Access to and Preservation of Scientific Information in Europe

Report on the implementation of Commission Recommendation C(2012) 4890 final

Research and Innovation

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Executive summary / Key messages

An important aspect of open science is a move towards open access to publicly funded research results, including scientific publications as well as research data. Based on the structure of Commission Recommendation C(2012) 4890 final and its assorted reporting mechanism (the National Points of Reference for scientific information) this report provides an overview on access to and preservation of scientific information in the EU Member States as well as Norway and Turkey. It is based on self-reporting by the participating states as well as cross-referencing with other relevant documents and further desk research.

Concerning open access to **scientific peer-reviewed publications,** most EU Member States reported a national preference for one of the two types of open access, either the Green (self-archiving) or the Gold (open access publishing) model. Preference for the Green model is found in Belgium, Cyprus, Denmark, Estonia, Greece, Ireland, Lithuania, Malta, Norway, Portugal, Slovakia and Spain. Those expressing a preference for the Gold model are Hungary, the Netherlands, Romania, Sweden and the United Kingdom. Other Member States support both models equally, such as Germany, France, Croatia, Italy, Luxembourg, Poland and Finland. However, the expressed preferences for one of the two models are not pure models in which only one route is followed. Instead, there is generally a system of predominance of one model with the possibility of using the other model, so a mixture of both routes results. While few Member States have a national law requiring open access to publications, a mandate put in place by law is not necessarily stronger or more effective than a mandate put in place by a single institution or funder. For example, an open access mandate is strong as it ties open access to possible withdrawal of funds in the case of non-compliance, or to the evaluation of researchers' careers.

Overall, **policies on open access to research data** are less developed across EU countries than policies and strategies on open access to research publications. However, individual Member State feedback shows a general acknowledgement of the importance of open research data and of policies, strategies and actions addressed at fostering the collection, curation, preservation and re-use of research data. Based on the self-reporting of the EU Member States and participating associated countries, the following classification is proposed.

- Very little or no open access to research data policies in place and no plan for a more developed policy in the near future: Cyprus, Latvia, Luxembourg, Malta, Poland.
- Very little or no open access to research data policies in place, but some plans in place or under development: Austria, Belgium, Croatia, Czech Republic, Estonia, Hungary, Italy, Portugal, Romania, Slovakia, Sweden, Turkey.
- Open access policies/institutional strategies or subject-based initiatives for research data already in place: Denmark, Finland, France, Germany, Ireland, Lithuania, the Netherlands, Norway, Slovenia, the United Kingdom.

Concerning the **curation and preservation of scientific information** (another issue covered by the 2012 Recommendation), institutional repositories are very well developed in most Member States although some NPR reports stress that, in many cases, institutional repositories are not certified to properly guarantee the long-term preservation of scientific information. NPR reports also show that many Member States have made a clear effort to become more efficient and transparent regarding scientific information and research activities in general. This being said, some Member States underline research information purposes rather than the objective of open access to research results, with most CRIS systems containing meta-data and not necessarily full results. Nevertheless, a tendency can be observed among the latest wave of EU enlargement countries that they are focusing efforts on developing centralised national repositories for preservation to be connected to the existing national CRIS systems and to be inter-operable across the EU with, for example, OpenAIRE protocols.

Many Member States have devised global policies and strategies for **developing e-infrastructures** in a comprehensive way. Such strategies often contain specific chapters or sections addressing scientific information, research and innovation, covering storage and high-performance computing capabilities as well as the appropriate dissemination, access and visibility of research results. As is the case in other areas, the stage of e-infrastructure development varies greatly among Member States, and it is worth noting differences in funding capabilities in this area. The support provided by EU-funded projects and initiatives is of significant importance here.

Concerning **participation in multi-stakeholder dialogues** and activities, several countries have set up national coordination bodies or networks (Belgium, Denmark, Germany, Italy, Austria, Poland, Portugal). Other countries rely on a university or a university library (or an association of libraries) to coordinate national stakeholders (Czech Republic, Lithuania, Luxembourg, Malta) or on their research promotion agency/research councils (Cyprus, Sweden, the United Kingdom) or their academy of science (Slovakia). Specific events, such as open-access workshops or activities during the annual open-access week, have also been identified as a way to galvanise stakeholder interaction at the national level (Czech Republic, Croatia, Italy, Romania). Additionally to EU fora (such as ERA, ERAC, the NPR, the Digital ERA Forum and the E-IRG), EU funded projects such as OpenAIRE FOSTER and PASTEUR4OA as well as PEER, Dariah and Serscida were mentioned as important support mechanisms. Furthermore, Belgium and the Netherlands have established bilateral cooperation and among the Nordic states (Denmark, Finland, Iceland, Norway and Sweden) part of the dialogue on open science is conducted within the framework of the NordForsk organisation.

1. Introduction

Background: open access in an open science context

The way research is performed, researchers collaborate, knowledge is shared and science is organised is rapidly changing. This change, referred to as 'open science', is enabled by the availability of digital technologies and driven by the exponential growth of data and the enlargement of the global scientific population. It affects the whole science and innovation system. An important aspect of open science is a move towards open access to publicly funded research results, including scientific publications as well as research data. Affordable and easy access to the results of publicly funded research is important for the scientific community, for innovative businesses and for society. The EU's vision on access to and preservation of scientific information is outlined in three documents.

- ERA Communication COM(2012) 392 final on A reinforced European Research Area partnership for excellence and growth. One of the key actions foreseen as part of ERA is to optimise the circulation, access to and transfer of scientific knowledge.

