State of Open Access procedures at Research Infrastructures

Written by: Ornela De Giacomo, Dariusz Brzosko, Jana Kolar

Contributors: David Berezckey, Matthias Girod, Jürgen Neuhaus, Salma Baghdadi

Deliverable 2.1, Version 3 (03 February 2021)

ACCELERATE - ACCELERATing Europe's Leading Research Infrastructures, EC grant No. 731112

www.accelerate 2020.eu

ACCELERATE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 731112

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State of Open Access procedures at Research Infrastructures

Summary

Open access procedures are crucial for the scientific excellence of the facility, and therefore its sustainability. A lot of progress has been made in terms of harmonisation and standardisation of access procedures in Research Infrastructures, yet there is still room for improvement. Standardisation has always proved to benefit the user's communities and resulted in better use of resources. Although the European Charter on access was an important milestone, there are real obstacles to the harmonisation deriving from the priorities of every RI and the need to respond to societal challenges in the most effective way. This is reflected in the selection criteria of proposals for open access. It is proposed that the Charter, the reference document for RIs, is updated in its definitions, principles and guidelines to become better suited for its purpose. Some of the possible changes are discussed.

RIs adapt to the needs of users, incorporating new procedures such as the fast access for macromolecular crystallography or to respond to societal challenges, as seen during the COVID-19 outbreak. From the information provided by both the User offices and the websites of the facilities consulted it emerges that facilities have strong similarities in their access procedures. However, differences become higher when considering the evaluation processes. Another substantial difference lies in the number of services provided by facilities for remote access, which in specific cases (e.g. macromolecular crystallography) is associated with an increase in the productivity in terms of the number of measurements performed and a decrease in the costs, mostly related to a more effective use of time with the help of robots for sample handling and focusing and savings in travel support for researchers coming from all over the world to perform the experiments.

The COVID-19 emergency has challenged facilities in an unprecedented way, affecting their operations, performance and procedures. An overview of these disruptions and the measures put in place by RIs to cope with the COVID-19 outbreak were collected and published, to allow facilities to share best practices in front of this serious challenge. A summary of the most relevant findings is included in this document. RIs were forced to speed up and apply remote access extensively, raising a series of issues partly due to the lack of technologies and dedicated funds to support it. ACCELERATE partners have the possibility to consider the experience of these facilities for developing or improving their policies and procedures, including the most recent developments as remote access and data issues.

The information collected about facilities procedures for open access, in very different formats (interviews, emails, policies, etc.) has been summarised in a table (Annex II) to improve the readability and allow for a

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better comparison of the different access policies and solutions adopted by the RIs involved. In the same way, the surveys used to collect information about the COVID-19 related services implemented by facilities are included as annexes III, IV and IV.

Background

Deliverable D2.1 was originally conceived as a report from a workgroup formed by the RIs with more experience in access policies in the ACCELERATE partnership namely the FRM II Neutron Research Reactor operated by the Technical University of Munich and CERIC-ERIC, in the framework of task 2.1. Based on the knowledge of these two partners alone, the content of such a report would have been limited, as well as its added value. For this reason, the Governing Board and Steering Committee of ACCELERATE decided to consult also some other projects and RIs to deliver a more comprehensive document, that could reflect the existing practices in open access to RIs, not only among the partners but also in other well-established user-driven research institutions.

The deliverable was originally due in Month 3 but was postponed to Month 12 in agreement and with the approval of the responsible project officer, Patricia Postigo-McLaughlin (correspondence archived in Ares (2017) 1066027). The extended deliverable was successfully submitted in Month 12 but after the feedback received, the Governing Board decided to reopen it, with the approval of the responsible project office, to perform a more structured and detailed analysis that resulted in a comparative table with all the results collected.

Finally, the deliverable was further updated in 2020 due to the COVID-19 pandemics, that affected the operation of RIs, forcing them to introduce new procedures for access that included remote access (in a wide sense, ranging from sample mailing to fully automated measurements) and preferential access (fast track) for the COVID-19 related research. The pandemic and the increasing emphasis on open access to data challenged the existing policies in RIs. It can be expected that most RIs will modify their access policies this year and the ones to come, to adapt to these challenges. The fast reply of RIs, introducing new access policies and procedures in reply to the emergency was considered an unprecedented event worth documenting. With the occasion, some information was updated, for example regarding projects. Previous versions of this document can be retrieved in the ACCELERATE website[1].

[1] ACCELERATE project, http://www.accelrate2020.eu/

Importance of Open Access as a driver of scientific excellence, innovation and long-term sustainability of a Research Infrastructure

There is a general agreement amongst the research community and policymakers, that open access plays a fundamental role in scientific excellence and innovation, allowing the best use of research infrastructures and the transfer of knowledge.

In 2008, the Report of the ERA Expert Group[2] highlighted open access as a key process in world-class research infrastructures: "*The existence of, and access to, leading research infrastructures is and will remain a key determinant of Europe's competitiveness in both basic and applied research*." The same report recommended that RIs should be open to all interested researchers, based on the selection of the best proposals evaluated on their scientific excellence by international 'peer-review'. The need to establish effective access mechanisms was recognised as a priority and the expert group suggested that Large Research Infrastructures develop general guidelines describing various access models, since they share some common challenges and problems. The European Charter for Access to Research Infrastructures[3] (in the following Charter), published in 2016 by the European Commission, addresses this issue proposing non-regulatory principles and guidelines for access and related services. The Charter also contains the definitions of several terms that have been used in widely different contexts (e.g. users, user access, research infrastructure). Adherence to it has also become mandatory for the transnational access activities funded by the European Commission. The Charter acknowledges how excellence-driven access "*enables collaborative research and technological development efforts across geographical and disciplinary boundaries*" and proposes three different Access modes, i.e. `excellence-driven`, `market-driven` and `wide`. However, as discussed later in this document, other modalities of access are necessary and actually can boost the excellence of the research infrastructure, and allow it to deliver a fast response to a societal challenge or help to reinforce the ERA.

The Commission working document on Long-term Sustainability of Research Infrastructures[4] published in September 2017 sets the basis for an action plan, yet to be elaborated. The first part of the document provides an overview of the most important elements contributing to long-term sustainability. Ensuring scientific excellence is one of the key points. On this topic, the action plan suggests some actions, related to access and access procedures, for the RIs to remain at the forefront of scientific excellence:

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[2] Report of the ERA Expert Group - https://ec.europa.eu/research/infrastructures/pdf/ri_era-expert-group-0308_en.pdf

[3] European charter for access to Research infrastructures - https://ec.europa.eu/research/infrastructures/pdf/2016_charterforaccessto-ris.pdf

[4] Commission working document on Long - term sustainability of Research Infrastructures - https://ec.europa.eu/research/infrastructures/pdf/swd-infrastructures_323-2017.pdf#view=fit&pagemode=none

1. *"Simplify and harmonise access by encouraging European RI to put in place transparent access policies, in line with the definitions, principles and guidelines of the European Charter for Access to Research Infrastructures;*
2. *Promote the "excellence-driven access mode", as defined by the Charter, as a requirement for funding the access to RIs;*
3. *Encourage RI to put in place multidisciplinary support mechanisms, including training modules to broaden the user base;*
4. *Whenever possible, guarantee that a share of Excellence-driven access is to be granted to the best research projects regardless of their origin and affiliation"*

Likewise, the OECD policy paper "Strengthening the Effectiveness and Sustainability of Research Infrastructures"[5] defines sustainability as "the capacity for a research infrastructure to remain operative, effective and competitive over its expected lifetime" and identifies the high level of competitiveness as one of the main challenges. In particular, this refers to the development of the infrastructure but also to "*ensuring reliability in terms of access and services, and assistance to users*".

The Charter has since become the reference for research infrastructures and is a requirement for the transnational funding in the calls under Horizon 2020 and Horizon Europe.[6] A recently published ESFRI White Paper[7] states that RIs based on physical or remote access should continue to offer services on an excellence basis in line with the Charter.

Despite of being a reference for RIs, the Charter could benefit from an update. A recent opinion[8] issued by one of the ACCELERATE partners, highlights the most urgent updates necessary in the definition, principles and guidelines of the Charter, to make it more specific and at the same time, comprehensive of the existing and required access practices to address societal challenges more efficiently.

Due to its relevance, open access has been extensively discussed and RIs devote significant efforts to improving their procedures following the recommendations from expert groups and the feedback from users, both academic and commercial. In the following, the practices of the RIs and the ones developed in

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[5] "Strengthening the effectiveness and sustainability of Research Infrastructures", OECD SCIENCE, TECHNOLOGY AND INDUSTRY - POLICY PAPERS, December 2017 No. 48

[6] Horizon Europe - Work Programme 2021-2022 Research Infrastructures, draft, December 2020.

[7] https://www.esfri.eu/sites/default/files/White_paper_ESFRI-final.pdf

[8] Jana Kolar, & Ornela De Giacomo. (2021). Applicability and challenges related to the Charter for Open Access to Research Infrastructures. http://doi.org/10.5281/zenodo.4475208

the response of the COVID-19 outbreak are reviewed, followed by an overview of the EU co-funded projects that have further contributed to the harmonisation of access procedures to RIs.

Open access procedures for scientific excellence

The number of projects and initiatives that have dealt with and are still working towards the harmonisation and/or standardisation of access procedures in research infrastructures give an idea of the complexity but at the same time, the importance of this topic. The Charter made a significant contribution in this respect, reaching consensus from most RIs in a series of definitions, principles and promoting good practices as guidelines. Although there have been important improvements in alignment over the last fifteen years, facility managers prefer to have full autonomy on some access procedures, especially those reflecting their mission and objectives. A good example is proposal evaluation. From the projects analysed in this report, only NFFA and LASERLAB managed to have a centralised review panel, and facilities accept the proposals selected by these panels without further evaluation, for an amount of access time previously agreed between the facility and the project. While projects may choose to have more than one evaluation panel, this is not the case for ERICs. CERIC-ERIC started offering open access in 2014, with a first test call in March that year. Facilities declare their time commitment annually and CERIC proposals are scheduled in the Partner Facilities according to the scientific merit, as established by CERIC's review panel. This is likely the approach that ELI-ERIC and ESS ERIC will adopt. The main condition for establishing a centralised evaluation panel is trust: facilities need to be convinced that the evaluation panel set up by the infrastructure or project is selecting the best proposals, since many of the outputs of the infrastructure depend on it, affecting its sustainability. For this reason, we decided to focus on this critical topic starting from the experience of well-established infrastructures. ACCELERATE partners will use this information for improving or establishing their evaluation procedures and all RIs are invited to use it and contact the authors to propose modifications or upgrades.

Overview of open access procedures in European Research Infrastructures

The chapter provides an overview of the access policies of the RIs, which have responded to the Accelerate survey: ALBA, ASTRID2, DESY, Diamond Light Source, Elettra Sincrotrone Trieste, European XFEL, FELIX, HZB, ISIS, LLB – CEA, INFN-LNF (DAFNE-Light), MLZ (for FRMII), PSI, and SOLEIL Synchrotron.[9] It is limited to the policies ruling the excellence-driven access. Market-driven access has completely different procedures than

[9] For a brief description of the facilities see Annex 1, page 18

the selection based on scientific quality. With some exceptions, the scientific quality of a market-driven access project does not influence the possibility to get access time.

Type of submission (call with a deadline, open submission, fast track)

Most of the RIs issue two **calls for proposals per year**, for short or long-term projects. This is a common practice, which reflects the compromise between the time the user has to wait from the application to the experiment, and the need to have a sufficiently high number of proposals to select the best ones. Some have developed specific access procedures for particular experiments. As an example, SOLEIL has, in addition to the regular calls, one call per year for long term projects (up to 2 years) on some of the instruments, and the Swiss light source at the PSI has, besides the regular two calls, another two for Macromolecular Crystallography (MX). Facilities offering macromolecular crystallography usually offer the possibility of **continuous submission** with the allocation of time shortly after the evaluation. In addition to the regular one or two calls per year, most facilities have **fast access** on a limited set of beamlines, also using continuous submission. The need to adopt Fast access can be driven by different factors, amongst which we could cite:

- Nature of the samples: their preparation is challenging and their lifetime is brief (e.g. protein crystallography)
- Feasibility tests: many facilities provide access for very short experiments aimed at assessing the feasibility, intended as the suitability of the technique to study a particular phenomenon, the suitability of the sample, its preparation method and sample environment, etc.
- Societal challenges: the COVID-19 pandemic has proved the suitability of fast access to contribute to the research in this area.

