



# Putting down roots Securing the future of open access policies

Workshop 10 November 2015  
Report dated January 2016



**“Putting down roots: Securing the future of open-access policies”**

This workshop and report was initiated by Knowledge Exchange  
[knowledge-exchange.info](http://knowledge-exchange.info)

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**Workshop held: 10 November 2015**  
**Report dated: January 2016**



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# 1. Executive Summary

This study, commissioned by Knowledge Exchange, explores the relationship between open-access policies and services. Drawing on a consultation with funders, institutions and service providers across the five Knowledge Exchange countries and beyond, it identifies the key services needed to successfully implement open-access policies, and suggests priorities for action in support of an open scholarly infrastructure.

## 1.1. Open-access policies

**Current open-access (OA) policies share common components, but differ markedly in emphasis.**

The majority of policies in the Knowledge Exchange (KE) countries support or permit both self-archiving in OA repositories and publishing in OA journals.

Self-archiving remains the dominant route in practice, particularly in Germany, Finland and Denmark, but OA publishing is actively promoted by research funders in the UK and Netherlands, and by many research performing organisations in the other countries.

The availability of funding for OA publishing, support for hybrid journals and the level of stringency applied to policies vary substantially across the five countries. While efforts to promote convergence are welcome, OA policy differences are often reflective of wider differences in national funding policy and culture rather than different stages in a linear development process.

## 1.2. Linking OA policies to OA services

**OA services are indispensable to the successful implementation of all OA policies** OA policies across the KE countries rely on a range of OA services, grouped into six categories. This study has considered more than 50 non-commercial services that support open access, and identifies a small number of critical dependencies that are common to the vast majority of policies:

- » **Underpinning services**, including identifiers like ORCID and FundREF, can often be invisible to the end user but underpin the workflows needed to comply with OA policy requirements.
- » **Abstracting and indexing services**, most notably the Directory of Open Access Journals (DOAJ), aggregate and index OA journals and content, can act as a marker of quality, and enable discovery and access post-publication.

- » **Support and dissemination services** assist authors and institutions in implementing OA and complying with OA policies. The most widely used are the SHERPA services, which are consistently relied on to support OA repository workflows.
- » **OA repository services** encompass a wide range of repository and related services that are crucial to the implementation of open access archiving. The critical dependency in this case is not on one or two individual services, but on the success of efforts to improve interoperability across the OA repositories landscape.

We also considered a range of **OA publishing services** and **OA monitoring services**. At the present time, policies are not highly dependent on these services but they seem likely to grow in importance in the future.



**The implementation of OA policies relies on the development of a fully-functioning OA infrastructure**

### 1.3. Priorities for action

**The fundamental challenge for the implementation of OA policies is the need to develop a fully functioning OA infrastructure from the current disparate collection of services.** This study has taken the form of a broad survey of the current OA policy and service landscape, and further work is needed to translate our findings into specific, costed recommendations. Nevertheless, the broad direction of travel is clear if OA policies are to be successfully implemented. Four priorities for action have therefore been identified:

1. **Adopt sound governance structures** with greater representation from funders and policy makers, promoting the wider use of crucial identifiers and standards.
2. **Ensure the financial sustainability of critical services**, particularly the DOAJ and SHERPA services.
3. **Create an integrated infrastructure for OA repositories** based on central 'nodes', interoperability across the broader landscape, and increased engagement with the European Commission's OpenAIRE project and the work of the Confederation of Open Access Repositories (COAR).
4. **Invest strategically in OA services in order to create a coherent OA infrastructure** that is efficient, integrated and representative of all stakeholders.

## 2. Introduction

### 2.1. Background

The movement to improve access to research publications began in the 1990s, when access to the World Wide Web became widely available and online publishing became increasingly common. Since then, a wide range of non-commercial services has been developed, largely by the scholarly community, to support stakeholders in the process of OA publishing. More recently, major research funders and higher education institutions (HEIs) have developed and implemented policies to promote, or mandate, open access to academic research. As the complexity of complying with such policies became increasingly clear, so the reliance on existing support services has grown. Yet the initial development of these services often happened organically, prior to the widespread adoption of OA policies, and the relationship between OA policies and services remains poorly understood.

The need to develop a sustainable infrastructure to support OA is increasingly recognised across the scholarly communications landscape<sup>1</sup>, leading Bilder, Lin and Neylon to propose a set of "Principles for Open Scholarly Infrastructures"<sup>2</sup> in early 2015. Knowledge Exchange (KE), a co-operative effort that supports the use and development of Information and Communications Technologies (ICT) infrastructure for higher education and research in five European countries, has previously commissioned two studies looking at the financial sustainability of OA services<sup>3</sup>. Building on these studies, this report for KE looks at the extent to which OA policies depend on the growing number of non-commercial OA services, and whether this presents risks for the implementation of OA policies - and indeed the OA movement as a whole.

### 2.2. Terms of Reference

This study reviews the extent to which the successful implementation of OA policies depends on OA services, and it seeks to pinpoint which services are the most crucial at the present time. Consideration is given to the OA policies adopted by the main public and private funders and an illustrative sample of HEIs across the five KE countries, as well as by the European Commission. The review also evaluates the use of over 50 widely used OA services, through consultation with relevant experts across the KE countries and beyond. The study aims to provide policy makers with clear evidence about the importance of particular services for the implementation of OA policies, and to initiate a dialogue about how the scholarly community can secure the maintenance and further development of these services.

### 2.3. Methodology

In order to assess policy dependency on OA services, the following methodology was adopted:

1. A review of the existing literature on OA policy implementation and OA service use, based on which a provisional list of non-commercial services that directly or indirectly support OA was prepared.
2. A review of the OA policies adopted by the main public and private research funders and selected institutions across the KE countries and by the EC, used to identify common groups of requirements in different OA policies (i.e. 'policy components').
3. A consultation with 25 experts and stakeholders drawn from academia, research funders and service providers (see Appendix 1), which informed the assessment of how, and how widely, services are currently used by stakeholders to comply with OA policies.
4. A frequency analysis of the interview scripts arising from the consultation, used to reveal the services most commonly identified by interviewees as supporting the implementation of OA policies. The results were moderated to reflect intensity as well as frequency, and to correct for repetition within a single interview.

5. Preparation of 'user stories' to show graphically how key OA services contribute to the workflows used by stakeholders to comply with policy requirements. Where appropriate, we also obtained data on current usage and funding of these services.
6. Use of the results of the preceding activities to draw out the implications for policy makers and other members of the OA scholarly community, and to identify priorities for action.

## 2.4. Terminology

A glossary of the terms used in this study can be found in Appendix 2.

## 2.5. Limitations in scope

Undertaking a comprehensive review of all funder and institutional OA policies across the KE countries was beyond the scope of this review, and risks duplicating recent work undertaken within the PASTEUR<sub>4</sub>OA project<sup>4</sup>. Instead we focused on the funder policies that were deemed to be most influential and on a judgemental sample of institutional policies. Similarly, it would not be feasible to list and review all the OA services currently in use, many of which are little known or have been developed as internal aids to specific OA workflows. For a broader review of over 600 scholarly communication tools and their use by the academic community, readers should refer to the recent survey of scholarly communication tool usage run by the University of Utrecht<sup>5</sup>.

With regards to the consultation, we took care to interview stakeholders from research funders, institutions, OA service providers and publishers. However, the consultation cannot be considered systematic or wholly representative of the wider scholarly community, and was therefore used to gain qualitative insights on the issues at hand. Finally, the implications and recommendations provided in this report should be seen in the context of a rapidly evolving

OA landscape, which is now at a crucial juncture. Our work was focused on non-commercial services, operated for the public good, that are either explicitly dedicated to OA, or that are central to the successful implementation of OA policies. Naturally, publishers play an integral role in the delivery of OA, as do commercial indexing services such as Scopus or Web of Science, academic networking and discovery services such as Academic.edu, ResearchGate and Google Scholar, current research information systems (CRIS) used by research organisations and many other commercial services. The importance of these organisations and services for OA is not in dispute, but they fall outside the scope of this report.

## 2.6. Acknowledgements

We are particularly grateful to Jan Erik Frantsvåg and Saskia Franken for their important contribution in carrying out consultation interviews across several of the KE countries, as well as for their valuable input into this report. We would like to thank the other members of the Knowledge Exchange Task and Finish group for their valuable input and substantial involvement in the preparation of this report, and for organising and running the London workshop: Neil Lars Bjørnshauge, John Doove, Johannes Fournier, Line Hunsbal, Neil Jacobs and Mafalda Picarra. A special thanks goes to Bas Cordewener for his invaluable help coordinating the project. Our thanks also go to the OA experts and other stakeholders that kindly agreed to participate in the consultation (see Appendix 1).

