Deliverable 9.1: Progress Report on the position of ACTRIS in the European Innovation Ecosystem

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1. Introduction

This document is prepared in the context of the activities of the ACTRIS IMP project, in particular, in the Work Package 9 that deals with the positioning of ACTRIS in the European innovation ecosystem with the main aim to increase the interest of the private sector towards ACTRIS as an innovation platform and to promote actions for an effective technology and knowledge transfer.

This deliverable has to be considered as a "Progress Report". The position of *ACTRIS in the European Innovation Ecosystem* will focus mainly on the relationship between ACTRIS and private sector with the assessment of ACTRIS´ past and current collaborative projects with the private sector and highlighting best practices and success stories.

A solid basis for efficient and successful liaison between private companies and ACTRIS had already been laid in previous projects (ACTRIS-2, EUROCHAMP 2020, ACTRIS PPP). Best practice examples (success stories) described in this report originate from these projects.

A desk analysis has also been carried out in a recent milestone *MS52 Identification of collaboration models between ACTRIS and the private sector* that goes hand in hand with the present document. It describes the past collaborations in the framework of the above-mentioned projects and links them with different identified collaboration models (Industry as a supplier, Industry as a user, Industry as a full partner)

In order to showcase all the latest developments, a dedicated survey *ACTRIS Survey on user needs and collaborations with the private sector* (hereinafter *Survey*) was also designed and launched in autumn 2020 and its findings are reported and analysed here.

The document is structured in 5 different sections. After this introductory Section 1, Section 2 provides an overview of the survey and the analysis of the results relevant to the collaboration between ACTRIS and the private sector. Examples of success stories are included in Section 3. Conclusions and suggestions to monitor Innovation related activities are illustrated in Section 4. Finally, Section 5 provides the list of references consulted. Detailed information on the survey structure is reported with the Annexes at the end.

2. Survey

The survey was launched on 17 November 2020 and closed on 22 January 2021.

In order to exploit synergies with WP6 (Implementation of the user access to ACTRIS services), the survey comprises specific questions addressing the collaboration between ACTRIS and private companies regarding innovation (WP9) and questions on the user access to ACTRIS services (WP6). This combined survey was designed in a branched structure to automatically direct different respondents to different branches, where they only answered relevant questions according to previous responses to specific questions. All questions and the structure of the survey can be found in ANNEX A.

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A total of 103 evaluable responses have been received. Since there are multiple responses from some organisations, the answers can be assigned to 73 organisations (see figure 1).

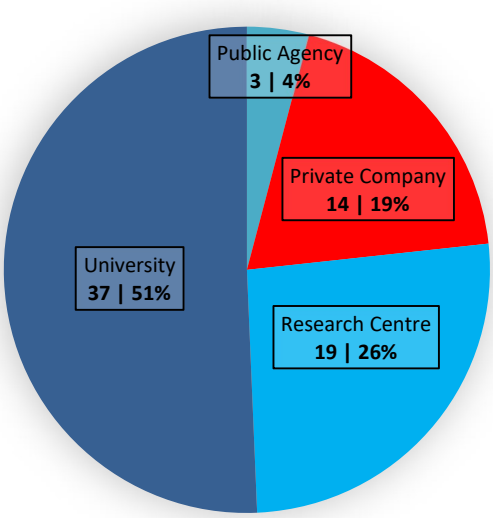

Figure 1: Respondents' organisation type

The breakdown of organizations into different categories (ACTRIS RPO, Academy, Private sector, etc.) originates from answers to the question on the organization represented by the respondents.

The analysis of the answers to the specific questions addressing the collaboration between ACTRIS and the private sector is the subject of this deliverable.

The analysis of the answers to specific questions regarding the users experience and interest to ACTRIS services (section can be found in the reports *WP6 MS30 ACTRIS User experience map* and *MS35 Updated analysis of user needs*. They both also include the perspective of the private sector' respondents to those specific questions.

2.1 Survey analysis

To determine the collaboration between ACTRIS and the private sector, both perspectives are considered. **We first examine the cooperation from the perspective of the private sector** and afterwards change the perspective (ACTRIS Community).

14 companies replied to the survey. Their answers for each specific question are shown below in the form of pie charts or mind maps.

A first insight into the topic summarizes the general profile of all the respondent companies.

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Regarding the size profile, about 2/3 of respondents work in small and medium size companies, about 20% in large companies (more than 250 employees) and about 14% work in micro companies (< 10 employees) (see figure 2).

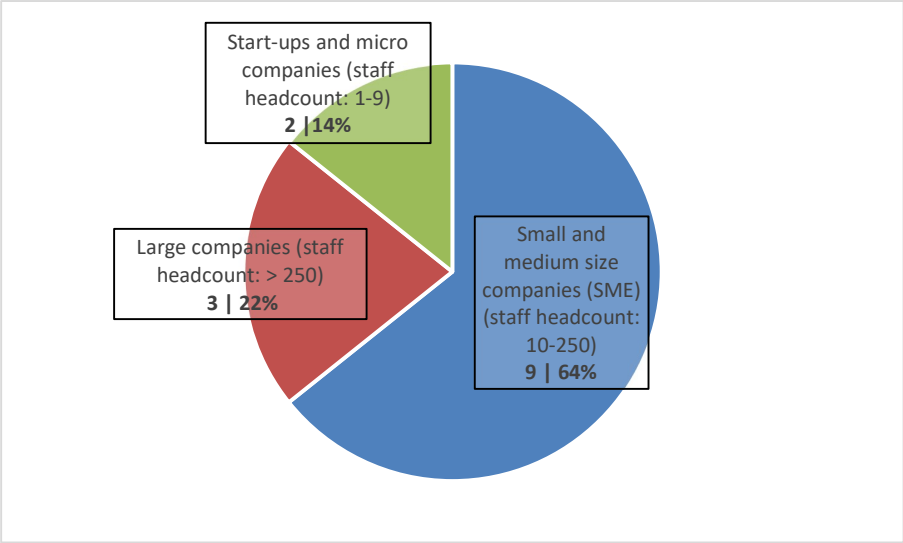

Figure 2: What is the size of your company?

Most companies belong to the instrument manufacturers or sensor industry (86%). Other respondents are classified mainly as distributor of instrument manufacturers (7%) and ICT services / products companies (6%) (see figure 3).

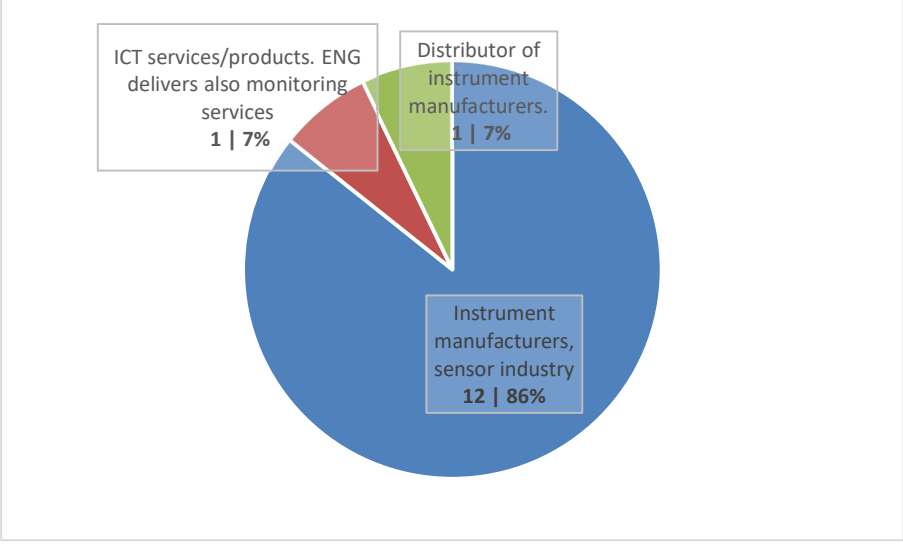

Figure 3: What is the type of your company?

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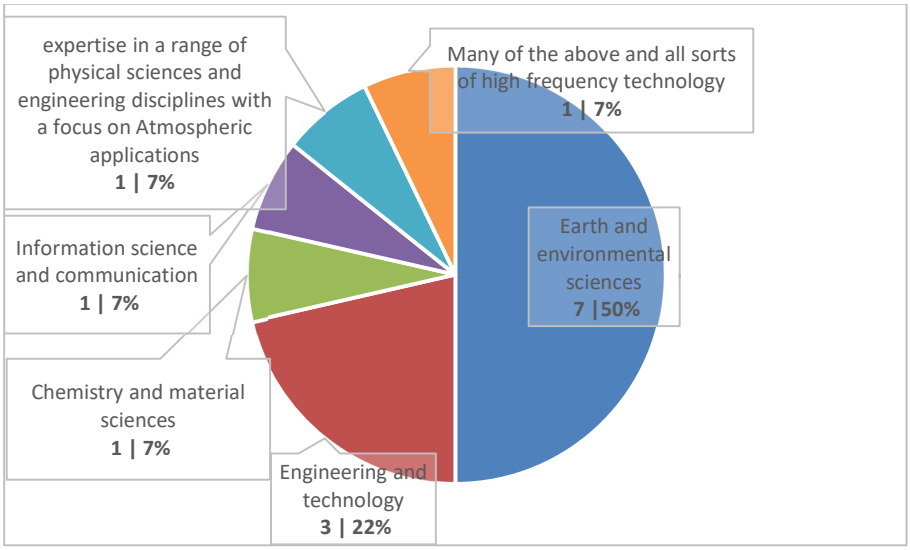

Figure 4: Which field are you active in?

A wide range of expertise are covered by respondent companies (see figure 5).

