations involving universities.

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- A combination of physical and remote access could be very beneficial for many users and facilities. However, the facilities that offer this combination of access must have sufficient funding for staff, resources and equipment to deliver the required services.

In the frame of the SMURBS project, extensive feedback was received by prospective users of Earth Observation (EO) - based products to address urban air pollution, disasters and urban growth issues. Input was received from 248 stakeholders (through an online survey, interviews, and workshops) based in 18 countries and 37 cities. The results have been synthesized into 24 key messages, from which the ATMO-ACCESS relevant user needs are:

- Higher spatial resolution in monitoring basic air pollutants
- Measure new pollutants with potentially high health risks, toxic plumes from industrial accidents
- Online, real-time delivery of Air Quality information
- Smart sensors, new mobile sensor technologies
- Citizen participation, personal exposure information, localized and personalized information
- Source apportionment, source contribution
- Linkage between air pollution and health symptoms/diseases
- Uniform data and services platform
- Systematic collaboration between the scientific community and policy-makers
- Public access to environmental information, public awareness, open access, web portals

5. Stakeholder Workshop

The feedback gathered from the users and access providers was incorporated into discussions held by WP6 participants and used to form the basis of the ATMO-ACCESS Stakeholders' Workshop, held online, 27 October 2021.

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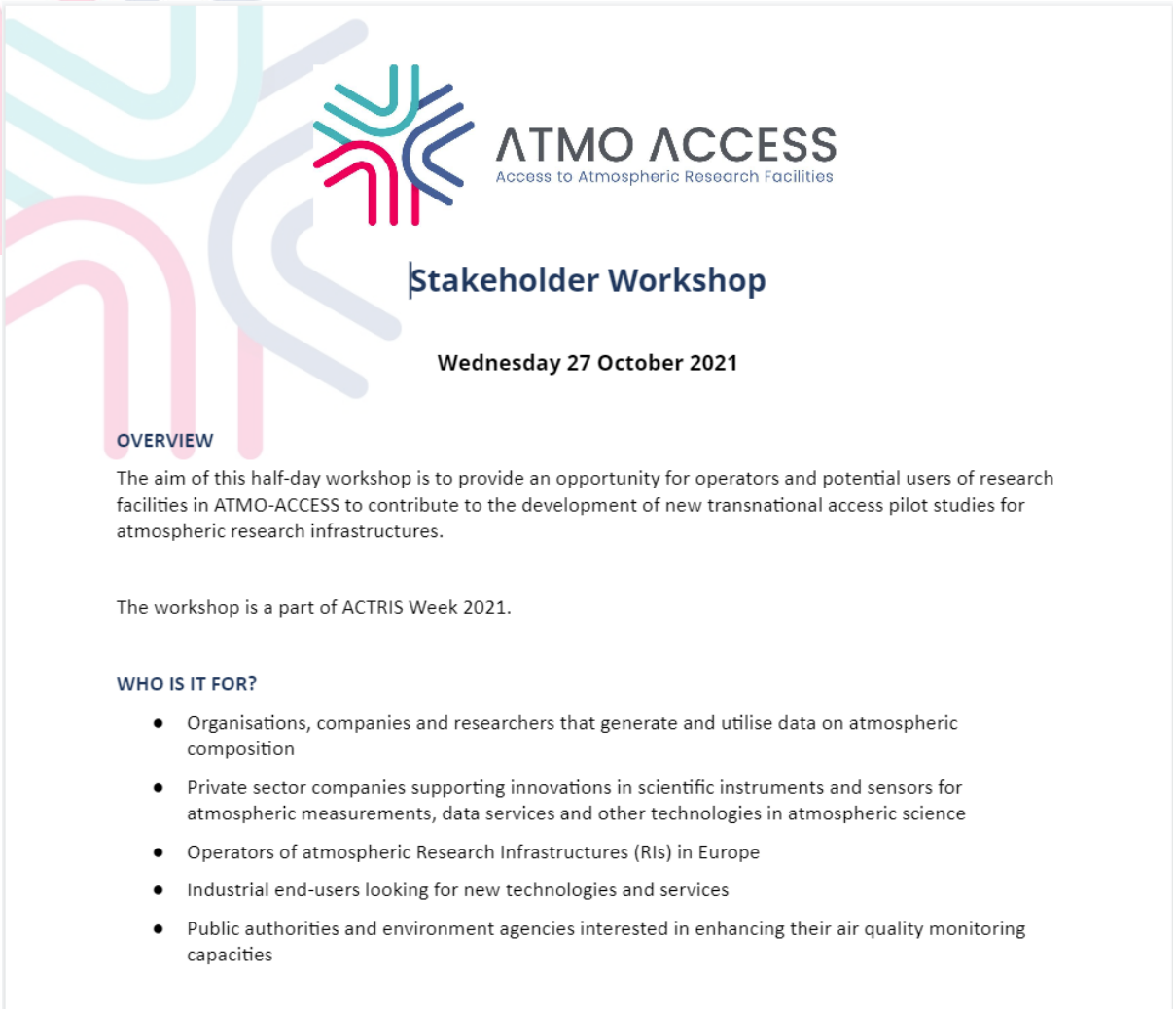