## 3. Open access policies

### 3.1. Funder and institutional policies in the Knowledge Exchange countries

Over the last decade, a growing number of research funders and institutions have adopted OA policies. The ROARMAP database<sup>6</sup> (as at July 2015) listed 79 funder policies, 54 funder and research organisation policies, 507 institutional policies (i.e. universities and research organisations) and 71 policies concluded at school or department level.

These policies, which are voluntarily registered by the sponsor organisations, are only a fraction of the total number of OA policies adopted worldwide.

This study has considered OA policies adopted by the European Commission and the five KE countries: Denmark, Finland, Germany, the Netherlands and the United Kingdom. Consultation with stakeholders in these countries allowed us to identify the key funder policies influencing the OA landscape at present, or likely do so in the near future. It also helped us tease out the most recurrent and significant requirements of each policy. Consideration has also been given to the OA policies concluded at the pan-European level, which have considerable significance for scientific research in the KE countries, and to a small sample of private research funder and institutional policies. The OA policies considered are summarised below, while Appendix 4 provides a brief summary of the main characteristics of the various policies.

**Table 1: OA policies considered within this review**

Country	Research funders	Research performing organisations
Denmark	<ul style="list-style-type: none"> <li>Danish Research Councils<sup>7</sup></li> <li>Danish Agency for Science, Technology and Innovation<sup>8</sup></li> </ul>	2 sampled institutions
Finland	<ul style="list-style-type: none"> <li>Ministry of Education and Culture<sup>9</sup></li> <li>The Academy of Finland<sup>10</sup></li> </ul>	2 sampled institutions
Germany	<ul style="list-style-type: none"> <li>German Research Foundation (DFG),<sup>11, 12</sup></li> </ul>	Helmholtz Association <sup>13</sup> Max Planck Society <sup>14</sup> 3 sampled institutions
Netherlands	<ul style="list-style-type: none"> <li>Secretary of State for Education, Culture and Science<sup>15</sup></li> <li>Netherlands Organisation for Scientific Research (NWO)<sup>16</sup></li> </ul>	2 sampled institutions
United Kingdom	<ul style="list-style-type: none"> <li>Higher Education Funding Council for England (HEFCE)<sup>17</sup></li> <li>Research Councils UK (RCUK)<sup>18</sup></li> <li>Wellcome Trust<sup>19</sup></li> </ul>	2 sampled institutions
European Union	<ul style="list-style-type: none"> <li>European Commission<sup>20</sup></li> <li>European Research Council<sup>21</sup></li> </ul>	N/A



**National approaches to OA differ in emphasis, but not in substance.** At first glance, the OA policy landscape varies considerably across the KE countries. For instance, countries such as Denmark and the UK have a centralised approach to OA, with national research funders applying mandatory policies that affect virtually all research institutions. By contrast, policies in Germany focus on encouraging OA and making the OA publication process simple and effective. Some funder policies (e.g. NWO, RCUK) clearly favour publishing in OA journals, while others (e.g. Danish Research Councils, HEFCE) are more typically implemented through archiving in OA repositories. Seen within the wider European and international context, the significant emphasis placed on OA publishing by some funders within many of the KE countries remains unusual, though not unprecedented<sup>22</sup>.

What is clear is that both OA publishing and self-archiving will have an important role to play in delivering OA across all KE countries for the foreseeable future. Recent developments, such as 'overlay journals' and the growing role of publishers in facilitating manuscript deposit, also mean the distinctions between the two are not clear-cut. Most KE funders, therefore, support both routes to varying degrees, and to focus exclusively on one form of OA at the expense of the other represents a false dichotomy. Differences do emerge in relation to hybrid journals, with policies divided between acceptance, active discouragement and outright ban on payment of article processing charges (APCs) for these publications. In sum, the broad objective of delivering OA to scientific publications is common across the KE countries. However, it should not be assumed that all countries are simply at different stages of a linear development process, and harmonisation remains a distant prospect despite valuable ongoing work in this area<sup>23</sup>.

**Funder mandates are the key drivers of OA.** There is a clear case for research funders' and institutions' leadership on OA, with recent work by the PASTEUR<sub>4</sub>OA project identifying a positive correlation between a range of policy requirements and OA deposit rates<sup>24</sup>. In those countries (e.g. the UK and Denmark) and in those disciplines (e.g. health and medical research) where research funders have a mandatory policy with detailed requirements, our work indicates that knowledge of OA and use of OA services by institutions and authors is generally more advanced.

By contrast, in countries where major research funders have less prescriptive policies (e.g. Finland, Germany), institutions are also more likely to take a passive approach, though there are exceptions. These can be attributed to individual leadership within universities and to concerns about rising journal subscription costs, but it remains to be seen whether institution-level policies and mandates are sufficient to have a systemic effect on the spread of OA.



**Current policies support both OA publishing and archiving, and to focus on only one of these is a false dichotomy**

**OA operates in a transnational, rather than national, context.** The OA landscape is neither national nor international, but rather transnational. Researchers and institutions operate in an environment where international and domestic funders operate simultaneously, and where multiple OA policies overlap and often have divergent requirements. This has implications for individual researchers, institutions and service providers. Researchers are sometimes faced with a complex task when complying with funder requirements, particularly when a project has multiple funders or where it is the result of international collaborations.

Institutions face similar challenges in developing comprehensive institutional OA policies and processes which also allow research staff to comply with applicable funder policies. Service providers must therefore cater for the needs of a global audience dealing with a multitude of continuously evolving, overlapping and non-harmonised policy requirements.

### 3.2. Policy components and requirements

#### OA policies share common components.

Notwithstanding qualitative differences in OA policy between countries, our analysis has identified three core 'components' (groups of requirements that regulate a distinct OA process) that figure consistently across almost all policies (see Table 2 on the following page). OA policies normally have a set of provisions regulating their scope and goals, as well as compliance monitoring and enforcement arrangements (component 1). Almost invariably, they contain provisions promoting OA deposit in repositories (component 2) and, less consistently, immediate publication in OA journals (component 3).

**Policy components can be further analysed into specific requirements that trigger the use of OA services.** Table 2 summarises the main policy requirements identified in the course of our work. While other potential requirements could be identified (e.g. licensing requirements for items in OA repositories; support for OA monographs), these do not figure significantly in the current policies adopted within the KE countries. Appendix 4 contains further information on the requirements of the policies analysed in this study.

**Relationships between OA policies and services crystallise in the workflows followed to achieve compliance.** Looking at the workflows necessary to meet OA policy requirements, it becomes apparent that differences in emphasis (for example whether a policy 'mandates' or 'encourages' deposit) are of less significance than might first be assumed, as the workflow followed is similar in each case. However, the relationship between policy requirements and OA services remains highly complex, with policy implementation often reliant on a complex web of inter-dependent services. It should further be noted that the workflows needed to meet a single requirement vary. For instance, if a policy requires compliance monitoring, it may rely on sector-wide monitoring, institutional OA reporting, grant holder reporting or any combination of these approaches.

Ascertaining whether or not a policy requirement gives rise to a dependency on OA services and infrastructure, therefore, requires a comprehensive understanding of both the wide range of services available and of the workflows involved.