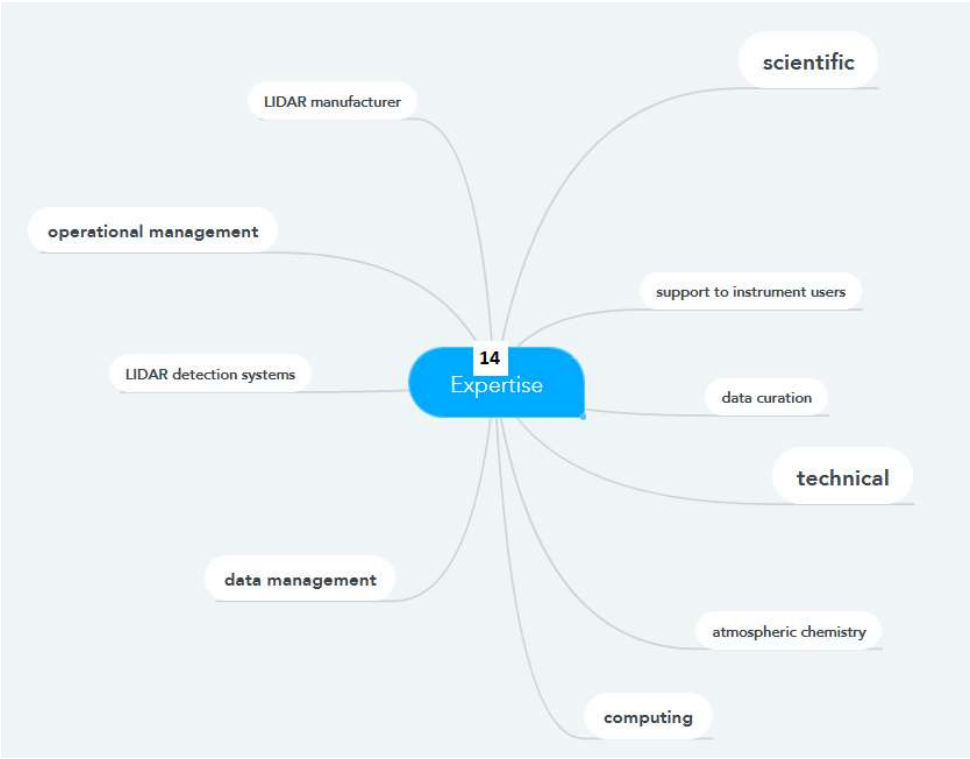

Figure 5: Expertise of the companies

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13 respondents already knew ACTRIS and got in touch with the RI (see figure 6), with 11 companies that have participated in a collaboration with an ACTRIS-related research-performing organisation (see figure 7).

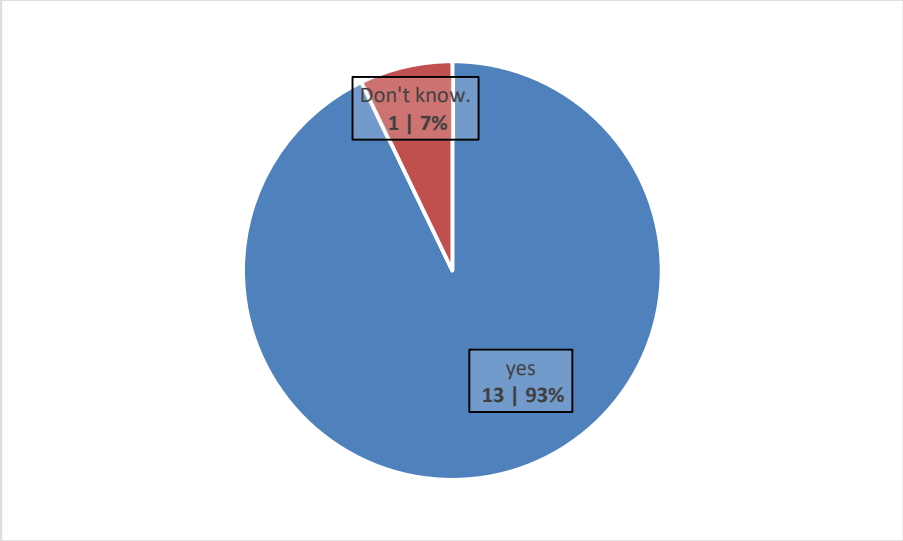

Figure 6: Did you already know ACTRIS and got in touch with the Research Infrastructure?

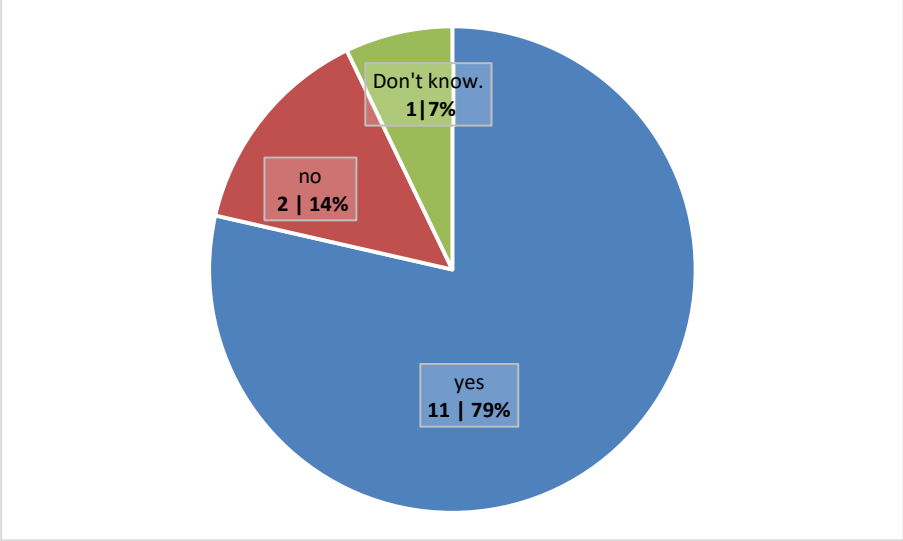

Figure 7: Has your organisation participated in a collaboration with an ACTRIS-related research-performing organisation?

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A more specific insight into the topic is given with the difference between companies that already knew ACTRIS (2/3 of respondents) and those that did not have previous knowledge of the ACTRIS services. This latter finding can be used to classify the respondent companies more generically as past and current industry users (nine answers) and new industry users (five answers) of the ACTRIS services (see figure 8).

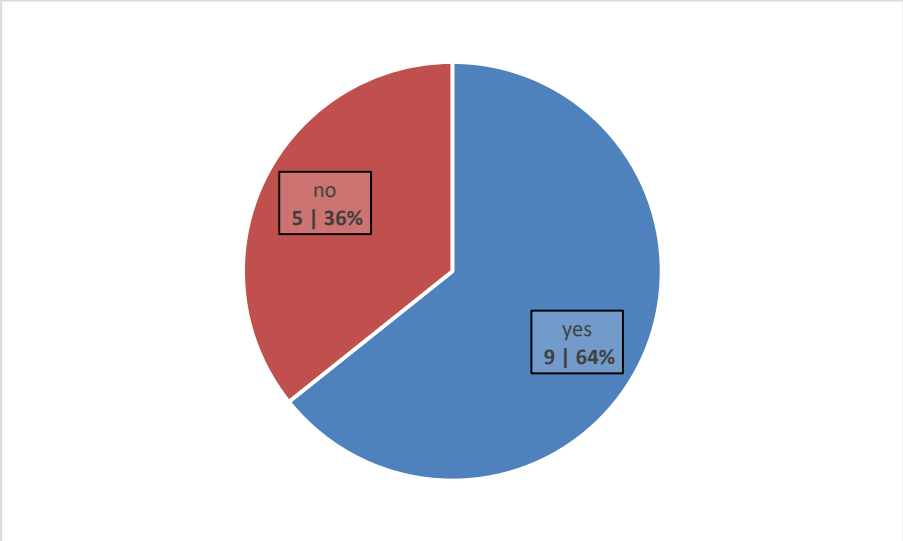

Figure 8: Do you know ACTRIS services?

All the past and current industry users also answered specific question to detail their position toward ACTRIS and the nature of the collaboration. Not all respondents answered to all questions in the section, so the rates reported in the figures just reflect the percentage of answers to the specific question they refer to.

Regarding the definition of their collaboration with ACTRIS, 4 companies ranked their experience with ACTRIS as a partnership, 2 as suppliers and 2 as users of the ACTRIS services (see figure 9). Most of the partners and suppliers being classified as intermediary users, i.e. companies that are not the end-user of the ACTRIS product/service.

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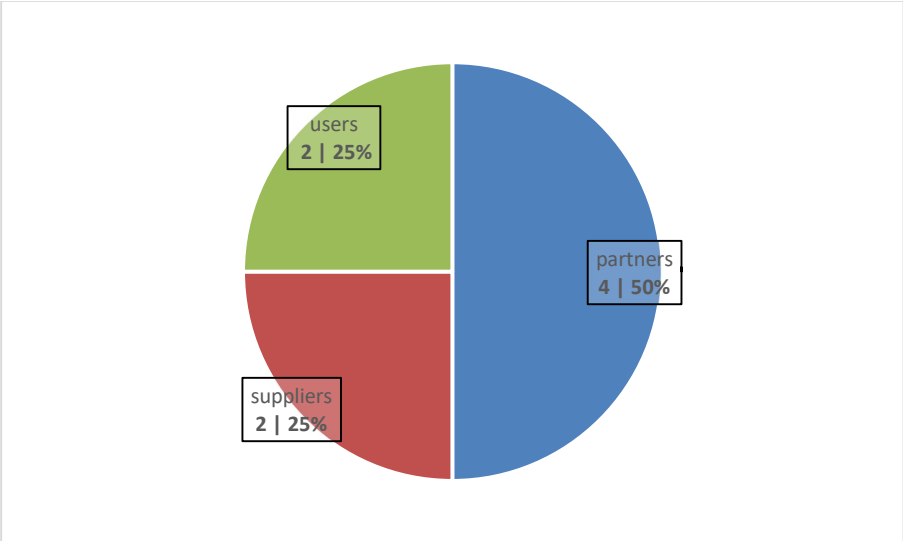

Figure 9: Which is your position toward ACTRIS and ACTRIS services? How you can you define the type of collaboration between your company and ACTRIS?

Regarding the location respect to the ACTRIS collaboration institution, 5 respondents reported to be located in other countries, 3 are based locally or regionally, and 1 is based out of the region but in the same country.

Regarding the type and nature of the collaboration, the answers of the respondents to this specific question of the survey cover all the different possible approaches: systematic long-term plan/relationship, one-off impromptu and other type of collaborations (see figure 10).

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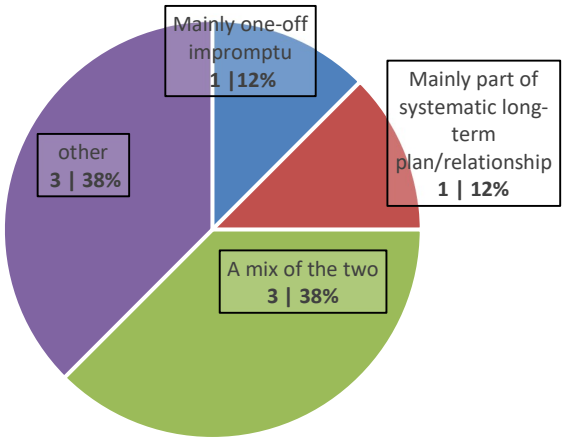

Figure 10: How would you describe the nature of the collaboration between ACTRIS and your company in the past?

A mix of the different ACTRIS services have been received and used by the 9 respondents (see figure 11).

