

# FAIR Principles

## Findable



The first step in (re)using data is to find them. Metadata and data should be easy to find for both humans and computers. Machine-readable metadata are essential for automatic discovery of datasets and services, so this is an essential component of the FAIRification process.

## Accessible



Once the user finds the required data, she/he needs to know how can they be accessed, possibly including authentication and authorisation.

## Interoperable



The data usually need to be integrated with other data. In addition, the data need to interoperate with applications or workflows for analysis, storage, and processing.

## Reusable



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 823852. The ultimate goal of FAIR is to optimise the reuse of data. To achieve this, metadata and data should be well-described so that they can be replicated and/or combined in different settings.



In 2016, the "FAIR Guiding Principles for scientific data management and stewardship" were published in Nature Scientific Data. The authors intended to provide guidelines to improve the findability, accessibility, interoperability, and reuse of digital assets. The principles emphasise machine-actionability (i.e., the capacity of computational systems to find, access, interoperate, and reuse data with none or minimal human intervention) because humans increasingly rely on computational support to deal with data as a result of the increase in volume, complexity, and creation speed of data.

# Contact

## Leader WP1 – Data Catalogue and Services

Jordi Bodera Sempere  
Phone: +33 476 882308  
Email: jordi.bodera@esrf.fr

## Leader WP2 – Data Policy and Stewardship:

Andy Götz  
Phone: +33 476 882131  
Email: andy.gotz@esrf.fr

## Leader WP3 – Data Catalog Services

Tobias Richter  
Phone: +46 72 1792 314  
Email: tobias.richter@esss.se

## Leader WP4 – Data Analysis Services

Hans Fanghor  
Phone: +49 (0)40 8998-6702  
Email: hans.fangohr@xfel.eu

## Leader WP5 – Virtual Neutron and X-ray Laboratory (VINYL)

Carsten Fortmann-Grote  
Email: carsten.grote@xfel.eu

## Leader WP6 – EOSC integration

Jean-François Perrin  
Email: perrin@ill.eu

## Leader WP7 – Sustainability

Roberto Pugliese  
Phone: +39 040 375 8028  
Email: roberto.pugliese@ceric-eric.eu

## Leader WP8 – Staff and User Training

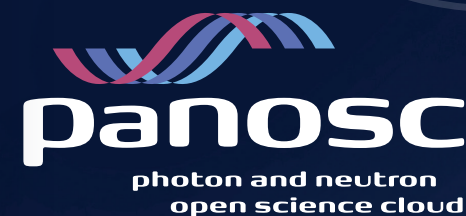
Thomas Rod  
Phone: +45 2550 3909  
Email: thomas.rod@esss.se

## Leader WP9 – Outreach / Communication and Dissemination / Impact

Nicoletta Carboni  
Phone: +39 040 375 8953  
Email: nicoletta.carboni@ceric-eric.eu



[www.panosc.eu](http://www.panosc.eu)



# Making FAIR data a reality

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 823852



[www.panosc.eu](http://www.panosc.eu)

# FAIR Principles

## Findable



The first step in (re)using data is to find them. Metadata and data should be easy to find for both humans and computers. Machine-readable metadata are essential for automatic discovery of datasets and services, so this is an essential component of the FAIRification process.

## Accessible



Once the user finds the required data, she/he needs to know how can they be accessed, possibly including authentication and authorisation.

## Interoperable



The data usually need to be integrated with other data. In addition, the data need to interoperate with applications or workflows for analysis, storage, and processing.

## Reusable



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 823852. The ultimate goal of FAIR is to optimise the reuse of data. To achieve this, metadata and data should be well-described so that they can be replicated and/or combined in different settings.



In 2016, the "FAIR Guiding Principles for scientific data management and stewardship" were published in Nature Scientific Data. The authors intended to provide guidelines to improve the findability, accessibility, interoperability, and reuse of digital assets. The principles emphasise machine-actionability (i.e., the capacity of computational systems to find, access, interoperate, and reuse data with none or minimal human intervention) because humans increasingly rely on computational support to deal with data as a result of the increase in volume, complexity, and creation speed of data.

