

A multi-module Open science kit



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Training

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From	Iryna Kuchma	EIFL	28/09/2018
Edited by	André Vieira, Pedro Príncipe, Najla Rettberg, Iryna Kuchma	UMINHO, UGOE, EIFL	14/11/2018
Reviewed by	Paula Moura, Pedro Príncipe	UMINHO	19/11/2018
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Publishable Summary

This report provides an overview of a multi-module Open science kit – a diverse set of training materials on different open science aspects for life sciences, social sciences, humanities, computing, engineering and other disciplines being developed in collaboration with FOSTER project. Targeted towards researchers, content providers, research managers, funders, research communities and innovators the kit aims to progress researchers from being aware of open science to being able to put open science into practice in their daily workflows.

1 | INTRODUCTION

The OpenAIRE portal includes a variety of support and training materials on how to implement open science targeted at a range of stakeholders: researchers, content providers, research managers, funders, research communities and innovators.







- Open science in Europe <https://www.openaire.eu/open-science-europe-overview>
- EC policies and mandates on Open Access to publications and research data, FAIR data <https://www.openaire.eu/ec-policies-and-mandates>

In addition, the OpenAIRE and FOSTER projects collaborate on releasing online courses on how to practice open science. The courses overview is provided below.

2 | OPENAIRE SUPPORT GUIDANCE FOR OPEN SCIENCE

Within the OpenAIRE Advance support activities several guides and other training and support materials has been developed targeting the different OpenAIRE users to acquire the skills and competencies for an effective Open Science implementation.

In order to engage with different stakeholders in all matters related to Open Science policies and practices, OpenAIRE presents the Open Science support and training materials categorized in six main categories as presented below.

 <p>Primers</p> <p>Getting started on Open Science good practices</p> <p>www.openaire.eu/os-primers</p>	 <p>Guides</p> <p>Howto's on practicing Open Science and on using OpenAIRE services</p> <p>www.openaire.eu/guides</p>
 <p>Factsheets</p> <p>Quick references on Open Science in H2020 topics</p> <p>www.openaire.eu/openaire-h2020-factsheets</p>	 <p>FAQs</p> <p>Quick answers to Open Science practices and OpenAIRE services issues</p> <p>www.openaire.eu/faqs</p>
 <p>Use cases</p> <p>of OpenAIRE services for different stakeholders</p> <p>www.openaire.eu/use-cases</p>	 <p>Webinars</p> <p>Training on Open Science topics</p> <p>www.openaire.eu/frontpage/webinars</p>

2.1 Open Science Primers

OpenAIRE offers two Open Science Primers:

- **Open Access Basics:** An Open Access primer to get you started
<https://www.openaire.eu/oa-basics>

- Research Data Management Handbook: a primer on managing your research data
<https://www.openaire.eu/rdm-handbook>

2.2 Open Science Guides

In order to provide guidance on practicing Open Science, OpenAIRE offers a number of support guides for different stakeholders, namely Researchers, Content Providers, Funders and Research Administrators, as can be found in the following table.

Guide / Stakeholder	Link
Researchers	
How to comply with H2020 mandate - for publications	www.openaire.eu/how-to-comply-to-h2020-mandates-for-publications
How to comply with H2020 mandate - for research data	www.openaire.eu/how-to-comply-to-h2020-mandates-for-data
How to identify and assess Research Data Management (RDM) costs	www.openaire.eu/how-to-comply-to-h2020-mandates-rdm-costs
How to make your data FAIR	www.openaire.eu/how-to-make-your-data-fair
How to select a data repository?	www.openaire.eu/opendatapilot-repository-guide
How to create a Data Management Plan for H2020 projects	www.openaire.eu/how-to-create-a-data-management-plan
Licenses for data	www.openaire.eu/licences-for-data-guide
How to deal with sensitive data	www.openaire.eu/sensitive-data-guide
How to deal with non-digital data	www.openaire.eu/non-digital-data-guide
DMP - data formats for preservation	www.openaire.eu/data-formats-preservation-guide
Open science in Europe	www.openaire.eu/open-science-europe-overview
EC policies and mandates on OA to publications and research and FAIR data	www.openaire.eu/ec-policies-and-mandates
Content Providers	
Making your repository Open	www.openaire.eu/making-your-repository-open
Funders	
Why, what and how to monitor	www.openaire.eu/monitoring-guide
How to join OpenAIRE	www.openaire.eu/funders-how-to-join-guide
Research Administrators	
Open Access policies guide: designing your Open Access policy	www.openaire.eu/open-access-policies-guide

2.3 OpenAIRE services guides

OpenAIRE develops and delivers a range of Open Science services. The following table outlines the user guides for OpenAIRE services.