- Communication COM(2012) 401 final Towards better access to scientific information: Boosting the benefits of public investments in research. This provides the basis for anchoring open access in Horizon 2020.

- Recommendation C(2012) 4890 final to Member States on Access to and preservation of scientific information. This Recommendation covers improving policies and practices on open access to scientific publications and research data, as well as the preservation and use of scientific information. The aim is not to harmonise national policies but to coordinate them.

The increasing importance of open access principles and policies has also been stressed in the context of the Digital Single Market strategy ([1]), a key priority of the Juncker Commission, whereby optimal circulation and transfer of scientific knowledge will contribute to increased innovation, jobs and growth in the EU. More recently, the growing importance of open (research) data was emphasised in the *Draft Council conclusions on open, data-intensive and networked research as a driver for faster and wider innovation*, of 19 May 2015. ([2])

In Horizon 2020, the Commission has made open access to peer-reviewed scientific publications mandatory. The Commission allows both 'Gold' and 'Green' open access. For Gold open access, costs charged to researchers by the publisher (Article Processing Charges, or APCs) are currently eligible for reimbursement as part of the grant. For APCs incurred after the end of the grant agreement, a mechanism for reimbursing some of these costs is being piloted. For Green open access, researchers deposit the final peer-reviewed manuscript in a repository of their choice. In this case, they must ensure open access to the publication within six months of publication (12 months for social sciences and humanities).

As for open access to research data, the Commission is running an Open Research Data Pilot in Horizon 2020. The pilot aims to improve and maximise access to and re-use of research data generated by Horizon 2020 projects, taking into account the need to balance openness and protection of scientific information, commercialisation and intellectual property rights, privacy concerns and security, as well as data management and preservation questions.

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[1]   The Commission has made the achievement of a Digital Single Market one of its 14 priority initiatives (http://ec.europa.eu/priorities/digital-single-market/index_en.htm).

[2]   http://data.consilium.europa.eu/doc/document/ST-8970-2015-INIT/en/pdf

The National Points of Reference and the structure of this report

The Commission Recommendation C(2012) 4890 final of 17 July 2012 on access to and preservation of scientific information ([3]) stipulates in Article 8 that each country should designate a national point of reference (NPR) with the task of coordinating the measures listed in the Recommendation and acting as an interlocutor with the Commission. Furthermore, Article 9 states that the NPRs also have the task of informing the Commission of the actions taken in response to the different elements of the Recommendation.

By the end of 2013, all EU Member States had nominated an NPR. A first, informal meeting took place in December 2013, after which the Commission prepared a template for reporting on progress at national level. A second, informal meeting took place in September 2014.

This report summarises all the reports received in this context. The report is divided into seven sections, with a view to offering a summary of the answers received. While the report primarily relies on self-reporting from the Member States, additional information has been integrated from other sources for the sake of consistency, mainly the OpenAIRE overview of open access in the EU Member States ([4]), the ERAwatch Platform on Research and Innovation policies and systems ([5]) and the ERA Progress Report 2014 ([6]). In addition, registry, directory and aggregator tools such as OPENDOAR ([7]), ROARMAP ([8]), SHERPA/JULIET ([9]) and DOAJ ([10]) have been consulted for an up-to-date record at national level of open access repositories, funders' mandates on open access and the number of open access journals. Finally, other information platforms on open access were consulted, in particular the Global Open Access Platform (GOAP) ([11]) run by Unesco. The final draft was then sent to the NPRs for further scrutiny before publication.

It was the aim to keep this report as up to date as possible (last validation: September 2015). However, due to the fast-moving nature of the field, its accuracy cannot be guaranteed beyond the date of validation.

Content feedback: RTD-OPEN-ACCESS@ec.europa.eu

([3])   http://ec.europa.eu/research/science-society/document_library/pdf_06/recommendation-access-and-preservation-scientific-information_en.pdf

([4])   https://www.openaire.eu/eu-member-states/noads/member-states-overview

([5])   http://erawatch.jrc.ec.europa.eu/

([6])   http://ec.europa.eu/research/era/pdf/era_progress_report2014/era_progress-report_150521.pdf

([7])   OpenDOAR is The Directory of Open Access Repositories (http://www.opendoar.org/index.html)

([8])   ROARMAP is the Registry of Open Access Repository Mandates and Policies (http://roarmap.eprints.org/)

([9])   Sherpa/JULIET lists research funders' open access policies (http://www.sherpa.ac.uk/juliet/index.php)

([10])   DOAJ is the Directory of Open Access Journals (https://doaj.org/)

([11])   http://www.unesco.org/new/en/communication-and-information/portals-and-platforms/goap/

2. Policies on open access to scientific publications and their implementation

Answers have been grouped into four areas: stakeholders; 'soft measures' versus mandates; open access 'preferred model'; and the funding/costs aspect. A table (see Appendix II) provides the detailed findings.

Stakeholders

Very different stakeholders are involved in open access policies, strategies and initiatives. These include government and ministerial departments, research funding organisations (e.g. national agencies, research councils), research performing organisations (including research institutes and universities), national science academies and learned societies, libraries (national and/or research libraries, often of a digital nature), umbrella research organisations, researchers themselves, publishers and others.