# Contact

## Leader WP1 – Data Catalogue and Services

Jordi Bodera Sempere  
Phone: +33 476 882308  
Email: jordi.bodera@esrf.fr

## Leader WP2 – Data Policy and Stewardship:

Andy Götz  
Phone: +33 476 882131  
Email: andy.gotz@esrf.fr

## Leader WP3 – Data Catalog Services

Tobias Richter  
Phone: +46 72 1792 314  
Email: tobias.richter@esss.se

## Leader WP4 – Data Analysis Services

Hans Fanghor  
Phone: +49 (0)40 8998-6702  
Email: hans.fangohr@xfel.eu

## Leader WP5 – Virtual Neutron and X-ray Laboratory (VINYL)

Carsten Fortmann-Grote  
Email: carsten.grote@xfel.eu

## Leader WP6 – EOSC integration

Jean-François Perrin  
Email: perrin@ill.eu

## Leader WP7 – Sustainability

Roberto Pugliese  
Phone: +39 040 375 8028  
Email: roberto.pugliese@ceric-eric.eu

## Leader WP8 – Staff and User Training

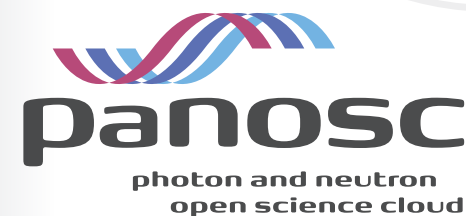
Thomas Rod  
Phone: +45 2550 3909  
Email: thomas.rod@esss.se

## Leader WP9 – Outreach / Communication and Dissemination / Impact

Nicoletta Carboni  
Phone: +39 040 375 8953  
Email: nicoletta.carboni@ceric-eric.eu



[www.panosc.eu](http://www.panosc.eu)



# Making FAIR data a reality

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 823852



[www.panosc.eu](http://www.panosc.eu)

# FAIR Principles

## Findable



The first step in (re)using data is to find them. Metadata and data should be easy to find for both humans and computers. Machine-readable metadata are essential for automatic discovery of datasets and services, so this is an essential component of the FAIRification process.

## Accessible



Once the user finds the required data, she/he needs to know how can they be accessed, possibly including authentication and authorisation.

## Interoperable



The data usually need to be integrated with other data. In addition, the data need to interoperate with applications or workflows for analysis, storage, and processing.

## Reusable



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 823852. The ultimate goal of FAIR is to optimise the reuse of data. To achieve this, metadata and data should be well-described so that they can be replicated and/or combined in different settings.



In 2016, the "FAIR Guiding Principles for scientific data management and stewardship" were published in Nature Scientific Data. The authors intended to provide guidelines to improve the findability, accessibility, interoperability, and reuse of digital assets. The principles emphasise machine-actionability (i.e., the capacity of computational systems to find, access, interoperate, and reuse data with none or minimal human intervention) because humans increasingly rely on computational support to deal with data as a result of the increase in volume, complexity, and creation speed of data.

# Contact

## Leader WP1 – Data Catalogue and Services

Jordi Bodera Sempere  
Phone: +33 476 882308  
Email: jordi.bodera@esrf.fr

## Leader WP2 – Data Policy and Stewardship:

Andy Götz  
Phone: +33 476 882131  
Email: andy.gotz@esrf.fr

## Leader WP3 – Data Catalog Services

Tobias Richter  
Phone: +46 72 1792 314  
Email: tobias.richter@esss.se

## Leader WP4 – Data Analysis Services

Hans Fanghor  
Phone: +49 (0)40 8998-6702  
Email: hans.fanghor@xfel.eu

## Leader WP5 – Virtual Neutron and X-ray Laboratory (VINYL)

Carsten Fortmann-Grote  
Email: carsten.grote@xfel.eu

## Leader WP6 – EOSC integration

Jean-François Perrin  
Email: perrin@ill.eu

## Leader WP7 – Sustainability

Roberto Pugliese  
Phone: +39 040 375 8028  
Email: roberto.pugliese@ceric-eric.eu