**The implementation of OA policies relies on a complex web of inter-dependent services**

Table 2: List of policy components and requirements

Policy component	Typical policy requirement
<p><b>1) POLICY COMPLIANCE</b></p>	<p><b>Goal:</b> The policy specifies a compliance target or objective</p> <p><b>Scope:</b> The policy only covers certain research outputs (e.g. articles), or outputs from specific groups of people (e.g. academic staff)</p> <p><b>Monitoring &amp; Reporting:</b> The policy makes provision for monitoring and/or reporting on compliance</p>
<p><b>2) OPEN ACCESS ARCHIVING</b></p>	<p><b>Deposit:</b> The policy mandates or encourages deposit in repositories</p> <p><b>Repositories:</b> The policy specifies whether deposit should occur in institutional or subject repositories (or both), and/or it mandates specific repositories</p> <p><b>Time:</b> The policy requires/encourages deposit at a particular point in time, e.g. by reference to the point of acceptance or publication</p> <p><b>Embargo:</b> The policy specifies/recommends a maximum embargo period</p>
<p><b>3) OPEN ACCESS PUBLISHING</b></p>	<p><b>Publishing:</b> The policy mandates or encourages OA publishing</p> <p><b>Finance:</b> The policy provides financial support for the payment of APCs to achieve OA publication, or permits the use of grant funding for this purpose</p> <p><b>Hybrid:</b> The policy specifies whether payment of APCs for hybrid OA journals is permitted</p> <p><b>Standard:</b> The policy sets a minimum quality standard for OA journals and/or publishing practices</p> <p><b>Licensing:</b> The policy requires or encourages the use of a specific publishing license</p>

## 4. Linking OA policies to services

### 4.1. Categorisation of OA services

The implementation of open access, and the delivery of policy compliance, is dependent on a wide range of services, many of which have evolved organically over time. A large number of services dedicated to, or supportive of, OA have emerged organically from the work of stakeholders in the library, research management, IT and publishing communities. In many cases the development of these services was led by OA advocates, and preceded the widespread adoption of OA policies and mandates. Among

other things, services allow stakeholders to deposit their manuscripts in institutional, national or subject repositories, provide information on funder and journal OA policies and the quality of OA journals, help stakeholders manage article processing charges (APCs), facilitate the transfer of author and publication metadata across institutions and funders, and so forth. Drawing on previous KE reports and our own stakeholder consultation, we have considered more than 50 services, which have been grouped into six categories, as shown in Table 3. An illustrative list of individual services can be found in Appendix 5.

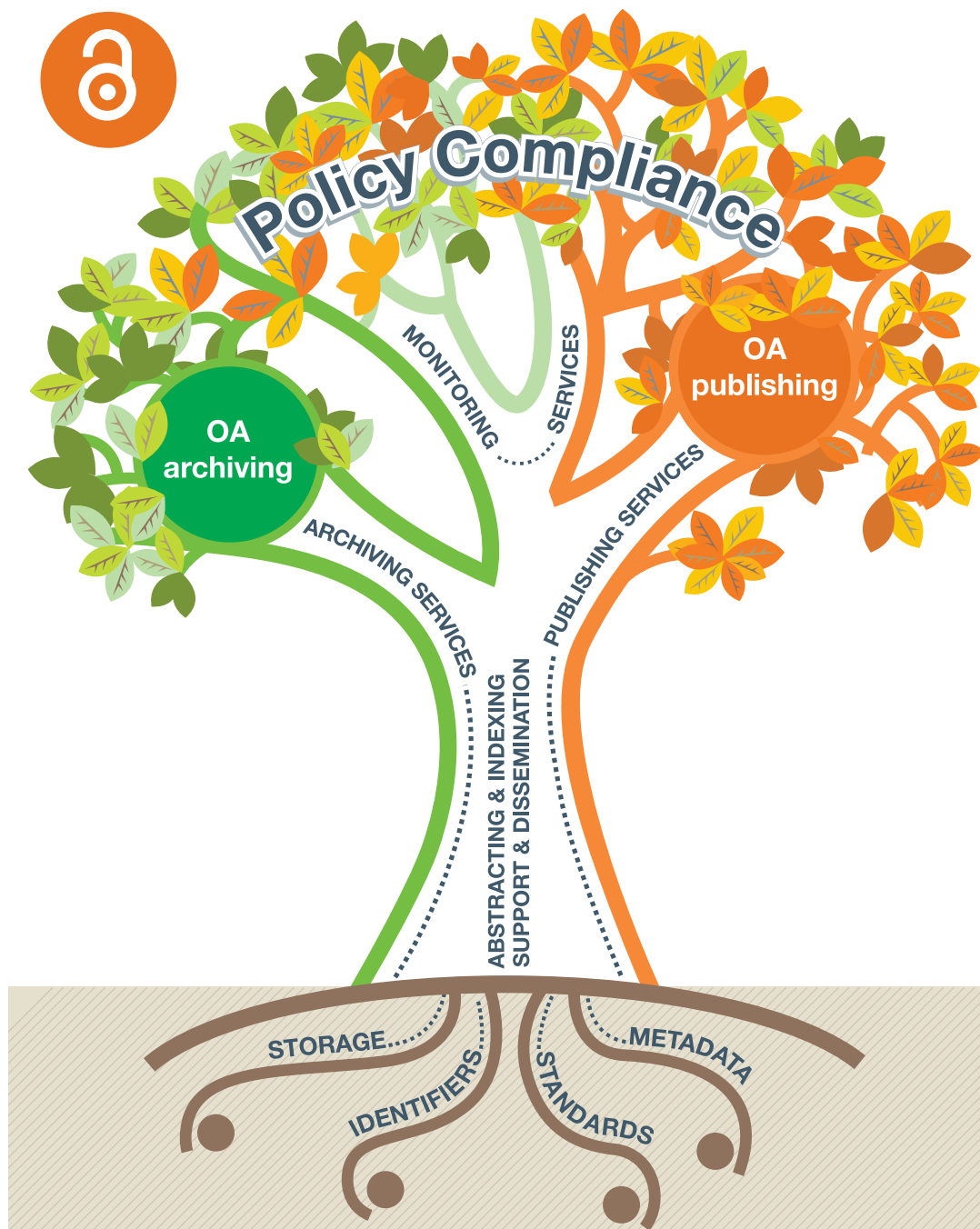
**Table 3: OA service categories and subcategories**

Category	Function	Subcategories	Example services and activities
<b>Underpinning services</b>	Storage for scholarly outputs, unique identifiers, metadata and standards	Storage Identifiers Standards Metadata	ORCID FundREF NISO DOI
<b>Abstracting /indexing (A&amp;I) tools</b>	To bring together, organise and systematise OA articles published from various platforms, allowing easy discovery and access from the public	N/A	DOAJ PubMed Directory of Open Access Books (DOAB) OpenAIRE BASE
<b>Support and dissemination services</b>	To provide information on various aspects of OA, from the generic (its rationale and objective) to the specific (individual journal and funder policies), and assist with capacity building	News / current awareness services Information / enabling services Business and technical planning advice Policy advisory services	SHERPA (Juliet, RoMEO) OpenDOAR
<b>Repository services</b>	To allow the deposit and discoverability of publications in OA repositories, enabling compliance with OA archiving policy provisions	Subject/national/international repositories Repository software/builders/hosting services/registries Preservation services Repository infrastructure and interoperability	DSpace EPrints Europe PubMedCentral ArXiv Zenodo Fedora
<b>OA publishing services</b>	Services that support or facilitate OA publishing, and non-commercial facilitators of APC payments	Fees agents APC data collection OA publishing platforms	Open Journal System Quality Open Access Market (QOAM) ESAC
<b>Monitoring services</b>	To allow funders and institutions to monitor the effectiveness and impact of OA policies	Impact metrics (citations) Usage analysis tools	IRUS-UK ROBOT

The relationship between different categories of services is complex, and in many cases the distinction between categories can become blurred, with a single organisation or service fulfilling multiple functions. The relationship between service categories is illustrated in Figure 1, reflecting the fact that the most visible services (those which directly support OA publishing and repository

deposit, as well as compliance monitoring) are typically reliant on abstracting, indexing, support and dissemination services, which in turn rely on the underpinning services of storage, identifiers, standards and metadata. In almost all cases, OA services can only function effectively in conjunction with other services.

Figure 1: How OA services enable OA publishing, OA archiving and policy compliance



The results of our stakeholder consultation have been used to identify the services that are most important to the implementation of OA policies. Our evaluation of the significance of the different services and service categories was informed by interviews undertaken with 25 OA experts and stakeholders across the five KE countries and beyond, together with the results of the previous KE studies in this area. Textual analysis of the interview scripts was used to identify the services that were most frequently identified as enabling the implementation of OA policies.

A visual representation of the results of this exercise is shown in Figure 2, where the relative size of each service title reflects the frequency and intensity with which it was mentioned by stakeholders in our consultation.

The implications of these findings for each of the service categories identified, and their linkages to policies, are considered further below.

#### 4.2. Underpinning services

The accessibility and discoverability of open scholarly outputs and their association with authors, funders and institutions relies on a range of underpinning services.

These services (which are themselves built on a number of critical components of internet infrastructure) include storage for scholarly outputs, unique identifiers, metadata and standards. The most frequently cited of these services in our consultation were ORCID (a unique identifier for researchers), FundREF (for funders) and digital object identifiers, or DOIs (for publications).

Figure 2: Services that support the implementation of OA policies



These underpinning services are both invisible and indispensable. Where they are working as intended, underpinning services such as identifiers are easily overlooked in favour of the end-user services they support. Yet they underpin virtually all aspects of OA policy implementation, from article-level workflows to high-level compliance monitoring, and improving these services will deliver benefits to all of the other services and workflows which rely on them.