Fast access will be discussed in more detail later in this document.

Evaluation procedures

Once the call closes, proposals go through an evaluation. Most facilities perform a **technical evaluation** to determine the feasibility of a proposal followed by a **scientific evaluation**. In a couple of facilities, the order is inverted, or both evaluations run in parallel. In addition, a **safety assessment** is performed through the submission of a signed form. EUROPEAN XFEL performs the technical evaluation, the safety checks and the scientific evaluation in parallel, but the technical evaluation and safety checks must be ready at least 10 days before the meeting of the Scientific review panel, for them to take into consideration the input from the other evaluations. Astrid2 have consultations between beamline scientists and users before or during the submission process to ensure the feasibility and safety of the proposals, making the technical evaluation not necessary, with the possibility to have technical comments during the other stages of the evaluation process. ISIS, on the other hand, runs a preliminary safety assessment during the submission phase and a more detailed one before the beginning of the measurements.

The scientific evaluation process is quite similar in all the facilities; however, every facility has a particularity, that makes it different from the others. Reviewers are asked to perform a scientific evaluation of the proposals assigned to them and to give feedback assigning a score and writing comments and recommendations, taking into account different evaluation criteria. The process ends with a ranking of the most promising proposals, delivered to the management of the facility. The way the ranking is created and the specific criteria that are taken into account changes from one facility to another.

The **evaluation criteria** are established by the management of the facility according to its priorities and objectives. According to the Charter, the excellence-driven mode should be exclusively dependent on the scientific excellence, originality, quality and technical and ethical feasibility of a proposal evaluated through peer-review conducted by internal or external experts. Although all RIs pursue scientific excellence as the main goal, some may decide to promote young/new users, weigh the level of potential contribution to an active field of science or an experimental technique, or outreach to new countries, which don't have similar RIs. They may also consider the output of the principal investigator/group, indirectly penalising young users. Various **sub-criteria** may be included as a part of the excellence score. They may also be used to decide between equally ranked proposals.

This is one of the reasons why an institution may be reluctant to entrust the evaluation process to another entity (e.g. use of a single review panel for all synchrotrons).

Internal and external experts can be involved in the peer-review process. Evaluators are in most cases independent experts to avoid conflicts of interest, but some facilities prefer to have also personnel of the facility involved in the evaluation. Evaluators are usually divided into groups or **panels according to their expertise in a scientific discipline or technique**. The number of these groups may change but goes from 4 to 9 in the facilities surveyed. The number of reviewers in each group depends on many factors; e.g. the number of required evaluations per proposal, the total number of proposals received by the facility, the number of instruments, etc. A review panel can easily contain 60-80 members, making it challenging for facilities to find such a high number of independent experts without conflict of interest since many of them are still users of at least one facility.

In addition to the differences in evaluation criteria, RIs adopt different **scoring** to select the best proposals. Some facilities (DESY, Elettra, PSI, Diamond and ISIS) use a numeric rating that may vary from 0-5, 1-5 or 0-10, while others (HZB-BESSY, ASTRID2, LLB-CEA, ALBA, FELIX) use a classification according to the scheduling priority. In this scale, a letter defines the proposals to be scheduled (A, A+), the following letter defines the reserve list (B) and a third one indicates proposals that should not be scheduled (C), with slight variations amongst facilities. SOLEIL's score system is quite different from those of the other facilities, with all the members of one of the 6 review panels allowed to grade all the proposals they feel competent about, but only 2 or 3 referees with a spokesperson are assigned by the chairperson to give a short report on each proposal and a grade between 1 to 9 according to 4 criteria: 1-scientific interest; 2-originality; 3-clear presentation of the theme and 4-feasibility. The score given by a member of the review panel not assigned to the proposal is weighted differently. Then, the final grade is assigned during a face to face meeting. JÜLICH uses a numeric rating with proposals scored 8 or more that must get beamtime, and proposals scored 5 or less that must not get it, with a waiting list for the proposals scored between 5 and 8. After one or more evaluators have assigned a score, the final score is decided either by average or by a plenary discussion. Some facilities (e.g. Elettra) apply normalisation to the score that corrects the bias introduced by the personal preference of evaluators to use the full scale available or only a very restricted part of it. The scope of the normalisation is to make proposals' scores comparable if two or more subpanels of reviewers serve an instrument or beam-line. After each review panel meeting, the chairman produces a report for the facility management with comments, concerns and recommendations. The outcome is then used as a basis for the final allocation supervised by the facility management.

Proposals received outside the two regular annual calls frequently follow a different procedure, conditioned by the need to allow a more immediate access, for example, proposals are assigned to a single evaluator (internal or external) or the score is calculated as the average of the ones assigned by more evaluators, but there is no discussion among them e.g. due to the need to provide a fast reply.

At the end of the evaluation process, users are notified about the results of the evaluation. For those who are granted time, all the facilities require an access request that has to be approved for the users to enter the selected facility.

Time dedicated to open calls

Most of the facilities have no or limited scheduling constraints mostly related to **maintenance and internal research**, with no quotas per country. LLB-CEA has no internal research time and 75% of available time is given to the committees, whereas the rest is used for fast access, alignment, maintenance or failure proposals. Astrid2 has several two-week shutdown periods and some machine/physics/development weeks scheduled throughout the year. SOLEIL uses 65 to 80 % of the beamtime to allocate proposals submitted to the review panel, and the rest for in-house research. The EUROPEAN XFEL had previously assigned 80% of beamtime for users and the rest for maintenance or in-house research and just a small 5% for industrial users, but now they try to use 100% of the beamtime for users. ALBA and Elettra give on average 70% of the beamtime to users and the rest to commissioning or in-house research. Diamond is in line with the other RIs, offering 80% of the available time to users with the remaining 20% for in-house research and commissioning.

Additional access channels

In addition to the regular calls for excellence-based and market-based access, most facilities have **additional access channels, that serve a specific purpose**.

In the last 20 years, **fast-track access** to macromolecular crystallography beamlines has become widespread. While this kind of fast track still conforms to the principle of excellence-based access, the fast nature and the rolling procedure involves the selection of the best proposals in a smaller group, according to the time of their submission. The implementation of the excellence-based fast track access for other disciplines has been proposed but so far until COVID-19 appeared, it wasn't as compelling for any of them as it was for macromolecular crystallography, due to the nature of the samples.

Moreover, fast track access is delivered by many facilities for other kinds of purposes, not exactly in line with the Charter excellence-driven mode. The fast track can be functional for researchers preparing an experiment and trying to assess whether a given technique or instrument will deliver the expected results, or whether the samples are prepared properly. This kind of access involves short slots (0-48 hours) of instrument time and it serves the purpose of improving the quality of the proposals submitted to the facility, removing the uncertainties about the feasibility, appropriateness of the samples, etc. This allows reviewers to make informed decisions and substantially reduces the time wasted in experiments that may not achieve the expected results for the reasons mentioned above. Although this kind of access does not fit into the definition of excellence-based access, its contribution to more efficient use of the beamtime and as a consequence, to better outputs is well known.

Another kind of fast track access adopted by some facilities in a more or less official way (sometimes it happens through direct contact with the beamline scientists and not through an official proposal submission) is the fast access for experiments that are complete but, for some reason, a very limited part of it needs to be repeated, or additional information needs to be provided for some specific reason. This is common during the submission of papers to scientific journals. In the review process, evaluators may ask for supplementary measures to confirm a hypothesis or e.g. to repeat some measures under different conditions. In this case, the fast access allows providing the additional information needed to proceed with the review and achieve the publication of a paper. Again, this kind of access undoubtedly contributes to the scientific excellence, considering that in most cases, it is measured by the number and quality of the publications produced, although it is not peer-reviewed, or more accurately, it is decided internally by the instrument or facility manager.

In the times of COVID-19, most RIs have set-up priority access for COVID-19 related research, in response to a societal challenge. This topic will be addressed in detail later in the document but it is important to mention that the pandemic disrupted the regular operations and the only way to deal with it was to think outside the box.

Finally, Research Infrastructures have been called to contribute to the European Research Area and to the EU priorities, such as the Green Deal or as previously mentioned, the fight against the spread of COVID-19. To respond to these challenges, they may need to adapt their access procedures, for example prioritising impact over excellence. As mentioned earlier, the Charter should be reviewed to consider this natural evolution, since most EU documents promote its adoption by RIs, leaving out any possibility for them to adapt and implement the most efficient access to respond to these challenges.

Remote access

As a consequence of the increase in the automation of beamlines, several facilities have developed, or are developing, "remote access". In this modality of access, users send their samples to the facility, to be analysed with the support of the beamline personnel. In the most advanced facilities, samples are handled by robots and calibration, measurements and data analysis are managed by the user remotely through virtual interfaces, often in real-time. Diamond, for instance, has developed a series of policies and procedures, that apply to a restricted number of instruments/beamlines, that allow to measure samples sent by the users and to access the results of the measurements remotely via a Data Collection Software developed appositely for these purposes.

Open access procedures of CERIC-ERIC

General access policy of CERIC-ERIC

One of the strengths of CERIC is to offer the possibility to submit multi-technique proposals: a user with a complex problem can ask for up to five complementary techniques with a single description of the scientific motivation (single proposal). Diversely to the conventional single instrument proposals, where the innovative approach or the full exploitation of the cutting-edge instrumentation is crucial, the score of a multi-technique proposal should reflect predominantly the importance of the scientific case. Therefore, a project with a high scientific relevance may get time despite requiring a standard (not highly innovative) measurement in one of the instruments. Reviewers are asked to consider the scientific relevance of the science behind the proposal, but also to assess whether a sophisticated facility like a synchrotron or neutron reactor is needed to achieve those results, or whether they can be achieved with conventional laboratory instruments, making the use of large-scale facilities unnecessary. This dual character of the evaluation makes it rather complex, and the subjectivity of reviewers can become even more pronounced.

Since CERIC was originally conceived to provide access for multi-technique proposals, the choice of the proper complementary techniques was one of the evaluation criteria. It was thus decided that the best way to reflect this was by calculating the final score of the proposal as the average of the score in each instrument. The scoring scale goes from 1 (excellent, responding to all scientific relevance criteria) to 5 (unfeasible, or the use of large-scale facilities is not duly justified). In the past, it was proposed to remove the instruments with the worse score from consideration in the final score. It was implemented during one call, but abandoned, because it led to many single-instrument proposals, denaturing the scope of CERIC.

After a full year of operation, some facilities asked to extend the open access also to single instrument proposals. These facilities had instruments that were otherwise not offered to external users in open access. The inclusion of these instruments, offered also for single technique proposals but in open access based on peer-review, optimised their use and increased the scientific output of these facilities. As a consequence, CERIC modified its access policy, in a way to require a multi-technique proposal, in the case of the instruments that already had their own channels for open access, and single or multi-technique for those instruments that offer open access only through CERIC calls.

In 2019, in reply to the requests received by some users, and the advice from the International Scientific and Technical Advisory Committee (ISTAC), CERIC implemented a “fast access” pilot for some instruments. The pilot is dedicated to feasibility studies, with a maximum access time of 48 hours. It was proposed that the fast access may also extend to additional cases (e.g. macromolecular crystallography) but this option is still under consideration since the scope of CERIC is to offer services that are complementary to the ones already offered by its participating RIs. An additional pilot, proposed to support outreach to countries with a less developed user community, was implemented in the last call. The outreach pilot foresees that scientists (potential users) are trained through targeted programs. The application for beamtime takes place through the regular calls for proposals but part of the time of the facilities is allocated preferentially to these proposals. Being a young institution, CERIC is always open to feedback from users and suggestions from ISTAC or other experts, to improve its services.

