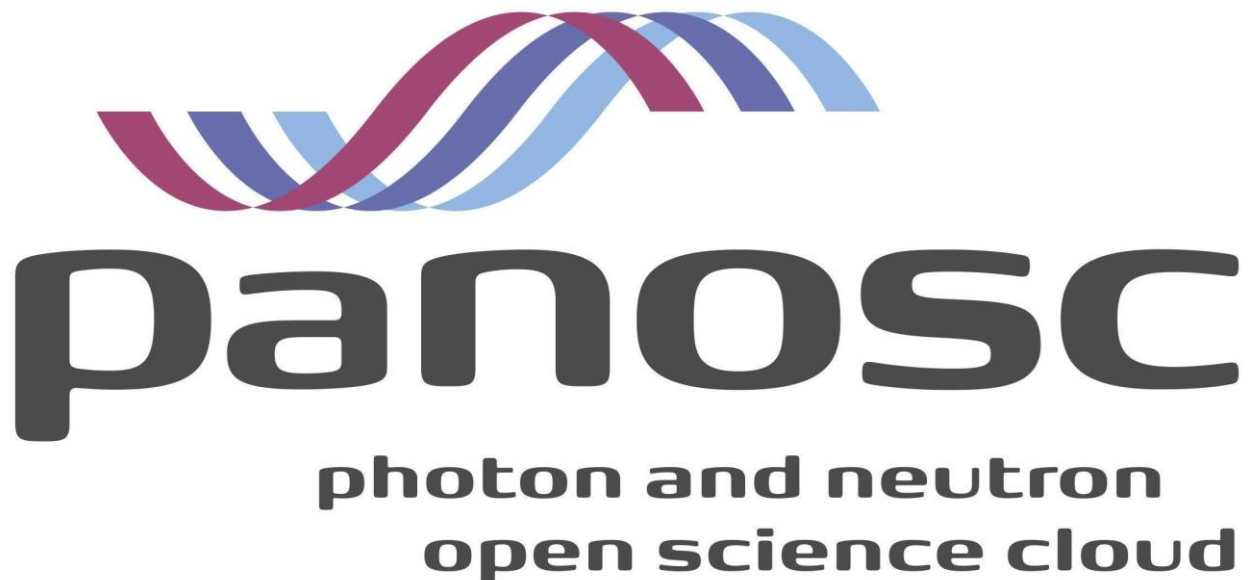


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Deliverable: 2.4 - Integration of the policy in the User Access and facility information systems

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1. Introduction

This document presents progress in adopting or adapting existing data management policies to the CERIC-ERIC PaNOSC data policy framework. This deliverable has been coordinated by CERIC-ERIC and ELI and prepared in collaboration with all the PaNOSC partners.

1.1 Adoption of PaNOSC data policy framework

In May 2020, the PaNOSC data policy framework was delivered to the European Commission as a deliverable of the PaNOSC project. It was published on [zenodo](https://zenodo.org/doi/10.5281/zenodo.3826040) (DOI 10.5281/zenodo.3826040) and is also accessible via the [PaNOSC website](#). Now, after two years from the beginning of the project, ELI and CERIC are going to adopt the data policy and the other partners are adapting their existing policies to be compatible with the PaNOSC Data Policy framework. This document aims to provide a clear picture of the status of this process and what the next steps are for each partner in order to get the data policies endorsed by their management and operating in the real scientific data management workflow.

2. Integration status

Integrating a scientific or research data management policy (RDP) in the real scientific discovery process is not an easy task. It requires the involvement of many different stakeholders and changing of their habits. It is a long process.

This chapter describes the specific situation and reports on the current status and the future developments of each research infrastructure involved in PaNOSC.