Universities and their libraries are amongst the most active stakeholders on open access topics. The latter have almost invariably become digital and are key actors in the preservation of scientific results, both by frequently hosting institution repositories of scientific outputs, and also as awareness-raising, training and helpdesk facilitators for dissemination and publication activities. Researchers and their universities are usually the first actors in signing and upholding the principles stated in well-known open access declarations such as the Berlin ([12]), Budapest ([13]) or Bethesda ([14]) declarations. In general, open access initiatives and mandates are bottom-up, initiated at the academic level institutionally, as they usually enjoy quite some freedom in devising their own academic policies. Universities and researchers usually work together with librarians and information scientists in ensuring the preservation of scientific papers, ETDs (electronic theses and dissertations) and grey literature such as conference proceedings, for which most of them have long ago set up repositories used for depositing research outputs. A next natural step is providing some form of access to this scientific output, although the degree of such access varies greatly between universities. Once preservation and open access are enabled at institutional level, funders usually follow up with the establishment of some policy, strategy or even pilot-funding mechanism relating to open access. This happens for example in the smaller Member States coming from the most recent waves of enlargement such as **Croatia, Cyprus**, **Malta** and **Slovakia**. In those countries where funders' mandates are mostly non-existent, universities and research libraries are more proactive in adhering to open access principles and being first in introducing open access mandates or 'soft measures', either via self-archiving depositing mandates (the first step usually being a deposit mandate for ETDs, and then for publications and/or data), or by setting up open access journals or small specific pilot funds to cover APCs. In Slovenia, the government adopted the National strategy of open access to scientific publications and research data in Slovenia 2015-2020 on 3 September 2015 ([15]).

In several Member States, university and research libraries tend to group together in order to discuss open access topics and produce commonly agreed declarations, strategies or policies, mirroring other EU umbrella organisations, such as LIBER, IFFLA, LERU, EUA, Science Europe or Europeana. These organisations network in order to raise awareness on open access subjects, to discuss broadly about common open access principles and to organise conferences, workshops and

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([12])   http://openaccess.mpg.de/Berlin-Declaration
([13])   http://www.budapestopenaccessinitiative.org/read
([14])   http://legacy.earlham.edu/~peters/fos/bethesda.htm
([15])http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Znanost/doc/Zakonodaja/Strategije/National_strategy_for_open_access_21._9._2015.pdf

training on open access topics generally. For example, in **Austria,** Universities Austria (UNIKO) is an umbrella organisation which brings together most Austrian universities. Together with the Austrian Science Fund (FWF), UNIKO established Open Access Network Austria (OANA) at the end of 2012. Likewise, the Austrian Library Network Ltd (OBVSG) groups different research libraries to coordinate and formulate common positions in relation to open access topics in Austria. Other organisations have been created in many Members States including the following.

- In **Belgium**, BibForum is the consultation platform for the libraries of federal research institutions, the *Bibliothèque Interuniversitaire de la Communauté française de Belgique* (BICfB) for the French speaking universities and the *Vlaamse Vereniging voor Bibliotheek, Archief en Documentatie vzw* (VVBAD) for the scientific libraries of the Flemish region.
- In **Bulgaria**, the Association of University Libraries (AUL).
- In **Cyprus**, the Cyprus Academic Library Consortium (CALC).
- In **Czech Republic**, the Association of Libraries of Czech Universities (ALCU).
- In **Denmark,** the Open Access Network.
- In **Estonia**, the Consortium of Estonian Libraries Network.
- In **Germany**, the Alliance of German Science Organisations and the German Initiative for Network Information.
- In **Greece**, the Hellenic Academic Libraries Link (HEAL-Link).
- In **Ireland**, the Irish Universities Association.
- In **Italy**, at the request of the government, a network of Institutional Points of Reference in each research organisation and university.
- In **Lithuania,** the Lithuanian Academic Libraries Network (LABT) and the Lithuanian Academic e-Library (eLABa).
- In the **Netherlands,** the Dutch Dataverse Network (DDN) for research data.
- In **Poland**, the Polish Digital Libraries Federation.
- In **Portugal**, university libraries have taken a predominant role around open access discussions since they are heavily engaged in RCAAP, the national network of open-access repositories (more details below). The RCAAP community comprises a number of stakeholders (the majority of its members are university librarians). ([16]) To this end, most university libraries in Portugal have proactively assumed the role of enablers of scientific information dissemination and facilitators of digital services. Thus, they are mostly also institutional repository managers and interface directly with the research community, spreading down the chain the orientations commonly agreed at the RCAAP meetings.
- In **Spain**, the Network of Academic and Research University Libraries of Spain (Rebiun).
- In **Turkey**, ANKOS (Anatolian University Libraries Consortium) Open Access Working Group.
- In the **UK**, Universities UK (UUK).

These umbrella organisations have been very proactive in fostering open access policies and strategies at national level within their membership. They organise conferences and workshops, provide training and, in some cases, offer helpdesk services to researchers and their institutions.

A specific case among libraries is that of **national libraries** (in some cases they are called 'royal libraries' or 'digital libraries')**.** Although in some Member States they are still going through a digitisation process, in most cases they have gone online and offer services to researchers and the wider public over the internet. They are key actors in the long-term preservation of cultural heritage and scientific knowledge, as in many cases they have been entrusted with performing the legal deposit of cultural heritage and scientific output in the national language or languages of the specific country. The legal deposit mandate ensures compliance with the proper recording and preservation of publications and cultural heritage, and facilitates the important tasks of harvesting, tracking and

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([16])   This community is highly cohesive and dynamic, with several of its members involved in working groups, and holding six-monthly meetings that promote the alignment of policies and dissemination of best practices.