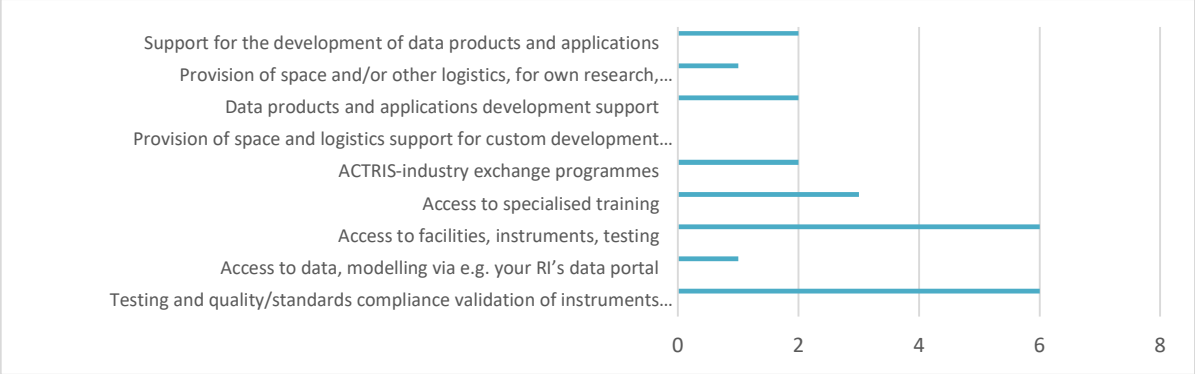

Figure 11: Which of the following ACTRIS services did your company use?

These companies got a combination of support or services at different stages of research, development, and innovation process: six companies got support or services from an ACTRIS RPO at commercialisation stage, four at proof of concept / demonstration stage, three for precompetitive research and two for feasibility studies.

Only two companies indicated that they had participated in an active programme of joint technology innovation pilots.

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To the question on the measures that could be beneficial to develop collaborations between ACTRIS and industry the most chosen answer from the 9 respondents was through EU / publicly funded projects, then industry training programmes and financial subsidies from ACTRIS.

As a free text comment at the end of the survey one industry commented that: the access to different research infrastructures should be exploited in an integrated, well-supported manner in the interest of the European population.

The 5 new industry users (companies with no previous knowledge of the ACTRIS services) also provided answers to a few questions regarding their interests and willingness for future collaboration. Although these few answers could not statistically represent and in no way are intended to represent the generality of companies, some of them could complete the analysis and better outline the current interests of private sector.

In particular, new users express interest for a wide range of services and collaboration, especially towards testing and quality/standards compliance validation of instruments and processes and access to facilities, instruments, and testing. The interest for a collaboration at proof of concept/demonstration stage is particularly recognisable. To the question on the measures that could be beneficial to develop collaborations between ACTRIS and industry the most chosen answer was through financial subsidies from ACTRIS, then EU / publicly funded projects and industry training programmes. Research needs seem to be focused on the access to ground-based observational platforms and exploratory platforms, with physical and remote access being the most interesting access type.

The following figures analyse **answers from the ACTRIS community regarding ACTRIS – private sector collaboration**.

34 respondents reported a previous experience in a collaboration with private companies (see figure 12).

Not all respondents answered to all questions in the section, so the rates reported in the figures just reflect the percentage of answers to the specific question they refer to.

More than 2/3 operate at National and Central Facilities, only two at the Data Centre (see figure 13).

Only 12 respondents confirmed to have a label certifying quality and compliance of instruments and processes with international reference standards (see figure 14); and a wide range of means have been used to engage industries in the collaboration, with EU/publicly funded projects being the most relevant opportunity (see figure 15). Furthermore, one can group these activities into the categories “on-off impromptu”, “systematic long-term relationship” and “mix of the two” (see figure 16).

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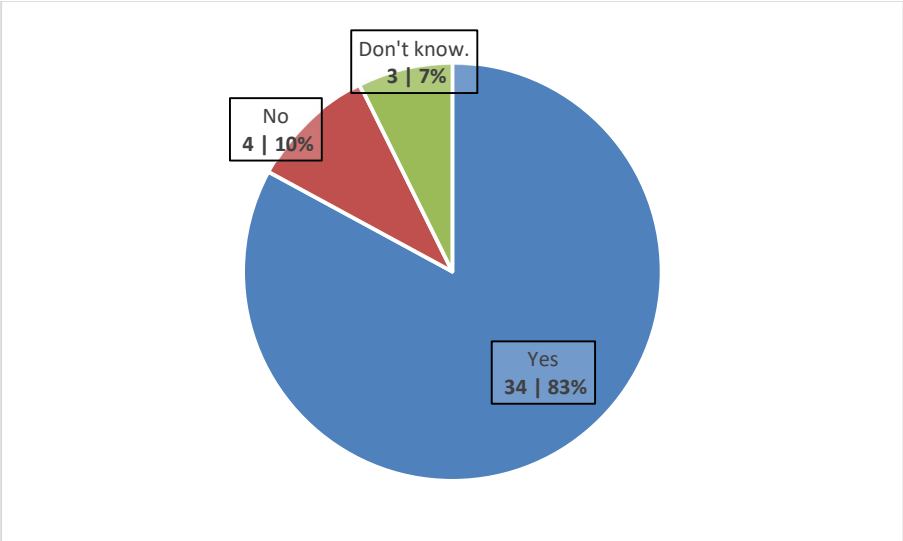

Figure 12: Has your organisation participated in a collaboration with private companies?

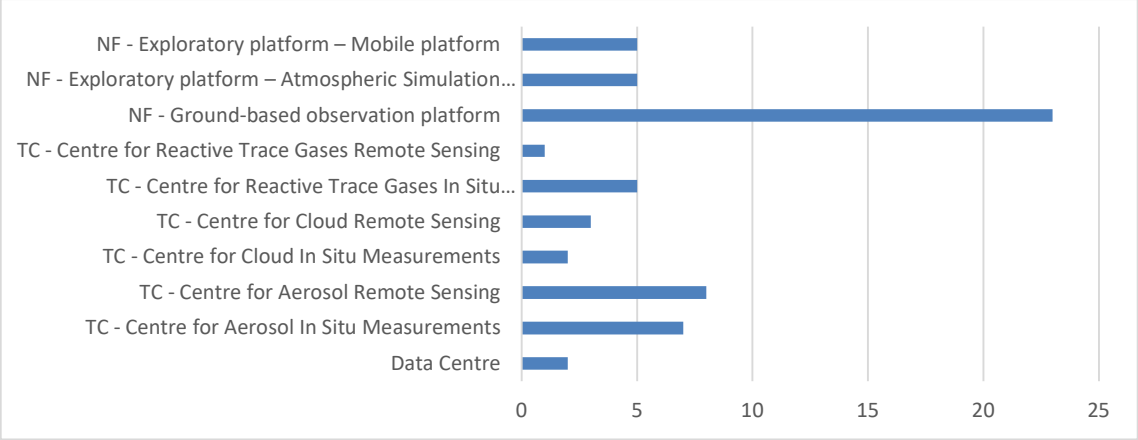

Figure 13: In which type of facility do you operate? (TC - Topical Centre; NF - National Facility)

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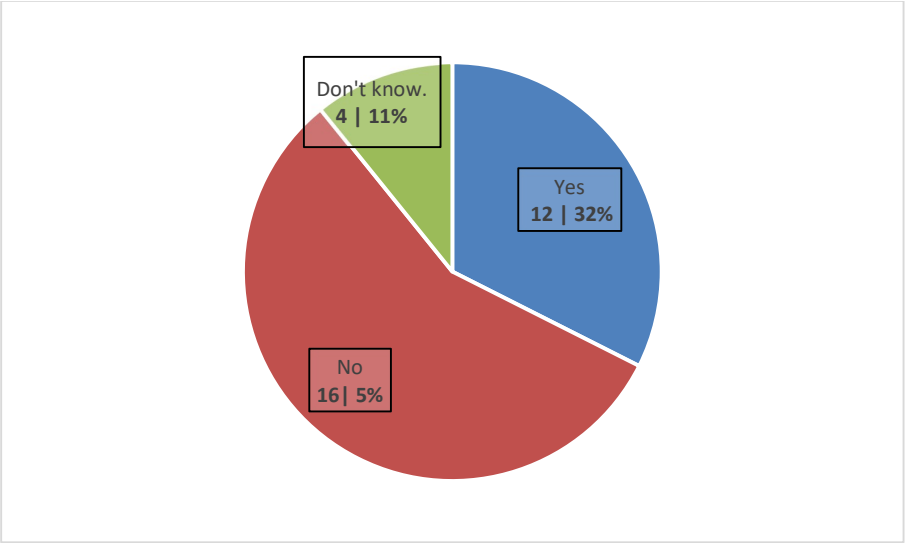

Figure 14: Do you have a label certifying quality and compliance of instruments and processes with international reference standards?

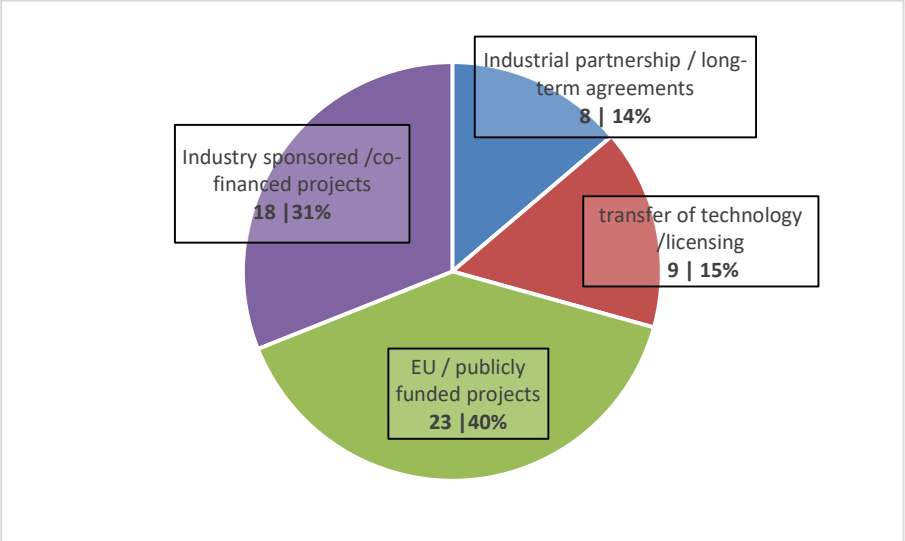

Figure 15: How did you engage industry for joint research, development and innovation (R&D&I)?