2.1 ESRF

Before PaNOSC the ESRF had already adopted a Data Policy (DP) in 2015 based on the PaNdata Data Policy framework (<https://www.esrf.fr/datapolicy>). When requesting beam time, the users have to agree to the data policy. This includes agreeing to the 3-year embargo period after which the data become open access. The ESRF DP has been part of the ESRF policies since December 2015. To reach this status, the DP had to be reviewed and agreed upon by the ESRF directors, the Scientific Advisory Committee (SAC), and the Council, the highest governing body of the ESRF. The DP is worded in a very general way to cover a wide range of situations where scientific data is produced as part of the data life cycle at the ESRF.

2.1.1 Current status

The PaNOSC project has been extremely useful to identify changes in the data policy landscape which should be included in the ESRF Data Policy and/or implementation. These changes have been documented in MS7¹. These changes led to a drafting of a new text for the Data Policy

¹ <https://github.com/panosc->



which was submitted to the science directors. The feedback was that they agreed in principle, but found there were too many implementation details for a policy document. It was decided to resubmit a new draft with only those items which could be considered as policy changes. A second document with implementation details in them will be provided separately.

2.1.2 Future developments

The next step is to meet with the ESRF top management to discuss which changes should be included in the policy and which in the implementation notes. Once this has been done, a new draft of the Data Policy will be prepared and submitted to the Scientific Advisory Committee and Council for approval. These actions will take place before the end of PaNOSC. In the meantime, the ESRF Data Policy is being applied to raw and processed data using the current implementation of the data repository based on ICAT.



2.2 EuXFEL

The present Scientific Data Policy was accepted by the European XFEL Council on 30 June 2017, shortly before the first beam time at the facility. The adoption of the policy was driven by the IT and Data Management group with the strong support of the responsible Scientific Director and with the involvement of various scientific, technical and administration groups.

The current data policy defines the common terms, rights and responsibilities of the facility and scientists performing experiments. The data policy covers all types of activities with respect to data generated across the facility as a whole. It allows the facility users and personnel to understand the necessary aspects of data stewardship at European XFEL. Acceptance of the Scientific Data Policy is a prerequisite for the award of beam time. Thus, each user must accept individually the Scientific Data Policy upon registration in the European XFEL user portal (UPEX).

The present Scientific Data Policy is based on the recommendations of the PaN-data Europe Strategic Working Group and the common framework for scientific data management at photon and neutron facilities established in 2011.

The benefits of having the data policy available have already been demonstrated in many circumstances. However, over time, it became clear that there is a need to update it according to the new paradigms and developments related to the FAIR data management concept.

2.2.1 Current status

European XFEL has identified differences between the current Scientific Data Policy and the recommendations in the "PaNOSC Data Policy framework".

The most prominent differences concern new options of preserving sets of raw and processed

[eu/panosc/blob/master/Submitted%20Milestones/07%20Adoption%20of%20PaNOSC%20DP%20Framework/PaNOSC-MS2.2%20-%20Adoption%20of%20PaNOSC%20DP%20framework.pdf](https://eu.panosc/blob/master/Submitted%20Milestones/07%20Adoption%20of%20PaNOSC%20DP%20Framework/PaNOSC-MS2.2%20-%20Adoption%20of%20PaNOSC%20DP%20framework.pdf)

data, introducing the data management plan, enhancement of metadata management and their content, and support of persistent identifiers.

European XFEL has received positive recommendations from the external committee appointed by the Management of the European XFEL with respect to adoption of the PaNOSC FAIR data policy framework. Furthermore, the topic was consulted with the user community during the annual European XFEL User Meeting in a dedicated session on “FAIR Data Management”.

Based on the analysis of differences, a new data policy has been drafted by the IT and Data Management group. The draft of the new Scientific Data Policy is being discussed within the Data Department of the European XFEL.

2.2.2 Future developments

The next step will be presenting a new version of the draft for further consultations with other internal stakeholders, such as Instrument Scientists, User Office and Legal group. After subsequent analysis and incorporation of this feedback, an updated version of the Scientific Data Policy will be presented to the Management Board for approval and subsequent presentation to the Scientific Advisory Committee to obtain its recommendation.