Guide	Link
Zenodo – A universal repository for all your research outcomes	www.openaire.eu/zenodo-guide
Amnesia – Anonymize your data before publishing	www.openaire.eu/amnesia-guide
Explore – How to report your publication and data to the EC	www.openaire.eu/reporting-to-the-ec
Explore – How to claim a publication to your funding	www.openaire.eu/claim-publication
ScholExplorer – Literature & Data interlinking	www.openaire.eu/scholexplorer-guide
Provide – How to validate and register your repository	www.openaire.eu/validator-registration-guide
Provide – How to enrich research artifacts	www.openaire.eu/content-enrichment-guide
Usage Statistics – How to track the usage activity of your repository	www.openaire.eu/guides-usage-statistics

2.4 OpenAIRE Open Science focused webinars

The OpenAIRE webinars are designed to all stakeholders to acquire the skills and competencies to practice Open Science, to learn how to comply with H2020 OA mandates and how to use the OpenAIRE services.

The OpenAIRE portal includes series of webinars for each category of stakeholders listed below.

- Project coordinators**
 Recordings and slides from 34 webinars for H2020 project coordinators detailing the requirements and guidelines on the Open Access to publications and Open Research Data, including issues related with the costs for publications and data management and sharing.
 Link: www.openaire.eu/category/project-coordinators
- Researchers**
 Recordings and slides from 42 webinars for researchers, including discipline specific webinars on Open Science practices and generic webinars detailing the requirements and guidelines for the Open Access to publications and for the Open Research Data in H2020.
 Link: www.openaire.eu/category/researchers

- **Research Communities**

Recordings and slides from 35 webinars for research communities on Open Science publishing and other OpenAIRE services, focusing on all kinds of research outputs and objects, such as publications, datasets, software., etc.

Link: www.openaire.eu/category/research-communities-2

- **NCPs**

Recordings and slides from 26 webinars to support the EC National Contact Points (NCPs) activities on disseminating Open Access to publications policy and Open Research Data requirements and other Open Science related issues, including legal and ethical topics.

Link: www.openaire.eu/category/ncps

- **Content Providers**

Recordings and slides from 15 webinars on interoperability guidelines, OpenAIRE services for linking research objects and on enriching the publications and data repositories content and metadata records, and on the next generation of literature repositories.

Link: www.openaire.eu/category/content-providers

- **Research support staff**

Recordings and slides from 37 webinars for research managers, librarians, research support offices on the practical implementation of the Open Science policies and workflows in research institutions, including the details on the Open Access and Open Data requirements in H2020.

Link: www.openaire.eu/category/research-support-staff

- **Funders**

Recordings and slides from five webinars for funders on the implementation of Open Science policies, requirements for Open Access mandates and Open Research Data policies, including webinars on the OpenAIRE services for research funding organizations.

Link: www.openaire.eu/category/funders-2

3 | FOSTER OPEN SCIENCE TRAINING COURSES

OpenAIRE uses and reuses the content and platform of FOSTER Open Science Training Courses <https://www.fosteropenscience.eu/toolkit>. The courses cover a range of open science aspects including open access, open data, open source, open methods and open peer-review. A key objective for the courses was to reuse intermediate level and interactive content to ensure the training is practical and engaging. To this end, CRG, GESIS and DARIAH as disciplinary partners included examples of relevant tools and resources that can help researchers in life sciences, social sciences and humanities put open science into practice.

There are ten courses covering the following topics:

1. [What is open science?](#)
2. [Best practices in open research](#)
3. [Managing and sharing research data](#)
4. [Open source software and workflows](#)
5. [Data protection and ethics](#)
6. [Licensing](#)
7. [Open access publishing](#)
8. [Sharing preprints](#)
9. [Open peer review](#)
10. [Open Science and innovation](#)

Figure 1 – FOSTER Open Science training courses



Each course takes about 1-2 hours to work through and a badge is awarded upon completion. The courses include practical tips on getting started with open science as well as provide information on discipline specific tools and resources.