Figure 2. Promotion of the ATMO ACCESS Stakeholder Workshop.

The aim of this half-day workshop was to provide an opportunity for operators and potential users of research facilities in ATMO-ACCESS to contribute to the development of new TNA pilot studies for atmospheric research infrastructures. To this end, short presentations were given on the nature of the overall project, the role of WP6 within the project and each of the targeted TNA pilot areas. This was accompanied by interactive Slido polls (Annex 2) during the meeting and a summary discussion at the end. More than 160 people attended the 3.5 hour virtual meeting. A detailed internal report on the workshop can be found here.

The Slido polls generated insightful and useful information with respect to the types of services, access, and facilities, as well as for the access modalities, both expected and provided. Some of the key points generated from the Slido Polls were:

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- Similar answers from users and providers
- Combination of physical and remote access is a popular option
- Combination of training and scientific delivery/innovation is also popular
- Co-design of pilots is favoured
- Make the application procedures as simple as possible –avoid bureaucracy whenever possible.
- All needs expressed by potential users could be delivered by the RIs participating in the ATMO-ACCESS project, even the needs expressed by only one or two users.
- Many specific comments on each of the three proposed pilot study areas.

The key results obtained from asking questions about the following four main areas are summarized below:

Services: The preferred services (both accessed by users and provided by RIs) were facilities, instruments, testing, data (including modelling), training and validation (instruments and processes). Support for developing data products and applications was also sought by 45% of the participating users, which could be provided by 25% of the facilities.

Types of access: The favorite types of access for both users and providers was in-person visits (physical access) to an infrastructure/facility and remote (non-physical) access to resources and services. Virtual access to users, provided through communication networks was also of interest, but to a lesser extent.

Types of facility: Observational platforms were the most popular type of facility. Other types of facilities offered by ATMO-ACCESS (mobile platforms, central laboratories and simulation chambers) were also requested by the users.

New modes of access: There was a good overlap between user needs and capabilities of the service providers, which underlined that a combination of remote and physical access is preferred, and/or a combination of training and scientific delivery is also favorable. Cross-disciplinary access (beyond atmospheric science) is also a desirable mode to aim for in the future.

The key points arising from the discussion were:

- Most usersers want to co-design specific access with the providers
- Industry users have concerns about managing intellectual property rights (IPR) when accessing facilities outside of their own country
- Good, clear information needs to be presented about the services offered by access providers
- Rolling TNA calls and targeted communication towards industry users is welcome

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- Challenges include - limited budget of TNA, bureaucracy, shipping costs, ensuring that the timing of access matches needs of the user
- Mobile platforms could be useful for facilitating fast track access to AQ monitoring, e.g. by public authorities during pollution events
- Permanently open calls may be better than one or two calls per year
- What about the possibility of long-term TNA?

