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OpenAIRE

Supporting a European open access mandate

Research outcomes resulting from taxpayers' investment in research are a common good and should be made openly available for all. According to the European Commission (EC), open access (OA) is defined as the "practice of providing online access to reusable scientific information that is free of charge to the end user."¹ The EC is a significant funder of research and facilitates collaborative and cross-disciplinary scientific activities. In 2008, the EC launched the Open Access Pilot,² requiring beneficiaries of its previous funding program, the 7th Framework Programme (FP7), to make their best effort to ensure OA to peer-reviewed articles. Its new funding program, Horizon2020, will invest nearly €80 billion in competitive research.³ Here the mandate was strengthened to stipulate that the publication output of *all* EC-funded projects be made open.⁴

What is OpenAIRE, and how does it work?

To complement this OA mandate, the EC funded the development of an infrastructure to support its take-up and implementation. It was recognized early on that a wide-reaching European mandate required local outreach to ensure its success. The outreach activities would include raising awareness, supporting researchers in OA matters, creating an online platform to provide a smooth workflow, and establishing a technical infrastructure to ingest and curate the metadata and to provide value-added tools.

OpenAIRE stands for Open Access Infrastructure for Research in Europe, and

its mission is to gather the metadata of research output (publications and associated research) funded by the EC. The infrastructure is composed of a decentralized network of data sources, namely publication repositories, data repositories, publishers, and current research information systems. By harnessing the contents of "compatible" publication and data repositories (both institutional and disciplinary), it encourages the exposure of metadata, including funding information, in a uniform way. It also collects information from OA journals and other services that collect and display disparate collections. This technical infrastructure is complemented by a range of activities that support the mandate's usage and uptake.

Pan-European support activities

Europe has a diverse repository landscape. The OA mandate situation across Europe is very heterogeneous and at different stages of maturity. A key element in OpenAIRE is its participatory design. A network of 33 pan-European advocacy nodes, known as National Open Access Desks (NOADs),⁵ reach out to researchers and project coordinators

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of EC-funded projects to inform them of the EC open access mandate and to align their local infrastructures with a common European platform. Additionally, the involvement of libraries within research infrastructures is an important signal that they constitute an integral building block of the scientific research landscape⁶ by enabling OA to vital research.

OpenAIRE provides support for the mandate using the following channels:

- *Helpdesk.* As part of its localized outreach, a ticketing system distributes requests (often policy- or repository-related) to NOADS. This proves to be an efficient way to allocate resources across the network.

- *Online resources.* The OpenAIRE portal gives access to many FAQs, guides, and factsheets. There are answers to common questions such as intellectual property rights or copyright. The portal also features EC projects that have successfully implemented OA.⁷ A strong social media presence helps attract new users and foster a sense of community. A blog⁸ and monthly newsletter⁹ also raise awareness of scholarly communication issues.

- *Webinars/training.* The OpenAIRE networking team is adept at holding webinars and training on different aspects of OA, and over the last few years has held a series of European workshops on scholarly com-

munication topics,¹⁰ such as legal issues in data sharing and effective data management practices and policies.

The scholarly communication landscape is changing rapidly, and OpenAIRE leverages its partnerships with key players to align its strategic goals. It works closely with a number of initiatives that promote open science, training, and common standards, e.g., the EC's project Facilitate Open Science Training

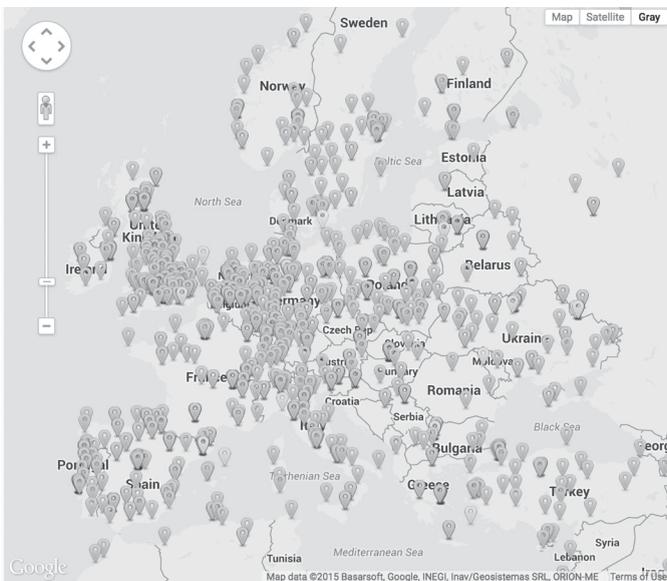
For European Research (FOSTER)¹¹ and the Confederation of Open Access Repositories (COAR).¹²