The final document will be then proposed to the European XFEL Council for final approval. The time needed to adopt the updated Scientific Data Policy is estimated to be one year.



2.3 ESS

Article 21 of the Statutes of the ESS states that ESS will adopt an Intellectual Property Rights and Data Policy. This provides the general principle that Open Access shall be favoured and that software shall be Open Source. With the intention of providing clear, concise policy documents, it was decided to have one Policy for Scientific Data and one Policy for Intellectual Property Rights, the latter receiving no further discussion herein.

The current Policy for Scientific Data was approved by the ESS Council in 2017. The policy covers raw data & metadata and results from non-proprietary use of ESS neutron instruments. The policy describes privileged and open access to data and specifies the use of persistent identifiers for raw data sets.

The main drivers for ESS to develop and formally agree a policy for scientific data early in the construction phase were the Head of the Data Management and Software Centre (DMSC), the Head of the Data Management Group, and the Director for Science. The process to develop the policy and gain council approval was undertaken in 2017. The process took approximately 12 months. There was considerable support from the ESS Director General.

The key reason to develop a policy for scientific data early in the ESS construction phase was to set the policy framework in place to assist future developments in scientific computing. As an example, one can use the existence of a data policy as a lever for developing scientific computing in a way that is commensurate with empowering open data for the ESS scientific community.

Though not the only reason, one important incentive for the ESS data policy was to maintain compliance with the core EU ambition for Open data.

The ESS policy for scientific data is based upon the proforma policy created by the PaNdata project. An initial comparison map was made of existing data policies from European research infrastructure. This document and the PaNdata proforma were used to develop a policy for ESS.

The ESS policy specifically excludes data from proprietary use of ESS beamlines / instruments. Metadata that constitutes sensitive data is not explicitly included or excluded. From the ESS perspective, this aspect falls within other policies set by the organisation.

In light of recent developments of data policy best practice from PaNOSC and ExPaNDS. The policy will be updated to reflect the movement towards FAIR data and best practice for research data management.

2.3.1 Current status

The adoption of the new data policy requires the review and approval of several stakeholders at ESS. The process starts at DMSC who, with input from the Scientific Activities Division, prepares an initial draft of the policy document in line with the Statutes of the ESS and the insight to best practise gained from PaNOSC and ExPaNDS. This preparatory stage requires a number of rounds to ensure precise, accurate language is used, clearly conveying each point and also to ensure uniformity between policies in terms of acronyms used and defined phrases.

The next phase of the process is to obtain approval. At each level of approval it will be necessary to make amendments to include the views of the body giving approval. The first level of approval is from the Science Management Team, made up of ESS staff and including the Director of Science. The second level of approval is from the Scientific Advisory Committee, a team of external experts who advise the ESS and the ESS Council. Finally, the policy will be presented to the ESS Council, the ESS's highest governing body.

At the moment the status of integration of the data policy in ESS can be described as follows:

- The current ESS Policy for Scientific Data has been used to guide the first draft of an updated Policy for Scientific Data.
- A team from the DMSC and Scientific Activities Division has undertaken an iterative cycle of revisions, to converge on a document with the clarity and precision that is necessary in such a policy.
- The Science Management Team is primed to review the policy as soon as the draft has converged.

2.3.2 Future developments

It is expected that the updated Policy for Scientific Data will receive approval by the ESS Council during 2022. In the meantime, work has started in implementing the general principles of the new policy ahead of that approval. In particular, key platforms for data management are being established such that the FAIR data principles are promoted. One clear example of this is the development of the metadata catalogue, SciCat, which will enable users to capture and share data simply, as well as enabling ESS to make data open, after an embargo period, in a way that is useful to the whole community.