monitoring research outputs and related open access mandates. Further, legal deposit is aimed at tackling the long-term preservation requirement for scientific and cultural outputs and national libraries and assimilated bodies are thus deemed highly valuable for the easy findability of scientific materials. Countries in which national libraries have such a legal deposit mandate (often covering research publications as well) are: **Belgium** (Royal Library); **Denmark** (The Royal Library and the State and University Library have legal deposit mandates); **Germany** (the German National Library or DNB which stands for 'digital legal deposit'); **France** (the *Bibliothèque Scientifique Numérique* or BSN (Scientific Digital Library)); **Croatia** (National and University Library, through the Croatian Web Archive and Digital Academic Repository for ETDs); **Luxembourg** (the National Library of Luxembourg); the **Netherlands** (the Dutch Royal Library); **Portugal** (Decree-Law 115/2013 mandates legal deposit of a print copy of every national master's degree dissertation and doctoral thesis at the National Library and, simultaneously, deposit of a digital copy in one of RCAAP's network repositories); **Slovenia** (the Digital Library of the National and University Library); **Finland** (the National Digital Library); **Sweden** (legal deposit mandate at the National Library of Sweden); and the **United Kingdom** (the British Library, for UK online publications and UK Web Archive for inactive or historical versions of UK websites.

However, among legal deposit mandates, there are important differences as to the level of access provided and to whom such access is guaranteed, as this access varies from only meta-data and links to original publishers' websites to the full-text of the publications or digital materials themselves. There are also important differences regarding who access is guaranteed to, and this varies from the provision of access to registered users in the country to free online access for anyone. For this reason, in some instances we cannot properly talk about open access being provided by these actors as yet, but they are able and often willing to do so in the near future. For example, in **Luxembourg,** access to the records held by their National Library is limited to Luxembourg's residents. In the **United Kingdom** an initiative by the Publishers Licensing Society provides free, walk-in access to a wide range of academic articles and research in public libraries across the UK.

Most Member States reported having what are known as current research information systems (CRIS), which are specific platforms harvesting meta-data at national level related to research output of publicly funded research, as well as other information on research projects. An EU-wide not-for-profit organisation called EuroCRIS is responsible for continuing the European Commission initiative CERIF (Common European Research Information Format), which brought together all EU CRIS systems in order to gather and exchange research information in Europe and agree on the common standards and interoperable information to be made publicly available ([17]). Countries with CRIS systems in place are as follows:
- **Belgium** (for the Flemish authority the Flanders Research Information Space or FRIS).
- **Croatia** (it has an existing national bibliography of scientific publications Croatian Scientific Bibliography or Crosbi, which provides deposition of publications in full text, a recently launched common repository infrastructure for all Croatian academic and research institutions called DABAR, and Who's Who in Science in Croatia which contains information on Croatian researchers).
- **Denmark** (it has the Danish National Research Database, which is a central portal for published Danish research).
- **Estonia** (it has set up full-text deposition of publications resulting from publicly funded research to the Estonian Research Information System or ETIS as a requirement for future funding).
- **Finland** (Juuli is the Finnish research publication portal and in addition several organisations have their own online CRIS portals and a nationwide CRIS is planned for 2020).

([17])   http://www.eurocris.org/

- **France** (it has an existing national open archive repository called HAL, *Hyper-Articles en Ligne*, and is in the process of creating a future central reference system for all French public research publishing with the Conditor project).
- **Hungary** (the Hungarian National Scientific Bibliography project called MTMT started in 2009, and is a CRIS system collecting comprehensive national scientific output of all researchers working in Hungary, affiliated to a Hungarian university or funded by Hungarian grants; it is expected that registration of scientific publications will become compulsory in Hungary from 2015 onwards).
- **Italy** (the Portal of Italian Electronic Scholarly Literature in Institutional Repositories platform or Pleiadi).
- **Ireland** (the bibliographic content platform RIAN harvests bibliography from institutional repositories of seven Irish universities and the Dublin Institute of Technology).
- **Lithuania** (it has the Lithuanian Academic e-Library, which since 2006 has performed the function of a national open access repository, and the Lituanistika database which contains information on scientific research and studies in Lithuania and the world).
- **Malta** (the University of Malta's institutional repository OAR@UoM performs the function of a CRIS system).
- the **Netherlands** (the Narcis portal is the Dutch gateway for scholarly information).
- **Norway** (CRIStin is the Norwegian research information tool that records meta-data on all scientific publications from higher education, hospitals and research institutes. The data is used for allocating part of the funding for these institutions. The database also contains competency profiles of researchers and information on research projects).
- **Poland** (the primary function of the Polish Scholarly Bibliography database system or PBN is the gathering of up-to-date information on Polish research output, but it also performs a repository function for self-archiving).
- **Portugal** (PT-CRIS, nationally defined as an ecosystem of CRISs, is at implementation stage and it will integrate and make interoperable — through the adoption of the best current standards, such as ORCID, ISNI, the OpenAIRE guidelines and EuroCRIS — several pre-existing platforms such as the DeGóis Curricula Platform that mainly contain information on researchers, the national open access repository infrastructure network RCAAP that provides open access to national research publications, the national library consortium b-On or Biblioteca Online that provides access to thousands of subscription research publications and, among several other systems, the local management systems of FCT, the single public research funder, that contain information on research projects, institutions, research funding and infrastructures).
- **Slovakia** (it has both a specific Slovak CRIS system, SK CRIS, and a Central Bibliographic Database of Slovak Electronic Information Resources for Research and Development and Portal Solution called SciDAP).
- **Spain** (Spain's national harvester and service provider for the repositories' community is called Recolecta or Open Science Harvester, a digital platform that aggregates national scientific open access repositories in one place and provides advocacy and dissemination activities, as well as support and services to repository managers, researchers and policymakers).