6. Further Input from ATMO-ACCESS Principal Investigators

Progress in the WP6 activities was presented and discussed at the first in-person meeting of the ATMO-ACCESS Scientific Steering Committee (SSC), held in Toulouse, 3-4 March 2022. For part of the meeting, the Committee was also joined by over 40 online participants, comprised mainly of Principal Investigators on the project. A Slido poll was also completed and used to direct the wider discussions on optimum ways to develop, process and manage future TNA calls. The priority topics highlighted by the attendees are shown in Figure 3.

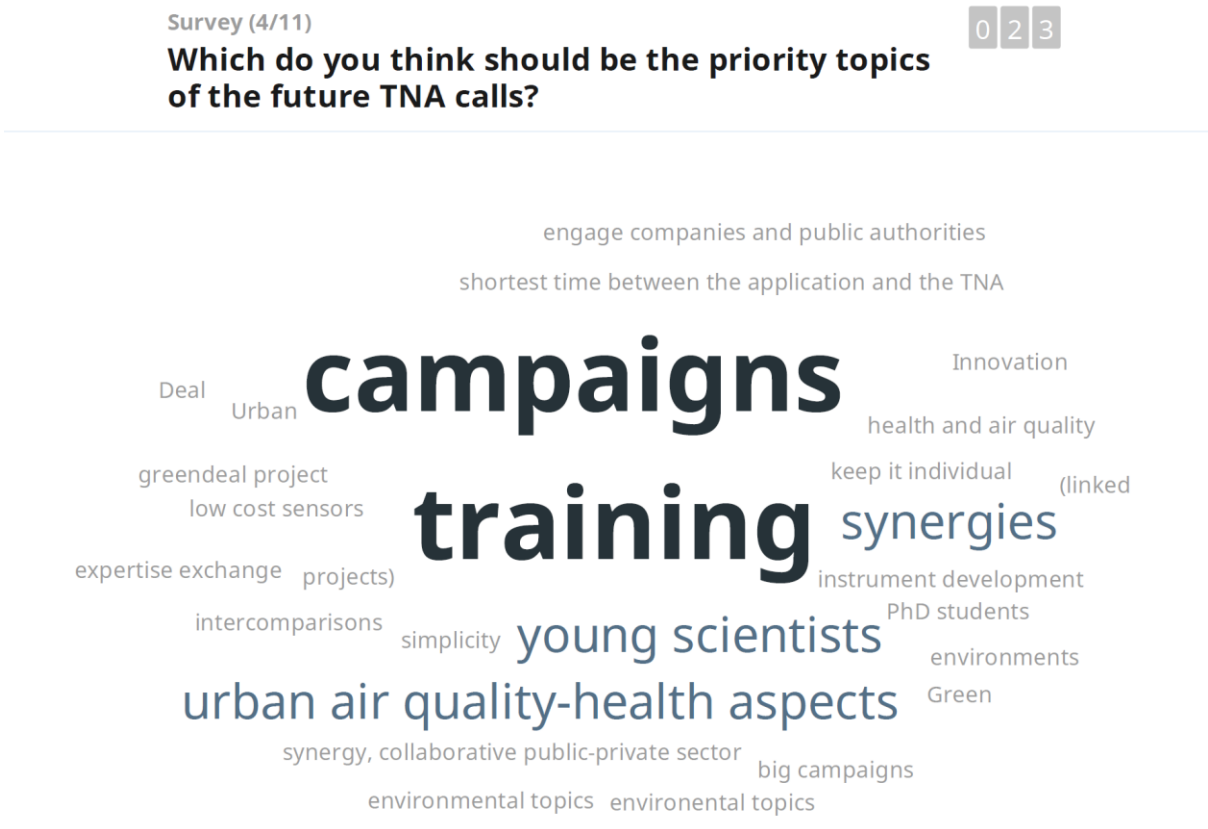

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Figure 3. WordCloud created from feedback given by service providers on the priority topics for future TNA calls.

The topics identified in the discussions and surveys held during this meeting will be taken into consideration when the TNA pilot studies for WP6 are being developed. Important further discussions also focused on the need to establish plans and timelines for delivery of the TNA pilot studies and how they fit in with the connecting tasks in WP3, WP7 and WP9.

