

Applicability and challenges related to the Charter for Open Access to Research Infrastructures

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Executive summary

In the EC's Communication A new ERA for Research and Innovation,¹ The Commission proposes that Member States reinforce their commitment to shared policies and principles, drawing on the 20 years of the ERA, by adopting a Pact for Research and Innovation (Pact). In the field of Research Infrastructures (RIs), a relevant contribution to such a Pact could be the Charter for Access to Research Infrastructures (Charter). Since the Pact preparation is planned for the first half of 2021, the present document reviews its applicability and raises the potential need for a revision. It is considered that the Charter needs to cover a vast community of research infrastructures, hence its rather general; however, this needs to be weighed against its usability. For example, the current lack of some key definitions, such as scientific excellence, peer review, and restricted access, makes it possible for many different practices to qualify as excellence-based mode, defying the Charter's purpose.

In the following, some of the issues are proposed for the discussion during the forthcoming updating of the Charter.

- Despite its non-legally binding nature, the Charter's application is mandated by the European Commission for funding trans-national access to RIs. ESFRI also states that the RIs should continue to provide access in line with the Charter. Considering the contribution of the Charter to the increased harmonisation and transparency of the access policies, it is proposed that the reference to the Charter is also included in the next review of the ERIC Practical Guidelines.
- The section on **Definitions** needs to be updated regarding the definition of RIs and the recent development of Open Science. The Charter would also benefit from the inclusion of the definitions of scientific excellence, peer review, and restricted access. While scientific excellence is notoriously different to define, the Charter could include some typical examples, which could be used in its evaluations.
- The Section of **Principles** needs an update as well, as some references are outdated. It is also proposed to consider adding/expanding some principles related to Open science, such as encouraging/mandating the users to publish their peer-reviewed publications under gold or green open access models.

¹ A new ERA for Research and Innovation, 2020, COM(2020) 628 final

- The **Guidelines** describe the Access policy elements and should be updated concerning open access to data and related services (e.g. computing capacities).
- Of particular relevance is the excellence-based mode, which 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. The paper discusses various current practices and proposes clarifying the criteria used to assess the excellence-driven mode proposals. It furthermore suggests examining the inclusion of 'impact' among the criteria of the excellence-based access, and/or considering adding a new impact-based access mode to the Charter. The later would allow the RIs to address a very specific problem, e.g. development of a specific technology. Moreover, the Charter could be reformulated to clearly allow for ringfencing of a part of the excellence-driven access, to allow the RIs to address particular topics, such as Sustainable Development Goals (UN SDGs), or other higher-level priorities of European Research Area.
- The Charter may also benefit from addition of a new section on Supporting measures to the users, which would include services such as certified repositories, data stewardship, computing resources, on-line data evaluation tools, remote access, and similar.
- It is also proposed that the RIs are encouraged to use the ESFRI monitoring framework related to access activities, whenever possible.

1. Introduction

Research infrastructures (RIs) are among critical enablers of scientific research for millennia and one of the cornerstones of science policy globally. As early as the 3rd century BC, the imperative to collect, organise and conserve the knowledge acquired in the service of the advancement of knowledge gave birth to the Mouseion, a cultural centre, university and library founded in Alexandria.² The origin of large physical RIs goes back 90 years when Ernest Lawrence designed the first cyclotron, for which he was awarded a Nobel prize in physics in 1936. The relevance of nuclear research during World War II led to the development of nuclear reactors and particle accelerators, raising the status of RIs as assets for research.^{3,4} The early European RIs for use by European researchers were in nuclear physics (CERN, Joint Research Centre in Ispra, Italy). The European Southern Observatory (ESO) in the early 1960s was perhaps the first collaborative European RI, entirely motivated by scientific ambitions and necessitating collaboration to share the costs.³ A significant step for RIs in Europe was achieved with the launch of the European Research Area, which acknowledged the relevance of the European RIs and stressed the need to develop a European approach to infrastructures, covering the creation of new installations, the functioning of existing ones and access to them.⁵ As a response, the European Strategy Forum on Research Infrastructures (ESFRI) was set-up in 2002. Since then, it has supported a coherent and strategy-led approach to policy-making on research infrastructures in Europe, facilitating multilateral initiatives leading to the better use and development of research infrastructures at the EU and international levels.