Outside Europe, OpenAIRE collaborates with many international organizations, such as SHARE¹³ and the Australian National Data Service,¹⁴

and the Research Data Alliance,¹⁵ as well as data infrastructures such as Dryad¹⁶ and DataCite.¹⁷

What does the infrastructure provide?

OpenAIRE has built a robust infrastructure to support the above activities. Repository managers are supported by a set of OpenAIRE guidelines¹⁸ on how to interpret and expose metadata and how to get metadata validated and aggregated into the OpenAIRE infrastructure. At present, OpenAIRE harvests from 477 repositories and 75 OA journals.¹⁹ In terms of numbers, OpenAIRE is growing and currently provides access to more than 8.5 million OA records, of which 85,000 are linked to EC funding information.



OpenAIRE-compliant repositories across Europe. View this article online for detailed images.

The screenshot shows the OpenAIRE portal interface. At the top, there are navigation links for 'PARTICIPATE', 'SEARCH', and 'STATIST'. Below the header, there are tabs for 'Home', 'Search', and 'Find'. A 'SWITCHBOX' icon is visible. The main content area displays project details in a table-like format:

TITLE	Switchbox: Maintaining health in old age through homeostasis
FUNDER	FP7
FUNDING STREAM	SP1
SCIENTIFIC AREA	HEALTH
CALL	FP7-HEALTH-2010-two-stage
CONTRACT (GA) NUMBER	259772
START DATE	2011/02/01
END DATE	2015/07/31
SPECIAL CLAUSE 39	yes
ORGANIZATIONS	MPG, UMINHO, IEM HAS, LUMC, LMU MUENCHEN, CNRS
MORE INFORMATION	⌵ Detailed project information (CORDIS)

Below the table, there are tabs for 'Publications', 'Data', and 'Statistics'. A sample publication is shown with the title 'Non-receptor tyrosine kinases integrate fast glucocorticoid signaling in hippocampal neurons' by Yang, S.; Roselli, F.; Patchev, A. V.; Yu, S.; Almeida, O. F. (2013). A 'view all 52' link is also present.

Example project overview via the OpenAIRE portal.

OpenAIRE can extend its services to other national funders. This means that it can identify the research output of any funder or initiative that is able to share its program details. OpenAIRE has started to do this for the Wellcome Trust, the European Grid Initiative, the major Portuguese National Science Funder, and the German Research Foundation.

For researchers, OpenAIRE has established Zenodo,²⁰ which provides a fallback repository for those who don't have the appropriate data storage infrastructure. OpenAIRE also offers a CrossRef service to establish the links between publications and FP7 projects.

The most widely used service is aimed at project coordinators, and it allows them to obtain an overview of their projects, which provides the number of publications and

status, details of the funding stream, and links to the EC services.

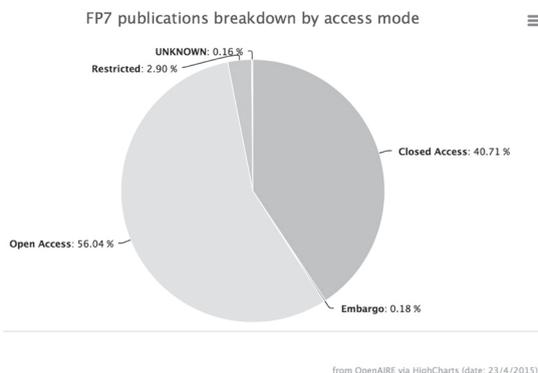
What challenges has OpenAIRE faced?