Other countries are either studying the possibility of having such systems or are already in the process of implementing them. For example, in **Belgium** (at federal level) the Federal Science Policy office (Belspo) is implementing the Orfeo repository for all federal research institutions. Orfeo will be made public at the beginning of 2016 starting with content from Belspo research institutions. In **Luxembourg,** the University of Luxembourg has set up the ORBilu repository for the university's research output to which self-deposit is mandatory, although a national repository for long-term preservation is also envisaged. In **Romania**, the AnelisPlus project is set to launch a virtual campus that would become a one-stop sign-in portal for access to all Romanian scientific and academic online resources, updated information on research projects, beneficiary institutions and affiliated researchers.

Some of these CRIS systems also perform the function of national repositories for scientific publications or are in the process of implementing such a function, as they have or will have specific

mandates to deposit meta-data about research projects, research results and researchers into their digital systems. In some other cases, the CRIS systems also perform bibliographic aggregator functions and yet in other cases, they will run in parallel with ad hoc national open access repositories specifically devised for long-term preservation of scientific results. The value of CRIS systems and digital bibliographic platforms is their capacity to track and monitor important information about the research results of publicly funded research. Potentially, they may be required to upgrade to more sophisticated systems to record, track and monitor automated payment for APCs, which open access model was pursued (Green or Gold), the existence and length of embargo periods if applicable and, more importantly, use all these data for comparison and statistics, funding and resource allocation and ultimately, decision-making purposes. If appropriately implemented, CRIS tools could further help Member States obtain a clearer picture of the publishing costs of their publicly funded research at institutional and national level. For example, **France** is funding some science and technology stakeholders to create a platform which aims to become France's central reference system for all French publicly funded research publishing (Conditor project). Further, **Slovenia** reports that 'So far special technical measures for tracking open access publications authored by Slovenian researchers and funded by national funders, have not been designed yet. The existing national Current Research Information System (Sicris) upgraded with OpenAIRE compliance, could be used for this purpose . . . no software solutions are used for tracking [these] articles or automating the payment of Article Processing Charges'.

Funders are another set of key actors in devising open access policies and mandates. They are instrumental in the implementation and monitoring of preservation and dissemination policies, strategies and mandates. They are the ones deciding on the distribution of public funds to research institutions and programmes, and thus establish the conditions and rules for doing so in a top-down fashion and with a wider scope. Their role in influencing practices and advancing open access policies according to specific national needs is crucial.

Research councils and science academies also perform important tasks in relation to open access to research outputs, dissemination and awareness-raising activities on open access topics, although they do not always have fully-fledged open access mandates in place. Sometimes they are signatories to open access declarations but have not yet implemented open access mandates. It is worth mentioning some of those which have shown engagement with open access initiatives, such as the Austrian Academy of Sciences (OAW), the Bulgarian Academy of Sciences (BAS), the Belgian Conference for Federal and International Cooperation (CIS-CFS), the Czech Academy of Sciences (CAS), the Estonian Research Council, the Academy of Finland (AKA), the Hungarian Academy of Sciences (MTA), the Irish Research Council (IRC), the *Consiglio Nazionale delle Ricerche* (CNR), the Latvian Academy of Sciences, the Lithuanian Research Council (LMT), the *Fonds Nationale de la Recherche* (FNR), the Royal Netherlands Academy of Arts and Sciences (KNAW), the Slovak Academy of Sciences (SAS), the Spanish National Research Council (CSIC), the Swedish Research Council (SRC) and the Royal Swedish Academy of Sciences (KVA), the Scientific and Technological Council of Turkey (TÜBİTAK) and Research Councils UK (RCUK). Some of them control important budgets which allow them to devise and implement funds specifically to cover Article Processing Charges (APCs) for immediate publication mandates (either following a purely Gold model or a hybrid one) and therefore have a highly influential role. In the **United Kingdom,** for example, the seven Research Councils represented by Research Councils UK (RCUK) [18] have set aside important funding primarily to cover APCs (GBP 17 million for 2013/2014, GBP 20 million for 2014/2015 and GBP 20 million for 2015/16). Such provisions for funding APCs are not the norm and research funders usually prefer to set up small open access pilots with a view to extending it once the transition to the Gold model is more advanced. In 2012, an independent group led by Dame Janet Finch released the report 'Accessibility, sustainability, excellence: how to expand access to research publications' which became the foundation for developing the United Kingdom (and thereby RCUK)

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(18)   http://www.rcuk.ac.uk/research/openaccess/

policy on open access. RCUK updated its policy in 2013 and made further updates in 2015 following the publication of the Review of the implementation of the RCUK policy on open access, commissioned to analyse the impact of RCUK policy and suggest improvements following the first 18 months of implementation.