CERIC has scheduling constraints linked to the time committed by the Representing Entities. Some infrastructures dedicate to CERIC on average 10% of the users dedicated time, while some others provide enough time to schedule 100% of the highly ranked proposals (30-40% of the user’s time).

Open Access under emergency conditions: the COVID-19 case

The access policies in place in the different RIs allow to operate correctly under normal circumstances, but the pandemic situation of 2020 showed that they were inappropriate under particular emergencies. Since then, many facilities’ operations were disrupted to the point of shutting down partially or even completely for a some time, according to the impact of the COVID-19 in the different countries. Before the pandemic, the majority of the user-based operations of RIs were focused on physical access by researchers travelling all over the world to reach the best facilities to perform their experiments. The travel restrictions introduced by the countries from the beginning of the COVID-19 pandemic have forced the RIs to adapt their access procedures and in many cases to develop new ones, to allow them to maintain their operations at the highest possible level. In conjunction with the new Access Policies, a major focus has been also put on the development of new technologies to overcome the necessity for users to be present during the experiments and to allow their input during the measurements as well as during the analysis of the data. In response to the pandemic, several research infrastructures have set up specific services, such as remote access and rapid or fast track access for specific projects related to the COVID-19 related research.

To help RIs to deal with the crisis benefitting from the best practices put in place by other RIs, the ACCELERATE partnership teamed up with ERF (The Association of European-Level of Research Infrastructure Facilities) and develop three surveys that were submitted to most analytical RIs in Europe.

The first survey, launched in March, served to collect the various approaches and solutions developed by RIs in response to the COVID-19 pandemic and to share this information on a webpage.[10] The aim of the immediate publication was twofold: to serve as an inspiration to other Research infrastructures for the implementation of similar initiatives and to inform researchers about the various opportunities and special programmes set-up by infrastructures, from which they could benefit. This page was widely advertised in all the relevant websites and initiatives to achieve the widest visibility.

The second survey was launched in April 2020 and it focused on the safety and operational measures introduced to allow the highest possible level of operation of facilities but ensuring the safety of the staff and researchers.[11]

The third survey instead was launched in October 2020 to collect any updates from RIs after six months of operation under the conditions imposed by the pandemic.[12] From the moment it became clear that the pandemic would be long lasting, many facilities reflected on how to provide the most effective and resilient services in a world where COVID-19 would continue to be present and perhaps return in successive waves. The experiences of these months, with increased provision of remote access, drastically reduced travel possibilities for staff and users, and the widespread development of home office may lead to permanent changes of operations, and to new standards for operations and access independent from pandemic considerations.

An overview of the questions posed to infrastructures with each questionnaire and the list of respondents is available as Annexes III, IV and V. In the following section we summarise the main results and conclusions.

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[10] https://erf-aisbl.eu/research-infrastructures-offer-for-research-on-covid-19/

[11] Jana Kolar, Andrew Harrison, & Florian Gliksohn. (2020, May 6). ERF's Review of Working Practices of Analytical Facilities During the Pandemic. Zenodo. http://doi.org/10.5281/zenodo.3795660

[12] Jana Kolar, Andrew Harrison, & Florian Gliksohn. (2021). Effect of the COVID-19 Pandemic on the Working Practices of Analytical Facilities II. http://doi.org/10.5281/zenodo.4423107

Overview of the different COVID-19 related solutions adopted in European Research Infrastructures

COVID-19 disrupted operations

Most of the RIs surveyed were forced to adapt the operations of their laboratories according to the emergency in terms of external users, staff and instruments/end-stations/beamlines running. The majority of the RIs reduced the number of staff on-site in a range of 40% to 80% compared to pre-COVID-19 levels. On the contrary, the majority of the RIs in operation decided to keep 100% of instruments/end-stations/beamlines running during the pandemic with a significant reduction of external users allowed to enter the laboratories with services largely dedicated to COVID-19 research. Only a few managed to keep the flow of external users at the same level as in the pre-COVID-19 period. To be noted that many of the surveyed institutions were at some point (during the first wave) forced to stop completely any user-based operations and focus only on internal research. Some infrastructures needed to go further and shut down all operations, to guarantee the safety of the staff.

Impact on the excellence-access mode

Some of the facilities have set up remote access procedures with a sample mail-in process but usually, roughly 20% of the programmed measurements have been conducted using it. A good number of facilities have been using sample mail-in procedures to perform some more complex remote user experiments assisted by local scientists/staff with a few of them, such as Centro de Láseres Pulsados, Laboratoire d'Optique Appliquée, European XFEL and BNC, on the totality of the planned experiments. The majority of the RIs have set up a hybrid access mode, that allows some external users on-site during the measurements while the rest of the team follows through remote connections. In the case of HZB, 100% of the planned experiments use the hybrid method.

Requirements, opportunities and issues linked to remote access to facilities

Regarding the measures introduced to assist remote access, almost all of the responding facilities have created or improved their IT resources for data sharing, Remote analysis in real-time, Webcams and microphones for video conferences and remote control of the data acquisition systems. Some of the facilities have been providing custom solutions based on the singular needs of the users.

The highest impact on the regular operations was due to the travel restrictions, that prevented researchers from reaching the facilities. Moreover, also the impossibility of the users to prepare samples due to the limited operations of their institutions played a major role. This remains true during the second survey in October, where the relative importance of the impossibility to prepare the samples grows higher.

Among the issues reported by the facilities with remote access during the pandemic emergency, the most prominent are the increased workload on the beamline/instrument scientists, reduced training opportunities for users and experiments being too complex to be able to provide a high-quality remote service. The October survey looked deeper into the specific issues raised by remote access, amongst which facilities cite a high or moderate decrease of the efficiency (10/15), higher or moderately higher amount of time needed to perform the experiments (15/25), experiments being too complex to be able to provide a high-quality remote service (high and medium relevance 21/27), lower user engagement (high and medium relevance 10/26), the workload on the beamline/instrument scientists is too high (high and medium relevance 23/27) and reduced training opportunities for users (high and medium relevance 21/27).

In terms of resources allocated to facilitate remote access, the majority of the respondent RIs did not have access to additional funding but mostly relied on the reallocation of internal resources, the only reported exception being HZB, who benefitted from a European grant.

In terms of use of remote Access in the pre and post-COVID-19 periods, the share of remote access before the pandemic was close to 20% of the total performed experiments (only in few cases up to 40%), but during the COVID-19 emergency it has roughly duplicated, resulting in a total of 40% of experiments performed remotely in relation to the total of all the proposals granted access. In the case of Diamond, European XFEL, Physikalisch-Technische Bundesanstait and ISIS the share of remotely performed experiments raised to 80% of the total accesses. For BNC and Laboratoire d'Optique Appliquée even to 100% meaning that experiments during the pandemic were done exclusively in remote access. We would see in the third questionnaire that after six months, the share of remote access in most facilities is as high as 60%.

Almost all the RIs reported that business travels dropped down to usually 20-40% in comparison to the pre-COVID-19 period. In many cases business trips are not allowed at all.

It is clear that the current pandemic will have long-ranging consequences on the delivery of services by analytical facilities to their users. When asked about the future of remote access after the COVID-19 period, most RIs identified the main advantages of remote access in the decrease of environmental impact mainly due to the reduction of users traveling to reach the facilities. Only some of the interviewed facilities think remote access will be an additional and alternative service to the regular access after the pandemic.

The second and third questionnaires were focused on the safety measurements put in place by RIs during the COVID-19 period. Facilities that replied to the first questionnaire made it clear that most procedures were in continuous evolution, as the situation was, and no one could see how it would develop. This is why, after a first questionnaire about the measurements put in place that surveyed the most widely adopted practices, we proposed a second "update" to follow up on what practices the facilities found more effective and sustainable, since at this point it was clear that the pandemic would last for more than one year. The third questionnaire was analyses in detail in a paper[13], however, some of the most important highlights will be mentioned here.

At the beginning of the pandemic, almost all (23/27) of responding institutions reported having established dedicated COVID-19 safety protocols. Often, they were disseminated to staff through email, although some institutions have published them on their web pages, or both. Widespread – although remarkably diverse – preventative measures have been adopted since the April survey. The main measures introduced were those promoted by the World Health Organization, such as the use of protective masks, social distancing, use of hand disinfectants, gloves for shared surfaces, hygienic training and new protocols for canteens as well as business travel restrictions and the need for negative SWAB test results by external users accessing the laboratories. In October, most RIs have worked out how to put in place best-practice protocols and have implemented them. The most common planned development to enhance safety in the future is the widespread use of testing for staff and users. However, one-third of all respondents have no plans to enhance safety measures further, and only a third indicated plans to introduce measures that are not yet in force, suggesting a high degree of satisfaction with current measures.

In most cases, only approved staff could enter the facilities in April, while an authorisation was needed for the rest. This situation did not change significantly during the year. Regarding the prospective for the future, in April only a few institutions were considering reducing the staff on-site and increasing the resources dedicated to remote access. In fact, the survey in October confirmed this position. The level of operation of facilities and the number of instruments available, compared to pre-COVID 19 is rather high (mostly 80 to 100%) and almost half of the facilities (9/20) maintained the average presence of staff from 80% to 100%.

Most of the facilities had put in place special measures in support of home working already in April. In general, they focus on providing the staff with home office tools, access to the internet and safety guidelines and health recommendations are regularly communicated to the staff. EU countries have issued instructions to employers and several of the RI report that they adhere to the national guidelines. Also, few facilities provide psychological support.

[13] Jana Kolar, Andrew Harrison, & Florian Gliksohn. (2021). Effect of the COVID-19 Pandemic on the Working Practices of Analytical Facilities II. http://doi.org/10.5281/zenodo.4431748

COVID-19 dedicated Open Access procedures of CERIC-ERIC

Like the majority of the other RIs in Europe, CERIC decided to adapt its access policies in reply to the pandemic emergency with two major measures, setting up of a new Fast-Track open access dedicated to COVID-19 studies and extending the *"remotisation"* process with a reallocation of the internal resources as well as from the EU project PaNOSC,

The number of experiments performed in 2020 decreased significantly in comparison to previous years, due to the travel restrictions adopted by countries, both nationally and internationally, in addition to the restrictions on business travels imposed by some Research Organisations on their personnel. Moreover, researchers were invited to work from home, being unable to access their laboratories to prepare the samples.

A significant number of the experiments performed were conducted remotely (40% of the total), with users shipping samples and participating in the measurements remotely. However, several of the experiments (60%) were not suitable for this kind of access due to the complex nature of the experiments.

Activities to support remote access

In order to maintain its level of operation, and to accommodate external researchers' demand to perform their experiments remotely, CERIC developed dedicated procedures for remote access with specific tools facilitating samples shipment, such as automatic dedicated solutions for the front-end forms for the logistic organization of the shipments, and virtual connections to allow a real-time interaction of researchers with the personnel and instruments of the facilities during the measurements, and later for the analysis of the data acquired.

COVID-19 Fast Track

Using the experience acquired during the development and implementation of the Accelerate Fast-Track Access pilot, during the first weeks of the COVID-19 emergency, CERIC has set up a priority Fast Track Access to its most relevant instruments for COVID-19 related experiments. Featuring a continuous submission, the evaluation procedure is simplified through internal feasibility and excellence review, and the scheduling is granted within 1 month from the submission of the proposal. Users are encouraged to contact the facilities and discuss their projects in advance with the scientific personnel before submitting their proposal.

The regular submission and evaluation procedure that usually takes approximately 3 months, was deemed inappropriate to deal with this emergency.

To allow the fastest exploitation and dissemination of the results, a reduced embargo period was set for the raw data obtained through this access, limited to 6 months from the end of the measurements.

Due to the lack of the necessary bio-safety accreditation in the CERIC facilities, only samples guaranteed as non-harmful and with no ability to cause or transfer viral infection were accepted for research.