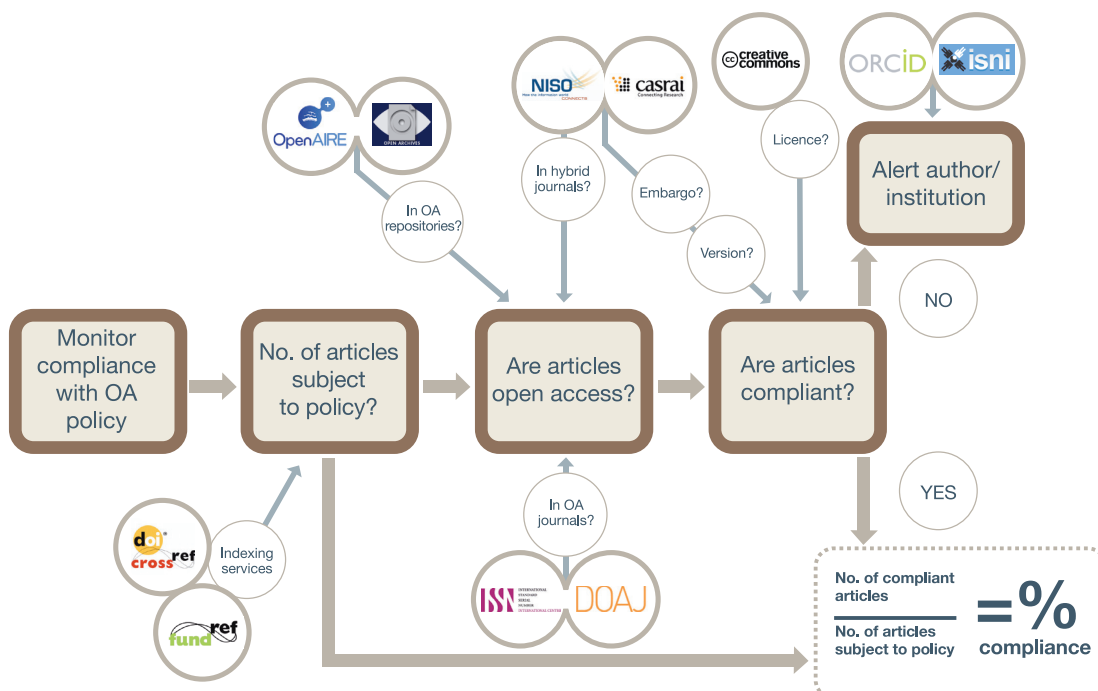
The publishing community has historically taken the lead in developing underpinning services. To date, the most stable underpinning services have been largely initiated and funded by the publishing community, with digital object identifiers (DOIs), a unique identifier for scholarly articles, a case in point. Even initiatives which directly benefit other stakeholders, such as ORCID and FundREF, have also tended to be initiated and funded by publishers, at least in their early stages, and have taken longer to gain traction in other stakeholder communities.

Without underpinning services, it is almost impossible for the implementation of OA policies to be effectively tracked and monitored. For any policy maker to obtain meaningful data on the overall progress and effectiveness of an OA policy, they must be able to answer two questions:

1. How many research outputs are subject to our OA policy in a given period? (The numerator)
2. How many of the above outputs were made OA in a form compliant with our policy? (The denominator)

Compliance monitoring was the subject of a Knowledge Exchange workshop in May 2015, and a number of monitoring services are under development which seek to answer one or both of these questions, examples being OpenAIRE at a European level, Robot in Denmark, and CHORUS in the US. However, as Figure 3 illustrates, all are reliant on the same underpinning services such as persistent identifiers, standards (e.g. for licensing and article versions) and metadata.

Figure 3: How underpinning services enable the effectiveness of OA policies to be tracked

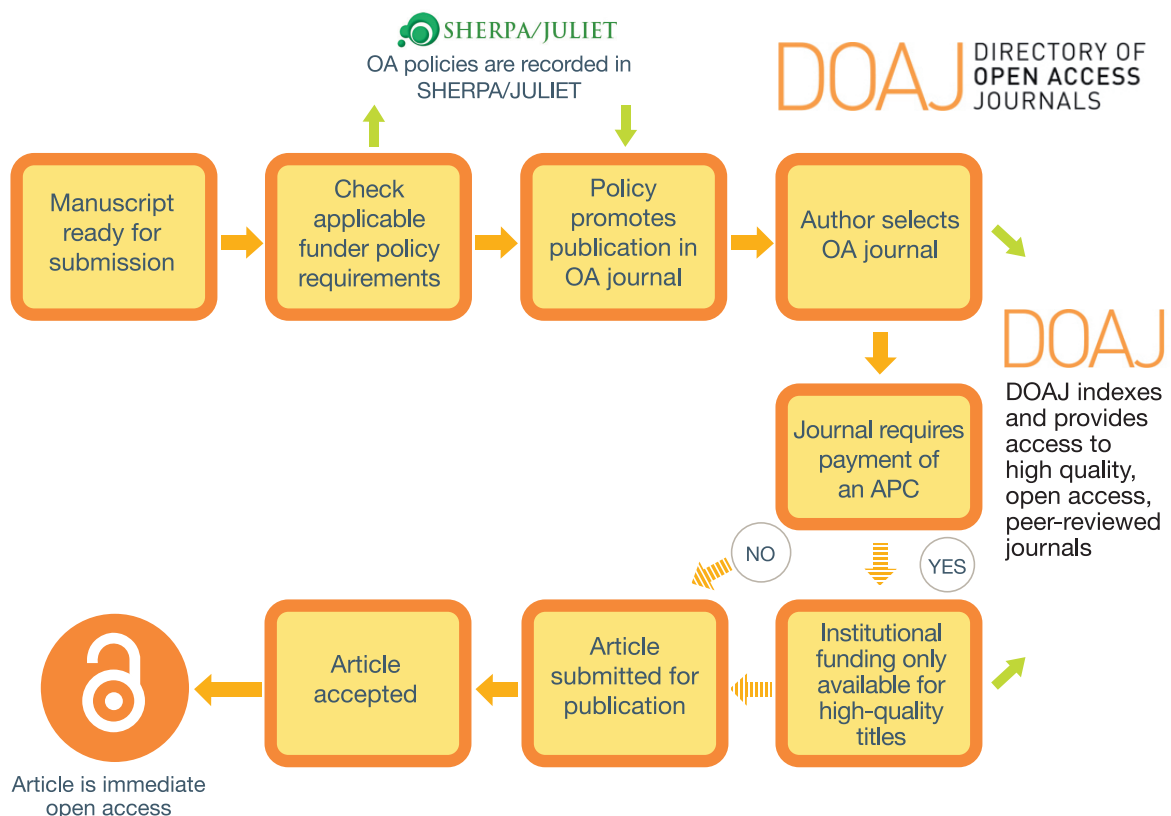


The inadequacy of current underpinning services will be increasingly exposed as OA policies become more stringent. Our consultation indicated that there are fundamental gaps and inadequacies among current underpinning services, particularly the absence of consistent standards, identifiers and metadata, which become apparent when any attempt is made to evaluate a policy’s scope and effectiveness in the round. At the present time, only a minority of OA policies include strict provisions for monitoring compliance, but there is a clear trend towards setting ambitious national targets for OA (see Appendix 3). Meeting these targets, and reliably tracking progress towards them, is in large part reliant on the delivery of improvements in the adoption and interoperability of these underpinning services.

### 4.3. Abstracting and indexing services

Abstracting and indexing services, most notably the DOAJ, are crucial to the implementation of OA policies. Abstracting and indexing services figured heavily in our consultation, with the DOAJ being the most frequently cited of all OA services. As illustrated in Figure 4, the service indexes OA journals, and acts as a marker of quality that can be used to determine whether titles are eligible for funding. In addition, it enables discovery and access post-publication, and DOAJ data is re-used in a range of other services. Other valuable abstracting and indexing services range from PubMed (an indexing service for the biomedical and life sciences) to the Directory of Open Access Books (DOAB), illustrating the importance across all disciplines of tracking and codifying OA outputs in a systematic manner.