They do not aim to provide comprehensive coverage of all possible issues that may fall under a given course topic but rather to provide focused, practical and – where relevant – discipline specific examples to try and answer some of the burning questions researchers have about practicing open science.

Table 1 – List of learning objectives for each course – Upon completing the courses you (a researcher) will understand/know/learn/be prepared/be able/be aware

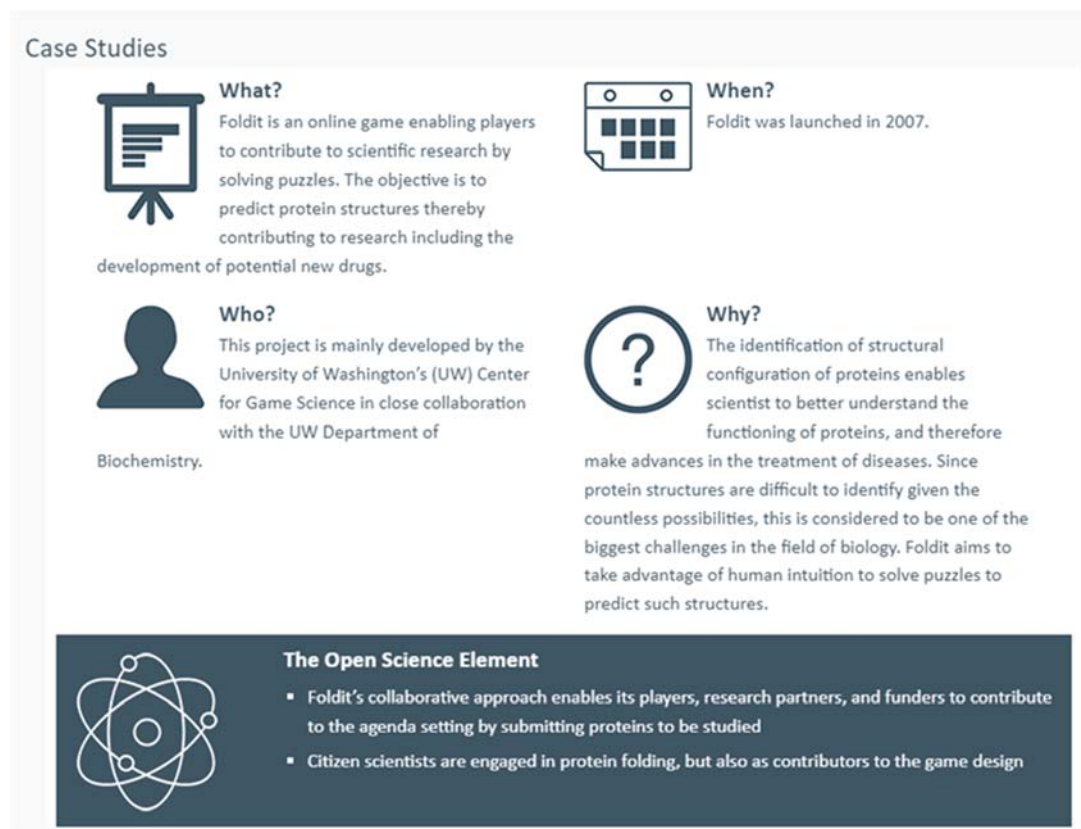
What is open science?
<ul style="list-style-type: none"> • understand why open science is an issue that you can't afford to ignore
<ul style="list-style-type: none"> • understand how to go about making your own research more open
<ul style="list-style-type: none"> • know what funders expect to see about open access and data sharing when applying for new grants
<ul style="list-style-type: none"> • learn how to progress your career through practicing open science
Best practices in open research
<ul style="list-style-type: none"> • understand the practical implications of taking a more open approach to research
<ul style="list-style-type: none"> • be prepared to meet expectations relating to openness from funders, publishers and peers
<ul style="list-style-type: none"> • be able to reap the benefits of working openly
<ul style="list-style-type: none"> • have an understanding of the guiding principles to follow when building openness in to your research workflow
<ul style="list-style-type: none"> • know about some useful tools and resources to help you embed Open Science into work research practices
Managing and sharing research data
<ul style="list-style-type: none"> • understand which data you can make open and which need to be protected
<ul style="list-style-type: none"> • know how to go about writing a data management plan
<ul style="list-style-type: none"> • understand the FAIR principles
<ul style="list-style-type: none"> • be able to select which data to keep and find an appropriate repository for them
<ul style="list-style-type: none"> • learn tips on how to get maximum impact from your research data
Open source software and workflows
<ul style="list-style-type: none"> • understand the roles that open source software and open workflows play in supporting open science