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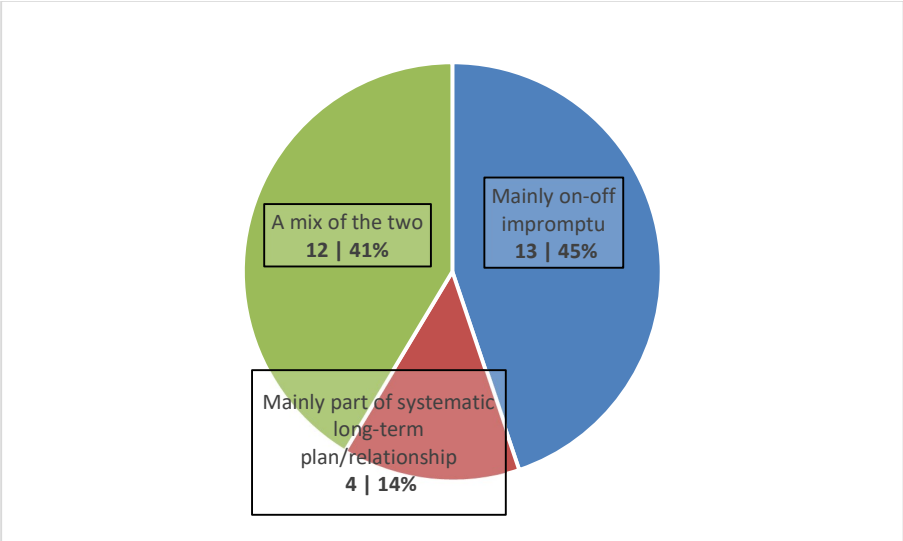

Figure 16:How would you describe the nature of the collaboration between your ACTRIS facility and industry clients in the past?

There has been a lot of collaborations in the past in different modes listed in figure 17, and ACTRIS-industry collaboration took place at different stages of the industry's research, development, and innovation process (see figure 17).

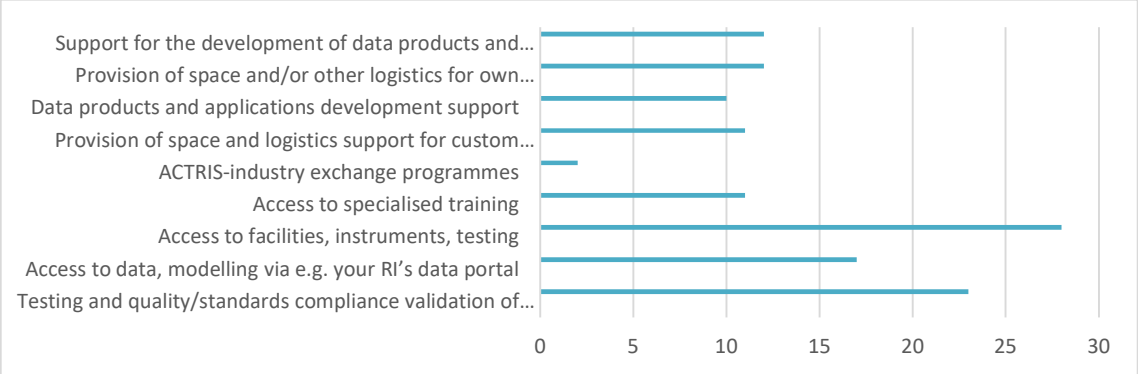

Figure 17: Which of the following services did your institution offer for companies?

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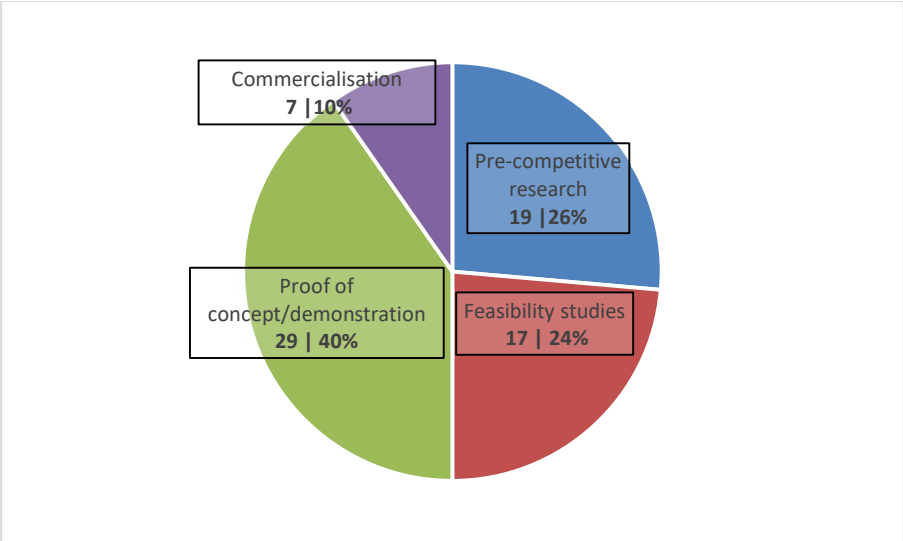

Figure 18: At which stages of the industry's research, development and innovation process did your institution provide support and services?

The origin of the collaborating companies is particularly important with regard to EU funding. So far, national, local, and international collaborations are well balanced (see figure 19). Whether the company is an intermediate user or an end user of ACTRIS services could be crucial for specific funding schemes (figure 20). Finally, different methods are proposed to foster collaboration between ACTRIS and the private sector. EU / publicly funded projects and financial subsidies for ACTRIS-industry collaboration seem

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to be of almost equal importance, whereas direct company meetings/visits, education programmes, industry training programmes and match-making events are slightly less popular (see figure 21).

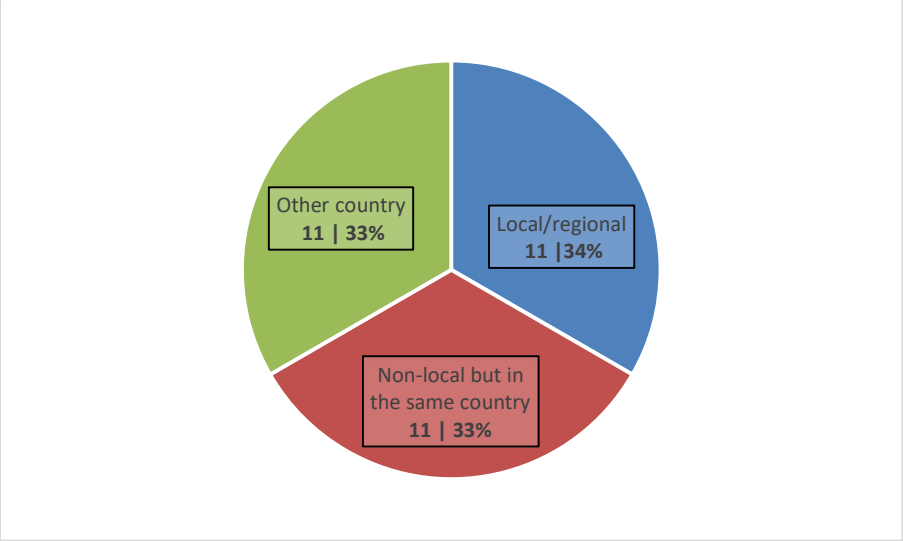

Figure 19: Where do the companies using ACTRIS facilities mainly come from?

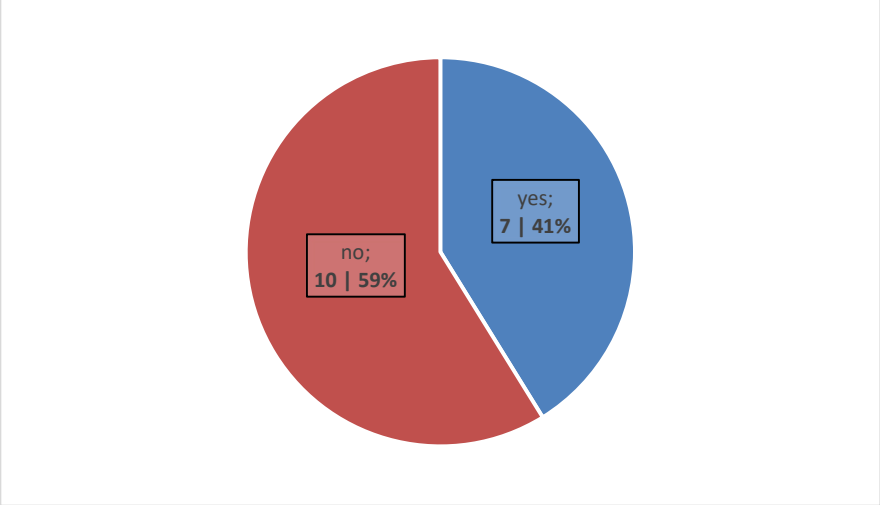

Figure 20: Do your ACTRIS facilities have intermediary users, i.e. companies that are not themselves the end-user of the ACTRIS product/service?

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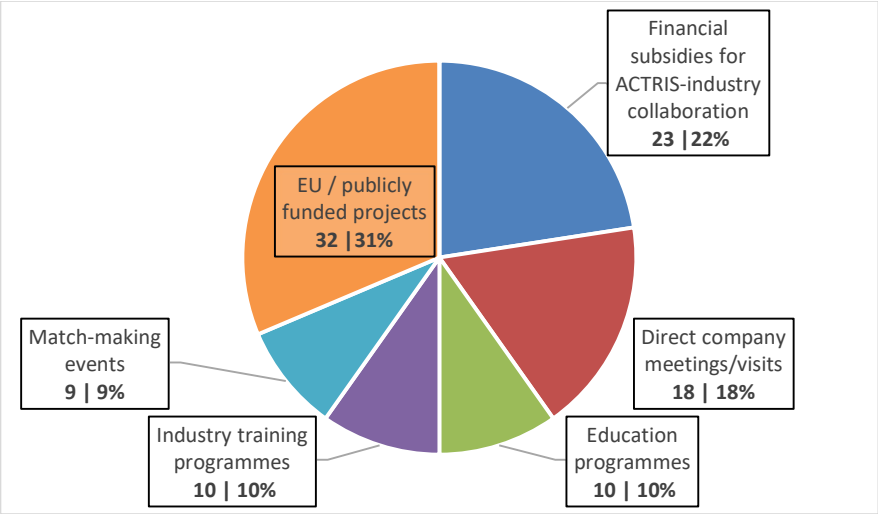

Figure 21: Which of following measures would be beneficial to develop collaborations between ACTRIS and industry?

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3. Success stories

Since "innovation" is a very abstract concept originating in economics, examples of ACTRIS – industry collaborative projects are very important for natural scientists, who are not familiar with this terminology. There have been many collaborative projects between ACTRIS and private companies in the past. This compilation does not claim to be complete. Most of the examples described here have already been described in the EUROCHAMP-2020 or ACTRIS-2 projects.

3.1 Involved companies

Examples of industry – ACTRIS collaborations have been already collected in ACTRIS-2 and EUROCHAMP-2020 projects.