7. Formation of Working Groups for the co-design of TNA pilot studies

All of the information collected from the surveys and the Stakeholder Workshop has been evaluated in a series of discussions held by WP6 participants and Scientific Steering Committee (SSC) members. The most important finding of these meetings was that co-design of the TNA pilots is essential for their success. It was therefore decided that a working group, comprised of users and service providers, be established to work on the co-design of pilots in each of the three targeted areas - international stakeholders, innovators in technology and public authorities. The working groups will be co-ordinated by the task leaders and engage in the following range of activities in order to achieve the goal of delivering suitable TNA pilots:

- Use the surveys and polls to create a list of participants for the Working Group which effectively represents the interests of all stakeholders
- Hold a kick-off meeting of the Working Groups for the three TNA pilots
- Establish regular communication (email, discussions board) and follow-up meetings
- Expand to include new users (utilize personal networks)
- Communicate with Project Office and other WPs on possible procedures for pilots
- Prepare draft document outlining the proposed pilots and associated access modalities
- Gather feedback from SSC and partners
- Prepare final document outlining the proposed pilots and associated access modalities

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8. Conclusions

A general framework for designing new and flexible TNA modalities has been developed through extensive consultations with all stakeholders. Based on input received via surveys, meetings and discussions, it was decided that co-design of the TNA pilot studies is the best approach. Working groups, comprised of users and service providers, will be established to work on the co-design of pilots in each of the three targeted areas. The Groups will meet on a regular basis to identify the proposed pilots and associated access modalities. Feedback on draft documents generated by the working groups will be provided by the SSC and final documents describing the proposed TNA pilots in each of the three areas are expected to be delivered by Month 24 of the project.

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Appendix 1

ATMO ACCESS WP6 Questionnaire for Access Providers

Page 1:

The overall objective of WP6 is to design and evaluate new trans-national access modalities for the Atmospheric RIs.

Three key areas have been targeted for pilot studies and we would like the access providers to indicate their potential involvement in each of these areas, as well as their interest in contributing to development of the pilot studies.

Please enter your details below and respond to the questions on each of the following pages.

Please complete this form by 27 August 2021.

Thank you

John Wenger (WP6 leader), Ariane Dubost (Project Office)

Informed consent

The only personal details we ask you to provide will be your name, the position in your organization/ company. Your answers will be treated in a strictly confidential manner.

For more information, please read our privacy notice https://www.atmo-access.eu/atmo-access-privacy-policy/ and the Google privacy policy https://policies.google.com/privacy

The individual answers and informed consent forms will be stored at University College Cork until the end of the project. All information and responses to the questionnaire will be kept confidential.

I voluntarily agree to participate in this survey. By clicking "yes" below, I acknowledge that I have read and understood the above information.

Yes

No

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Name:

Institution:

Role:

Email address:

Page 2:

Pilot TNA(s) for international stakeholders

Objective: to design pilot TNA(s) for international stakeholders involved in the acquisition and utilization of data on atmospheric composition, e.g. ESA, Copernicus, EUMETSAT, EEA.

Example of a potential pilot: Support for a satellite Cal/Val exercise by involving ATMO-ACCESS TNA providers operating aerosol and clouds (remote sensing and in-situ) Observation Facilities, Mobile Exploratory Platforms and Central laboratories; ATMO-ACCESS WP2, 3 and 7.

Contact person: Doina Nicolae, nnicol@inoe.ro

- Are you interested in contributing to development of a pilot in this area? Y/N boxes
- Are you interested in contributing to development of the proposed potential pilot? Y/N boxes.
- Do you have any ideas for other pilots in this area? Y/N – If yes please provide details.
- Please provide contact details for other organisations, institutes, companies, public authorities or individuals that you think may be interested in contributing to the development of a pilot in this area or in exploiting the atmospheric data/outputs that may be generated.

Page 3:

Pilot TNA(s) for innovators in technology

Objective: to design pilot TNA(s) for involving the private sector in the development and testing of instruments, sensor technologies, calibrations and benchmarking procedures.