Figure 4: How the DOAJ facilitates the OA publishing workflow





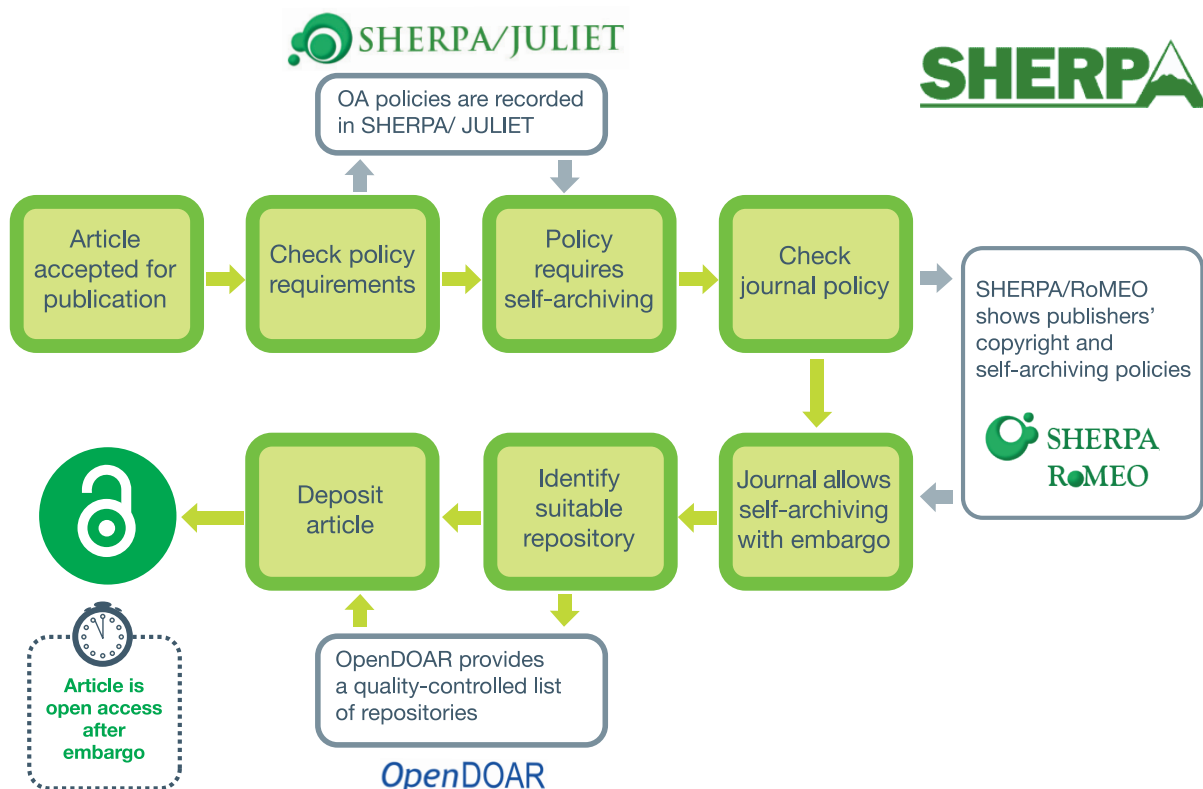
#### 4.4. Support and dissemination services

The SHERPA services are the most widely-used and highly-valued support and dissemination service. The SHERPA services assist authors and institutions in implementing OA and complying with OA policies, and were second only to the DOAJ in the collective importance attached to them in our consultation. Particularly important is the SHERPA/RoMEO service which shows which publishers comply with policy makers' conditions for OA (see Figure 5), though SHERPA also operates the Juliet service (for funder policies) and OpenDOAR, which provides a quality-controlled list of repositories. ROARMAP, a searchable international registry charting the growth of OA mandates, was the only other service that was consistently identified as important in this category. The majority of other support and dissemination

services considered in our study either operate only at a national level, or have not gained the widespread currency of SHERPA and, to a lesser extent, ROARMAP.

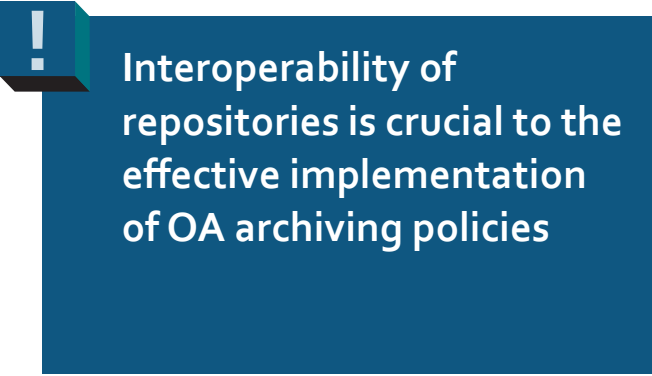
**The SHERPA services are the most widely used and highly valued support and dissemination service**

Figure 5: How SHERPA services facilitate the OA archiving workflow



## 4.5. OA repository services

There is little consensus on the most critical OA repository services at present, reflecting the wide range of services and activities falling under this category. OA repository services encompass open-source repository software, hosting services, registries and interoperability initiatives. Some important software can be identified (particularly DSpace, Eprints and Fedora Commons-based repositories<sup>25</sup>), and services provided by the OpenAIRE project are rapidly becoming a key part of the landscape, but in most other respects repository services remain highly fragmented, with little agreement across countries and academic disciplines on which services are most important. The highly distributed nature of repositories means that there are relatively few essential services, though a number of subject repositories have become invaluable within their disciplinary fields. This perhaps reflects the fact that repository development was initially rather slow and fragmented, and adoption has varied across disciplines (with ArXiv in physics, PubMedCentral in the biomedical sciences and RePEc in economics being amongst the most widely used services).



**Interoperability of repositories is crucial to the effective implementation of OA archiving policies**

Efforts are underway to promote greater consistency through the work of the OpenAIRE project in Europe and of COAR<sup>26</sup> at a global level. Both OpenAIRE and COAR seek to improve interoperability between the multitude of institutional, subject, national and international repositories. The success of these initiatives will be crucial to supporting more effective implementation of OA archiving policies.

## 4.6. OA publishing services

At the present time, OA publishing services are seen as a secondary priority, but this is a rapidly evolving area. Several of the stakeholders consulted recognised the need to streamline APC processes if costs are to be covered in this way, and to gather more accurate data on this aspect of OA. Open-source journal management and publishing software (such as Open Journal Systems) is also seen as vital to the establishment of new OA journals. Nevertheless, the link between policies and services is less clear in this area, with few critical dependencies noted in our consultation. Emerging platforms such as the Open Library of Humanities could play an important role in enabling journals to transition from a subscription-based model to open access. However, they are not sufficiently ubiquitous at the present time to be placed on a par with services like the DOAJ, SHERPA RoMEO or ORCID. Meanwhile, the transactional nature of OA publishing based on APCs means there is potentially a viable business model available both for OA publishers themselves, and for enabling services in this area (e.g. the Copyright Clearance Center's Rightslink for Open Access service). However, as APC volumes and the popularity of offsetting deals rise, and as institutions and libraries increasingly take on the role of OA publisher, non-commercial OA publishing services may grow in importance.

## 4.7. OA monitoring services

OA monitoring services remain in their infancy, and their effectiveness is constrained by limitations in the underpinning services on which they rely. As noted in section 4.2, a number of monitoring services are under development to help funders and institutions assess the effectiveness and impact of OA policies. At present, non-commercial services of this type remain under-developed and (with the exception of OpenAIRE) are primarily national initiatives. The perceived value of these tools is undermined by the limited adoption of the underlying standards and metadata on which they rely, and is also challenged by the presence of established commercial providers which offer more robust, proprietary datasets (e.g. Elsevier's Scopus database and Thomson Reuters Web of Science). Monitoring services can nevertheless be expected to gain in importance and visibility as OA policies requirements become more stringent, and as underpinning services gain broader adoption.

## 5. Priorities for action

This report highlights four priorities for action which are addressed firstly to the KE countries, but are equally applicable to the international research community. These include short-term actions to improve governance and uptake of underpinning services (5.1) and to secure the two most critical services identified from our stakeholder consultation, DOAJ and SHERPA (5.2). However, these actions are but a first step towards addressing the fundamental challenge to the implementation of OA policies - the need for a functioning OA infrastructure.

**The key message that emerges from this study is that systematic policy implementation will require a fully functioning OA infrastructure that connects, improves and integrates the current disparate collection of services.** This will require collective action and, crucially, investment, and we have made preliminary observations on the way forward in respect of both the repository infrastructure (5.3), and the broader scholarly infrastructure underpinning both OA publishing and archiving (5.4). The four priorities for action indicate the direction of travel that must be followed for OA policies to become truly effective at opening up academic research to the world. Further work will be required to translate these priorities into targeted and costed recommendations, and to determine the mechanisms by which they might best be taken forward.