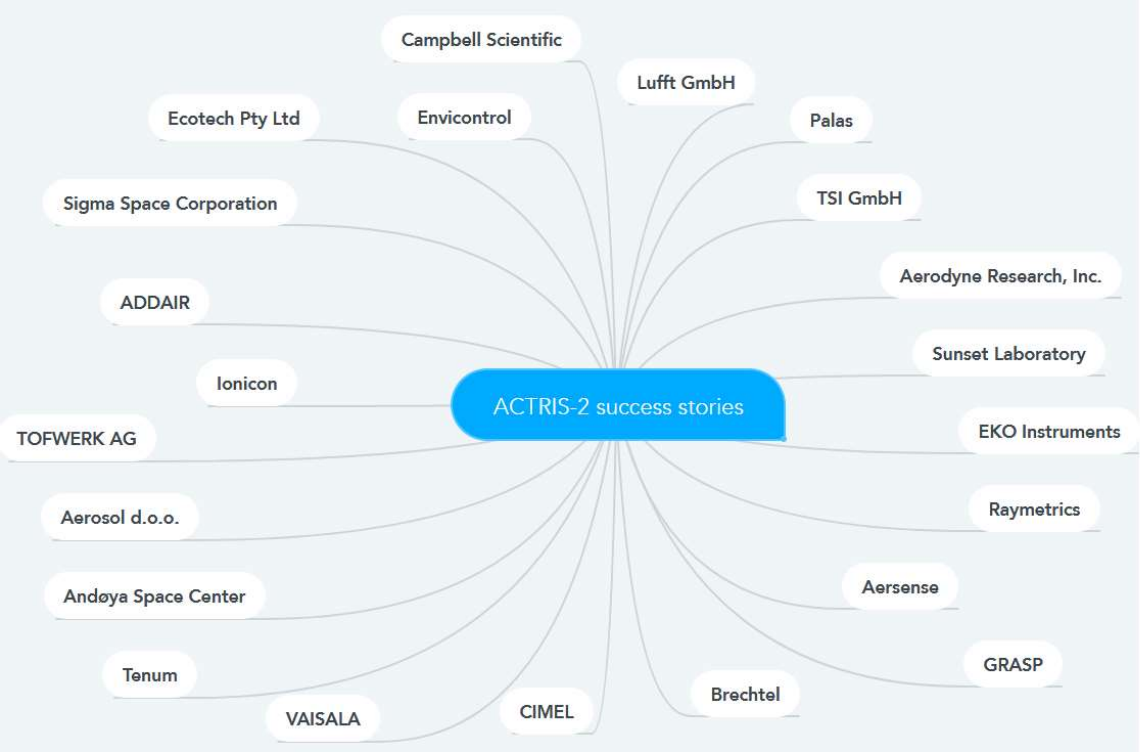

Figure 22: ACTRIS - Industry collaborations collected within the ACTRIS-2 project

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Figure 23: ACTRIS – industry collaborations collected within the EUROCHAMP-2020 project.

3.2 Selected examples

PLUMELABS & CNRS-LISA: a successful collaboration for the development of innovative personal air quality sensors

The collaboration between Plume Labs and the CNRS-LISA started in 2014 and focused on air quality, nanosensor technologies and their scientific applications, especially for personal use. The CESAM team at CNRS and the Plume Labs have so far engaged in an exciting collaboration aimed at benchmarking the nanochips available in the market to determine which is the best. Results were beyond initial expectations, especially for ozone, and enabled Plume Labs to build an advanced and comprehensive personal air quality tracker to help people know exactly what they breathe.

Since then, Plume Labs have been regular users of the CESAM platforms and their engineers are interacting with the CESAM team on a daily basis. The simulation chamber provides them the needed tools (huge set of "classical" well calibrated instruments) and ability to control the atmospheric composition (in terms of humidity, concentration of target pollutants, concentrations of co-pollutants...), required for the development of algorithms and the identification of cross-sensitivities and potential artefacts.

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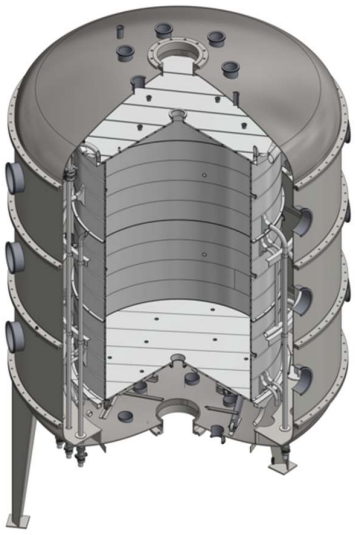
CNRS-LISA group regularly participates in "brain storming meetings" with Plume Labs to interpret results and improve the design of the sensor devices. They are also involved in key events such as the presentation of 50 prototype sensors to the people of Paris in 2016 and the launch of Plume Labs first product – FLOW, the first smart air quality tracker in early 2017. Plume Labs has been a key supporter of the EUROCHAMP-2020 project since the beginning and are now associated partners of our Research Infrastructure".

Bilfinger & KIT

KIT is closely collaborating with the German company Bilfinger Noell GmbH in two innovative projects. The first is the construction of the new dynamic cloud chamber AIDA-2 which has a unique and innovative engineering design in order to perform cloud simulation experiments at constant cooling rates of up to 10 K min-1 in a temperature range from 30°C to -55°C (see http://www.bilfinger.com/en/media/news/bilfinger-to-supply-cloud-chamber-for-international-climate-research/).



**Structure of the cloud chamber*

The second is the development of a new and innovative mobile instrument for atmospheric measurements of ice nucleating particle (INP) concentrations and laboratory studies of ice nucleation processes. This new instrument called PINE (Portable Ice Nucleation Experiment) is co-developed by KIT, the University of Leeds and Bilfinger Noell GmbH. PINE will be the first instrument of its kind for fully-automated long term INP measurements at high sensitivity and time resolution. Prototype versions have already successfully been tested and a commercial version will be available from early 2019.

Chromatec & CNRS/ICARE

CNRS/ICARE has started a close collaboration with **Chromatotec Company** aiming at improving the gas analyzers developed by Chromatotec. The ***HELIOS chamber*** is hosting the latest GC-FID-MS system from the company since May 2019. It has been used in the **PTR-ToF-MS intercomparison campaign**, which took place in May 2019 in HELIOS Platform. The performance of the Chromatotec GC-FID-MS is tested and improved under real atmospheric conditions (concentrations of VOCs, interference with atmospheric species, temperature…).

CIMEL & CNR IMAA Atmospheric Observatory (CIAO, Italy)

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CIMEL is a manufacturer of automatic meteorological instrumentation with expertise in the field of meteorology, atmosphere optics, design of integrated systems, software solution development and production control. For over 25 years, CIMEL has developed specific instruments for atmospheric monitoring that are deployed by leading scientific organisations in the world. CIMEL has developed remote sensing instruments CE318 photometer and the CE370 Micro-Lidar. CIMEL has participated in the INTERACT II (Intercomparison of aerosol and Cloud Tracking) measurement campaign to study the atmosphere through the use and integration of its different active and passive remote sensing techniques in order to evaluate the potential use of such automated instrumentation for monitoring of aerosols produced by different source (both natural and anthropic, such as desert dust, typically observed in the Mediterranean area during the summer, fires present in Eastern Europe and North America). CIMEL has been in charge of operating the automated CE370/CE376 Lidar, of data acquisition and analysis of data measured in combination with a CE318-T photometer, and the comparative analysis with CIMEL iAAMS software. CIMEL further has been supportive for CIMEL Lidar performance for aerosol and cloud measurements, and to evaluate the stability, sensitivity, and uncertainties of automated lidars and ceilometers in terms of instrumental sensitivity and uncertainties, and to put these into context by simultaneously evaluating the performance of a high specification research lidar. This is a first-time intercomparison of commercial ceilometers, lidars, with advanced research systems.

Palas GmbH (Germany) & Puy de Dome high altitude station (PUY, France)

Palas is a company specialized in particle measurement technology and the development and production of filter test systems and optical aerosol spectrometers. In October 2016, Palas participated in an intercomparison field campaign of cloud microphysical probes with two of its Fidas® 200 S instruments. Fidas® 200 S is a fine dust monitoring and ambient air measurement system for ambient air monitoring of fine dust for regulatory purposes. Goal of this campaign is to evaluate a new automatic instrumentation for clouds droplet real time analysis. The new Fidas® 200 analyzer supplies a particle size distribution (mass and/or number) between 0.4 and 40 µm. The aim is to study the interaction between droplets size and condensation nucleus with two analysers, installed side by side. One is configured to measure droplets size, the other to dry droplets and to evaluate condensation nucleus size. If successful, the low-cost and low-maintenance instrument could be an efficient solution for long-term measurement of cloud droplets at ACTRIS stations.

TSI & European Centre of Aerosol Calibration (ECAC)

TSI Inc. is a company specialized in the design and production of precision measurement instruments for aerosol science, airflow, chemical analysis, indoor air quality, fluid dynamics, biohazard detection, and even scrap metal sorting and plastics identification. TSI collaborates with most ACTRIS-2 partners that widely use the TSI aerosol particle counters and sizers. During ACTRIS-2, TSI has been closely cooperating with the World Calibration Centre for Aerosol Physics (ECAC-WCCAP) at TROPOS: to calibrate a number of various TSI CPCs and particularly to verify, test, and calibrate their new ultrafine Condensation Particle Counter 3772-CEN. This newly developed instrument is compliant with the proposed Technical Specification CEN/TS 16976, drafted by the European Committee for Standardization, for harmonization of measurement and sampling of ultrafine particles. The testing

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and development of TSI technology at ECAC ensures reliable data in thousands of installed units around the world.

4. Innovation Key Performance Indicators (KPIs)

Considering their relevance for an operational Research Infrastructure, it is necessary to measure the innovation related activities through specific KPIs tested against the RACER criteria, i.e. they had to be Relevant, Accepted, Credible, Easy to monitor, Robust.

A first attempt to define these KPIs was already done during the ACTRIS Preparatory Phase Project, with *Milestone MS26: Definition of Key Performance Indicators related to ACTRIS service provision*.

Category	Performance Indicator (suggested KPIs are indicated in bold)	Value type	Definition
Impact on innovation	**Increase in number of users from private sector**	quantitative	Measure of attractiveness towards the private sector
	Number of patents	quantitative	Measure of innovation capacity
	Number of technology transfer activities (public-private)	quantitative	Measure of innovation capacity

A specific Working Group was established by ESFRI to develop a common approach across Research Infrastructures for monitoring their performance based on Key Performance Indicators (KPIs). (https://www.esfri.eu/sites/default/files/ESFRI_WG_Monitoring_Report.pdf).

These KPIs will be used in the periodic review of ESFRI Landmarks and, in a more general approach, could also be adopted by the RIs, funding authorities and/or stakeholders. With particular reference to the innovation, the following tables and comments could be extracted from the Report of the ESFRI Working Group on Monitoring of Research Infrastructures Performance.

In particular, the **indicator suggested to measure the extent to which scientists from industry, the RI and possibly also one or more universities collaborate and exchange knowledge** is:

Objective	FACILITATING ECONOMIC ACTIVITIES

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Indicator	**Share of users associated with industry and publications with industry**
Definition(s)	For access to facilities: number of granted proposals/accepted users. For publications: number of publications based on the research performed using facilities/resources of the RI. The publication is shared by the countries of the home institutions of all authors, the sum of the shares being one.
Unit of measure	% and number
Frequency of measurement	Annually
Assessment of indicator quality and comparability	Commonly used

A detailed methodology for indicator calculation is also suggested from ESFRI and here briefly summarized.