The FP7 OA pilot was not strong enough to influence researcher practices in the broader sense. Additionally, while many researchers might in principle support OA, they were unaware of how to do it, saw it as a burden, and had reservations about copyright and intellectual property issues. Many repository managers saw little value in the extra work of adding funding information when the number of EC-related publications was very low.

To address these issues, efforts were made to streamline the process to give value-added services to support

researchers and repository managers, e.g., text-mining contents for funding information. Plugins are also available for Open Journal Systems and repository platforms, such as EPrints and

DSpace. In some cases the metadata quality is poor and OpenAIRE carries out extensive efforts to clean and curate the data.²¹



Ratio of closed versus open access publications in the FP7 funding stream.

Noteworthy results so far in OpenAIRE

OpenAIRE is able to provide detailed statistics for the FP7 funding program: 115,000

publications were produced, of which over 50% were OA.²² This is a substantial step forward in monitoring the implementation of the OA mandate.

Since the launch of OpenAIRE, the number of deposited publications has steadily increased, showing a healthy trend in making publications OA (see graph on next page). Since 2010, the growth in repositories compat-

ible with OpenAIRE has intensified, jumping from 102 repositories in 2012 to 432 in 2014. Widening the scope to gather contents from all OA repositories has also contributed to this number, with an emphasis on encouraging repositories to expose funding information where possible.

The OpenAIRE community has been a catalyst in shaping new national OA policies and aligning them with the ECs. NOADs have disseminated

valuable advice to decision makers, thus contributing to the national OA policy agenda. Each country has made advancements, ranging from implementing new OA funder policies, to making recommendations along the lines of the EC OA mandate, and increasing awareness of OA among key national stakeholders.²³

Where local infrastructures have aligned with the EC or OpenAIRE guidelines, efforts are eased in by adhering to local OA mandates. This can be seen in the Portuguese repository network, which supports both its national funder OA mandate as well as European OA mandate requirements.²⁴ Some other EU countries, such as Italy and Spain, are following suit.

Some observations and looking forward

A new round of funding, OpenAIRE2020, has recently begun.²⁵ The scope of the project has expanded, with 50 partners and many areas of research into scholarly communication. OpenAIRE will support the Open Research Data Pilot,²⁶ which aims to maximize access to and re-use of research data. A post-project Gold Open Access Pilot will be implemented,²⁷ and

other scholarly communication topics, such as peer review and metrics, will be explored. It is worth noting that a pivotal point is the 2012 EC communications and recommendations to the EU member states to align their policies with the

ECs, which has already started a fresh momentum, among institutions and projects, to comply to the OA mandate.

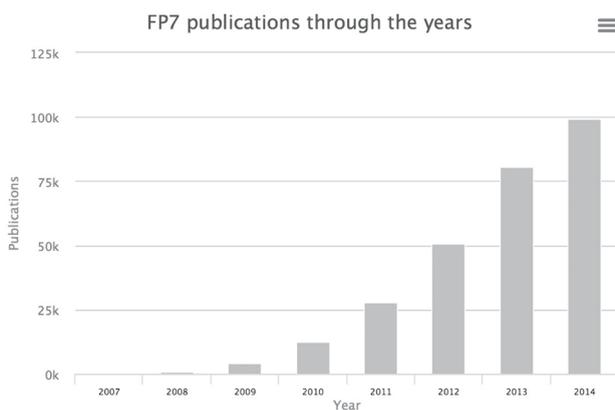
At the core of the new project are technical activities and community coordination

in support of an OA mandate. However, the effort needed for the successful uptake of the infrastructure should not be underestimated. Outreach and policy back up, as well as an understanding of the differences in local infrastructure implementation, are crucial. OpenAIRE can build trust by providing good quality services that are developed incrementally.

Repositories and their OA contents have huge potential for enhancing the scholarly communication landscape. Tools and services can be built to measure research impact, citation analysis, and usage. In particular, there is work ahead to promote quality metadata and the inclusion of funding information in the metadata records of institutional and disciplinary repositories. Libraries and institutions have an important role to play in this regard and their future engagement in this network to implement OA across Europe is vital.

Notes

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15. Research Data Alliance, <https://rd-alliance.org/>.

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