Example of a potential pilot: Design a testing platform for low cost sensors for measuring air quality and greenhouse gases, potentially involving Observation Facilities, Mobile Platforms, Simulation Chamber facilities and Central laboratories.

Contact person: Leonard Rivier, leonard.rivier@lsce.ipsl.fr

- Are you interested in contributing to development of a pilot in this area? Y/N boxes

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- Are you interested in contributing to development of the proposed potential pilot? Y/N boxes.
- Do you have any ideas for other pilots in this area? Y/N – If yes please provide details.
- Please provide contact details for other organisations, institutes, companies, public authorities or individuals that you think may be interested in contributing to the development of a pilot in this area or in exploiting the atmospheric data/outputs that may be generated.

Page 4:

Pilot TNA(s) for public authorities

Objective: to design pilot TNA(s) for public authorities that need access to atmospheric measurements for routine monitoring or the characterization/assessment of atmospheric episodes e.g. industrial accidents, air pollution events, extreme weather and related natural hazards.

Example of a potential pilot: Provision of air quality information by involving ATMO-ACCESS TNA providers operating (in situ) Atmospheric Observation Facilities and/or Mobile Platforms. Simulation Chamber Facilities and Central Laboratories could also be involved by providing information on cal/val of sensors and networks, threshold assessment support, exposure studies and source identification.

Contact person: Eleni Athanasopoulou, eathana@noa.gr

- Are you interested in contributing to development of a pilot in this area? Y/N boxes
- Are you interested in contributing to development of the proposed potential pilot? Y/N boxes.
- Do you have any ideas for other pilots in this area? Y/N – If yes please provide details.
- Please provide contact details for other organisations, institutes, companies, public authorities or individuals that you think may be interested in contributing to the development of a pilot in this area or in exploiting the atmospheric data/outputs that may be generated.

Page 5:

This is the end of the questionnaire

Thank you for providing your input. It will help us to design the best TNA pilot studies for ATMO ACCESS.

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Appendix 2

ATMO ACCESS WP6 Slido Poll during the Stakeholder Workshop, 27 October 2021

I. Users (multiple choice)

What services are you most interested in ?

- **Access to facilities, instruments, testing (66%)**
- Testing and quality/standards compliance validation of instruments and processes (62%)
- Access to data, modelling (51%)
- Access to specialised training (49%)
- Access to basic training on atmospheric sciences / MOOCs (31%)
- Provision of space and logistics support for custom development and trials (14%)

Which type of access are you most interested in?

- **Physical access - *Physical access is "hands-on" access when Users physically visit an infrastructure/facility* (71%)**
- Remote access - *Remote access is access to resources and services offered without users physically visiting the infrastructure/facility* (48%)
- Virtual access - *Virtual access is free access to Users provided through communication networks* (37%)

Which type of facilities are you interested in using?

- **Observation Platforms (82%)**
- Simulation Chamber Facilities (33%)
- Central Laboratories (53%)
- Mobile Platforms (62%)

Which innovative modes of access are you interested in ?

- **Combinations of remote and physical access (70%)**
- Combinations of training and scientific delivery / innovation (66%)
- Cross-disciplinary access from beyond atmospheric science (39%)
- Simultaneous or sequential access to multiple facilities (38%)
- Simultaneous access by users from multiple sectors (36%)

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- Piloting the use of facilities for novel purposes (31%)
- ATMO platforms offering access for the first time (21%)

II. **Providers (multiple choice)**

What services are you planning to provide?

- **Access to facilities, instruments, testing (80%)**
- Access to specialised training (53%)
- Testing and quality/standards compliance validation of instruments and processes (51%)
- Access to data, modelling (49%)
- Access to basic training on atmospheric sciences / MOOCs (27%)
- Support for the development of data products and applications (25%)
- Provision of space and logistics support for custom development and trials (22%)

Which type of access are you planning to provide?

- **Physical access - *Physical access is "hands-on" access when Users physically visit an infrastructure/facility* (90%)**
- Remote access - *Remote access is access to resources and services offered without users physically visiting the infrastructure/facility* (71%)
- Virtual access - *Virtual access is free access to Users provided through communication networks* (44%)

Which type of facilities are you offering in ATMO-ACCESS?