2.4 ILL

A Data Policy (DP) has been in operation at the ILL since 2012, with the latest version being adopted in 2017. This policy already integrates several aspects of the FAIR principles. The Data Policy is displayed on the ILL's proposal portal (User Club), and requires the user's agreement when submitting a proposal. This includes agreeing to the 3 to 5 years embargo period regarding open access to the data. All proposed changes to the Data Policy must be approved by the Data Protection and Processing Group (DPP) and then by the ILL Management Board.

2.4.1 Current status

In order to conform to the PaNOSC Data Policy Framework regarding FAIR principles, the current ILL Data Policy has to be updated with the few changes mentioned in the MS7 document. The creation of this new policy draft has been delayed as a result of the staff turnover and difficulties regarding the recruitment on ILL's side, which directly affected the project schedule. The policy will get updated in the next few weeks, then it will be submitted for review and approval, as previously mentioned.

2.4.2 Future developments

Once the updated policy is approved by the ILL Management, it will be published on the ILL's website. An evaluation of the technical aspects necessary to implement the changes will be then made. Changes to the Data Policy will mainly affect the ILL's data management services, but could additionally require changes to data processes and procedures.

CERIC

2.5 CERIC-ERIC

Adopting a data policy is a management decision because the data policy will be part of the governance documents of the RI. The main drivers should include top management. They will need to be supported by IT experts, scientists and data managers. For CERIC-ERIC the decision was taken by the Executive Director of CERIC-ERIC.

The main reasons and benefits of adopting a Research Data Policy are many and range from the need to make science reproducible and replicable by adopting Open Science approach, following the recommendations of international bodies like the OECD, ISC, IUCr, implementing the FAIR principles to enable the re-use of data, providing scientists with new data services, archiving of important datasets, to improving the quality of scientific data. For CERIC-ERIC the data policy is necessary to be compliant with H2020 funding. Also, CERIC committed to the ORDP for the data generated in the ACCELERATE project. CERIC believes that open data will benefit researchers and institutions, increasing the visibility, enhancing collaborations and allowing a better use of resources.

The obvious place to start for Photon and Neutron Research Infrastructures is with one of the existing Research Data Policy frameworks developed specifically for the Photon and Neutron RIs, namely the most recent PaNOSC [1] one (written in 2020) which specifically treats the FAIR principles and is an update of the original PaNdata [2] one (written in 2010).

CERIC-ERIC used the PaN-data policy guidelines and incorporated elements of other existing policies (ALBA synchrotron, Elettra Sincrotrone Trieste, EuXFEL, ESS, ESRF, ILL).

The important groups of people to consult are the beamline scientists, the User Office, legal office and management, who will be confronted with the consequences of implementing the DRP. In addition, the control engineers, data managers and IT engineers need to be involved in the implementation. Users have to agree to the policy when applying for any of the instruments and beamlines offered. New data consumers (who do not have access to state-of-the-art RIs) should also be consulted. The latter group is represented by community organisation (e.g. IUCr) and forums (e.g. RDA and GO-FAIR). CERIC-ERIC is a consortium offering access to 8 facilities in Europe. Our Partner Facilities were consulted and the final decision was made in June 2021 by the General Assembly. Users were not consulted so far, this may happen at a later stage.

The RDP should be reviewed by the legal counsel of the Research Infrastructure to ensure it complies with the legal statutes of the institute. The RDP should be reviewed by the Data Protection Officer to ensure it complies with GDPR for scientific data. In case of CERIC-ERIC the RDP wasn't checked by a lawyer so far.

The RDP covers scientific research data and metadata. Data can be raw data, processed data, auxiliary data or results (refer to the PaNOSC data policy framework [1] for a definition of the different types of data). It is highly recommended to exclude data from clinical trials or other data where the samples refer to identifiable humans, as these are considered sensitive data. Paleontological human samples are not considered sensitive data. Proprietary research (resulting from commercial beamtime) is usually not covered by the RDP. The RDP of CERIC-ERIC can be applied to all the data produced and relative metadata. Personal or sensitive data will not be disclosed.