Publishers are usually mentioned when a reference is made to the negotiation of licensing agreements at national level between consortiums of research organisations and/or libraries. For example, **Austria**'s OA Network Austria (OANA), a network comprising UNIKO and the Austrian Science Fund, formulates uniform positions in relation to information providers, including publishers; Cooperation E-Media Austria (KEMO) is another consortium which negotiates buying of electronic journals for several Austrian universities. In **Croatia** open access journals have developed rapidly ([19]) as they are partly subsidised by the government; inclusion in the HRCAK portal (the repository of Croatian open access journals) is an important criterion for evaluation of journals by research authorities. Further, the recently established portal of electronic resources for the Croatian academic and research community (National and University Library) is in charge of negotiations with major publishers at national level, harmonising licence agreements with national open access policies and existing self-archiving practices. In **Cyprus** the Cyprus Academic Library Consortium (CALC) has negotiated and signed a nationwide contract with BioMed Central for an open access model to BMC journals. In the **Czech Republic** the National Technical Library has centrally negotiated licensed access to over 5 000 e-journals (until 2017). **Denmark´**s Electronic Research Library (DEFF) has the task of negotiating at national level all major licences with publishers and enters into contracts for electronic licences on behalf of academic, research and education libraries for the effective implementation of open access policies in Denmark. **Estonia** also negotiates licensing access to e-journal collections of major publishers at national level in a central, coordinated way. A financial allocation of EUR 841 350 has been made to fund research collections and access them. Further, Estonia reports that 'The central coordination of licensing and monitoring publishing behaviour of Estonian researchers via Estonian Research Information System (ETIS) would enable to reallocate funding from purchasing access to publications to funding article processing charges (APC) if major publishers start to transfer their toll-based journals to OA business model. Until now, the transfer has been minimal…'. In **Finland** the FinELib Consortium comprising research and higher education institutes is starting negotiations with the big publishers early in 2016. The three goals set for the negotiations are moderate price, open access rights and the right for text and data mining. **France** has also signed a national licence with Elsevier for its Freedom collection. The Alliance of the German Science Organisations is entrusted with national licensing in **Germany**. In **Hungary**, the Academy of Sciences has signed a specific agreement with Elsevier on self-archiving (Green open access) of MTA scientific articles. In **Luxembourg,** the Consortium Luxembourg has been negotiating with publishers over the acquisition and management of electronic publications since 2006, for the National Library, the University of Luxembourg and three other major public research centres. In **Malta**, the University of Malta (UoM) is leading negotiations with publishers at national level. The **Netherlands** also negotiates and reported that 'stakeholders, including publishers, will work on the development and implementation of new business models. Negotiations will start about the transformation of the "big deals" between toll-access journal publishers and university libraries into full open access, or at least, financial compensation for APCs paid (ending "double-dipping'")' ([20]). Agreement with several publishers have been reached. In **Norway**, CRIStin is the national negotiator of consortium licensing agreements. In **Poland**, several national licensing agreements are negotiated with major international scientific publishers by ICM of the Warsaw University, whereby an open access option allows authors in certain cases to retain copyright and licence their publications under an open access licence without additional fees being paid to the publishers on top of the subscription fees already paid. In **Portugal**, the Online Knowledge Library or b-on negotiates subscription agreements with publishers on a national basis and this consortium is currently bringing

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([19]) At present there are more than 370 open access journals, of which over 100 are listed in the DOAJ directory
([20]) For a more in-depth explanation of the 'double-dipping' phenomenon, please see paragraph (d) below which deals with funding/costs issues.

the topic of open access publishing by national researchers to the negotiating table with the publishers, addressing issues such as double-dipping and the length of embargo periods. In **Romania**, staff at the AnelisPlus Project negotiate with major international publishers and have obtained special promotional prices and discounts for open access publications from Romanian researchers. In **Slovenia**, a consortium formed by the Central Technological Library of the University of Ljubljana, the National and University Library and the Institute of Information Science, manages the negotiations with major international publishers for access to their collections. In particular, 'A lot of effort is put into the negotiations with publishers to match the needs of researchers and students as well as the current Slovenian financial situation. Unfortunately, the non-disclosure clauses in agreements with publishers are still preventing the improved transparency by informing the public'. The National strategy of open access to scientific publications and research data in Slovenia 2015-2020 of 3 September 2015 requires that 'The organisations managing consortia for access to paid scientific information resources are obliged to provide the transparency of license agreements with publishers. While managing the consortia for access to paid scientific information resources, they should strive for more favourable Article Processing Charges of open access peer-reviewed articles for researchers from the Slovenian research organisations and try to their best abilities to prevent double payments to publishers of hybrid scientific journals (subscription for access to the journal as well as Article Processing Charges of openly accessible articles). At the same time they must also strive to achieve appropriate embargo periods.' ([21]).

Finally, in the **United Kingdom**, the previous government said it was looking to the publishing industry to develop innovative solutions for sustainable funding models that establish a relationship between the payment of APCs (and the costs of administering them) and subscription fees for an institution. Government is encouraging three key principles for sustainable funding models. Solutions to the 'double-dipping' issue stand to further encourage the greater take up of Gold open access. The United Kingdom is looking to the publishing industry to take the initiative.

Publishers are also mentioned in the case of specific pilot mechanisms launched for converting hybrid journals (or specific titles in these journals) to pure Gold open access journals or for creating new ones. This is the case for example for **Germany**, **Croatia** and **Austria**.

As for researchers, **Denmark** reported that 'For the Danish research community it has been most important not to limit the freedom of publication. That is, no mandate on Open Access should dictate in which journals the researchers should publish. This is especially an issue within some fields of research where no Open Access journals currently exist (most notably social sciences and the humanities)'. **Estonia** also acknowledges the academic freedom of publication 'to choose appropriate publication channels' adding that 'there is no pressure to publish in so-called Gold OA journals', as a key principle of the Estonian open access self-depositing mandate.