- **Observation Platforms (66%)**
- Simulation Chamber Facilities (21%)
- Central Laboratories (21%)
- Mobile Platforms (21%)

Which innovative modes of access are you interested in?

- **Combinations of remote and physical access (84%)**
- Combinations of training and scientific delivery / innovation (60%)
- Cross-disciplinary access from beyond atmospheric science (40%)

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- Simultaneous access by users from multiple sectors (36%)
- Piloting the use of facilities for novel purposes (36%)
- Simultaneous or sequential access to multiple facilities (32%)
- ATMO platforms offering access for the first time (14%)

III. Pilot 1

A. Multiple choice

Why do you think that TNAs are not generally used for Cal/Val activities?

- **I don't know (43%)**
- Not sufficiently known (35%)
- Too bureaucratic (26%)
- Available only through short-term projects (24%)
- Not sufficiently flexible (17%)
- Too complicated (11%)
- Lack of control from the stakeholders point of view (9%)
- Facilities open for TNA are not relevant for Cal/Val activities (4%)

What kind of TNA project would fit better to Cal/Val needs?

- **Long-term TNA (e.g. correlative observations from multiple stations, FRMs) (67%)**
- Short-term TNA (e.g. intensive observations campaigns, combination of platforms) (33%)
- TNA is not proper for Cal/Val activities (0%)

What would be your preferred level of complexity for this pilot?

- Targeted TNA (access to data / access to calibration labs / training / consultancy / algorithm development, etc) (11%)
- Multi-aspect TNA (combination of access to data, access to facilities, access to expertise, training, etc.) (18%)
- Depending on the situation (co-designed with the stakeholder) (69%)
- No preference (2%)

B. Open text

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What would be your primary expectation for this TNA pilot?

- Provide access to a wider scientific community
- Determining the degree of reliability and testing/verification the capacity of the infrastructure with respect on the stakeholder demands.
- Strong collaborations
- I am curious whether and which communities outside of ACTRIS show interest in the TNA services.
- General challenge: top down vs bottom up. European scale coordination tends to amplify the value of RI products while vanishing the visibility of the average user. So far many initiative happen heavily top-down with potential NF-type contributors learning about it at very late stages. Therefore co-design also with balancing top-down vs bottom up (not for each activity but allowing for both).
- To establish flexible and clear access tools/procedures between providers and users
- A lot of applications and great projects
- Long-term, multi-site access
- Simple, flexible and clear process
- Collaboration on with EarthCARE on Cal/Val preparation for Aerosol and Cloud properties validation and best practices (including intercalibration of ground, airborne and with other non-ACTRIS networks), in a way that is useful also for Aeolus Follow On (Aerosol) and AOS (was ACCP) Cloud and Aerosol.
- Respond to a demand expressed by stakeholders
- Synergy between observational data from multiple platform
- Test data and test access in order to consolidate long term cal/val needs
- More complementary research, establishment of synergies from different areas where possible.
- Fostering the wide and advanced use of Individual but even combined RIs

IV. Pilot 2 (open text)

Why are you as an innovator in industry interested in access to research infrastructures?

- To know needs To adapt products
- Optimizing instrumentation
- Usability of measurement systems for air quality and greenhouse gases that have been tested with research standards
- Unicity of the platform to test in specific conditions and possible certification for the condition of use of the instrument for atmospheric measurements
- To get a recognized quality label
- Access to advanced reference instruments together with expertise
- Access to different validation measurements for new technology
- Rigorous and certified assessment of uncertainties.

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- Testing of prototypes in the central labs (comparison with reference instruments)
- Help with training, optimization, and development/improvement of our instruments along with new/exciting research

What are the major obstacles for technology innovators accessing RIs?

- Information about services available
- Training/experience of user
- Fear for IPR management in a international context
- NA

What improvements would you suggest to make RIs more accessible to innovators, particularly in the private sector?

- ATMO-ACCESS is the good step forward - have a dedicated liaison officer - Private sector working group is a good idea
- Efficient process for access: time, resources, bureaucracy
- They need a central resource to go to find where the access is
- Rolling TNA calls.
- Target communication to private sector

What types of activity and access would you propose for this TNA pilot?