<ul style="list-style-type: none"> • know how open science can support reproducibility
<ul style="list-style-type: none"> • be aware of different stakeholders' needs when it comes to software and workflows
<ul style="list-style-type: none"> • know about useful tools and resources to help you get started with using open source software and open workflows
Data Protection and Ethics
<ul style="list-style-type: none"> • what personal data are and how you can protect them
<ul style="list-style-type: none"> • what to consider when developing consent forms
<ul style="list-style-type: none"> • how to store your data securely
<ul style="list-style-type: none"> • how to anonymize your data
Licensing
<ul style="list-style-type: none"> • know what licenses are, how they work, and how to apply them
<ul style="list-style-type: none"> • understand how different types of licenses can affect research output reuse
<ul style="list-style-type: none"> • know how to select the appropriate license for your research
Open access publishing
<ul style="list-style-type: none"> • understand how to publish your work openly and be aware of the advantages
<ul style="list-style-type: none"> • be able to find an open access publisher for your research
<ul style="list-style-type: none"> • know how to find a suitable repository to provide open access and archive your work
<ul style="list-style-type: none"> • know how to publish open access monographs
<ul style="list-style-type: none"> • understand funders' expectations and policies on open access
<ul style="list-style-type: none"> • be able to secure funding for Article Processing Charges (APCs) where applicable
Sharing preprints
<ul style="list-style-type: none"> • know what preprints are
<ul style="list-style-type: none"> • be able to find a suitable preprints platform to share your early findings
<ul style="list-style-type: none"> • understand the pro and cons of sharing preprints
<ul style="list-style-type: none"> • be aware of how sharing preprints can benefit your career progression
Open peer review
<ul style="list-style-type: none"> • understand what open peer review means and how it supports open science
<ul style="list-style-type: none"> • be aware of open peer review workflows and which aspects of the review process can be conducted openly
<ul style="list-style-type: none"> • know how to write a constructive and responsible open peer review
<ul style="list-style-type: none"> • know about useful tools and services that can support you putting open peer review into practice

Open science and innovation
<ul style="list-style-type: none"> • understand key concepts and values of open business models and responsible research and innovation
<ul style="list-style-type: none"> • know how to plan your innovation activities
<ul style="list-style-type: none"> • be able to use Creative Commons licenses in business
<ul style="list-style-type: none"> • understand new technology transfer policies with the ethos of open science
<ul style="list-style-type: none"> • learn how to get things to market faster

To make the module content more practical, FOSTER disciplinary partners (GESIS, CRG, and UGOE) have produced case studies illustrating relevant tools and resources available to researchers. FOSTER has opted to emulate the approach developed by the European Commission's Open Science Monitor¹ to share these examples – i.e., each short study explains who was involved in developing the tool or resource, what the tool or resource helps researchers to do, and why using them helps researchers to practice Open Science.