Mandates versus soft measures

Funders and research-performing organisations are mostly inclined to support academic freedom and therefore tend to devise and implement soft measures rather than outright mandates. Mandates in general (including soft requirements) relate to two different aspects, the preservation and the dissemination of the scientific results. Both aspects can be required by funders and research institutions, but this is not necessarily the case. The starting point for institutional actors and funders has usually been a mandate to deposit or self-archive scientific output (that is, the Green model) often at institutional or subject-based level, so that institutions know what their scientific output, projects and research teams are. At the beginning, publishers' embargoes are usually respected if a Green model is followed. Thereafter, the mandate usually evolves to require some type of maximum-allowed embargo period to make the scientific results freely available. Next, some institutions and funders have set out pilot mechanisms for covering APCs resulting from research they fund, in order

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([21])http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Znanost/doc/Zakonodaja/Strategije/National_strategy_for_open_access_21._9._2015.pdf

to better understand a Gold model. And finally, those funders and institutions with a longer history in the implementation of open access strategies and policies, and with working institutional repositories, establish ad hoc block grants specifically aimed at funding APCs from their affiliated researchers or grantees. In most cases, however, the possibility of asking for APC funding goes hand in hand with a self-depositing mandate, in order to ensure the preservation of scientific results and to increase the institutional knowledge of funded research.

Preservation enjoys generally stronger mandates than dissemination. This is probably because of recording, tracking and monitoring research output for evaluation and quality assurance purposes, rather than purely preservation purposes; in many instances, institutional repositories are reported not to be properly certified to ensure long-term preservation of scientific results. Many countries have decided to address this shortcoming by enlarging existing national legal deposit requirements to digital results (see the previous section on stakeholders, in the paragraph dealing with national and digital libraries). Table b in Annex III offers a non-exhaustive list of existing mandates in this respect and is illustrative of the evolution from soft measures to hard-law mandates. Soft mandates can be easily identified in that the dissemination aspects are stated in lighter terms, such as requiring that publication should be 'encouraged' or be made 'as soon as possible'. Bearing in mind the information contained in the NPR reports and complemented with desk research, countries with no existing open access mandates are **Croatia** (with the exception of a legal mandate to deposit theses and dissertations into a digital repository), the **Czech Republic**, **Estonia**, **Poland**, **Romania,** and **Slovakia** (with the exception of a legal mandate to deposit theses and dissertations into a digital repository). Member States which have some type of mandate or soft-law measure, but which respect publishers' embargo periods in the case of Green open access, or state in open terms the dissemination aspect of the mandate are **Finland**, **France**, **Greece**, **Hungary**, **Ireland**, **Latvia**, **Lithuania**, **Luxembourg**, **Malta**, and **Norway** ([22]). Finally, the rest of Member States have established or implemented open access mandates with a maximum embargo period if Green open access is followed: **Belgium**, **Denmark**, **Germany**, **Spain, Cyprus**, the **Netherlands**, **Austria**, **Portugal**, **Slovenia ,** and **Sweden**. In the majority of cases, embargo periods align with the ones established in Horizon 2020 (that is, 6 months for STEM and 12 months for SSH) ([23]). In these Member States too, Gold open access is allowed in almost all cases, often as part of the research project grant, although at institutional level there is an increasing provision for ad hoc funding to cover APCs independently of the research grant. The **United Kingdom** represents the best example of a substantial funding provision for APCs as a stand-alone grant.

A mandate put in place by a law is not necessarily stronger or more effective than a mandate put in place by a single institution or funder. For example, an open access mandate is strong is it ties open access to possible withdrawal of funds in the case of non-compliance, or to the evaluation of researchers' careers. To date, only three countries (**Spain, Italy** and **Lithuania)** have set up general dissemination obligations in a legal instrument. Spanish law requires the shortest embargo periods for making research articles freely available from the time of publication in a subscription-based journal (12 months), whereas Italy accepts embargo periods of 18 and 24 months for scientific, medical and technical fields, and social sciences and the humanities, respectively. Lithuania accepts in its legal instrument the maximum embargo period at three years, from commercial publication. United Kingdom funder policies, while not a legal requirement, also set up a dissemination obligation and, as with Spain, require a short embargo period.

As an effective enforcement measure, in Portugal an integration mechanism has been created between RCAAP — the national OA repository infrastructure network — and FCT's grant management systems in such a way that a research publication cannot be reported for project evaluation purposes

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([22])   Norway notes that this will change with a new national policy.
([23])   See H2020 legal open access mandate in Article 29.2 of the Model Grant Agreement (accessible at http://ec.europa.eu/research/participants/data/ref/h2020/mga/gga/h2020-mga-gga-multi_en.pdf).

or for financial reporting or reimbursement requests purposes if it has not been previously deposited into one of the repository members of the RCAAP network.

Open access model

Most NPR members reported a national preference for one of the two types of open access to publications, that is, either the Green or the Gold model. Preference for the Green model are found in **Belgium**, **Cyprus**, **Denmark**, **Estonia**, **Greece**, **Ireland**, **Lithuania**, **Malta**, **Norway**, **Portugal**, **Slovakia** and **Spain**. Those expressing a preference for the Gold model are **Hungary,** the **Netherlands**, **Romania**, **Sweden** and the **United Kingdom**. Other Member States support both models equally, such as **Germany**, **France**, **Croatia** ([24]), **Italy, Luxembourg** ([25]), **Poland and Finland**.