² ESF, Science Policy Briefing, Research Infrastructures in the Digital Humanities, Sep 2011, http://resaw.eu/wp-content/uploads/2013/06/ESF_Research-Infrastructures-in-the-Digital-Humanities.pdf

³ M. Hiltzik, Big Science: Ernest Lawrence and the Invention that Launched the Military-Industrial Complex, ISBN: 9781451675757, Simon & Schuster, 2015.

⁴ O. Hallonsten, Research Infrastructures in Europe: The Hype and the Field, Cambridge University Press, 02 March 2020.

⁵ Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions - Towards a European research area, COM/2000/0006 final.

2. Open access to research infrastructures and Charter for Access to Research Infrastructures

Promotion of the competitive and open access to high-quality RIs has been central to the mission of ESFRI since its establishment. The first ESFRI roadmap in 2006 stressed that 'in all cases considered for the roadmap, these infrastructures must apply an 'Open Access' policy for basic research, i.e. be open to all interested researchers, based on open competition and selection of the proposals evaluated on their sole scientific excellence by international peer-review.' In 2008, the Report of the ERA Expert Group⁶ recommended that RIs be open to all interested researchers, based on selecting the best proposals evaluated on their scientific excellence by international 'peer-review'. The need to establish effective access mechanisms was recognised as a priority. The expert group suggested that Large Research Infrastructures develop general guidelines describing various access models since they share some common challenges and problems. This proposal was addressed by the European Commission in 2016 in its European Charter for Access to Research Infrastructures (Charter),⁷ which laid down the principles and guidelines for access and related services. The Charter was conceived to represent a wide range of research infrastructures and procedures, resulting in a rather general description of the topics.

Despite being functional and well-established among the different RIs in Europe, access procedures are evolving, which calls for an assessment of its implementation. The review of the Charter was proposed by the ESFRI White paper, to reinforce further the accessibility of Research Infrastructure services for European scientists and innovators.

This paper looks into the current application of the Charter, reviews its content and proposes some modifications.

⁶ Report of the ERA Expert Group - https://ec.europa.eu/research/infrastructures/pdf/ri_era-expert-group-0308_en.pdf

⁷ EC, ISBN: 978-92-79-45600-8, doi:10.2777/524573

https://ec.europa.eu/info/sites/info/files/research_and_innovation/2016_charterforaccessto-ris.pdf

3. Application of the Charter

The Charter states that, while it does not have any legally binding nature, Research Infrastructures are encouraged to use it when defining or revising their access policies. Nevertheless, adherence to it is a requirement for transnational funding in Horizon 2020 and Horizon Europe calls.⁸ A recently published ESFRI White Paper⁹ also emphasises its role by stating that RIs based on physical or remote access should continue to offer services on an excellence basis in line with the European Charter.

Considering the broad application of the Charter, it is relevant that ERICs, the research infrastructures established by an EC's implementing decision according to the ERIC Regulation,¹⁰ which may or may not be on the ESFRI Roadmap, are currently not mandated to provide access according to the Charter. The ERIC Regulation, which pre-dates the Charter, requires that 'effective access, in accordance with the rules established in its Statutes, is granted to the European research community, composed of researchers from Member States and from associated countries.' The Charter is also not referenced in the ERIC Practical guidelines,¹¹ which aims at assisting applicants for the ERIC legal framework. Considering the contribution of the Charter to the increased harmonisation and transparency of the access policies, it is proposed that the reference to the Charter is included in the next review of the ERIC Practical Guidelines.