After 10 months of operations (March 2020 – December 2020), CERIC has received 10 proposals from which 9 have been positively evaluated and performed. The COVID-19 Fast Track Access is still ongoing and is planned to be offered to the global research community until it will no longer be necessary, based on the demand.

European projects that contributed to the harmonisation of access policies in RIs

In the previous Framework programmes the European Commission has funded several coordination and support actions in which the core activity was providing transnational access to Research Infrastructures. Some projects included work packages that focused on access policies aiming at the standardisation and harmonisation of procedures among similar facilities. This is a request that comes from the users' community, where users normally need to use several facilities for their research purposes and "learning" how to get access to a set of infrastructures may become challenging. We contacted some of these projects funded during the last two programming periods (FP7 and H2020) that contributed significantly to the harmonisation of access procedures amongst European RIs. The following section presents an overview of their main achievements.

Projects in FP 7

BioStruct-X

BioStruct-X brought together 19 European research organisations from 11 EU member and associated states to build a broad platform of infrastructures addressing all stages of biological structure determination, from protein production of sufficient quantity and quality for structure analysis, to sample production and data collection by a variety of X-ray methods (macromolecular crystallography, Small-Angle X-ray Scattering (SWAXS), X-ray imaging).

BioStruct-X was a successful example of access to multiple methods through a unified portal and with a centralised review panel. The portal offered a standardized proposal form (developed by the project) for submission of single projects or BAG (block application group) applications. The user could choose the facility. Facilities could choose either to accept the evaluation of BioStruct-X or propose to include these proposals in their usual review processes.

BioStruct-X had its follow up in INSTRUCT-X, and the community was successful in finding a long-term solution for providing integrated access, that is INSTRUCT-ERIC.

Website: https://www.biostruct-x.eu/

CALIPSO

This project comprised a consortium of 20 synchrotrons and Free-Electron Lasers. The work of standardisation and harmonisation was centred on the development of the web portal wayforlight.eu, which incorporated a database developed in a previous I3 CSA (FP6, ELISA). The database in wayforlight.org was further developed and, at present, it allows to search and compare all photon-based instruments in the EU and some outside the EU (e.g. SESAME). CALIPSO developed a standardised proposal form that allows the transfer of a series of basic contents to all the facilities where the user wants to apply for, and specific contents are completed at the facility's user office. This multiple-application process was made easier also by the implementation of a single sign-on software called Umbrella, which is still viable and allows to login to the CALIPSO portal, as well as to all the Virtual User Offices, through a single username and password. After submission, the proposal is transferred to the selected facility and processed according to each facility's procedures (no single evaluation panel). In line with the scope of this project, CALIPSO's user survey showed that a significant number of users asked for more standardised and transparent evaluation procedures and criteria.

CALIPSO made big steps towards standardisation and harmonisation. The main results of the project in this regard are integrating parts of the wayforlight portal[14] and some of the solutions developed (e.g. umbrella) are still in use at the date of publication of this report.

WAYFORLIGHT portal http://www.wayforlight.eu/eng/home.aspx

IRUVX-PP

This preparatory phase was meant to create the consortium of Free electron lasers in Europe (EuroFEL). A full work package was dedicated to users: The IRUVX-PP Work Package 2 aimed, "*among other, at defining, (1) an Access Policy, and (2) tools and procedures allowing for a common, transparent and optimised user access to the distributed FEL facilities within the EuroFEL consortium".* WP2 produced the Deliverable D2.3: Review of Access Policies and Panels. This deliverable shows a nice overview of the main characteristics of access policies in eight European large research infrastructures. Unfortunately, the deliverable is not available publicly but any project dealing with access procedures will surely find this document very useful. In addition, an Expert's report was published called "Handbook for FEL users". This document is mainly focused on FLASH since it was the only facility in operation but reports also on proposal evaluation and

[14] http://www.calipso.wayforlight.eu/

includes the opinion of three experts on the advantages and drawbacks of access procedures. What emerges is that while some procedures are almost identical (call for proposals, submission, allocation of time, etc.) the main differences reside in the evaluation process. Although this WP made a good preparatory work for the harmonisation of access in FELs, developing the first “standard proposal form” that inspired a similar approach in CALIPSO, there was no convergence to a single policy for access to FELs. Nevertheless, discussions led to the development of the Umbrella system, further developed by the PanData and CRISP projects, used at present mainly by the photon community thanks to the deployment by CALIPSO.

Website: www.iruvx.eu

LASERLAB-EUROPE

The Integrated Initiative of European Laser Research Infrastructures brings together 35 leading institutions in laser-based inter-disciplinary research from 18 countries. Together with associate partners, LASERLAB-EUROPE covers the majority of European member states. 24 laboratories offer access to their facilities for research teams from Europe and beyond, kindly supported by EC funding.

One of its objectives is to offer transnational access to top-quality laser research facilities in a highly co-ordinated fashion for the benefit of the European research community. The consortium achieved this goal through the development of an access policy. The latter has only global objectives and EU resources (number of access days, total access funds) for the whole network and not for individual facilities. LASERLAB-EUROPE accounts only for 10%-20% of the beamtime available in these facilities. It must be mentioned that this project (and its predecessors in FP6 and 5, LASERNET) managed to develop from scratch an access policy and develop all the necessary tools to offer open access to facilities that traditionally did not provide it. They were the first clear example of centralised access to a distributed infrastructure, with a single-entry point for users and a unique proposal review panel.

Website: https://www.laserlab-europe.eu/

NMI3

The aim of the Integrated Infrastructure Initiative for Neutron Scattering and Muon Spectroscopy (NMI3) was to facilitate the Pan-European coordination of neutron scattering and muon spectroscopy research activities, by integrating all the research infrastructures in these fields within the European Research Area. NMI3 was a consortium of 18 partner organisations from 12 countries, including 8 facilities, opening the way for a more concerted, and thus more efficient, use of the existing infrastructure; the ultimate aim being a more strategic approach to future developments and increased European competitiveness in this area. In WP5 Integrated User Access a single entry point for all participating neutron and muon facilities was developed. An 'Integrated User Access (IUA)' Networking Activity was launched to develop ideas for a framework to structure and harmonize an integrated access format to European national neutron and muon facilities for the scientific users. The project achieved to contribute to the harmonisation of access procedures in Neutron sources through these main tasks: development of a general integrated user registration; harmonized proposal forms and templates; Web-based proposal peer-review process; platforms for cross-source independent beamtime access.

NMI3 also conducted surveys among active neutron users and neutron reviewers. One survey showed that 58% of the users would have liked that one of their rejected proposal was transferred to another facility. 42% of the users would favour a joint neutron evaluation panel while 34% would be against. 24% remain uncertain. Among the reviewers only 24% would appreciate a common review panel while 28% reject the idea. The majority of 48% remains uncertain.

Website: http://nmi3.eu/

Projects in H2020

CALIPSOplus / LEAPS

The WP 2 in CALIPSOplus is working on a further harmonization of access to synchrotrons and FELs towards a more extensive deployment of the Wayforlight portal and coordinated deadlines for calls for proposals. The evaluation system remains unchanged from CALIPSO (FP7).

The League of European Accelerator-based Photon Sources (LEAPS) initiative will set up a workgroup that will assist in the developments of CALIPSOplus and will discuss the possibilities of more harmonisation and transparency in the evaluation process. An attempt to form a single centralised review panel was unanimously rejected.

Website: http://www.calipsoplus.eu/

The European Cluster of Advanced Laser Light Sources (EUCALL)

EUCALL is a network of leading large-scale user facilities for free-electron laser, synchrotron and optical laser radiation and their users. Under EUCALL, they work together on their common methodologies and research opportunities, and develop tools to sustain this interaction in the future. EUCALL involves 11 partners from nine countries as well as the networks LASERLAB Europe and FELs of Europe during the project period 2015 to 2018. Regarding access procedures, EUCALL organised in 2017 the workshop User Access Policies at Advanced Laser Light Sources and Innovation Potential of Advanced Laser Light Sources that brought together representatives from many large research infrastructures and were an excellent opportunity for the exchange of good practices and procedures.

Website: https://www.eucall.eu/

Workshop User Access Policies at Advanced Laser Light Sources

NFFA

The NFFA project provides coordinated free and open access to an advanced distributed infrastructure to perform growth, nano-lithography, nano-characterization, theory and simulation and fine-analysis with synchrotron, FEL and neutron radiation sources. The users access includes several “installations” and is coordinated through a single-entry point portal that activates an advanced user-infrastructure dialogue (Technical Liaison Network - TLNet) to build up a personalized access programme with an increasing return on science and innovation production. The TLNet tasks are the assessment of the technical feasibility of the proposals and their assignment to the best-suited instruments according to their technical requirements and availability. After the TLNet evaluation, the proposal is submitted to an independent and external Access Review Panel (ARP) for the scientific evaluation. The ARP consists of twelve experts in nanoscience that cover all necessary competences foreseen by the NFFA access programme. The scientific evaluation is based on scientific merit (evaluated in terms of scientific relevance for nanoscience, appropriateness of the experimental/theoretical programme and expected impact of the results), demonstration of the need for the use of the NFFA infrastructure, innovation potential and industry interest as added value. In case of competition between projects at an equal level of scientific ranking, a preference is given to projects with female proponent(s) or user groups who are new to the specific NFFA installations or are working in countries where no equivalent research infrastructure exists. The set up and implementation of the TA and evaluation procedures are summarised in a project deliverable[15].

Website: http://www.nffa.eu

[15] Deliverable D1.3: http://www.nffa.eu/outcomes/deliverables/

Conclusions

Open access procedures are crucial for the scientific excellence of the facility, and therefore its sustainability. A lot of progress has been made in terms of harmonisation and standardisation of access procedures in Research Infrastructures, yet there is still room for improvement. The European Charter on access could play a more prominent role if updated in its definitions, principles and guidelines, acknowledging RIs adapt to the needs of users, incorporating new procedures such as the fast access for macromolecular crystallography or to respond to societal challenges, as seen during the COVID-19 outbreak.

The COVID-19 emergency has challenged facilities in an unprecedented way, affecting their operations, performance and procedures. Although remote access seems to be the most efficient tool to maintain operations, there are a series of issues related to it. The WHO monitors yearly and produces a list of the most dangerous pathogens in terms of their capacity to generate a pandemic. If, as states by specialists, pandemics will be more frequent in the future, we need to do our best to be prepared. Remote access could offer a good solution in case of an emergency, however to be more widely applied, consistent funding should be invested in it.

Acknowledgements

The ACCELERATE partners would like to thank the User Offices of the following RIs and the FP7/H2020 project coordinators for their valuable contribution sharing their good practices and previous experience:

RIs: ALBA Synchrotron, ASTRID2, DESY, Diamond Light Source, Elettra Sincrotrone Trieste, ESRF, European XFEL, FELIX, HZB BESSY II, ISIS, LLB – CEA, INFN-LNF, KIT, MLZ, PSI, SOLEIL Synchrotron

Projects: BioStruct-X, BrightnESS, CALIPSO, CALIPSOplus, ELI-TRANS, EUCALL, INSTRUCT-X, IRUVX, LASERLAB Europe, NFFA, NMI3

and the EC for funding the ACCELERATE project and allowing us to extend the scope of this deliverable in reply to the pandemic.

Annex I: Brief description of the facilities consulted for the collection of the excellence-driven access procedures

Alba Synchrotron (ALBA)

ALBA is a Synchrotron Light facility located near Barcelona/Spain with a complex of electron accelerators which allows the visualization of the atomic structure of matter as well as the study of its properties. The facility has eight operational beamlines comprising soft and hard X-rays, devoted to biosciences, condensed matter (magnetic and electronic properties, nanoscience) and materials science.

https://www.cells.es

ASTRID2

ASTRID2 at the Department of Physics and Astronomy, Aarhus University, Denmark, is a low energy synchrotron light source used for research within medicine, molecular and cell biology, nanotechnology and atomic and molecular physics. A wide range of spectroscopic methods from the infrared to soft x-rays are used across the 6 beam lines, with access to the facilities available to academic and industrial users worldwide.

www.isa.au.dk

Deutsches Elektronen-Synchrotron (DESY)

DESY is one of the largest research centres in Germany and is involved in many national and international projects. The research activities focus on three areas: Accelerators, photon science and particle and astroparticle physics. Moreover, DESY operates the synchrotron radiation source PETRA III and the X-ray laser FLASH for scientific users from academia and industry.