- Remote-sensing retrieval evaluation with airborne or ground-based in-situ measurements
- Identification of new parameters / species that the community needs most / wish lists
- A combination of TNA to CFs and TNA to multi-parameter NFs to benefit from top-level single parameter testing and response to complex mixture testing.
- Instrument intercomparisons for specific applications
- Support of national access, not only international access
- Recurrent access to central labs
- Specific call reserved for private sector to increase visibility ?

V. Pilot 3

A. Multiple choice

What type of events/information/services would you consider to be high priority in relation to your work?

- **Natural episodes (e.g. pollen, dust) (67%)**
- Assessment of air pollution events (56%)

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- Smoke plumes from (peri-)urban fires (54%)
- Source apportionment (near real time, annual/seasonal) (46%)
- Real-time information, alarm systems (46%)
- Transboundary air pollution (46%)
- Toxic plumes from industrial accidents (44%)
- Mapping, hot spots identification (28%)
- Extreme weather events (23%)
- Support for guidelines/standardization (21%)
- Policy/mitigation/climate scenario analysis (18%)
- Past assessment/reporting on pollution levels and exceedances (8%)

Is your National Infrastructure/Regulatory network sufficient to cover your needs in atmospheric monitoring, decision making, public information etc?

- **No (18%)**
- Yes (82%)

B. Open text

What type of events/information/services would you consider to be high priority in relation to your work?

- Please, list and/or comment on emerging needs for atmospheric monitoring due to new, upcoming regulations, targets etc.
- An online monitor (s) for viruses !!!
- Health guidelines for some "new" pollutants are unknown (BC, PNC) reasonable cost measurement for some compounds mentioned in the new directive (NH3, PNC, pollen, pesticide)
- Uptake of new observation methodologies by the operational agencies
- Urban Quality Air (with related measurement uncertainties)
- Regulating footprints from air traffic.
- A requirement for measurement and unambiguous characterisation of semivolatile organic compounds or "condensables" will be required for CLRTAP / Gothenburg protocol compliance. This requires technology / instrument / technique development as well as deployment
- Better evaluation of PM toxicity
- New technology capability and new data analysis tools
- Young people working on that!!!
- Verification of GHG emissions for carbon-neutral and net-zero pathways

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- Human resources ?
- Monitoring greenhouse gases in urban areas?
- We are not really monitoring, so how we should know this? for sure more contact with monitoring agencies in needed
- LIDAR modules?
- Need for individual exposure determination
- Indoors air quality
- Demand is high, but costly
- Dealing with extreme pollution events may need to be able to mobilize mobile instruments from different places in Europe to help
- Rigorous assessment of data uncertainty, homogeneity of datasets, certified calibration.

Mention any good practices from the past or your personal view for access modalities to research infrastructures RIs

- Research groups already used TNA networks to get in contact with stations to do measurements for specific questions (pollution, pollen, etc.) , ATMO-ACCESS can support here and can work as an communicator
- Users should (digitally) sign a protocol in order to protect IPR and data ownership
- Access to tailored (simplified) data products from observational platforms

Which challenges have you already experienced or expect to face for utilizing trans-national access (TNA) to research infrastructures (RIs)?

- Weather timing of the access application in combination with the calls billing modalities
- Limited budget of TNA (higher actual costs than covered by TNA)
- Bureaucracy and costs of equipment shipping abroad.
- Time constants to line up on short notice.
- Need to access national platforms within "T"NA scheme
- Complex paper-work

VI. Final question

Please provide some final comments on the potential TNA Modalities and pilot studies

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- The procedure should be as easiest as possible (some former "Classical" TNA participants said they would no more participate because too much bureaucratie)
- Pilots should go beyond the "classical" TNAs: combination of access types and modalities, involvement of the providers in co-designing the experiment, facilitate large-scale projects, ...
- For national access: internationally coordinated national access should become possible. Still doesn't solve the national industry access.
- Permanently open call would be more appropriate than just one or two calls per year.

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