4. Suitability of the Charter as a reference document and proposed revisions

The Charter contains the chapters on Definitions, Principles and Guidelines, which, due to the development of the policies and the research infrastructures, should be reviewed. In the following section, some of the Charter's issues are discussed, and some modifications proposed. The list is a non-exhaustive one, and its main aim is to contribute to discussions on the Charter given its forthcoming revision.

⁸ Horizon Europe - Work Programme 2021-2022 Research Infrastructures, draft, December 2020.

⁹ https://www.esfri.eu/sites/default/files/White_paper_ESFRI-final.pdf

¹⁰ Community legal framework for a European Research Infrastructure Consortium (ERIC), COUNCIL REGULATION (EC) No 723/2009 of 25 June 2009

¹¹ ERIC Practical guidelines, European Union, 2015, ISBN 978-92-79-37861-4, doi:10.2777/72348.

4.1 Definitions

The section on Definitions contains many relevant definitions, yet some are outdated, while others need to be either included or further expanded to increase the transparency and relevance of the Charter. As described through examples in this paper, the lack of definition of key concepts, such as scientific excellence, peer review, and restricted access, leads to many different scenarios in the Charter application.

To start the section, the Charter defines RIs. To avoid inconsistencies, it is proposed to align this definition with the one of Horizon Europe Regulation,¹² to be adopted in the first half of 2021.

Access is defined as physical, remote and virtual admission to, interactions with, and use of Research Infrastructures and services offered by Research Infrastructures to Users. These three types of admission would need to be defined in the Charter, and the ESFRI White paper provides a sound basis for their more detailed elaboration, with some modifications. For example, virtual access is defined as free access simultaneously used by an unlimited number of users. The meaning of 'free' needs to be defined. Also, the simultaneous use by an unlimited number of Users might be questioned, for example, due to the network limitations.

Also, the importance of **scientific excellence** in the selection of proposals warrants laying out its definition. A recent review of the Access policies of a variety of RIs¹³ revealed that although all RIs pursue scientific excellence as the primary goal, there are many ways to define excellence. As a part of the criterion RIs usually consider the level of potential contribution to an active field of science or an experimental technique and the likelihood of the experiment to result in a publication, but also other criteria, such as the promotion of PhDs, young or new users, and similar.

The excellence-driven mode requires the selection to be based on internal or external **peer-review** and specifies the selection criteria. As it is not defined, a variety of practices are in line with the requirement. As an example, recent information collected about the COVID-19 dedicated access services of the RIs can be given.¹⁴ The dedicated services typically offer continuous submission and priority/fast access, including mobility support. Most of the facilities have adopted internal

¹² Article 2, Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination, [COM/2018/435 final](#)

¹³ State of Open Access procedures at RIs, ACCELERATE Project Deliverable D2.1, January 2021.

¹⁴ <https://erf-aisbl.eu/wp-content/uploads/RIs-COVID19-Services-Access-to-Instruments.pdf>

review. Among the practices reported there is a review by the scientists in charge, management, or prioritisation at the Science Director's discretion.¹⁵ All these practices may currently be considered in line with the internal peer review requirement. It is proposed that the Charter defines the peer-review in more detail, in order further to increase the transparency of the excellence-driven access mode. An addition of a 'light' peer review, such as some of the COVID-19 ones, could also be considered and defined.

The Charter states that RIs can introduce some **access restrictions** using quota or pre-defined User groups, as long as they clearly communicate such conditions. Access restrictions reflect the real-life situation at various RIs. The Charter describes the rationale for restricting the access, beyond typical membership and fees, such as training and education, research programmes, ethics, legal and contractual obligations. However, it is not clear what the restricted access means, as it is not defined. For example, RIs may restrict access to members on a non-competitive basis. However, they may restrict it to members, or a particular scientific field, and within it, follow the principles of excellence-driven mode.

Considering the recent developments towards Open science and the strong commitment of the Competitiveness Council to it,¹⁶ and the need to contribute to the EOSC (European Open Science Cloud),¹⁷ the chapter on Definitions should be expanded to cover these topics.