A user tracking/recording system should be set up by the RI in order to update the KPIs on publications.

The number of publications based on research performed using facilities/resources of the RI provides a measure of the extent of those services, the size of the user community and the combined performance of the two in transforming the experimental results or data into publishable material. But it is necessary to highlight that not all publications based on work conducted using RIs cite the RI and not all users are forthcoming in providing such data.

Commercial databases such as Web of Science (https://apps.webofknowledge.com/) and Scopus (https://www.scopus.com/) will be used to retrieve information mainly on articles published in peer reviewed journals. However, the scope of the KPIs definition is wider and may require gathering the information directly from the users, including proceedings papers, book chapters, books and technical reports, etc.

About access, as the establishment of the RI service provision progresses, in the case of physical access, the number of users served will then depend on the experimental time available.

This indicator can also provide a measure of the efficiency of operations, linked to SAMU (Service Access Management Unit) operation, and provided that the quality of service is not diminished (for example, if the time allocated per user is reduced too far without any compensating improvement in performance per unit time, the output may be affected negatively).
For ACTRIS, a detailed, systematic, and easy way to manage, monitor and collect data on access request and results is going to be implemented through SAMU, as described in the ACTRIS IMP Deliverable 6.5: ACTRIS Access and Service Management Plan.

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The monitoring activities carried out by SAMU will corroborate the **user-driven approach** of ACTRIS, providing the ACTRIS Facilities and governing bodies with helpful information to consent an evaluation of the ACTRIS services from the perspective of those who effectively make use of them.
Performance data on the quantity and quality of ACTRIS service provision, expressed as KPIs, will be reported on an annual basis, allowing to identify areas of enhancement so to consent the ACTRIS Facilities and governance bodies to consider/plan actions to improve service provision, develop further services and advance the user strategy.
Moreover, a focused space dedicated to all matters related to the physical and remote access of users to ACTRIS services is ACTRIS Science and User Access Forum (hereinafter Forum), now online as initial version. Exchanges between ACTRIS and the users are hosted here with the aim of fostering the users' awareness of the service opportunities provided by ACTRIS and gaining valuable insights on users' experience, needs and expectations regarding the access to ACTRIS services.

The Forum will be continuously developed and organized to effectively support its informative and strategic mission and to follow the interaction with users, in the form of:

- Continuous feedback, as an ongoing opportunity for users and providers to reach out at any point of their experience and express needs or challenges. For example: spontaneous feedback form, user satisfaction surveys, success stories templates, etc
- Proactive feedback, as specific questionnaires planned and triggered by SAMU to reach specific objectives of the user strategy. For example: polls, consultations, specific questionnaires, etc.
- Other feedback collected as part of the interactions planned on the access platform (PASS) or through the specific incoming support request through the SAMU contact form.

The indicator suggested from ESFRI to measure the level of commercial activity in relation to the overall level of operation of the RI is**:**

Objective	FACILITATING ECONOMIC ACTIVITIES
Indicator	**Income from commercial activities and the number of entities paying for service**
Definition(s)	Share of revenue from the RI's economic activities (sale of services and goods, access provision) reported in the in the annual accounts
Unit of measure	Unit of the currency; the number of entities
Frequency of measurement	Annually
Assessment of indicator quality and comparability	
Estimated cost of data collection	Generally low. It is medium for entities, where operation of the RI is only a part of the activities and thus assigning revenues to the RI is not always straightforward.

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Level of reporting burden	Low.
Additional issues or Observations	Not all RIs share this objective.

Detailed methodology for indicator calculation from ACTRIS ERIC Management Unit will consist in the sum of the revenues from RI economic activities (sale of services and goods; access provision from users, which are not funded by a public funder), and the number of entities. Measuring the revenues is a good quality tool to indicate the actual technology transfer that has successfully taken place. However, ACTRIS' willingness boundary conditions to engage in commercial activities has yet to be clearly investigated (The ERIC regulation limits the fraction of commercial activities of an ERIC).

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5. Conclusion

The positioning of ACTRIS in the European innovation ecosystem is a measure of how much ACTRIS can contribute to European Research Area. ACTRIS will benefit from the European Policy on European Innovation Ecosystems (EIE) in complement and synergy with the European Innovation Council (EIC) and European Institute of Innovation and Technology (EIT). ACTRIS will take the advantage of all innovative activities across Horizon Europe and other EU funding programs to improve the overall ecosystem for innovation in Europe.

The EU strategies aim to create more connected and efficient innovation ecosystems to support the scaling of companies, encourage innovation and stimulate cooperation among national, regional, and local innovation actors.

A set of KPIs has been here proposed and at the end of the project will be valorized in order to measure ACTRIS contribution to European innovation ecosystem.

Some recommendations can be derived from the answers received at the end of the survey exercise. They refer to those aspects and issues that go beyond the strict assessment of previous and current collaboration between ACTRIS and the private sector, in particular to increase dissemination and knowledge of the ACTRIS services and potential for collaboration with the private sector.

In this respect, a proper development of the ACTRIS Catalogue of services and Science and User Access Forum could serve the objective and ensure maximum use of the ACTRIS resources by the private sector with improvement of ACTRIS services visibility and discoverability. Specific programs and joint technology innovation pilots should be promoted to draw attention and interests of the private sector. Fostering the awareness on the potential of collaboration also depends on a proper recognition and promotion of the possible positioning at the different stages the industry's research, development, and innovation process. It is also important to push for an ever-increasing systematic long-term relationship and a maximised use of the ACTRIS services beyond the partnerships at local and national level, in order to take full advantage and exploit the full potential of the collaboration.

Simplified procedures and requirements should be put in place for setting up the partnerships and ensuring that the market-driven access to ACTRIS resources is fully implemented.

All these favourable conditions also depend on the financial measures and availability of resources that could be beneficial to develop the collaboration: ACTRIS should ensure that the needed resources, including experienced researchers and technicians, are dedicated to develop and serve the possible requirements from the private sector.

More recommendations will be collected and provided to the operation of the ACTRIS liaison office in the context of the future activities of WP9.

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6. References

Deliverables, Milestones

ACTRIS IMP deliverable D6.2 Report on the ACTRIS User support system – https://www.actris.eu/how-are-we-funded/actris-imp-documents

ACTRIS IMP milestone MS30 ACTRIS User experience map – https://www.actris.eu/how-are-we-funded/actris-imp-documents

ACTRIS IMP milestone MS35 Updated analysis of user needs – https://www.actris.eu/how-are-we-funded/actris-imp-documents

ACTRIS PPP milestone MS26 Definition of Key Performance Indicators related to ACTRIS service provision - https://www.actris.eu/how-are-we-funded/actris-ppp-documents

Projects

EUROCHAMP-2020 - https://www.eurochamp.org/

ACTRIS-2 - https://www.actris.eu/how-are-we-funded/past-projects

Other

ESFRI WORKING GROUP REPORT Monitoring of Research Infrastructures Performance - https://www.esfri.eu/sites/default/files/ESFRI_WG_Monitoring_Report.pdf

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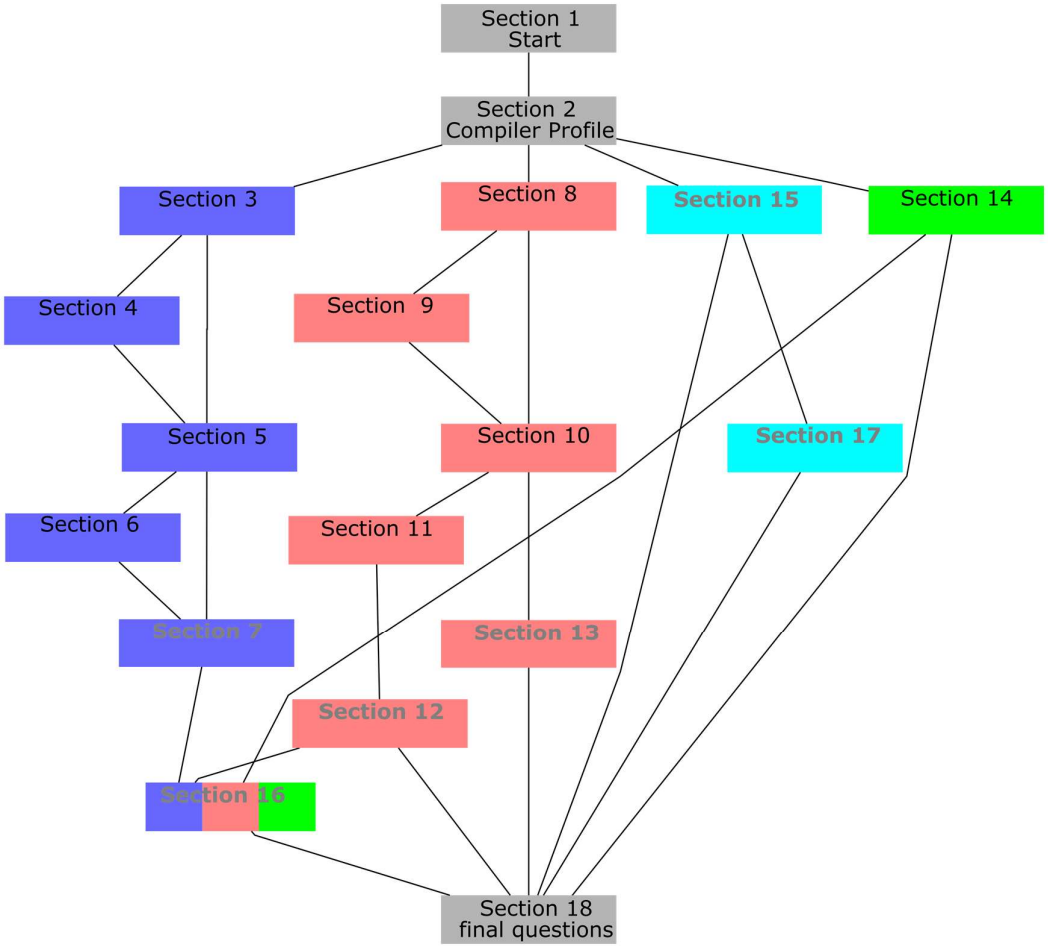
ANNEX A: Survey Structure and Questions



Section 1 Start

ACTRIS survey on user needs and collaborations with the private sector

ACTRIS promotes the provision of access to a large variety of high-quality services offered by ACTRIS facilities, to a wide range of users and needs and for scientific, technological and innovation-oriented usage.

This survey aims at identifying past and current collaborations between ACTRIS and the private sector and inventorying the needs of ACTRIS key user groups and put them in relation with current and future ACTRIS capabilities to derive recommendations for the development of services and the access system. The survey is part of the overall ACTRIS user strategy. It aims at considering the user dimension and identifying the potential gaps between the user's needs (past, current and future) and the services offered within the limits of the facilities' capacities.