The implementation of an RDP requires dedicated personnel mainly data managers but also controls engineers, data scientists, and IT personnel. Training will be necessary during the implementation.

It is necessary to review the RDP at regular intervals to consider the evolving norms for research data (e.g. introduction of the FAIR principles in 2016) and experience gained in implementing the RDP. The data management landscape is evolving with the increased adoption of the FAIR principles and Open Science methodology thanks to the efforts of scientific communities and support from scientific bodies and governments, and last but not least, the EOSC. The RDP needs to be regularly reviewed to consider new guidelines like FAIR and be adapted if the new guidelines improve scientific data management. The review process should be foreseen, and minor changes should be possible without going through the full approval process.

The CERIC RDP is considered a living document. Reviews may take place when necessary and, in case major changes are required, the maximum time for a deliberation is up to 6 months.

Now, it is standard practice to adapt the definitions of certain terms in the template to the local vocabulary. If a definition needs to be altered significantly then it is better to introduce a new

term. CERIC-ERIC needed to include the definition of 'Partner Facility', due to its particular nature.

The RDP should guarantee that all curated data can be read and understood by the custodians of the data, i.e. the RI. Defining the data format in which (raw, processed, auxiliary and results) data will be curated ensures the data can be read. Standard metadata and/or using standard vocabularies are part of ensuring data can be understood by the community. The preferred data format and vocabulary should be mentioned in the RDP. In CERIC-ERIC, HDF5 may fit the needs of all the partners.

CERIC-ERIC has chosen 3 years of embargo period, which is the standard duration for a PhD degree, and it is a reasonable period in which all data should have led to a publication.

The embargo period is based on an average PhD project duration and is a compromise for research projects that need more than 3 years. The RDP should foresee the extension of the embargo period for such projects and ensure the process is easy for researchers. It should not however encourage blanket extensions to the embargo period for research groups without good reasons.

In CERIC-ERIC, the PI can request an extension of the embargo period based on legitimate grounds defined by CERIC-ERIC.

One of the main reasons for adopting an RDP is to improve the quality of scientific data and be able to provide data services to researchers. Adopting an RDP should go hand in hand with the proposal of new data services enabled by proper data management, e.g. services like long-term archiving, download and data transfer services, data processing and analysis services, DOI services, etc.

For CERIC-ERIC, specific services are not specified in the RDP (and thus not approved by the General Assembly). The following compliant services are to be provided in the near-future:

- persistent identifier, for example DOI generation,
- data and metadata catalogues,
- access to and storage of raw, processed and auxiliary data,
- long-term data archiving service (10 years for data and indefinite for metadata).
- Automatic metadata ingestion (through e-logbook if available).

Now, the ideal granularity is to provide researchers with the possibility of minting DOIs for a bespoke set of datasets. To ensure all data including unpublished data are referenced by a DOI most sites offer a DOI which is minted automatically. The automatically minted DOIs granularity is usually at the level of the proposal or beamtime session.

Data should be archived for as long as possible. Most of the PaN RIs implement archiving for 10 years but time is a compromise based on the costs of archiving and what was considered a good starting value. In the future, this could be shortened or lengthened depending on financial reasons and the scientific interest in the data.

DOIs for Instruments allows them to be identified in a given configuration. Some sites are already generating DOIs for Instruments but only one PaN RI is generating Instrument DOIs. This should evolve in the future to include more sites.

Two Open Source solutions developed by the PaN community are used at multiple sites, namely ICAT (<https://icatproject.org/>) and SciCat (<https://scicatproject.github.io/>). In addition, there are local solutions used by individual sites. Raw data refers to the experiment data generated at the facility which are persisted and is implementation specific. Raw data do not necessarily only refer to the output generated directly by the detector but may refer to data produced further down the processing pipeline. Raw data represents the data closest to the ground reality to reproduce the results and which are stored for long-term archiving. This can refer to processed data which has been reduced in order to be archived.