4.2 Principles

The chapter covers many of the key principles related to access, some of which need to be updated and expanded.

The Charter refers to The European Code of Conduct for **Research Integrity**¹⁸, which has been updated since the chapter was published.

The principle of encouraging, or mandating the users to publish their peer-reviewed publications under **gold or green open access** model¹⁹ should also be added.

¹⁵ <https://erf-aisbl.eu/research-infrastructures-offer-for-research-on-covid-19/>

¹⁶ The transition towards an Open Science system, Council Conclusions of 27 May 2016, 9526/16

¹⁷ Council conclusions on the European Open Science Cloud (EOSC) of 18 May 2018, 9029/18

¹⁸ ALLEA, The European Code of Conduct for Research Integrity, REVISED EDITION, 2017, ISBN 978-3-00-055767-5

¹⁹ https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/open-access_en.htm

Furthermore, principles relating to the open access to **research data** require a revision. In particular, RIs should be encouraged to adopt and publish data policies and data management plans supporting the FAIR principles and align with the recommendations issued by the EOSC working groups and related initiatives (EOSC Secretariat and EOSC Association, RDA, etc).

4.3 Guidelines

The Guidelines describe the elements of the Access policy. They should be updated with respect to open access to data and related services (e.g. computing capacities), with some proposals elaborated towards this sub-chapter's end. Furthermore, the Charter specifies three access modes to the RIs, i.e. 'excellence-driven', 'market-driven' and 'wide'. These access modes may be insufficient to describe the existing relevant practices of RIs, especially the ones addressing societal challenges.

4.3.1 Excellence-based access mode

Of particular relevance is the excellence-driven mode, which 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.

As mentioned in the Definitions section, various **sub-criteria** may be included as a part of the excellence score. They may also be used to decide between equally ranked proposals.

It may be questioned whether consideration of PhDs or young users should be a part of the excellence evaluation, or contribute to another criterion currently not included among the excellence-based mode ones, namely, impact. With such a criterion RIs may also wish to consider the mission and objectives of the RIs, their owners, or even EU-level policy objectives. The evolving nature of research and innovation policy has led to a strong focus of research and innovation activities on their contributions to Sustainable Development Goals (UN SDGs), and RIs are no exception. ESFRI in its White Paper invited the RIs to include outreach to broader policy objectives as part of their strategic approach and stressed that the sectorial research agendas should be considered for formulating RI missions and objectives, e.g. concerning the UN SDGs.

Therefore, it is proposed to clarify the criteria used for the assessment of the proposals in the excellence-driven mode and consider including 'impact' among the criteria. A possibility of introduction of a new impact-based access mode could also be considered. This could be particularly suitable for technological development, or other targeted solutions, where the production of a high impact publication is not the main goal.

Another issue linked to excellence-based access mode relates to the possibility of dedicating a part of the access to a particular community. The Charter allows for **restricting a part of access**; however, how these restrictions can be applied, is not defined. It would be necessary to specifically mention that it also means partitioning a part of the excellence-based mode.

A rather extreme example is the COVID-19 outbreak. It caused many of the RIs to close doors for operations. As of the end of April, only a third of the analytical facilities responding to the ERF survey enabled general user experiments; however, all but one of these have set up dedicated COVID-19 access.²⁰ ERIC Forum provides another example of a proposed ringfencing of the excellence-driven access. In its recent policy brief,²¹ it states that 'ERICs and the European Commission could jointly benefit from targeted funding for TNA activities that would focus on the enlargement of a particular user base to enhance the circulation of knowledge in the ERA (e.g. specific support for neighbouring countries, or upskilling of a new community for optimal RI use)'.