### 5.1. Adopting sound governance structures

**Ensure that critical underpinning services have appropriate stakeholder representation, transparent operations and non-discriminatory membership.** Our work indicates that the OA community sees identifiers such as ORCID and FundREF, and standards development bodies such as NISO, as being of great importance to the implementation of OA policies. However, the historic tendency to rely on the publishing community to initiate and drive forward many of these initiatives has meant that

they have been slow to gain acceptance and endorsement from all sectors of the research community. Services such as SHERPA, meanwhile, are critical to the implementation of OA policies across the world, but their governance arrangements often fail to reflect the broad spread of their stakeholders. Proponents of OA policies would be advised to engage more closely in promoting good governance of these critical services, either through direct engagement or by delegation of this role to another body or agency authorised to represent their interests.

**Endorse and support the use of identifiers and standards through a combination of mandates, funding, steering and effective governance at national and international level.** In the short-term, there is a clear need for funders and institutions to continue to endorse and support ORCID, while funders and policymakers would be advised to proactively support greater adoption of FundREF through engagement with the FundREF advisory board. In the longer term, co-ordinated action is needed to promote consistent standards (through bodies such as CASRAI and COAR) and to work with publishers to embed these in article metadata. There is also a need to consider the implications of future policy developments for service providers, and to seek opportunities to embed policies more effectively into the existing landscape of OA services and infrastructure. The development of policies in machine-readable form, in accordance with a consistent schema<sup>27</sup>, would be an important first step in this direction.

### 5.2. Securing the financial sustainability of critical services

Review the business model of critical services, and, where appropriate, address their reliance on short-term, project-based funding. Sustainability means ensuring that an organisation has the resources to meet its obligations, and has been considered in detail within previous KE reports<sup>28</sup>. There is a pressing need to develop more sustainable business models for the two most important services identified in our consultation, the DOAJ and SHERPA. Figures 6 and 7 illustrate the current mixture of funding sources and usage for these two services<sup>29</sup>.

**There is a pressing need to develop more sustainable business models for the DOAJ and SHERPA services**

Figure 6: DOAJ usage and funding data

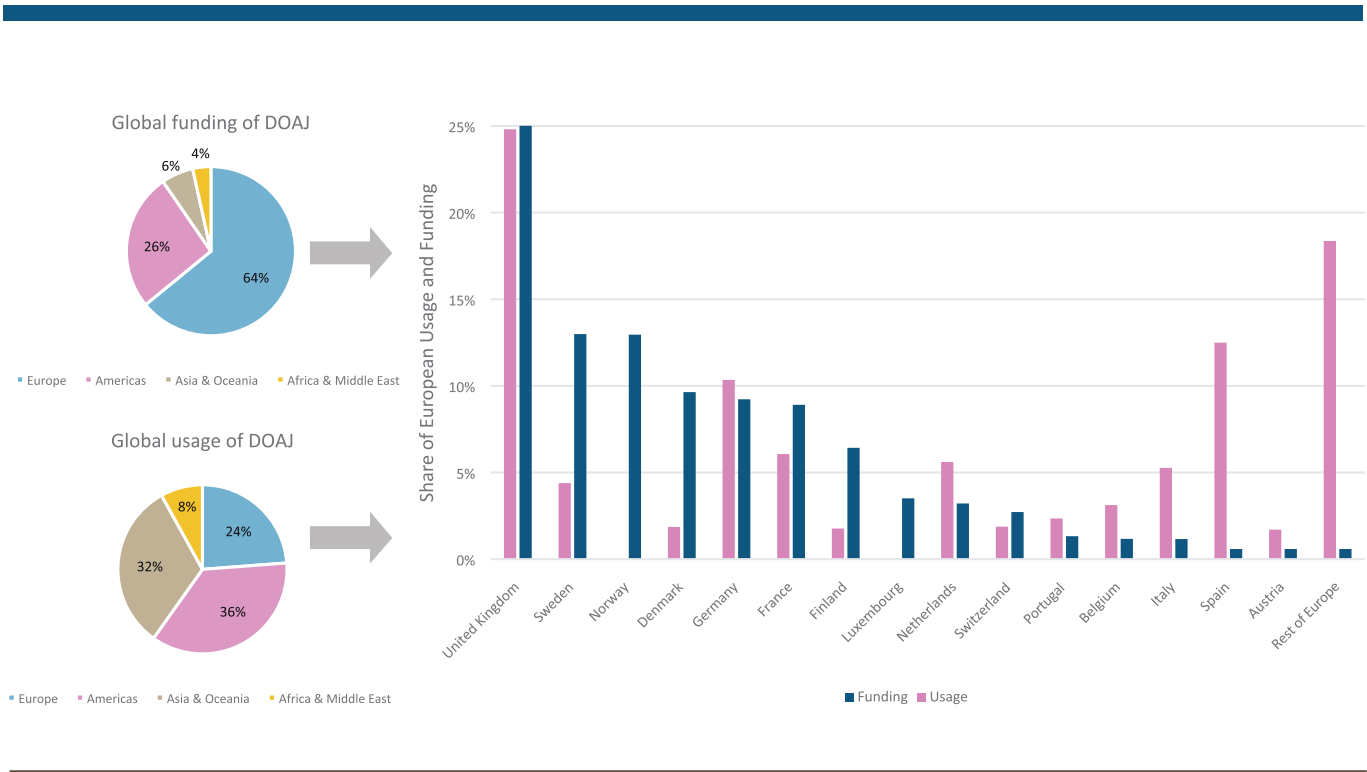
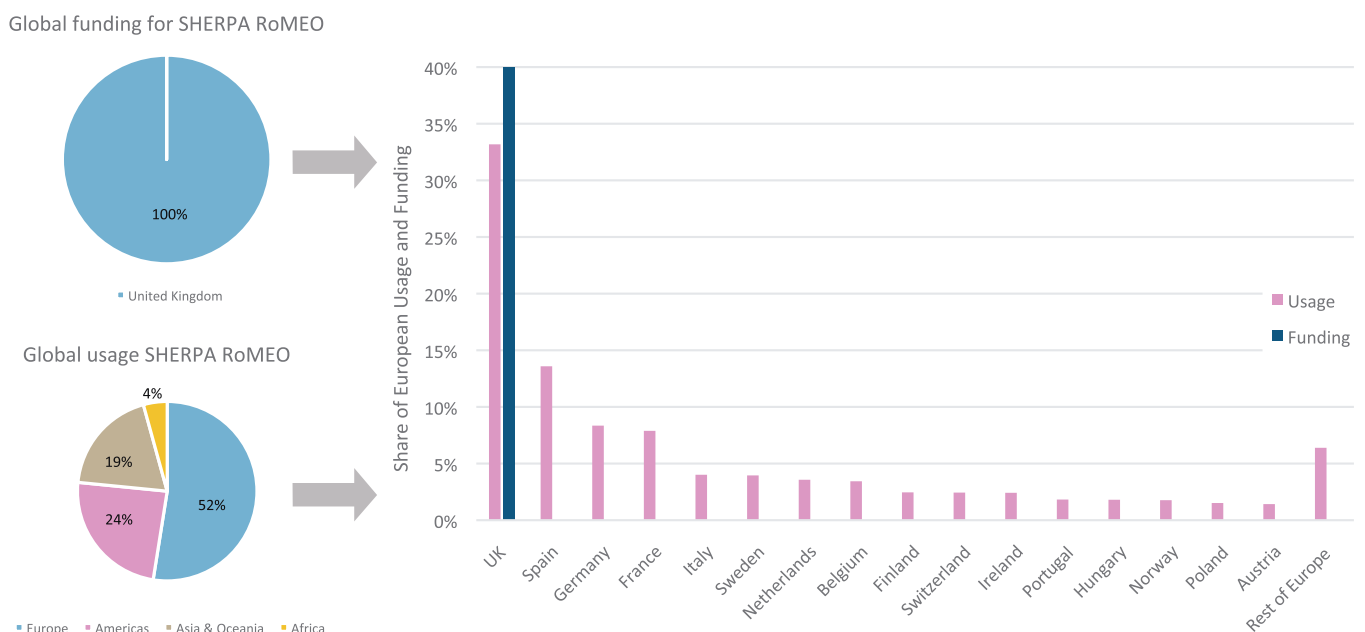


Figure 7: SHERPA/RoMEO funding and usage data



## 5.2. Securing the financial sustainability of critical services (continued)

**Consider concerted action by institutions, funders and publishers to safeguard the DOAJ's future and place it on a sustainable footing.** In the case of the DOAJ, both its funding and usage are relatively diversified, and it has had some success in developing a membership model based on library/consortia funding plus a sponsorship programme targeting (OA) publishers and commercial aggregators. However, for largely historical reasons it remains over-reliant on funding from university libraries and library consortia in a small number of European countries.