PETRA III at DESY is one of the brightest storage-ring-based X-ray radiation sources in the world. The portfolio of currently 20 beamlines encompasses key instrumental and methodological capabilities that enable high-resolution diffraction and inelastic spectroscopy, correlation spectroscopy and imaging with coherent X-rays, or high-resolution X-ray microscopy and nano-analysis. Typical applications are for instance investigations of solar cells, catalysts, and batteries under working conditions.

FLASH at DESY, the world's first free-electron laser in the soft X-ray range, generates extremely intense and ultrashort pulsed laser flashes. At present two FEL lines are being operated in parallel with independent photon beam parameters for user experiments. Typical applications are pump-probe experiments for the investigations of processes on atomic time scales like photocatalytic chemical reactions or light induced switching of conductivity or magnetization. http://www.desy.de

ACCELERATE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 731112

DIAMOND Light Source

The DIAMOND Light Source is the UK's national third-generation synchrotron located at the Harwell Science and Innovation Campus in Oxfordshire that has been designed to produce very intense beams of X-rays, infrared and ultraviolet light. The facility provides a medium energy source supporting a very wide range of applications. The synchrotron is free at the point of access through a competitive application process, provided that the results are in the public domain.

http://www.diamond.ac.uk/Home.html

Elettra Sincrotrone Trieste S.C.p.A

Elettra Sincrotrone Trieste is a multidisciplinary international research center of excellence, specialized in generating high quality synchrotron and free-electron laser light and applying it in materials and life sciences. Its mission is to promote cultural, social and economic growth. The main assets of the research centre are two advanced light sources, the electron storage ring Elettra and the free-electron laser (FEL) FERMI, continuously (H24) operated supplying light of the selected "colour" and quality to more than 30 experimental stations. These facilities enable the international community of researchers from academy and industry to characterize structure and function of matter with sensitivity down to molecular and atomic levels, to pattern and nanofabricate new structures and devices, and to develop new processes. Every year scientists and engineers from more than 50 different countries compete by submitting proposals to access and use time on these stations.

http://www.elettra.eu

European XFEL

The construction and operation of the European XFEL facility has been entrusted to a non-profit limited liability company under German law, the European X-Ray Free-Electron Laser Facility GmbH (European XFEL GmbH), that has international shareholders. The shareholders are designated by the governments of the international partners who commit themselves in an intergovernmental convention to support the construction and operation of the European XFEL. Denmark, France, Germany, Hungary, Italy, Poland, Russia, Slovakia, Spain, Sweden, and Switzerland participated in the construction and operation of the European XFEL. The United Kingdom is in the process of joining as the twelfth member state. The Facility is based in Schenefeld, Germany.

Research currently being done at X-ray FELs is already breaking new ground, with studies across many disciplines: determining structures of molecules critical to biology, watching ultrafast energy transfers within molecules, probing the characteristics of extreme states of matter, and observing the behaviour of electrons within complex molecules. The European XFEL started Early User operation in September 2017

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and with its special characteristics of ultrashort pulses and ultrahigh brilliance, it is expected that new opportunities in many areas of research will be created.

https://www.xfel.eu

FELIX Laboratory

The FELIX Laboratory at Radboud University in the Netherlands exploits intense, short-pulsed infrared and THz free electron lasers that are used for research of matter both by in-house as well as national and international external users. The four lasers FELIX-1, FELIX-2, FELICE and FLARE each produce their own range of wavelengths and together, they provide a tuning range between 3 and 1500 µm.

http://www.ru.nl/felix/

Helmholtz Zentrum Berlin (HZB)

The HZB facility in Germany conduct research on complex systems of materials. The BESSY II photon source in Berlin-Adlershof with its 46 beamlines is highly suited for analysing thin-film materials. With its emphasis on vacuum ultraviolet radiations (VUV) and soft X-ray emissions, it offers ideal capabilities for investigating thin films as well as boundary surfaces. Further the HZB operates the BER II neutron reactor located in Berlin-Wannsee. The BER II comprises 9 different neutron instruments.

https://www.helmholtz-berlin.de

Istituto Nazionale di Fisica – Laboratori Nazionali di Frascati (LNF.INFN)

INFN is the Italian National Institute for the study of Nuclear and Sub-nuclear Physics with accelerators and the Frascati National Laboratory (LNF) is the largest INFN laboratory. INFN-LNF operates the DAΦNE storage ring and DAΦNE - Light synchrotron radiation facility with three operational beamlines and two under commissioning.

http://w3.lnf.infn.it

ISIS Neutron and Muon Source

ISIS Neutron and Muon Source is based at the STFC Rutherford Appleton Laboratory in Oxfordshire and is a world-leading centre for research in the physical and life sciences. With over 30 neutron and muon instruments the ISIS allows an international community of more than 3000 scientists to study materials at the atomic level

https://www.isis.stfc.ac.uk

ACCELERATE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 731112

JÜLICH Forschungszentrum

The JÜLICH Forschungszentrum is a German located interdisciplinary research institution and member of the Helmholtz Association. JÜLICH has ten research institutes with over 60 sub-institutes working in the areas of energy and climate research, bio- and geosciences, medicine and neuroscience, complex systems, simulation science, and nanotechnology.

http://www.fz-juelich.de

Laboratoire Léon Brillouin (LLB – CEA)

The French Laboratoire Léon Brilloin uses neutron beams produced by the Orphée research reactor to perform neutron scattering experiments for fundamental and applied research. The scientific activities of the laboratory can be classified in three fields: physical-chemistry, structural and phase transition studies, magnetism and superconductivity.

http://www-llb.cea.fr

Paul Scherrer Institute (PSI)

The Paul Scherrer Institute - located in Villigen/CH - is the largest research institute for natural and engineering sciences in Switzerland. The institute performs research in three main subject areas: Matter and Material, Energy and Environment, Human Health. PSI operates five large scale facilities, the Swiss Light Source (SLS) – a 3rd generation synchrotron, the spallation neutron source SINQ, the Swiss muon source SµS, a meson factory for particle physics and the X-ray free electron laser facility SwissFEL, which just started pilot user operation by the end of 2017. All PSI user facilities offer open access to external academic and industrial users worldwide via one single entry point, operated by the PSI User Office.

https://www.psi.ch

Soleil Synchrotron (SOLEIL)

SOLEIL is the French National Synchrotron Light Source to matter analysis down to the atomic scale. SOLEIL's 29 Beamlines cover fundamental research needs in physics, chemistry, material sciences, life sciences, earth sciences, and atmospheric sciences. It offers the use of a wide range of spectroscopic methods from infrared to X-rays, and structural methods such as X-ray diffraction and diffusion.

https://www.synchrotron-soleil.fr

ACCELERATE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 731112

FACILITY	KIND OF ACCESS PROVIDED				KIND OF EVALUATIONS PERFORMED	
	Number of regular Calls	Fast Track	Other	Industry	Type of evaluations	Comments
ALBA	2 calls per year (1 call for year: BAG MX: for Macromolecular crystallography)	YES Rapid access ('Call for continuous access at MX) : limited number of projects.	NO	YES	- Safety evaluation - Technical evaluation - Scientific evaluation	N/A
ASTRID2	1 call per year	Limited number of proposals outside of the main call, and time is set aside on some beam lines for this to allow more immediate access to the facility	NO	Only very few (1) projects/proposals per year.	Scientific evaluation	Consultations between beam line scientists and users take place before or during the proposal submission process in order to ensure that what is proposed is technically possible and safe, so technical evaluation by the panel is generally not needed, however may be commented on.
DESY	2 Calls per year	N/A	NO	N/A	- technical feasibility - safety check - compliance with DESY mission (peacefulness) - Scientific evaluation: PETRA III and FLASH	Written comments are visible to PRP members (external reviewers)
DIAMOND	2 Calls per year	YES restricted to some instruments	NO	N/A	- Technical evaulation - Scientifi evaluation - Safety check	N/A
ELETTRA	2 Calls per year	NO	Macromolecular Chrystallograpy monthly calls	Yes, through ILO	- Technical evaulation - Scientifi evaluation - Safety check	Technical evaluation at the facility, comments are visible to PRP members (external reviewers)
EUROPEAN XFEL	At present only regular access, aiming at allocation periods / year in the longer term. Other access options to be defined.	To be defined	NO	N/A	- Technical evaulation - Scientifi evaluation - Safety check (All in parallel)	Technical feasibility and safety checks in parallel, these results being available about ten days before the meeting of our review body (Proposal Review Panels). Scientific review phase starts at the same time of the technical feasibility and safety checks but longer time is allowed for in order to take into consideration also the input about the other technical/safety evaluations.
FELIX	2 Calls per year	N/A	NO	N/A	- Technical evaulation - Scientifi evaluation - Safety check	N/A

FACILITY	KIND OF ACCESS PROVIDED				KIND OF EVALUATIONS PERFORMED	
	Number of regular Calls	Fast Track	Other	Industry	Type of evaluations	Comments
HZB-BESSY	N/A	N/A	NO	N/A	- Technical evaluation - Scientifi evaluation - Safety check	N/A
INF.INFN	2 Calls for proposals per year (short and long term proposals)	N/A	NO	N/A	- Technical feasibility - Scientific evaluation	(In the experimental proposal there is a form that the main proposer must fill and sign concerning safety information on samples, a cross check is also performed during the proposal technical evaluation). A User Selection Panel that performs a scientific evaluation
ISIS	2 calls per year (deadlines in April and October)	YES	'Xpress' access, for very small amounts of beamtime, when users can send samples in to get a quick crystal structure or for a single measurement – these are just given a technical assessment	YES	- Technical evaulation - Scientifi evaluation (All in parallel)	Initial safety info at time of proposal, but a more detailed Experiment Risk Assessment is done before the experiment is run.
JUELICH	2 Calls per year	N/A	N/A	N/A	- Technical evaulation - Scientifi evaluation - Safety check	if during the technical evaluation the instrument scientists finds something suspicious she/he sends the proposal for the safety/radiation protection check beforehand.
LLB - CEA	2 calls per year (1st Mai, 1st November)	YES (limited to 1 day beam time per request)	NO	YES	- Technical evaulation - Scientifi evaluation - Safety check	Scientific evaluation by independent external committees (4 differents : diffraction, soft matter, inelastic, material science)
PSI-Particle Physics facilities	1 Call per year	NO	NO	N/A	- Technical evaulation - Scientific evaluation - Safety check	N/A
PSI-SINQ (neutron source)	2 Calls per year	YES	X+N powder diffraction	typically short-term contracts on single campaigns	- Technical evaulation - Scientific evaluation - Safety check	N/A
PSI-SLS (synchrotron light source)	4 Calls per year (2x MX, 2x non-MX)	YES	Mail-In, X+N powder diffraction	various models: long-term contracts and short-term contracts on single campaigns	- Technical evaulation - Scientific evaluation - Safety check	N/A

FACILITY	KIND OF ACCESS PROVIDED				KIND OF EVALUATIONS PERFORMED	
	Number of regular Calls	Fast Track	Other	Industry	Type of evaluations	Comments
PSI-SμS (muon source)	2 Calls per year	YES	NO	typically short-term contracts on single campaigns	- Technical evaulation - Scientific evaluation - Safety check	N/A
PSI-SwissFEL (X-ray FEL)	2 Calls per year	YES	NO	typically short-term contracts on single campaigns	- Technical evaulation - Scientific evaluation - Safety check	N/A
SOLEIL	2 calls per year. (1 call per year for: BAG MX – BioSAXS: for Macromolecular crystallography experiments on PROXIMA 1 and/or PROXIMA 2A, and/or for Small Angle X-ray Scattering experiment on SWING. BAG NON MX – BioSAXS: for other fields if the beamline offers this access mode)	YES (Rapid access: A very limited number of projects may be accepted as rapid access for urgent work)	NO	N/A	Technical assessment Scientific reviewing Safety assessment	N/A