It is possible to understand that the 'Access restrictions by means of quota or pre-defined User groups', which the RIs can introduce according to the Charter, also applies to the two outlined cases. It is proposed that the Charter is reformulated to clearly allow for ringfencing of a part of the excellence-driven access, to allow the RIs to address particular topics, such as Sustainable Development Goals (UN SDGs), or other higher-level priorities of European Research Area. Yet another issue is linked to the technical feasibility. According to the Charter, the feasibility is evaluated using peer review, demonstrating the peer review's broad meaning in the Charter. Furthermore, the nature of some recent changes is such that they may not only result in the feasibility assessment, as is often the case, with a yes/no/partially answer, but may significantly affect the proposals' ranking.

²⁰ 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.3813493>

²¹ ERIC Forum Policy Brief. Funding Models for Access to ERIC Multinational/ Transnational Services, 2020, https://www.eric-forum.eu/wp-content/uploads/2020/09/ERIC-Forum_Policy-Brief.pdf

Technological developments (e.g. increased resolution in detectors) frequently introduce operational changes that require policies to be modified and adapted. Advanced experiments generate an increasing amount of data that is difficult to handle and that obliges the facilities to create new solutions that often influence the access procedures. As an example, in the cluster of photons and neutron facilities, PaNOSC,²² it has been discussed to include the amount of data generated by an experiment, and the need to analyse and access this data remotely, as parameters to consider for the feasibility of a project proposal.

The issue of the amount of data generated through the access to large scale facilities is present transversally, in most of the analytical techniques, especially those related to imaging and tomography. RIs are taking this challenge into account in their Data Management Plans, also mandated by the current Charter. However, the increasing challenges related to data will require RIs to consider the amount of data generated, if it needs to be processed in real-time (existence of available computing capacities), how will data be transferred and stored, and if raw or processed data needs to be accessible remotely also in the submission phase and used for the evaluation during the technical assessment. It is not excluded that soon, the data issue may lead to the rejection of a proposal on technical grounds, limiting its scope, or even considered a criterion in evaluating the proposals. The inclusion of good practices in data management could, for example, be considered as one of the criteria for the excellence-driven access, as is currently the case with the outputs in terms of publications.

4.3.2 Support measures

The Supporting measures section of the Charter focuses on the facilitation of access, with user support measures such as User manuals, provision of User support, and similar. Although not linked to access the RIs offer also other services, and the Charter refers to Education and training, in particular. This warrants also inclusions of the measures, which support the evaluation and publication of results, reuse of data, and similar. For example, RIs should also be encouraged to provide, either in their premises or through an agreement with third parties, certified repositories where data could be accessible and curated for periods well beyond the embargo.

²² Panosc, The Photon and Neutron Open Science Cloud, www.panosc.eu, Grant agreement 823852

Considering the workload imposed by all the new tasks related to the provision of FAIR data, and the specificity of the tasks involved, the Charter could include the recommendation to RIs to facilitate the task for researchers introducing data stewards for this purpose.

A further element driven by technological advances and related to data is the large datasets generation, which cannot be easily moved from the facility. This situation is typical in some analytical facilities such as Free Electron lasers or tomography and imaging instruments. In these cases, the Charter could recommend that facilities make available, in addition to the datasets, computing resources for online data analysis.

The provision of these kind of services should be included in the in the new or enlarges section of Support measures.

4.3.3 Other issues

In addition to the type of access, the Guidelines also address transparency, health, safety, and other issues. Major editing is needed concerning open science and in particular open data.

It is also proposed that the RIs are recommended using the ESFRI monitoring framework related access activities, whenever possible.

5. Conclusions

The paper looks at the Charter for access to research infrastructures, which contains definitions, principles and guidelines relating to access to RIs. Since its publication in 2016, it became a reference document for the European RIs, and the Commission and ESFRI strongly support its use.

The paper reviews the various Charter elements, and several topics are proposed for further discussion. While it is very challenging to find common grounds between very diverse RIs, it is believed that the elaboration of some of the Charter's aspects might significantly increase the effect that the Charter has on the operations of the RIs.

6. Acknowledgement

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