Figure 2 – Open Science Monitor Case Studies

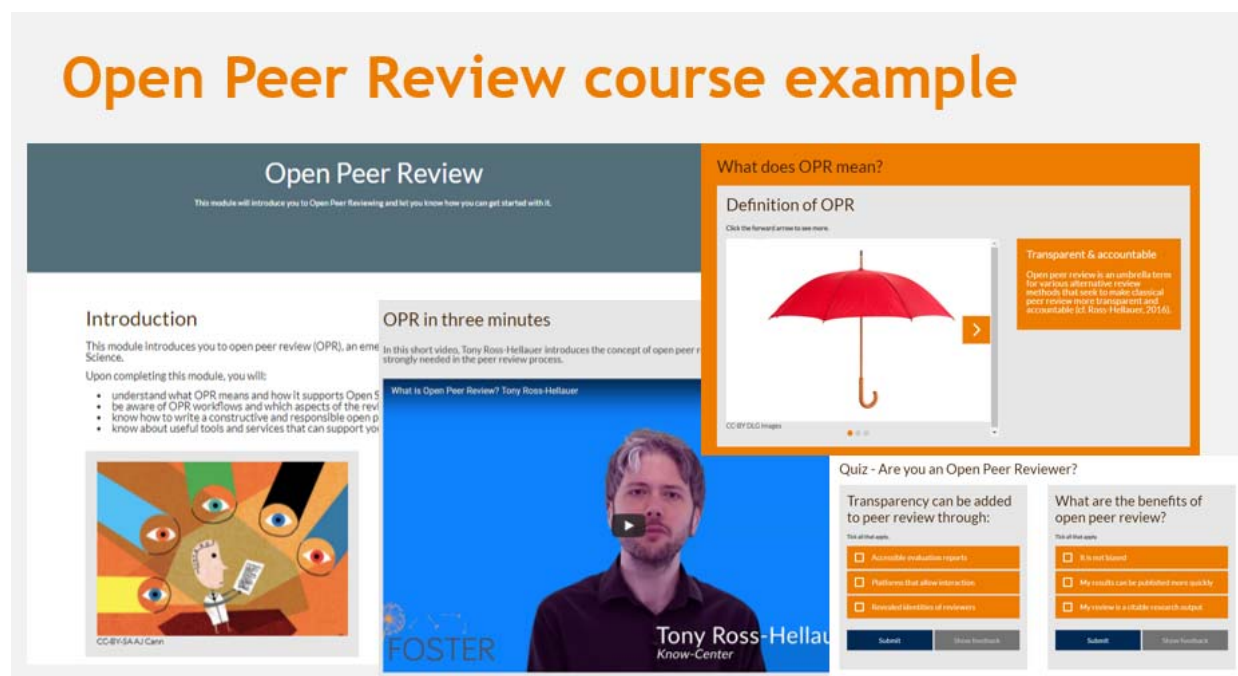


¹ <http://ec.europa.eu/research/openscience/index.cfm?pg=citizen§ion=monitor>

There is no specified pathway through the courses. Participants simply take the courses that are of interest to them. By avoiding specified routes through the courses, the toolkit can easily be extended to accommodate new content as required.

Each course has been developed to include interactive content to ensure that the training is engaging. To develop the courses, open content was reused wherever possible.

Figure 2 – FOSTER Open Science Training Toolkit course sample



To avoid duplicating effort and to maximize shared efforts, FOSTER is collaborating with a range of related training initiatives such as the Open Science MOOC being developed by Jon Tennant as well as European Research Infrastructures offering training and guidance on aspects of Open Science such as CESSDA and DARIAH.

The content will be downloadable as SCORM packages which can be easily adapted and reused by trainers which should significantly reduce the burden on those who find themselves tasked with delivering open science training with limited resources.

3.1 Learning Pathways

A learning pathway is an ordered list of courses (logically ordered list of modules ending with an exam/quiz resulting in a learner receiving a certificate/badge), which can lead to receiving a specialization. This interface enables users to easily navigate the portal, engage with the training materials, immediately start learning and gain a new skill that can be used in their working environment. FOSTER platform includes a series of learning pathways, whereby users are able to

dive into the open science concepts and develop skills they need. The usefulness of learning pathways is threefold and users can:

- a) Discover related courses in a subject matter of their interest,
- b) Get access to a concrete educational route, which after explored can result into developing an expertise
- c) Use the learning path as a mean to get equipped with a new skill – specialization.

The following specializations have been developed as pathways through relevant content presented in the individual courses. Each specialization requires that the participant works through between three and five courses. The combination of courses has been selected to ensure that participants can understand the bigger picture and not just a single component of open science. For example, to earn the Open Peer Reviewer specialization, participants will not only need to take this course so that they know what open peer review is but will also need to take the Managing and sharing research data and Open source software and workflows courses so that they understand the role both of these play in supporting validation and reproducibility.