FACILITY	SCIENTIFIC EVALUATION					
	PEER REVIEW PANEL	EVALUATORS PER PROPOSAL	KIND OF EVALUATION	EVALUATION PROCEDURE	PROPOSALS SCORES	SCHEDULING CONSTRAINS
ALBA	The panel is formed by international experts (external to ALBA).	At least two referees per proposal.	The panel meeting is hold in ALBA where face-to-face discussions are performed	Once the call is closed, submitted proposals will go through an evaluation procedure based on: - Technical feasibility - Scientific merit, assessed by international experts - Previous record at ALBA - Availability of resources required	Each referee gives a score before coming to ALBA and after discussion during the panel meeting in ALBA (face-to-face) they have to agree on a score (not necessarily the average). A+ (awarded beamtime), A (waiting list), B (failed proposals).	On average 70% of Beamline Days are dedicated to users (rest of the days: commissioning, in house, propriety).
ASTRID2	The review panel consists of 7-8 people coming from the facility, other departments at the university and also from outside the university and abroad.	One reviewer per proposal.	Face to face.	Each proposal is reviewed in depth by the reviewer and briefly presented and discussed by all in the panel at the meeting. Proposals received outside of the annual call to allow for more immediate access, are sent to one of the panel members for approval of allocation of beam time.	Each proposal is graded by the reviewer on a sliding scale from "A" where the proposal must be given the beam time requested, to "E" where the proposal should not be given time, in a similar way to other facilities. Beam time assigned to the proposals receiving B, C and D will be dependent upon the number of proposals and how much time is available for a particular beam line, with priority given to those with the higher grades.	We have several two week shutdown periods during the course of the year, and there are machine physics/development weeks scheduled throughout the year. Users are made aware of the outline of the schedule as early as possible (several months in advance). Beam time is allocated in coordination with the users in order to try and accommodate their scheduling requirements as much as possible.
DESY	Project review panel (PRP): PETRA III: - PRPs are field-specific, not beamline-specific - At present ~70 reviewers for approx. 450 - 500 proposals - Each PRP coordinated by DESY/HZG secretary FLASH: - One PRP for all proposals - At present 10 reviewers for approx. 30-50 proposals - For each proposal one lead reviewer (prepares discussion; final comment)	PETRA III: - 3 reviewers per proposal: approx. 20-25 proposals per reviewer FLASH: - 3-4 reviewers per proposal: approx. 10-15 proposals per reviewer	N/A	N/A	ratings from 1-5	N/A
DIAMOND	Panels are organised by technique or beamlines, from 6 up to 11 or 12 evaluators depending the technique. Mostly external reviewers	2 reviewers per proposal aiming to have no more than 25 reviews per reviewer.	Face to face discussions per panel.	Proposals are individually scored by reviewers before the panel meeting. In the panel meetings the proposals get ranked. No scores are shared with users.	Each refree gives a score between 1 and 5, where 5 is the highest score.	Each instrument aims to offer 80% of the available time. Internal = in house and commissioning share the other 20%. No quotas.

FACILITY	SCIENTIFIC EVALUATION					
	PEER REVIEW PANEL	EVALUATORS PER PROPOSAL	KIND OF EVALUATION	EVALUATION PROCEDURE	PROPOSALS SCORES	SCHEDULING CONSTRAINS
ELETTRA	Panels are organised by technique or beamlines, 7 sub-panels	from 2 up to 3 evaluators depending the technique. All external reviewers	All evaluators remote, chairs of subpanels meet face to face	Technical evaluation, if feasible then goes to scientific evaluation. Evaluators assign a score and send comments, the chairs decide the ranking and allocation of time	the scale goes from 1 to 5, the scores are normalised by evaluator and averaged. Chairs of subpanels meet face to face to decide the final score, usually changed only for proposals near the cutoff	From the beamtime available, 30% goes to internal research. The rmaining 70% is for external researchers. Some beamlines of property of external partners have a quota for national users, usually 35% of the total available time.
EUROPEAN XFEL	The scientific reviews are uniquely taken care of by external experts	Usually three reviewers per proposals are appointed.	According to PRCs and the number of proposals to evaluate, one day or two days meetings for the reviewing process are organised.	The reviewers can access the proposals assigned to them to review by the Chairperson of the relevant PRP through our user portal. Evaluators are requested to provide a brief report and score the proposals. At the PRP meeting, the results are discussed and a common approach is found about a final result, including final comments by the panel and a final score. The outcome is then used as basis for the final allocation supervised by the European XFEL management.	Every reviewer gives a score and a comment. Scores are averaged for information in the user portal but the PRPs have freedom give a different score in the final discussions – with respect to the other proposals. There are plans for normalization but so far not implemented.	In principle, out of the beamtime delivered to our facility 80% is for user operation (now 'early user operation), 15% for maintenance, in-house research and upgrades, 5% as management contingency for industrial users or for proposals of exceptional scientific value needing fast access. But at present, in the current allocation period, we try and give 100% of beamtime to users
FELIX	International external advisory committee with min. 5 experts in the various fields	min. 2 evaluators per proposal	In general face to face but occasionally remote evaluation / written procedure	N/A	Categeories A, B and C - min. 2 evaluators, preferable all	Most of the beam time allocated without any constraints, a small fraction of the beam time is reserved as "director's discretion"
HZB-BESSY	N/A	2 external evaluators per proposal (in case of disagreement sometimes 3)	On-line/off-line first, followed by face-to-face meeting	N/A	Averaged ranking, grades A+ to C-	Different quota for joint labs, beamlines run by external facilities, in house, no country quotas (except for a Russian-German-Beamline)
INF.INFN	The User Selection panel is formed by 5 members: 4 external and 1 internal chosen on the basis of their recognized experience and these members are all appointed by the LNF Director.	At least 3 evaluators per proposal	Remote and then face-to-face	The USP members are asked to consider are the following aspects: relevance, innovation, quality of the research, level of potential contribution to an active field of science or an instrument/experimental technique and necessity for a synchrotron/FEL. From this evaluation of the proposals a scientific priority list is achieved that states which proposals are accepted and which ones are rejected.	N/A	N/A

FACILITY	SCIENTIFIC EVALUATION					
	PEER REVIEW PANEL	EVALUATORS PER PROPOSAL	KIND OF EVALUATION	EVALUATION PROCEDURE	PROPOSALS SCORES	SCHEDULING CONSTRAINS
ISIS	9 Facility Access Panels. Each has around 10 external experts, and they review all the proposals submitted in their area. They meet physically twice per year.	There are two principle evaluators assigned to each proposal, but any of the panel members can comment before a final score is reached.	Face-to-face discussion	Panels hear the views of the two principle evaluators and discuss the proposal. The panel reaches agreement on the final score - each proposal is scored from 1-10, with also R-reject but resubmission possible and X-reject with resubmission not possible as options. All proposals are ranked per instrument according to their score, and allocated appropriate time up to the number of days available on each instrument. Panels are encouraged to take publication record from previous beamtime allocations into account when reviewing proposals.	Scoring 1 (very poor) to 10 (outstanding). Proposals can also be scored R – rejection but resubmission welcome, or X – rejection for technical reasons, no resubmission allowed. Each panel produces a single score for each proposal.	We have no time allocated for internal research, and do not apply country quotas. Time is allowed for instrument calibration (normally 1-2 days per instrument at the start of each run cycle) and for commissioning of new equipment e.g. new detectors, cryostats, etc.
JUELICH	7 review panels, each has a variable number of members, one chairperson and one secretary. All reviewers are external	Each review panel has its own way: at the MLZ we have either 2, or, 3 or even 5 reviewers per proposal.	Face-to-face discussion	The User Office distributes the proposals to the review panels and discusses with the review panel secretaries for fine tuning	proposals are scored by each reviewer. average score is calculated and discussed. final scores after the discussion are >8 proposal MUST get beam time between 5 and 8 proposal COULD get beam time if enough beam time is available <5 proposal MUST NOT get beam time. One missing experimental report yields to a penalty of 0.25 point, the penalties are applied after the scientific evaluation	no country balance. 1/3 and 2/3 of the available beam time is devoted to internal and external proposals, respectively
LLB - CEA	N/A	2 external evaluators per proposal	Face to face, but possibility of remote that finish by a face to face between the president of the committee and the LLB organizer	N/A	graded A, B or C (A : beam time allocated, B on the reserve list, C will not be done). To obtain it some of our committees go through the attribution of scores to each beam time request	No internal time, 75% of available beam time given to the committees, the rest being allocated to fast access, alignment, maintenance, failure and B proposals. No quotas per countries. Scheduling of experiment done by dialog between local contact, instrument responsible and proposer.
PSI-Particle Physics facilities	13 memberrs, alla extarnal	6	face-to-face	if technically feasible and safety approved, only scientific ranking, no further balancing	very few new proposals per year therefore final ranking is agreed upon during face-to-face meeting	May-December, 1 cycle per year
PSI-SINQ (neutron source)	16 members, all extranal	2	face-to-face and (only exceptionally) remote	if technically feasible and safety approved, only scientific ranking, no further balancing	score system 0-10 scores by each referee in advance and then agreement on one final score in a meeting	May-December, 2 cycles per year
PSI-SLS (synchrotron light source)	MX: 9 members, non-MX 49 members, all external	MX: 2; non-MX: 3	MX: Remote and non-MX: face-to-face	if technically feasible and safety approved, only scientific ranking, no further balancing	score system 0-5 scores by each referee in advance and then agreement on one final score in a meeting	all over the year except shutdowns, 2 cycles per year

FACILITY	SCIENTIFIC EVALUATION					
	PEER REVIEW PANEL	EVALUATORS PER PROPOSAL	KIND OF EVALUATION	EVALUATION PROCEDURE	PROPOSALS SCORES	SCHEDULING CONSTRAINS
PSI-SμS (muon source)	12 members, all extarnal	2	face-to-face and (only exceptionally) remote	if technically feasible and safety approved, only scientific ranking, no further balancing	score system 0-10 scores by each referee in advance and then agreement on one final score in a meeting	May-December, 2 cycles per year
PSI-SwissFEL (X-ray FEL)	12 members, all external	3	face-to-face	if technically feasible and safety approved, only scientific ranking, no further balancing	score system 0-5 scores by each referee in advance and then agreement on one final score in a meeting	all over the year except shutdowns, 2 cycles per year
SOLEIL	Six Review panels which cover the following area: 1. Diluted matter 2. Electronic and magnetic properties of matter - Surfaces and Interfaces 3. Matter and material properties: Structure, Organisation, Characterisation, Elaboration 4. Chemistry and physico-chemistry - Reactivity in situ - Soft matter 5. Biology - Health 6. Ancient materials - Environment and Earth Scientific peer review panel members are nominated by SOLEIL board of directors. They serve for a fixed period of 2 years, possibly renewable. Each review panel comprises a sufficiently large number of members to cover the main sub-areas of its discipline.	All members can grade all the proposals for which they feel competent. Further, 2 or 3 referees, and among them one spokesperson, are assigned by the chairperson to give a short report on each proposal.	Face to face Meeting takes place twice a year, in the second half of April and in the second half of November.	After each panel meeting, the chairman produces a report for the SOLEIL management. This report: - Comments on the quality and scope of the proposals received - Points out any areas of concern - Recommends any potential improvements to either the beamlines covered by the panel or the allocation process.	Proposals ranking and grading are done online. The average grade of each proposal is calculated on the basis of the number of members which have given an evaluation: The referees give a grade between 1 to 9 to the proposal according to 4 criteria: 1/ scientific interest; 2/ originality; 3/ Clear presentation of the theme; 4/ feasibility; after having been evaluated or informed of their technical feasibility. The grade has a 2,5 coefficient. If a member (not the referee assigned) reads the proposal and gives a grade, the grade has a coefficient of 1. Then, the review panel members after discussions rank the proposals and assign each proposal a final grade (during the face to face meeting). The final ranking allows classifying proposals and gives priority order for adjusting demand to offer. They adjust the amount of requested beamtime if necessary. They recommend the allocation of beamtime on the most appropriate beamline. The decisions are taken by SOLEIL Board of Directors.	65 to 80 % of the beamtime is allocated to proposals submitted to Peer Review Committees (PRCs) evaluation. 20% for in house research. No quotas per countries; only on the basis of the scientific merit.