We kindly invite you to share your experience and your views on access to ACTRIS services by participating in this 15 min online survey!

Your answers will be treated in a strictly confidential manner and will be anonymized for aggregating statistical analysis.

For any questions or technical problems, please contact Jochen Wagner (jochen.wagner@i-med.ac.at).

Please fill in this survey by 22.01.2021.

Thank you very much for your valuable cooperation!

Informed Consent

Your participation in this study will consist of a completion of a questionnaire. The questionnaire consists of both multiple choice and open questions. You will be asked a series of questions about your experience in the exploitation of the knowledge environment of ACTRIS and how the scientific results percolate into innovation value. An important objective is the assessment of industry benefits from access to ACTRIS facilities and scientific data.

Feel free to co-operate with colleagues when answering the questionnaire, if you consider it necessary. Your participation in the survey is entirely voluntary. If you decide to not participate in this study, you may withdraw from your participation or you may pass on any question that makes you feel uncomfortable at any time without penalty. We encourage all participants to ask questions or raise concerns at any time about the nature of the study or the methods used.

The only personal details we ask you to provide will be your name, the position in your organization/ company and your role at ACTRIS. All gathered information will be grouped together at ACTRIS consortium level such that no personal data will be traceable from the end product. The individual answers and informed consent forms will be stored at the Medical University Innsbruck until the end of the project. All information and responses to the questionnaire will be kept confidential.

Subjects will not be compensated for participation in this study.

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

Section 2 - Compiler profile

What is your name?

What is the name of the organization you represent?

In which country is the institution you are affiliated with located (or where do you work/live)?

What is your gender?

- ☐ Female
- ☐ Male
- ☐ Prefer not to say
- ☐ Other

What is your level of education?

- ☐ Undergraduate
- ☐ Post graduate
- ☐ Post Doc
- ☐ Expert
- ☐ Technician
- ☐ Other

Your answers are on behalf of:

- ☐ Yourself
- ☐ Your research group
- ☐ You whole institution/company

What kind of organisation do you represent?

- ☐ Academia public service
- ☐ Private company
- ☐ ACTRIS Research Performing Organisation (RPO) - I am part of the ACTRIS Community
- ☐ other

Section 3 - Specific questions to academia and public services

What is your field of activity or of your research group or your institution on behalf of which you are answering for?

- ☐ Earth and Environmental sciences
- ☐ Physics astronomy, astrophysics and mathematics
- ☐ Chemistry and material sciences

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- ☐ Biological, life sciences, medical sciences and biotechnology
- ☐ Engineering and technology
- ☐ Energy
- ☐ Humanities and arts
- ☐ Information science and communication
- ☐ Social sciences
- ☐ Other

Section 4 - Specific questions to academia and public services

What is your field of activity within Earth and Atmospheric sciences?

- ☐ Atmosphere
- ☐ Hydrosphere
- ☐ Lithosphere
- ☐ Eco-biosphere

Section 5 - Specific questions to academia and public services

What is your expertise?

- ☐ scientific expert
- ☐ financial and operational management
- ☐ technical expertise
- ☐ data management
- ☐ data curation
- ☐ computing with research data
- ☐ other

Did you already know ACTRIS and get in touch with the RI?

- ☐ Yes
- ☐ No

Section 6 - Specific questions to academia and public services

What did you approach ACTRIS for?

Section 7 - Specific questions to academia and public services

Do you know the ACTRIS services?

- ☐ Yes
- ☐ No

What are your current and prospective interests with ACTRIS?

- ☐ Access to data, modelling
- ☐ Access to facilities, instruments, testing
- ☐ Access to specialised training

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- ☐ Access to basic training on atmospheric sciences / MOOCs
- ☐ Provision of space and logistics support for custom development and trials
- ☐ Support for the development of data products and applications
- ☐ Testing and quality/standards compliance validation of instruments and processes
- ☐ Other
- ☐ Don't know/Can't answer.

What support/assistance you might need to access ACTRIS services?

Which type of facility would you access for your research needs?

- ☐ Data Centre
- ☐ Ground-based observational platform
- ☐ Exploratory platform – Atmospheric Simulation Chamber
- ☐ Exploratory platform – Mobile platform
- ☐ Exploratory platform – Laboratory
- ☐ TC - Centre for Aerosol In Situ Measurements
- ☐ TC - Centre for Aerosol Remote Sensing
- ☐ TC - Centre for Cloud In Situ Measurements
- ☐ TC - Centre for Cloud Remote Sensing
- ☐ TC - Centre for Reactive Trace Gas In Situ Measurements
- ☐ TC - Centre for Reactive Trace Gas Remote Sensing

Which access type are you most interested in:

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

What is your expected frequency of access per year (number of visits at one ACTRIS facility, e.g., one visit = 1 instrument calibration, 1 research experiment, 1 training module):

- ☐ 1-2 times per year
- ☐ 3-5 times per year
- ☐ > 5 times per year
- ☐ Other

What is the expected duration of use per visit?

Regarding ACTRIS services you are:

- ☐ a recurrent user
- ☐ a past user
- ☐ a potential future user
- ☐ none of the above

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Section 8 - Specific questions to private sector

Has your organisation participated in a collaboration with an ACTRIS-related research-performing organisation?

- ☐ Yes
- ☐ No
- ☐ I don't know

What is the size of your company?

- ☐ Start-ups and micro companies (staff headcount: 1-9)
- ☐ Small and medium size companies (SME) (staff headcount: 10-250)
- ☐ Large companies (staff headcount: > 250)

What is the type of your company?

- ☐ Instrument manufacturers, sensor industry
- ☐ Companies/Spin-off companies oriented to develop monitoring techniques/services, software for environmental technologies
- ☐ Other

Which field are you active in?

- ☐ Earth and Environmental sciences
- ☐ Physics astronomy, astrophysics and mathematics
- ☐ Chemistry and material sciences
- ☐ Biological, life sciences, medical sciences and biotechnology
- ☐ Engineering and technology
- ☐ Energy
- ☐ Humanities and arts
- ☐ Information science and communication
- ☐ Social sciences
- ☐ Other

Section 9 - Specific questions to private sector

What is your field of activity within Earth and Atmospheric sciences?

- ☐ Atmosphere
- ☐ Hydrosphere
- ☐ Lithosphere
- ☐ Eco-biosphere

Section 10 - Specific questions to private sector

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What is your expertise? (scientific expertise, financial and operational management, technical expertise, data management, data curation, and computing with research data)

Did you already know ACTRIS and got in touch with the RI?

- ☐ Yes
- ☐ No
- ☐ I don't know.

Do you know the ACTRIS services?

- ☐ Yes
- ☐ No

Section 11 - Specific question on collaboration between ACTRIS and private sector

Which is your position toward ACTRIS and ACTRIS services? How you can define the type of collaboration between your company and ACTRIS?

- ☐ suppliers
- ☐ users
- ☐ partners
- ☐ none of the above

Section 12 - Specific question on collaboration between ACTRIS and private sector

Is you company an intermediary user, i.e. your company is not the end-user of the ACTRIS product/service?

- ☐ Yes
- ☐ No
- ☐ Do not know / prefer not to answer

Where is your company located in respect to the ACTRIS collaboration institution?

- ☐ Local/regional to the ACTRIS collaboration institution
- ☐ Non-local but in the same country as the ACTRIS collaboration institution
- ☐ Other country

How would you describe the nature of the collaboration between ACTRIS and your company in the past?

- ☐ Mainly one-off impromptu
- ☐ Mainly part of systematic long-term plan/relationship
- ☐ A mix of the two
- ☐ Other

Which of the following ACTRIS services did your company use?

- ☐ Testing and quality/standards compliance validation of instruments and processes
- ☐ Access to data, modelling via e.g. your RI's data portal
- ☐ Access to facilities, instruments, testing
- ☐ Access to specialised training
- ☐ ACTRIS-industry exchange programmes

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- ☐ Provision of space and logistics support for custom development and trials
- ☐ Data products and applications development support
- ☐ Provision of space and/or other logistics, for own research, development and trials
- ☐ Support for the development of data products and applications

At which stages of the industry's research, development and innovation process did your institution get support and services from an ACTRIS-related research-performing organisation?

- ☐ Pre-competitive research
- ☐ Feasibility studies
- ☐ Proof of concept/demonstration
- ☐ Commercialisation

Did your company participate in an active programme of joint technology innovation pilots?

- ☐ yes
- ☐ no

Which of following measures would be beneficial to develop collaborations between ACTRIS and industry?

- ☐ Financial subsidies for ACTRIS-industry collaboration
- ☐ Direct company meetings/visits
- ☐ Education programmes
- ☐ Industry training programmes
- ☐ Match-making events
- ☐ EU / publicly funded projects
- ☐ Other

Which access type are you most interested in?

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

Which type of facility would you access for your research needs?

- ☐ Data Centre
- ☐ Topical Centre
- ☐ Ground-based observation platform
- ☐ Exploratory platform – Atmospheric Simulation Chamber
- ☐ Exploratory platform – Mobile platform
- ☐ Exploratory platform – Laboratory

Regarding ACTRIS services you are:

- ☐ a recurrent user
- ☐ a past user
- ☐ a potential future user

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- ☐ none of the above

Section 13 - Specific question on collaboration between ACTRIS and private sector

Which kind of services or collaboration is your company interested in?

- ☐ Testing and quality/standards compliance validation of instruments and processes
- ☐ Access to data, modelling via e.g. your RI's data portal
- ☐ Access to facilities, instruments, testing
- ☐ Access to specialised training
- ☐
- ☐ Provision of space and logistics support for custom development and trials
- ☐ Data products and applications development support
- ☐ Provision of space and/or other logistics, for own research, development and trials
- ☐ Support for the development of data products and applications

At which stages of the industry's research, development and innovation process could your institution get support and services from an ACTRIS-related research-performing organisation?

- ☐ Pre-competitive research
- ☐ Feasibility studies
- ☐ Proof of concept/demonstration
- ☐ Commercialisation

Which of following measures would be beneficial to develop collaborations between ACTRIS and industry?

- ☐ Financial subsidies for ACTRIS-industry collaboration
- ☐ Direct company meetings/visits
- ☐ Education programmes
- ☐ Industry training programmes
- ☐ Match-making events
- ☐ EU / publicly funded projects
- ☐ Other

Which access type are you most interested in?

- ☐ Physical access: Physical access is "hands-on" access when users physically visit an infrastructure/facility
- ☐ Remote access: Remote access is access to resources and services offered without Users physically visiting the infrastructure/facility.
- ☐ Virtual access: Virtual access is free access to Users provided through communication networks

Which type of facility would you access for your research needs?