## Leader WP8 – Staff and User Training

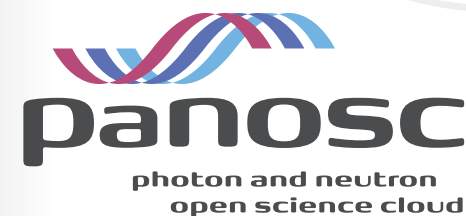
Thomas Rod  
Phone: +45 2550 3909  
Email: thomas.rod@esss.se

## Leader WP9 – Outreach / Communication and Dissemination / Impact

Nicoletta Carboni  
Phone: +39 040 375 8953  
Email: nicoletta.carboni@ceric-eric.eu



[www.panosc.eu](http://www.panosc.eu)



**Making  
FAIR data  
a reality**

Elecaerferi temos re  
et vent erferibus.  
Pienesequis solum  
aboreiur sit ommo.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 823852



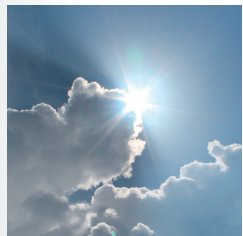
[www.panosc.eu](http://www.panosc.eu)



# About PaNOSC

## Subhead

Analyse, use and re-use raw data from PaN facilities, using Jupyter notebooks based data analysis services. Get new scientific insights using technique specific notebook recipes with the advanced technology for remote and cloud access via a user-friendly interface.



## Subsubhead

The PaNOSC project, Photon and Neutron Open Science Cloud, brings together six strategic European research infrastructures (ESRF, CERIC-ERIC, ELI Delivery Consortium, the European Spallation Source, European XFEL and the Institut Laue-Langevin – ILL, and the e-infrastructures EGI and GEANT), with the goal of contributing to the construction and development of the EOSC, an ecosystem allowing universal and cross-disciplinary open access to data through a single access point, for researchers in all scientific fields.

The mission is to contribute to the realization of a data commons for Neutron and Photon science, providing services and tools for data storage, analysis and simulation, for the many scientists from existing and future disciplines using data from photon and neutron sources. To achieve this aim, the exchange of know-how and experiences is crucial to driving a change in culture by embracing Open Science among the targeted scientific communities.

### The main objectives of PaNOSC are:

- Participate in the construction of the EOSC by linking with the e-infrastructures and other ESFRI clusters.
- Make scientific data produced at Europe's major Photon and Neutron sources fully compatible with the FAIR principles.
- Generalise the adoption of open data policies, standard metadata and data stewardship from 15 photon and neutron RIs and physics institutes across Europe.
- Provide innovative data services to the users of these facilities locally and the scientific community at large via the European Open Science Cloud (EOSC).
- Increase the impact of RIs by ensuring data from user experiments are used beyond the initial scope.
- Share the outcomes with the national RIs who are observers in the proposal and the community at large to promote the adoption of FAIR data principles, data stewardship and the EOSC.

# Services



## Data Catalog

Search, find and access data from PaN sources across the federated, cross-disciplinary and cross-border data catalogues infrastructure. Get easy access to the broadest sets of data from the diverse catalogues of European photon and neutron facilities, through the PaNOSC data catalogues using the federated search engine compatible with OpenAIRE.



## Data Analysis

Analyse, use and re-use raw data from PaN facilities, using Jupyter notebooks based data analysis services. Get new scientific insights using technique specific notebook recipes with the advanced technology for remote and cloud access via a user-friendly interface.



## Pan Software Catalogue

Access the PaN software catalogue linked to the analysis and simulation software used in PaN facilities. Find documentation, links and complete examples of data sets and practical information about the scientific instruments used to collect them.



## Data Storage

Search, find and access data from PaN sources across the federated, cross-disciplinary and cross-border data catalogues infrastructure, and access scientific open data remotely.



## Data Analysis Simulation Data System

Enter PaN cloud-based virtual facility and access the available simulation data services to rapidly prototype and execute (both experimental and simulation) data workflows from designing your beamline (using OASYS) to simulating the data to be produced to better plan your experiment and/or understand the results.



## Help Desk

Contact us for any question or clarification about the services developed for the PaN user community.