FOSTER offers the following specializations:

- The reproducible research practitioner
- The responsible data sharer
- The open access author
- The open peer reviewer
- The open innovator

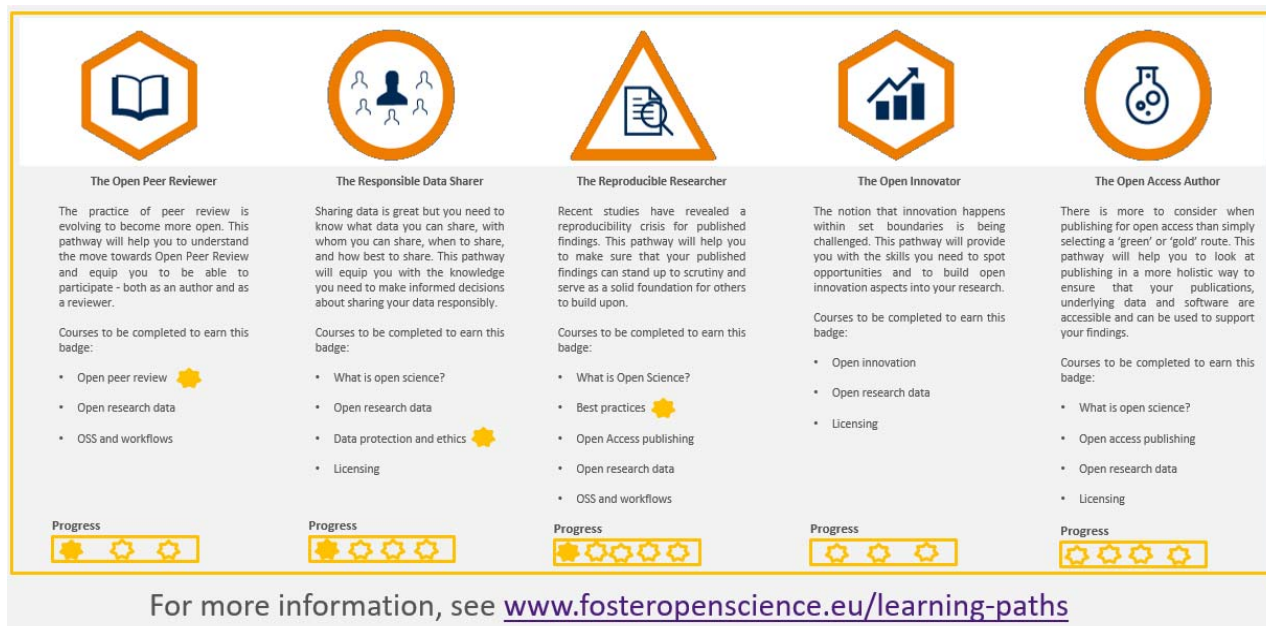
Figure 3 – Learning paths Specialisms dashboard



The specializations are presented as stand-alone options via the FOSTER portal so that users can choose to access the training content in a specific way in order to gain specialist badges. For more information, please see the FOSTER Portal².

For those working through the toolkit courses in a more random way, the system will track progress and will automatically awarded a specialization if the user has completed the required set of courses. For instance, if a participant has worked through the Managing and sharing research data and Open source software and workflows courses out of interest, they will be prompted to consider taking the Open peer review course so that they can earn the specialism badge for the Open peer reviewer.

² <https://www.fosteropenscience.eu/learning-paths>

Figure 4 – Specialisms dashboard

3.2 Open Badges

Open badges provide visual symbols of accomplishments packed with verifiable data and evidence that can be shared across the web. To incentivize researchers to spend time working through the training content, participants will be awarded an open badge upon successful completion of a quiz for each course undertaken. Upon successful completion of a set of defined courses (learning pathways for the specialisms) the participant will receive a specialism badge. If all specialisms are completed, the participant will be awarded an Open Science practitioner badge.

4 | NEXT STEPS

OpenAIRE will collect case studies from computing, engineering and other disciplines and will launch new courses extending the current FOSTER reach (life sciences, social sciences and humanities).

OpenAIRE will also collaborate with the Community of Practice for training coordinators and managers, launched by OpenAIRE with representatives of CESSDA, DARIAH, ELIXIR, EOSC-hub, EOSCpilot, FREYA, GEANT, Parthenos and PRACE, on making OpenAIRE training materials FAIR, offer open badges, measure impact of training and build skills and competencies more effectively.

And OpenAIRE will keep monitoring the needs (e.g. via the helpdesk question) and will create new guidelines, e.g. on how to make repositories FAIR, as planned in the “Report on Extend helpdesk content” (OpenAIRE deliverable 4.1).