ACCELERATE

Annex III: Questionnaire 1: Research Infrastructures and COVID-19 related research (March 2020)

Research Infrastructures and COVID-19 Research

QUESTIONNAIRE

Institution:

Brief publishable description of the institution (2 sentences)

Brief description of the service

Contact person's details - To avoid sending email addresses over google forms, please send contact person's details to useroffice@ceric-eric.eu, or include a website's link with the contact person's details:

SERVICES:

- Has your RI set up a specific service to support research on COVID-19?
  - YES (if yes, briefly describe the service replying to the questions in the boxes below)
  - NO

What stage in COVID-19 intervention your RI is addressing: ie basic virus function/immune response; epidemiology modelling; vaccine research; antibody generation and screening; large scale data management, etc

- Which instruments/databases does it involve?
- How is the proposal submitted? (if a form is published on the website, please provide a link)
- Who evaluates the proposal? (e.g. peer-review panel, facility, no evaluation)
- Is the submission continuous, or linked to a deadline?
- What is the estimated time from the submission to the access / service provision?

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ACCESS:

- Is there any restriction as to who can be granted access (e.g. only for members in the case of consortium-based RIs)?

- In the case of analytical facilities (access to instruments), does it allow:
  - Remote access only
  - Remote and on-site access

- Analytical Facilities: If your facility allows remote access only, include a comment (e.g., which instruments are accessible only remotely?)

- Analytical Facilities: If on-site access is allowed, is mobility support available?
  - YES
  - NO

- Analytical Facilities: Are there limitations regarding the type of samples (e.g. pathogens)?
  - YES
  - NO

- Analytical Facilities: Are there special requirements for shipment of the samples?
  - YES
  - NO

- Analytical Facilities: Are there specific requirements regarding the preparation or handling of the samples?
  - YES
  - NO

- All RIs: Is the service free for non-proprietary research?
  - YES
  - NO

- All RIs: Is commercial service available at reduced prices?
  - YES
  - NO

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- Please provide comments related to the questions above (e.g. what support is offered to the industry, if any, what is the maximum biosafety level allowed, what are the specific requirements regarding the shipment)

ACCESSIBILITY OF THE PUBLICATION AND DATA:

- Is there any requirement to publish in open access journals?
  - YES
  - NO

- Is the data generated associated to metadata and is it publicly available?
  - YES
  - NO

- If yes, what is the embargo period?

- Where is the data or metadata published? (e.g. in the institution's catalogue, in other open data repositories, etc).

- Do you have further comments about data or metadata?

PRIVACY STATEMENT

By submitting this form, I agree that my responses to the questionnaire will be processed and used for the purpose of advertising the services provided by my institution in support of research on COVID-19. I confirm that I'm entitled to give consent on behalf of my institution for that purpose.

The questionnaire has been set up in the frame of the CERIC-coordinated project ACCELERATE funded by the European Union Framework Programme for Research and Innovation Horizon 2020, under grant agreement 731112. Responses to the questionnaire will be recorded and preserved by CERIC ERIC for financial auditing reasons in line with the applicable provisions of the ACCELERATE grant agreement.

ACCELERATE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 731112

Questionnaire 1: RIs' COVID19 services

41 respondents (however, the ERF webpage lists 52 RIs – including COVID-19 services also of RIs' that didn't submit their information in the questionnaire)

1. ACTRIS – Aerosol, Clouds and Trace Gases Research Infrastructure
2. ALBA Synchrotron
3. BBMRI-ERIC
4. BigOmics Analytics
5. CERIC-ERIC
6. CIEMAT-Plataforma Solar de Almeria
7. CLARIN ERIC
8. DARIAH ERIC
9. Deutsches Elektronen-Synchrotron DESY in Hamburg (Germany)
10. Diamond Light Source
11. EATRIS
12. ECRIN-ERIC (European Clinical Research Infrastructure)
13. ELECMI (Integrated Infrastructure of ELECtron MIcroscopy for materials Characterization)
14. Elettra-Sincrotrone Trieste S.C.p.A.
15. ELI Beamlines
16. ERINHA
17. ESRF (European Synchrotron Radiation Facility)

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18. EU-OPENSCREEN ERIC
19. Euro-BioImaging ERIC
20. European Spallation Source ERIC
21. EUROPEAN VIRUS ARCHIVE GLOBAL (EVAG)
22. European XFEL
23. Heinz Maier-Leibnitz Zentrum (MLZ)
24. Helmholtz Zentrum Berlin für Materialien und Energie GmbH
25. INFRAFRONTIER
26. Infrastructure for the Production and Characterization of Nanomaterials, Biomaterials and Systems in Biomedicine (NANBIOSIS)
27. Institut Laue Langevin
28. Instruct-ERIC
29. IRTA-CReSA
30. ISIS Neutron and Muon Source, UK
31. Jülich Centre for Neutron Science
32. LifeWatch ERIC
33. MAX IV Laboratory
34. METROFOOD-RI
35. National Hydrogen Centre, CNH2
36. Paul Scherrer Institute
37. SHARE ERIC
38. SIB Swiss Institute of Bioinformatics
39. STFC Central Laser Facility, UK
40. Synchrotron SOLEIL
41. The Partnership for Advanced Computing in Europe (PRACE)

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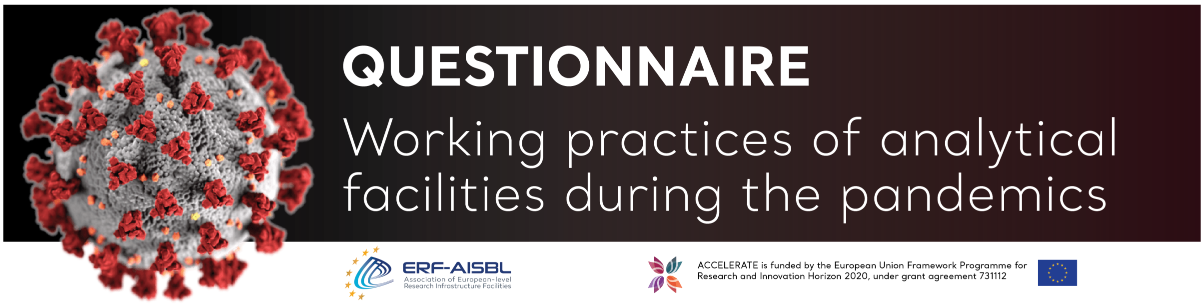
Annex IV: Questionnaire 2: Working practices of analytical facilities during the pandemics (April 2020)



Working practices of analytical facilities during the pandemics

QUESTIONNAIRE

The on-going pandemic has strongly impacted the operations of analytical facilities. To protect their staff, several research infrastructures are closed for operations, while others provide only limited access, primarily focused on COVID-19 related research. Yet the crisis is likely to last months and many facilities will consider restarting their services, albeit remotely and limited in scale. To assist RIs in this transition, we are collecting the current practices regarding safety measures put in place at the facilities.

To this end, we kindly ask the national and pan-European infrastructures [1] to fill in the questionnaire below. In case of questions, please contact useroffice@ceric-eric.eu.

[1] Analytical (experimental) facilities, located in Europe, that are open for international users.

This questionnaire has been set up by the ERF and CERIC in the frame of its EC project ACCELERATE, co-funded by the European Union Framework Programme for Research and Innovation Horizon 2020, grant agreement 731112.

- Institution:

- Contact person's details - To avoid sending email addresses over google forms, please send contact person's details to useroffice@ceric-eric.eu, or include a website's link with the contact person's details.

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- The responses to this questionnaire will be analysed and may be used for the purpose of a summary / analysis document published online. In view of this, I authorize that the institution is mentioned when referring to the replies given in this questionnaire in such summary / analysis document. In case of ticking ‘no’, the replies will be anonymized.
  - YES
  - NO

LEVEL OF OPERATIONS AND ACCESS

- The facility has been closed due to the COVID-19 alarm state:
  - Never
  - A few weeks
  - A few months

- It is currently:
  - In operation
  - Closed

- If in currently in operation, or about restart the operation, please describe the type of activity:
  - COVID-19 related research (remote users and researchers operating the instruments)
  - Research other than COVID-19 related (remote users)
  - Research other than COVID-19 related (researchers operating the instruments)
  - Normal operation

Provide further details.

- Is the number of beamlines and instruments and the staff reduced?

- YES
- NO

If yes, please describe (e.g. only the beamline scientist is present, only half of the instruments are running per day).

- Has your facility put in place measures to facilitate remote access? If yes, please comment.

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SAFETY MEASURES FOR STAFF

- Have you established specific safety protocols for work on-site?
  - YES
  - NO
- If yes:

1) Are your safety protocols publicly available? If so, please provide the link

2) Who can enter the facility (approved staff, authorization for exceptions?)

3) Have staff who are vulnerable or who have caring responsibilities for vulnerable people been identified?

  - YES
  - NO

4) If yes, are they restricted with regard to visiting the site, or are specific measures introduced?

5) What is the cleaning regime for:

- General areas:
- Working areas*:*
- Shared equipment and workstations (e.g. keyboard):

6) Do you provide personal protection equipment (e.g. masks, gloves, clothing)? Please provide details.

7) If any activity requires staff to work closer than the required distance, are mitigating measures put in place?

- Have any measures been either planned or put in place for safety and wellbeing of staff working from home?
  - YES
  - NO
- If yes, please explain.

In case you are not in operation or if you are consider expanding the range of access, what are your plans/protocols?

- Do you have any further comments or proposals?

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By submitting this form, I agree that my responses to the questionnaire will be processed and published in a form of a publicly available report (anonymously, if indicated as such in this questionnaire).

- YES

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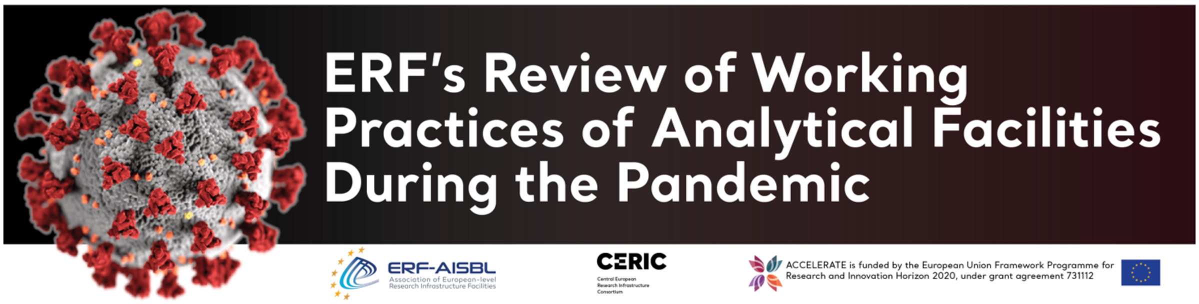

Questionnaire 2: Working practices of Analytical Facilities during the Pandemic

28 Respondents, of which only the following 20 authorised us to disclose their identity:

1. ALBA Synchrotron
2. BNC, Centre for Energy Research
3. CERIC-ERIC
4. Coimbra Laser LAb
5. Deutsches Elektronen-Synchrotron DESY in Hamburg (Germany)
6. Diamond Light Source
7. ELI-DC
8. EPF-Lausanne
9. FORTH, Ultraviolet Laser Facility (ULF-FORTH)
10. Helmholtz zentrum Berlin für Materialien und Energie
11. Helmholtz-Zentrum Dresden-Rossendorf
12. ILL, Institut Laue Langevin
13. Jülich Centre for Neutron Science – Forschungszentrum Jülich GmbH
14. Laboratoire pour l'Utilisation des Lasers Intenses
15. National Institute of Chemistry – NMR centre, Slovenia
16. National Institute of Materials Physics, Magurele, Romania
17. PHELIX at GSI, Germany
18. SOLARIS National Synchrotron Radiation Centre
19. Synchrotron SOLEIL
20. Vilnius University Laser Research Center (Lithuania)