Since DOAJ changed organisational setting in January 2013, it has extended its development, operations and services considerably. Funding has also grown by more than 30% year on year, but despite that the service has operated at a small deficit. The demands and expectations from the community are constantly increasing and further support is needed to allow the service to operate sustainably for the long term. The recent statement in

support of the DOAJ by the Austrian University Conference (uniko) and the Austrian Science Fund (FWF) represents a welcome model for doing this<sup>30</sup>.

**Consider the viability of establishing an international funding model and governance mechanism for the SHERPA services, particularly SHERPA/RoMEO.** The SHERPA services are at present wholly funded by Jisc in the United Kingdom, but the UK accounts for less than 20% of worldwide usage of SHERPA/RoMEO (although other services such as SHERPA/FACT have a much higher proportion of UK usage).

Jisc has committed to support the SHERPA offering as part of its core services, and thus its immediate future is secure. However, the mismatch between funding, governance and usage represents an unacceptable risk for the OA community, both in terms of the limited scope to enhance services above their current level, and the potential for bias towards the needs of UK users over the rest of the world.

### 5.3. Developing fully interoperable OA repository services

**Prioritise development of central ‘nodes’ and standards for interoperability in support of OA self-archiving.** In the area of OA repositories, the sheer number of current services, historic fragmentation along geographical and disciplinary boundaries, and limited inter-operability avoids the risk of a single point of failure, but also significantly impedes progress. Where funders have taken concerted action to develop centralised services, as in the case of Europe PubMedCentral, this has resulted in a repository infrastructure that largely meets the needs of both researchers and policymakers. Solutions developed primarily by the research community, such as ArXiv and RePEc, are valuable to researchers, but perhaps less suited to supporting policy compliance, while in many other disciplines both researchers and policy makers are ill-served by the current situation.

There is a pressing need for leadership and co-ordination to further develop these crucial ‘nodes’ in the OA repository infrastructure, and to deliver greater interoperability across existing institutional and subject repositories, thereby improving discoverability and enabling policy compliance. The interoperability roadmap developed by COAR<sup>31</sup> has identified a number of steps that can be taken in this regard, while greater engagement is also needed with the OpenAIRE project, which currently offers the greatest potential for a more joined-up, integrated OA repository infrastructure within both the KE countries and Europe as a whole.

### 5.4. Moving from services to a functioning OA infrastructure

The fundamental challenge raised by this study is how to fund and oversee a transition from the current disparate collection of OA services to a fully-functioning open scholarly infrastructure that can effectively deliver OA policy compliance. As OA policies continue to develop and broaden in scope, increased demands will be placed on existing services, and they will need to become increasingly interconnected. Policy makers, funders and institutions will need to consider how to invest strategically in OA services, in order to create a coherent OA infrastructure that is efficient, integrated and representative of all stakeholders. This will require dialogue with the publishing community, and new fora and mechanisms will be needed to determine the type, timing and modality of support for specific OA services. Ultimately, the delivery of OA policy compliance at scale must proceed hand-in-hand with the development of an effective OA infrastructure.



**Policy makers, funders and institutions need to invest strategically in OA services to create a coherent OA infrastructure**

# Notes

<sup>1</sup> 'Open Access Infrastructure', Information Standards Quarterly, Summer 2014, volume 26, no. 2, doi: 10.3789/isqv26no2/2015, <http://www.niso.org/publications/isq/2014/v26no2/>

<sup>2</sup> Bilder G, Lin J, Neylon C (2015) Principles for Open Scholarly Infrastructure-v1, retrieved 21 July 2015, <http://dx.doi.org/10.6084/m9.figshare.1314859>

<sup>3</sup> Two previous Knowledge Exchange reports on the topic of OA services are available for download at: <http://www.knowledge-exchange.info/Default.aspx?ID=535>

<sup>4</sup> Swan A, Gargouri Y, Hunt M and Harnad S (2015) Open Access Policy: Numbers, Analysis, Effectiveness. Pasteur4OA Work Package 3 report: Open Access policies, retrieved 9 July 2015, <http://eprints.soton.ac.uk/id/eprint/375854>

<sup>5</sup> <https://101innovations.wordpress.com/>

<sup>6</sup> <http://roarmap.eprints.org/>

<sup>7</sup> "Open Access policy for public-sector research councils and foundations" <http://ufm.dk/en/research-and-innovation/cooperation-between-research-and-innovation/open-science/open-access-policy-for-public-research-councils-and-foundations>

<sup>8</sup> "Denmark's National Strategy for Open Access" <http://ufm.dk/en/research-and-innovation/cooperation-between-research-and-innovation/open-science/open-access-to-research-publications/engelsk-version-national-strategy-for-open-access.pdf>

<sup>9</sup> Open Science and Research Roadmap 2014- 2017" <http://openscience.fi/open-science-and-research-roadmap-2014-2017>

<sup>10</sup> "Publishing open access and making data available" <http://www.aka.fi/en/funding/good-scientific-practice/tieteen-avoimuus/>

<sup>11</sup> "Guidelines Open Access Publishing" [http://www.dfg.de/formulare/12\\_20/12\\_20\\_en.pdf](http://www.dfg.de/formulare/12_20/12_20_en.pdf)

<sup>12</sup> "Guidelines for the Use of Funds" [http://www.dfg.de/formulare/2\\_012e/2\\_012e.pdf](http://www.dfg.de/formulare/2_012e/2_012e.pdf)

<sup>13</sup> "Open Access at the Initiative and Networking Fund"

<sup>14</sup> "Mission Statement at the Berlin 11 Open Access Conference of the Max Planck Society: Ten Years After the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities"

<sup>15</sup> "Letter to Parliament (2013)" <http://www.government.nl/documents-and-publications/parliamentary-documents/2014/01/21/open-access-to-publications.html>

<sup>16</sup> "Open Science" <http://www.nwo.nl/en/policies/open+science>

<sup>17</sup> "Policy for open access in the post-2014 Research Excellence Framework" "<http://www.government.nl/documents-and-publications/parliamentary-documents/2014/01/21/open-access-to-publications.html>" <http://www.government.nl/documents-and-publications/parliamentary-documents/2014/01/21/open-access-to-publications.html>

<sup>18</sup> "RCUK Policy on Open Access and Supporting Guidance" <http://www.rcuk.ac.uk/RCUK-prod/assets/documents/documents/RCUKOpenAccessPolicy.pdf>

<sup>19</sup> "Position statement in support of open and unrestricted access to published research" <http://www.wellcome.ac.uk/About-us/Policy/Policy-and-position-statements/WTD002766.htm>

<sup>20</sup> Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020 - Version 1.0" [https://ec.europa.eu/research/participants/data/ref/h2020/grants\\_manual/hi/oa\\_pilot/h2020-hi-oa-pilot-guide\\_en.pdf](https://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf)

<sup>21</sup> "Open Access Guidelines for research results funded by the ERC" [http://erc.europa.eu/sites/default/files/document/file/ERC\\_Open\\_Access\\_Guidelines-revised\\_2014.pdf](http://erc.europa.eu/sites/default/files/document/file/ERC_Open_Access_Guidelines-revised_2014.pdf)

<sup>22</sup> For further information on the international landscape see section 4 of RCUK (2015) Review of the Implementation of the RCUK Policy on Open Access, retrieved 21 July 2015, <http://www.rcuk.ac.uk/RCUK-prod/assets/documents/documents/Openaccessreport.pdf>

<sup>23</sup> PASTEUR<sub>4</sub>OA (Open Access Policy Alignment Strategies for European Union Research) aims to support the European Commission's Recommendation to Member States of July 2012 that they develop and implement policies to ensure Open Access to all outputs from publicly-funded research. <http://www.pasteur4oa.eu/>

<sup>24</sup> Swan A, Gargouri Y, Hunt M and Harnad S (2015) Open Access Policy: Numbers, Analysis, Effectiveness. Pasteur<sub>4</sub>OA Work Package 3 report: Open Access policies, retrieved 9 July 2015, <http://eprints.soton.ac.uk/id/eprint/375854>

<sup>25</sup> Among the most important Fedora repositories are: Escidoc (Germany), Hydra (US, UK), Islandora (US, soon Netherlands) and custom made fedora solutions (Netherlands).