With the increasing data volumes, Data Management Plans are becoming more and more necessary in order to ensure that users are aware of the data volumes that will be produced and how to process them. Currently, none of the PaN RIs have DMPs in place. PaNOSC and ExPaNDS are collaborating on a solution for generating and managing DMPs for PaN RIs.

2.5.1 Current status

Now, adopting the RDP doesn't involve only an agreement between the Partner Facilities but the capability of CERIC-ERIC as a whole to implement it in reality, which means including the support of the technical systems involved in the whole life cycle of the scientific data acquisition, analysis, processing and curation. At the moment the status of integration of the RDP in CERIC-ERIC can be described as follows:

- the RDP has been approved by the CERIC-ERIC General Assembly.
- only one among 8 of the Partner Facilities (PF) has an approved RDP: Elettra has integrated the RDP in the proposal submission system (VUO) and asks users to approve the RDP as a condition to submit the proposal via VUO. The Elettra RDP is FAIR but not exactly the same as the RDP approved by the CERIC-ERIC General Assembly.
- only one among 8 PFs can mint DOIs: Elettra can generate DOIs that by default can be associated with a whole proposal/investigation. The users can anyhow decide to generate a DOI and associate it to a specific dataset to be used in publications.
- A Data Portal is available in Elettra and is going to be integrated with ICAT.
- long-term data archiving service is under testing in Elettra (10 years for data and indefinite for metadata). DMPs are mandatory for each beamline but currently have not yet been defined.
- Automatic metadata ingestion (through e-logbook if available) is under implementation on some of the beamlines in Elettra.

2.5.2 Future developments

In order to meet the final objectives of PaNOSC many things have to be done. The intrinsic structure of CERIC-ERIC makes all these steps even more difficult to implement. Nevertheless, it is clear that gradually all the mandatory steps have to be taken by all the facilities.

The first step will be for sure the integration of the RDP in the proposal submission system. The experience acquired by Elettra where the proposal management systems already request the users to accept the RDP before submitting the proposal will be transferred to the other 8 PFs. CERIC-ERIC is currently using a specific version of the VUO as a proposal management system. In order to facilitate the adoption of the RDP by all the other PFs the VUO can be extended in order to ask the users to accept the RDP depending on the PF providing the specific instrument required by the proposal.

In the same line, the DOI management system already integrated in the VUO have to be adopted by the other PFs.

The integration of the Data Portal with ICAT should be completed and a decision on the long-term storage should be taken in order to comply with the specific rules of the different countries. Automatic data ingestion implementation should continue in the beamlines hosted by the Italian PF and be possibly extended to the other PFs.



2.6 ELI

On 30 April 2021, the Extreme Light Infrastructure (ELI) was granted the legal status of European Research Infrastructure Consortium (ERIC) by the European Commission. ELI ERIC will provide access to world-class high power and ultra-fast lasers for science and enable cutting-edge research in physical, chemical, materials, and medical sciences, as well as breakthrough technological innovations.

The ERIC is a specific legal form designed to facilitate the establishment and operation of Research Infrastructures of European interest. ERICs are participated by states and international organisations as members. As a main statutory mission, ELI ERIC is responsible for making the ELI Facilities available to the scientific community as a single international organisation, with unified governance and management.

The Czech Republic hosts the ELI ERIC statutory seat in Dolní Břežany, in the South of Prague, at the ELI Beamlines facility. A second facility, ELI-ALPS, is hosted by Hungary in Szeged. The Czech Republic and Hungary are joined by Italy and Lithuania as founding members, while Germany and Bulgaria are founding observers. A third ELI facility is under construction in Romania in the field of nuclear photonics and is expected to complement the current ELI ERIC facilities in the future.

The General Assembly of ELI ERIC is in charge of approving the policies of the organisation, including the Data Policy. Article 13 of the ELI ERIC Statutes reads as follows:

- 13(1) 'Data' refers to all information collected by users and the staff while performing scientific experiments under the access for users' policy and performing operations of the ELI Facilities.
- 13(2) Open Access to FAIR data sets and metadata stored in Open Access repositories shall be favoured for data collected as a result of the use of the ELI Facilities and, to the extent possible in case of software and computer programmes created by the ELI ERIC and the ELI Facilities; open source principles shall be considered.