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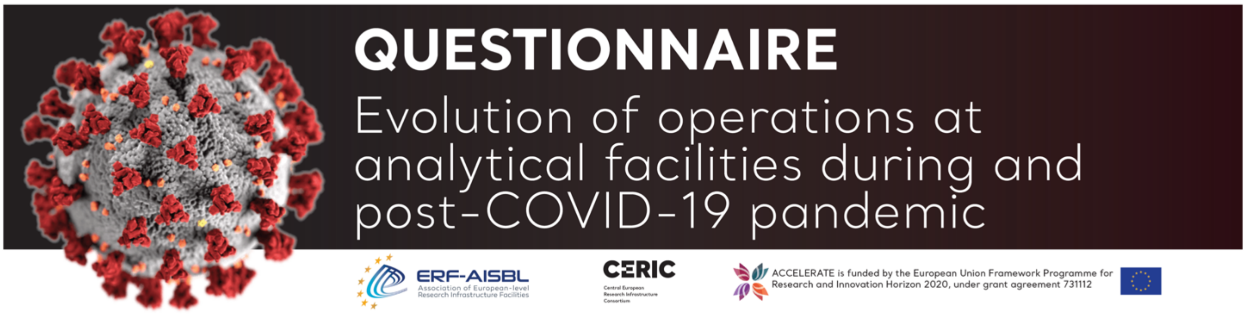
Annex V: Questionnaire 3: Evolution of operations at analytical facilities during and post COVID-19 pandemic (October 2020)



The on-going COVID-19 pandemic has strongly impacted the operations of analytical facilities, from widespread closure or severely restricted operations at the outset to ongoing changes in operations months later. It is not yet possible to predict with any certainty when a complete return to normal operations will be possible. Many facilities are indeed reflecting on how to provide the most effective and resilient services in a world where COVID-19 will continue to be present and perhaps return in successive waves. The experiences of the past few months, with increased provision of remote access, drastically reduced travel possibilities for staff and users, and the widespread development of home office, may even lead to permanent changes to operations, and to new standards for operations and access independent from pandemic considerations.

ERF and CERIC conducted a survey in the Spring 2020 of the measures that RIs had taken in the wake of the first wave of COVID-19 to try to maintain operations, particularly to support research on COVID-19. Much has been learned since then about the nature of the virus, and how to work while it is present in our communities. As outlined above, our perspectives and mindsets for operations of RIs in post-COVID-19 are evolving. We believe it is timely to carry out a follow-up survey to try to capture, share and benefit from these changing experiences, understandings and plans. To this end, we invite the national and pan-European infrastructures [1] to fill in the questionnaire below. In case of questions, please contact useroffice@ceric-eric.eu.

Although not a part of this questionnaire, respondents may find useful the questionnaire that Elettra sent to their beamline staff. In case of questions regarding this questionnaire, please contact Lisa.vaccari@elettra.eu or Andrea.locatteli@elettra.eu.

This questionnaire has been set up by ERF and CERIC in the frame of the EC project ACCELERATE, co-funded by the European Union Framework Programme for Research and Innovation Horizon 2020 (grant agreement 731112), coordinated by CERIC.

[1] Analytical infrastructures that are open to international users and include national infrastructures as well as European networks and consortia of research infrastructures.

- Institution:

ACCELERATE has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N. 731112

- Contact details of respondent - To avoid sending email addresses over google forms, please send your professional contact details to useroffice@ceric-eric.eu, or include a website link where the relevant contact details are available.

- The responses to this questionnaire will be analysed and may be used for the purpose of a summary / analysis document published online. In view of this, I authorize that the name of my institution be mentioned when referring to the replies given in this questionnaire in such summary / analysis document and confirm that I am entitled to respond on behalf of my institution. In case of ticking 'no', your replies will be used only anonymously.
  - YES
  - NO

LEVEL OF OPERATIONS AND ACCESS

- Current state of operations of your facility:
  - Fully operational (pre-COVID-19 operational capacity, with same capacity of on-site user access)
  - Fully operational (pre-COVID-19 operational capacity, with modified access modes)
  - Reduced operational capacity relative to the pre-COVID-19 period
  - No operational capacity for external users

- Please describe the level of operations at the level of the facility (Estimate in % relative to pre-COVID-19 levels: 0 %, 20%, 40%, 60%, 80%, 100%):
  - Average presence of staff on-site (estimate in % relative to pre-COVID-19 levels)
  - % of instruments/end-stations/beamlines running
  - Current average availability (in % relative to the pre-COVID-19 steady state)
  - Overall level (%) of external users served compared to pre-COVID-19.

- Please describe the level of operations at the level of the facility: (tick all appropriate boxes. 1, 2, 3, 4, 5, 6, 7)
  - Number of days per week the facility is running

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Please, provide further details, if you consider relevant, of how operations have been affected if not covered in the above points:

- Please indicate the type of operations that are supported (tick all appropriate boxes):
  - COVID-19 related research (remote users and facility staff operating the instruments)
  - Research other than COVID-19 related (remote users)
  - Research other than COVID-19 related (facility staff operating the instruments)
  - Research other than COVID_19 related (users in presence and remote depending on travel restriction and type of experiments)

Indicate the main measures, if any, that have been introduced to ensure proper engagement level and productivity of the staff working from home:

CHANGES IN OPERATIONS DUE TO COVID-19

- Please indicate the type of user access currently in place at your facility (tick all appropriate boxes: 0%, 20%, 40%, 60%, 80%, 100%):
  - Mail-in access for routine, automated measurements.
    - Estimated share of users served in this mode:
  - Mail-in for more complex remote user experiments assisted by local scientists/staff
    - Estimated share of users served in this mode:
  - Limited user access (fewer users per experiment, others possibly electronically):
    - Estimated share of users served in this mode:
  - Full user access on-site, as in pre-COVID-19 period
    - Estimated share of users served in this mode:

- Please indicate measures introduced to assist remote access (tick all the appropriate boxes):
  - IT resources for data sharing
  - Remote analysis in real-time
  - Webcam and microphones for video conferences
  - Remote control of the data acquisition system
  - Custom solutions

  Other:

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- If users cannot be served on-site, what are the main reasons (please give a score according to the relevance low', 'medium' or 'high')
    - Our facility cannot serve all users due to the limited scope of operations
    - Users cannot prepare samples, due to limited operations of their institutions
    - Users cannot travel to perform the experiments

Other:

- Have additional funds been allocated to facilitate remote access? (tick all appropriate boxes):
    - No
    - Internal funds through reallocation of existing budget
    - Internal funds through allocation following increase of operational budget (e.g. increased membership contributions / institutional funding due to COVID)
    - National project funding
    - European Commission funding
    - EU structural funds

If additional funds have been allocated, please indicate the approximate amount. Enter "0" if your answer to the previous question is "no" or "figure not available" if you are able to provide an estimate.

- Please describe the main issues related to remote access (tick all appropriate boxes). Please also express an opinion of the severity of the problem, by assigning a score of 'low', 'medium' or 'high:
    - Time allocated is generally used less efficiently ('low', 'medium' or 'high')
    - When the experiments are implemented remotely, they take longer and more time has to be allocated overall ('low', 'medium' or 'high')
    - Total available beamtime to be allocated is reduced (e.g. no night shifts) ('low', 'medium' or 'high')
    - Experiments are too complex to provide a high-quality remote service at this point ('low', 'medium' or 'high')
    - Lower service quality due to lack of personal contact ('low', 'medium' or 'high')
    - User engagement is generally lower ('low', 'medium' or 'high')
    - Workload on beamline/instrument scientist is too high ('low', 'medium' or 'high')
    - Reduced training opportunities of users ('low', 'medium' or 'high')
    - Other:

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EXPECTED MEDIUM TO LONG-TERM CHANGES IN OPERATIONS DUE TO COVID-19

- Estimated extent of remote access (Please tick: 0%, 20%, 40%, 60%, 80%, 100%):
    - Pre COVID-19: ________ % of all access
    - Current: ________ % of all access
    - Medium-long term: ________ % of all access

- What do you anticipate will be the main reasons for the use of remote access in the post-Covid-19 period? Please also assign the relevance through a score 'low', 'medium' or 'high'
    - Reducing the time taken to perform an experiment enabling higher throughput ('low', 'medium' or 'high')
    - Decrease environmental impact (e.g. through reduced travel). ('low', 'medium' or 'high')
    - Additional or better service to the users ('low', 'medium' or 'high')
    - Allowing a higher number of users to access each experiment ('low', 'medium' or 'high')
    - Other:

SAFETY MEASURES

- What are the main differences in the safety measures since you first introduced COVID-19 related measures:

    - What safety measures do you plan to put in place in the future?
    - What safety measures would you wish ideally to have in place in the future?

    - Relative to the pre-COVID-19 period, indicate the extent to which staff are travelling (in terms of number of trips), e.g. to do experiments, to attend events, etc.): (please tick: 0%, 20%, 40%, 60%, 80%, 100%):
        - domestically:
        - abroad:

    - Is mask wearing (tick the appropriate one):
        - mandatory everywhere
        - mandatory in shared and common areas

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- not required at all, except when the prescribed distance between people cannot be assured
- Other (please specify)

By submitting this form, I agree that my responses to the questionnaire will be processed and published in a form of a publicly available report.

- YES

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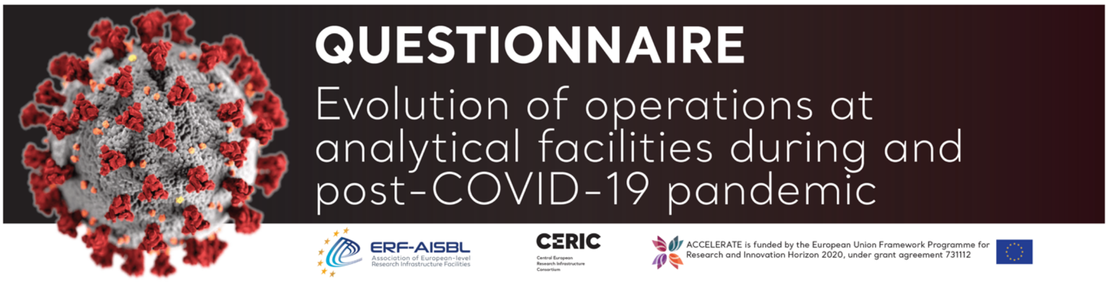

Questionnaire 3: Evolution of operations at analytical facilities during and post COVID-19 pandemic

27 respondents, of which only the following 25 authorised us to disclose their identity:

1. ALBA Synchrotron
2. Budapest Neutron Centre - Centre for Energy
3. CEA-DRF-IRAMIS-LIDYL
4. Centro de Laseres Pulsados
5. Deutsches Elektronen-Synchrotron DESY in Hamburg (Germany)
6. Diamond Light Source
7. Elettra Sincrotrone Trieste
8. European XFEL
9. FELIX Laboratory
10. Forschungszentrum Juelich, JCNS
11. FORTH, Institute of Electronic Structure and Laser, Ultraviolet Laser Facility
12. Heinz Maier-Leibnitz Zentrum, MLZ
13. Helmholtz-Zentrum Dresden-Rossendorf
14. HiLASE
15. HZB Helmholtz Zentrum Berlin für Materialien und Energie HZB – BESSY II
16. ILL, Institut Laue-Langevin
17. ISA, Aarhus University, Denmark
18. ISIS Neutron & Muon Source
19. Laboratoire d'Optique Appliquée
20. National Synchrotron Radiation Centre SOLARIS, Jagiellonian University
21. Nuclear Physics Institution of the Czech Academy of Sciences
22. PALS, Prague Asterix Laser System
23. PAUL SCHERRER INSTITUT
24. Physikalisch-Technische Bundesanstalt
25. Synchrotron SOLEIL

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