<sup>26</sup> Collaboration on data exchange, technological development and metadata <https://www.coar-repositories.org/activities/advocacy-leadership/aligning-repository-networks-across-regions/collaboration-on-data-exchange-technological-development-and-metadata/>

<sup>27</sup> A draft schema for OA policies has been developed and is currently open for comment at <http://scholarlycommunications.jiscinvolve.org/wp/2014/12/01/a-schema-for-oa-policies/>

<sup>28</sup> Crow R. (2013) 'Sustainability of Open Access Services - Phase 3: The Collective Provision of Open Access Resources'. retrieved 9 July 2015, <http://www.knowledge-exchange.info/event/sustainability-oa-services>

<sup>29</sup> Usage figures for the DOAJ reflect usage on the website (i.e. users generating sessions searching for journals, articles etc) for the top 50 countries only, over the period June 2014 to May 2015, and do not include usage of the harvesting (OAI-PMH) facility or the OpenURL resolver. As a result, usage is substantially understated for countries such as Norway which ingests DOAJ data for re-use within its national CRIS. Usage for SHERPA RoMEO similarly reflects website sessions in the period May 2014- May 2015, and does not include use of the SHERPA/RoMEO API. In both cases the usage figures should therefore be considered indicative only.

<sup>30</sup> "uniko and FWF recommend support of the Directory of Open Access Journals" (translated from the German), retrieved 8 July 2015, [http://www.ots.at/presseaussendung/OTS\\_20150617\\_OTS0063/uniko-und-fwf-empfehlen-unterstuetzung-des-directory-of-open-access-journals-anhang](http://www.ots.at/presseaussendung/OTS_20150617_OTS0063/uniko-und-fwf-empfehlen-unterstuetzung-des-directory-of-open-access-journals-anhang)

<sup>31</sup> Confederation of Open Access Repositories (2015) 'COAR Roadmap Future Directions for Repository Interoperability', retrieved 9 July 2015, [https://www.coar-repositories.org/files/Roadmap\\_final\\_formatted\\_20150203.pdf](https://www.coar-repositories.org/files/Roadmap_final_formatted_20150203.pdf)



# Appendix 1: List of interviewees

Contact name	Country	Perspective	Organisation	Role
Falk Reckling	Austria	Funder	FWF	Department Head - Strategic Analysis
Bertil Dorch	Denmark	Research Performing Organisation (RPO)	University of Southern Denmark	Library Director
Mogens Sandfær	Denmark	RPO	Technical University of Denmark	Head of Bibliometrics and Data Management
Jean-Francois Dechamp	EU	Funder	European Commission	Open Access Policy Officer
Natalia Manola	EU	Infrastructure/ service provider	OpenAIRE	OpenAIRE representative
Jarmo Saarti	Finland	RPO	University of Eastern Finland	Library director
Tua Hindersson-Söderholm	Finland	RPO	Hanken University	Library Director
Birgit Schmidt	Germany	RPO	Göttingen University	KE OA Working Group
Gernot Deinzer	Germany	RPO	Regensburg University	KE OA Working Group
Kai Geschuhn	Germany	RPO	Max Planck Digital Library	Open Access Policy
Najko Jahn	Germany	RPO	Bielefeld University	BASE
Paola Gargiulo	Italy	Infrastructure/ service provider	CINECA	International Business Development Unit
Eelco Ferwerda	Netherlands	Infrastructure/ service provider	OAPEN Foundation	Service provider
Elly Dijk	Netherlands	Infrastructure/service provider	DANS	Head data services (responsible for the NARCIS, Dutch OA portal)
Jeroen Sondervan	Netherlands	Infrastructure/service provider	Utrecht University Library	Utrecht University Open Access journals (formerly Igitur)
Just de Leeuwe	Netherlands	RPO	TU Delft Library	OA coordinator at TUD, OpenAIRE representative and provider of the Dutch OA website
Merle Rodenburg	Netherlands	RPO	TU Eindhoven Library	OA coordinator
Ron Dekker	Netherlands	Funder	NWO	Director, responsible for OA dossier
Ben Johnson	UK	Funder	HEFCE	Research Policy Advisor
Bill Hubbard	UK	Infrastructure/service provider	Centre for Research Communications	Director
Cameron Neylon	UK	Publisher	PLOS	Director of advocacy (until June 2015)
Geoff Bilder	UK	Infrastructure/service provider	CrossREF	Director of Strategic Initiatives
Mark Thorley	UK	Funder	RCUK	Head of Science Information and Data Management Co-ordinator
Robert Kiley	UK	Funder	Wellcome Trust	Head of Digital Services
Josh Brown	UK/ Switzerland	Infrastructure/ service provider	ORCID	Director of European Advocacy

## Appendix 2: Glossary of terms

Below is a definition of the key terms used in this report (in alphabetical order):

<b>Article processing charge (APC)</b>	A fee which is sometimes charged to authors in order to publish an article in an open access journal. The fee is usually paid by an author's institution or research funder rather than by the author themselves.
<b>Categories and subcategories of OA services</b>	A 'category' indicates a broad group of services that allow implementation of distinct workflows in compliance with OA policy requirements; a 'subcategory' is a smaller and more cohesive group of OA services sitting within a category.
<b>Open access archiving</b>	The practice of archiving a version (often the peer-reviewed postprint author's accepted manuscript) of an article for free public use in an institutional repository (IR), a central repository (e.g., PubMed Central), or on some other open access website. Where this is done by the author the term 'self-archiving' is typically used.
<b>Open access publication</b>	The article is published in an open access journal that provides immediate open access to all of its articles on the publisher's website.
<b>Hybrid open access</b>	An open access model where a journal provides open access only for those individual articles for which an open access publishing fee has been paid by the author (or the author's institution or funder).
<b>Identifiers</b>	Unique numbers assigned to entities such as publications, authors, funders and institutions to ensure their consistent identification across platforms, particularly online.
<b>Infrastructure</b>	Those services that are invisible to the end user but which contribute, directly or indirectly, to the successful implementation of OA workflows.
<b>Metadata</b>	A set of data that describes and gives information about other data, for example linking publications to authors and institutions.
<b>Open access policies (also OA policies or OA mandates)</b>	The documents, declarations, recommendations or set of operational guidelines adopted – formally or informally – by a research funder, governmental entity, research organisation or higher education institution, which regulate Open Access to academic publications.
<b>Open-access services (also OA services)</b>	Services that allow, support or facilitate the workflows necessary to implement OA mandates.
<b>Overlay journal</b>	A specific type of open access academic journal which does not produce its own content, but selects from texts that are already freely available online.
<b>Repository</b>	A mechanism for managing and storing digital content. Repositories can be subject, institutional, national or international in their focus.

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# Appendices 3 to 5

The following appendices are available to download at:

**Appendix 3:** [http://repository.jisc.ac.uk/6269/1/KE\\_Putting\\_Down\\_Roots\\_-\\_Appendix\\_3.pdf](http://repository.jisc.ac.uk/6269/1/KE_Putting_Down_Roots_-_Appendix_3.pdf)

**Appendix 4:** [http://repository.jisc.ac.uk/6269/2/KE\\_Putting\\_Down\\_Roots\\_-\\_Appendix\\_4.pdf](http://repository.jisc.ac.uk/6269/2/KE_Putting_Down_Roots_-_Appendix_4.pdf)

**Appendix 5:** [https://repository.jisc.ac.uk/6269/3/KE\\_Putting\\_Down\\_Roots\\_-\\_Appendix\\_5.pdf](https://repository.jisc.ac.uk/6269/3/KE_Putting_Down_Roots_-_Appendix_5.pdf)

- » **Appendix 3** provides a narrative overview of selected OA policies adopted by public research funders, private research funders and HEIs across the five Knowledge Exchange countries, plus the European Commission. Although non-exhaustive, the summary shows the diversity of approaches European countries have taken in the field of open access, and the non-homogeneous pace at which the OA agenda is advancing in Europe.
- » **Appendix 4** summarises, in tabular form, the main requirements of the OA policies adopted by public research funders across the five KE countries plus the EU. Policy requirements have been classified according to the three components used in the report (Compliance, OA archiving and OA publishing).
- » **Appendix 5** contains an illustrative list with summary descriptions of the OA services that were reviewed for this study. A typology of services is used, comprising six categories (underpinning services, abstracting indexing services, support and dissemination services, repository services, OA publishing services, and monitoring services) and 18 sub-categories.



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