Statutory policies are the cornerstones of ELI's management system. They set the vision and missions of the organisation in the various areas of management. Policies are worked out and proposed by the Director General and Management Board to the General Assembly, which approves them after review by advisory bodies (Administrative and Finance Committee, AFC,

and/or International Scientific and Technical Advisory Committee, ISTAC, depending on the policy area).

The ELI Data Policy, drafted by the ELI management, builds on the Data Policy Framework developed within the PaNOSC WP2. It confirms the commitment of ELI to abide by the FAIR principles in the management of all experimental and scientific data generated at the ELI Facilities.

The approval of the Data Policy requires the approval of the ELI ERIC General Assembly by a qualified majority. As a first step, the proposed Data Policy was discussed and approved by the Management Board, which includes the ELI ERIC Directors and Directors of the ELI ERIC Facilities. It was then presented to the AFC, to the General Assembly for a first review, and is now to be submitted to the ISTAC. The proposal will be consolidated after this ultimate review and submitted formally for approval by the ELI ERIC Director General to the ELI General Assembly. We expect the overall process to be completed and have the Data Policy approved by the end of 2021.

The development of the Data Management Plan for all ELI experiments is an ongoing process. and it starts with the design and implementation of systems supporting the integrated management and, at the same time, preparing the Data Policy implementation plan.

2.6.1 Current status

Current activities, such as the development of the User Office and User Portal processes and procedures, as a part of the integrated management system designed to support the integration of the Data Policy or development of a custom electronic logbook for ELI experiments, not depending directly on the Data Policy approval process, are designed to support and facilitate the implementation of the Data Policy.

Since the Data Policy presented to the ELI ERIC General Assembly is now sent for a final review to the International Scientific and Technical Advisory Committee, the Computing Teams at the two ELI host facilities are now actively promoting the FAIR principles and working on identifying the required tools and services that could support current and future users.

Even if the Data Policy has not yet been adopted, based on the ELI ERIC Statutes and positive feedback received from the General Assembly, a set of independent but integrable projects have been started. The Pilot projects such as benchmarking the data cataloguing solutions ICAT/NEXUS and INVENIO/NEXUS aiming to enrich the visibility and data or the new notebook based electronic logbook solution that is now starting as a pilot project together with ELI-ALPS and ELI Beamlines.

2.6.2 Future developments

Considering that the adoption of ELI's Data Policy is expected before the end of 2021, the ELI ERIC Team has started preparing the Data Policy implementation, training data stewards and raising the awareness of the teams and staff in order to facilitate the future implementation of the Data Policy.

3. Conclusions

Integrating a scientific or research data management policy (RDP) in the real scientific discovery process is not an easy task. It requires the involvement of many stakeholders and changing of their habits. It is a long process. We have described in this document the specific situation and reported on the current status and the future developments of each research infrastructure involved in PaNOSC. Most of the research infrastructures involved in PaNOSC have already in place a RDP based on the PaNdata Data Policy framework. All the research infrastructure involved in PaNOSC are currently modifying their RDP to be fully compliant to the PaNOSC data policy framework delivered in 2020 to the European Commission as a deliverable of the PaNOSC project, published on [zenodo](https://zenodo.org/doi/10.5281/zenodo.3826040) (DOI 10.5281/zenodo.3826040) and accessible via the [PaNOSC website](https://panosc.eu). The approval process takes time and is on the way. In the same line, all the research infrastructures are currently implementing the required support infrastructure needed to integrate the RDP in the daily operations. By the end of the PaNOSC project, all the research infrastructures are planning to have adopted or updated RDP in place with the user required to accept it before having access to the beamtime for publicly funded research.

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