- ☐ Data Centre
- ☐ Topical Centre
- ☐ Ground-based observation platform
- ☐ Exploratory platform – Atmospheric Chambers

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- ☐ Exploratory platform – Mobile platform
- ☐ Exploratory platform – Laboratory

Section 14 - Specific questions on current and prospective interests with ACTRIS

Are you affiliated with?

- ☐ Voluntary and community organisation
- ☐ NGOs, non-profit research institution
- ☐ Citizen
- ☐ Other

Which field are you active in?

- ☐ Earth and Environmental sciences
- ☐ Physics astronomy, astrophysics and mathematics
- ☐ Chemistry and material sciences
- ☐ Biological, life sciences, medical sciences and biotechnology
- ☐ Engineering and technology
- ☐ Energy
- ☐ Humanities and arts
- ☐ Information science and communication
- ☐ Social sciences
- ☐ Other

What is your expertise?

- ☐ scientific expertise
- ☐ financial and operational management
- ☐ technical expertise
- ☐ data management
- ☐ data curation
- ☐ computing with research data
- ☐ other

Did you already know ACTRIS and got in touch with the RI?

- ☐ Yes
- ☐ No

Section 15 - Specific question on collaboration between ACTRIS and private sector

In which type of facility do you operate? (TC - Topical Centre; NF - National Facility)

- ☐ Data Centre
- ☐ TC – Centre for Aerosol In Situ Measurements

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- ☐ TC – Centre for Aerosol Remote Sensing
- ☐ TC – Centre for Cloud In Situ Measurements
- ☐ TC - Centre for Reactive Trace Gases In Situ Measurements
- ☐ TC – Centre for Reactive Trace Gases Remote Sensing
- ☐ NF – Ground-based observation platform
- ☐ NF – Exploratory platform – Atmospheric Simulation Chamber
- ☐ NF – Exploratory platform – Mobile platform
- ☐ NF – Exploratory platform – Laboratory

Do you have a label certifying quality and compliance of instruments and processes with international reference standards?

- ☐ Yes
- ☐ No
- ☐ I don't know.

Has your organisation participated in a collaboration with private companies?

- ☐ Yes
- ☐ No
- ☐ I don't know.

At which stages of the industry's research, development and innovation process did your institution provide support and services?

- ☐ Pre-competitive research
- ☐ Feasibility studies
- ☐ Proof of concept/demonstration
- ☐ Commercialisation

How did you engage industry for joint research, development and innovation (R&D&I)?

- ☐ Industrial partnership / long-term agreements
- ☐ Transfer of technology / licensing
- ☐ EU / publicly funded projects
- ☐ Industry sponsored / co-financed projects

What are your current and prospective interests with ACTRIS?

- ☐ Access to data, modelling
- ☐ Access to facilities, instruments, testing
- ☐ Access to specialised training
- ☐ Access to basic training on atmospheric sciences / MOOC's
- ☐ Providing space and logistics support for custom development and trails
- ☐ Data products and applications development support
- ☐ Providing space and/or other logistics, for own research, development and trials
- ☐ Support for the development of data products and applications
- ☐ Testing and quality/standards compliance validation of instruments and processes

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- Don't know, can't answer
- Others

7. Which of the following services did your institution offer for companies?

- Testing and quality/standards compliance validation of instruments and processes
- Access to data, modelling via e.g. your RI's data portal
- Access to facilities, instruments, testing
- Access to specialised training
- ACTRIS-industry exchange programmes
- Provision of space and logistics support for custom development and trials
- Data products and applications development support
- Provision of space and/or other logistics for own research, development and trials
- Support for the development of data products and applications

How would you describe the nature of the collaboration between your ACTRIS facility and industry clients in the past?

- Mainly one-off impromptu
- Mainly part of systematic long-term plan/relationship
- A mix of the two
- Other

Where do the companies using your ACTRIS facilities mainly come from?

- Local/regional
- Non-local but in the same country
- Other country

Do your ACTRIS facilities have intermediary users, i.e. companies that are not themselves the end-user of the ACTRIS product/service?

- Yes
- No
- Don't know / prefer not to answer

Which of following measures would be beneficial to develop collaborations between ACTRIS and industry?

- Financial subsidies for ACTRIS-industry collaborations
- Direct company meetings/visits
- Education programmes
- Industry training programmes
- Match-making events
- EU / publicly funded projects
- Others

Regarding ACTRIS services you are:

- a recurrent user
- a recurrent provider

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- ☐ a past user
- ☐ a past provider
- ☐ a potential future user
- ☐ a potential future provider
- ☐ none of the above

Section 16 - Access Experience as user of ACTRIS services

Which type of facility did you use?

- ☐ Data Centre
- ☐ Topical Centre
- ☐ National Facilities
- ☐ other

How was the access organized?

- ☐ via access programs (type TNA or national access program)
- ☐ directly organized

Which access type have you used?

- ☐ Physical access: Physical access is "hands-on" access when users physically visit an infrastructure/facility
- ☐ Remote access: Remote access is access to resources and services offered without Users physically visiting the infrastructure/facility.
- ☐ Virtual access: Virtual access is free access to Users provided through communication networks

Which type of service have you accessed?

- ☐ Access to data, modelling
- ☐ Access to facilities, instruments, testing
- ☐ Access to specialised training
- ☐ Access to basic training on atmospheric sciences / MOOCs
- ☐ Provision of space and logistics support for custom development and trials
- ☐ Data products and applications development support
- ☐ Provision of space and/or other logistics, for own research, development and trials
- ☐ Support for the development of data products and applications
- ☐ Testing and quality/standards compliance validation of instruments and processes
- ☐ Don't know, can't answer

How often have you accessed? - Please explain it in words and/or numbers (Frequency (X times) and/or duration (number of access days) or quantity (number of access unit e. g. calibration)).

How many members did the user group consist of?

- ☐ 1 (principal investigator)
- ☐ 2-3 persons
- ☐ 4-5 persons
- ☐ >5 persons

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The access was:

- ☐ Free of charge
- ☐ Subject to fees

What's the most problematic and hard part about your experience of access to Facilities?

Please describe how you got access to facilities (sequence of main steps in the process, e.g. answer to a call, suggestion by acquaintances and/or colleagues, etc.)

Overall, how easy or difficult did you find the procedure to get access to facilities and services?

- ☐ extremely difficult
- ☐ somewhat difficult
- ☐ neither difficult nor easy
- ☐ somewhat easy
- ☐ extremely easy

Why?

Did you receive proper assistance before, during and after your access experience (application, selection, service fruition, …)?

- ☐ Yes
- ☐ No
- ☐ Other

How would you describe your overall access experience?

- ☐ extremely satisfactory
- ☐ somewhat satisfactory
- ☐ neutral
- ☐ somewhat poor
- ☐ extremely poor

What would you suggest as possible improvements?

Are there services you need but don't know how to access?

- ☐ Yes
- ☐ No
- ☐ Other

Are you overall satisfied with ACTRIS? (rate from 0 to 10?)

Section 17 - Experience as provider of ACTRIS services to users

How did you provide any ACTRIS services to users (not only industries) in the past?

- ☐ Via access programs
- ☐ directly organized
- ☐ other

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Which access type did you offer?

- Physical access (Physical access is “hands-on” access when users physically visit an infrastructure/facility)
- Remote access (Remote access is access to resources and services offered without users physically visiting the infrastructure/facility)
- Virtual access (Virtual access is free access to users provided through communication networks)

How often did you provide access? Please explain it in words and/or numbers (Frequency (X times) and/or duration (number of access days) or quantity (number of access unit e. g. calibration))

What’s the most problematic and hard part about your experience to provide access to Facilities?

Overall, how easy or difficult did you find the procedure to provide access to facilities and services?

- extremely difficult
- somewhat difficult
- neither difficult nor easy
- somewhat easy
- extremely easy

Why?

7. Did you receive proper assistance before, during and after your provider experience (application, selection, service fruition, …)?

- Yes
- No
- Other

How would you describe your overall experience as provider of ACTRIS services to users?

- extremely satisfactory
- somewhat satisfactory
- neutral
- somewhat poor
- extremely poor

What would you suggest as possible improvements?

Section 18 – Final questions

How did you know about the questionnaire?

- Social media
- Through colleagues
- Website
- Newsletter
- Email
- Other

Please, Feel Free to leave your comments about ACTRIS services not included in the answers ab

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ANNEX B: List of respondents

The following table lists respondents per country and affiliation based on their answers to the question "What kind of organisation do you represent?

- ☐ Academia public service
- ☐ Private company
- ☐ ACTRIS Research Performing Organisation (RPO) - I am part of the ACTRIS Community
- ☐ other

France	Germany	Greece	Italy	United Kingdom	Romania	United States	Netherlands	Finland	Slovenia	Spain	Switzer-land	Austria	Bulgaria	Czech Republic	Portugal	Belgium	Brazil	Canada	Croatia	Denmark	Lithuania	Mexico	Norway	Poland	Serbia	South Africa	Sweden
CIMEL	TSI GmbH	CNC Solutions P.Gounas K.Enezlis O.E.	Engineering Ingegneria Informatica	University of Birmingham	INOESY SRL	Aerodyne Research, Inc	EKO Instruments	Tampere University	Aerosol d.o.o.	CEAM Foundation	ETH Zürich	Ionicon Analytik GmbH	Institute for Nuclear Research and Nuclear Energy	Czech Metrology Institute	University of Beira Interior	Royal Belgian Institute for Space Aeronomy	Universidade Federal de Sao Paulo	University of Toronto	Institute for Medical Research and Occupational Health	Aarhus University	SRI CPST	Universidad Nacional Autónoma de México	NILU	Institute of Physical Chemistry	Institute of Physics	University of Cape Town	Lund University
Meteo modem	Licel GmbH	National Technical University of Athens	CNR-ISAC	University of Leicester	Technical University of Iasi	Carnegie Mellon University	Sunset Laboratory BV	University of Eastern Finland	NLZOH	Universidad de Valladolid	Uni Bern	ZAMG Sonnblick Observatory	Institute of Electronics	ICPF CAS	University of Evora												
INRAE	RPG Radiometer Physics GmbH	University of Crete	Università degli Studi di Napoli Federico II	University of Manchester	University of Iasi	Technological University	Wageningen University	University of Helsinki	University of Nova Gorica	Universitat Politècnica de Catalunya	EMPA									legend:							
University of Lille	EUMETSAT	Aristotle University of Thessaloni	National Research Council	University of York	AI I Cuza University	University of San Diego	ESA												ACTRIS RPO		name	one participant					
Qualitair Corse	TROPOS	FORTH	Università degli Studi dell'Aquila	Ricardo Energy & Environment	Babes Bolyai University, UBB	West Texas A&M University	TNO												private Company		name	two participants					
SIRTA	KIT	National Observator y	ENEA		INOE														Academia		name	three participants					
of Bordeau x	University of Cologne	Raymetrics	University of Salento																other		name	six participants					
University of Paris East at Creteil (UPEC)	DWD																										
CNRS																											
IMT Lille Douai																											