Where support is mostly offered for self-archiving (Green model) and where mandates are established for this open access model, there are two important elements that may diminish the effectiveness of strategies. First, in many cases there is a soft approach regarding the respect of the embargo periods or at most, an explicit reference to publishers' embargoes. This may water down mandates as publishers' allowed embargoes often go beyond the 6 and 12 month embargo periods generally followed by funders and institutions. Secondly, mandates and soft measures are not always carefully tracked, monitored and enforced. These two arguments were highlighted by both the **Netherlands** and the **United Kingdom** as two important aspects needing careful consideration. However, in **Portugal**, the aforementioned integration of the RCAAP and FCT grant management information systems will enable an effective enforcement of the policy and its tracking and monitoring by default, and this may still be complemented by cross-checking the in-house collected information with other external sources and indicators.

In **Sweden**, the Swedish Research Council recently published a 'Proposal for National Guidelines for Open Access to Scientific Information' (February 2015) ([26]). The document refers to stakeholders of the opinion that embargo periods for subscription-based journals are becoming longer in response to funders opting more often for the Green open access model. Consequently, the Council suggested putting in place some form of cap for hybrid publishing, as well as a deadline for allowing hybrid publication in Sweden.

Notwithstanding the above, the expressed preferences for one of the two models are not pure models whereby only one route is followed. Instead, there is generally a system of predominance of one model with possibility of using the other, so a mixture of both routes results. In those countries where the Green model is preferred, many research-performing organisations also allow or devise some sort of support for Gold open access (e.g. by reimbursing APC charges, setting up ad hoc Gold open access pilots etc.). As a consequence, the importance of Gold open access may be increasing, as in many cases the Green open access mandates do not impose any particular embargoes but accept those required by publishers, leaving researchers with the possibility of asking for a financial contribution to publish in an APC-based journal. That is the case, for example, in **Belgium**, **Estonia**, **Finland**, **Norway** and **Spain**. Luxembourg has no national preference: the national funding agency FNR only provides support for APC costs in full open access journals as part of the project grant (from the agency itself), with a maximum cap of EUR 3 000 and a minimum quality threshold. On the other hand, those Member States with a clear preference for Gold open access also allow self-archiving on occasions, as in the case of **the Netherlands** or **the United Kingdom**.

([24]) Croatia reports that only one month since the launch of the DABAR repository infrastructure, there were 21 new institutional repositories and this growth is expected also in the near future.
([25]) University in favour of Green route FNR supports the gold route in the long term.
([26]) https://publikationer.vr.se/en/product/proposal-for-national-guidelines-for-open-access-to-scientific-information/

Finally, some Member States are discussing new business models for publications with scientific publishers, where negotiations with them are taking place in order to 'transform the "big deals" between toll access journal publishers and university libraries into full Open Access, or at least financial compensation for APCs paid (ending "double-dipping")', as reported by the **Netherlands**. As previously stated, **Portugal** has also brought open access into discussions with publishers.

Denmark, **Estonia**, **Austria**, **Slovenia** and **Finland** give particular priority to the freedom of researchers as to where they want to publish. For example, **Slovenia** reports that the 'decision to publish in Gold and hybrid journals is made by individual researchers, no software solutions are used for tracking these articles or automating the payment of Article Processing Charges'.

The **Netherlands** and the **United Kingdom** presented a jointly written report at the March Competitiveness Council on 3 March 2015 entitled Non-paper on open science: open access to publications and data ([27]). This document contains an invitation to Member States to think about open access and open science topics, as these topics will be key priorities for the Dutch Presidency of 2016.

Funding/costs

Generally, financial constraints to public budgets have influenced or are influencing existing or projected open access policies, strategies and mandates. These constraints are experienced by both institutions and funders.

Member States may encourage the Green model at least partially due to financial and budgetary constraints. A few countries have gone beyond that and provided specific funding to ensure immediate dissemination upon publication (and thus pay Author Processing Charges). Another reason for the majority preference for the Green model are existing gaps in knowledge about the real costs incurred in subscription-based journals compared to APCs, as some Member States expressed concerns about the so-called double-dipping phenomenon. This occurs in the case of hybrid journals, where funders and research organisations may be paying twice for the same publication.

Portugal reported that 'An implementation proposal plan is due to be presented in the near future that will most likely consist of an experimental initial phase and a second phase. The first phase has the main objective of gathering data, such as the publication practices of Portuguese researchers and all the related costs. During this period, payment of APCs will be eligible only within the research project or scholarship budget. The second phase of the implementation plan and future measures to propose are still under reflection, because it depends on how transparent and competitive the market towards Gold Open Access will be.'

CRIS systems, bibliographic tools and publication portals and platforms may offer more granular detail as to the level and extent of publication costs and could be used to adopt more cost-effective policies and mandates on open access to scientific information. Other Member States have even expressed concerns that this lack of transparency is reinforced on occasions by certain publishers, as they usually insert confidentiality clauses in publication agreements. **France** and **Finland** openly discourage the payment of APCs to hybrid journals, although it is unknown to what extent this recommendation is actually followed. Finland is looking for possible ways to monitor hybrid

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[27] http://www.google.at/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CCAQFjAA&url=http %3A %2F %2Fww w.rijksoverheid.nl %2Fbestanden %2Fdocumenten-en-publicaties %2Fpublicaties %2F2015 %2F03 %2F23 %2Fnon-paper-open-acces-to-publications-and-data %2Fnon-paper-open-acces-to-publications-and-data.pdf&ei=iBQUVf7lNs_LaPL_gegB&usg=AFQjCNHsmxbeLthw_XPwF4jTqHIaCvlCSA&sig2=PNpuv_bGCIOpbLxQB22QNw&b vm=bv.89217033,d.d2s

publication activity alongside the annual collection of information from higher education institutes. In **Germany**, the Max Planck Society organises, through its Digital Library, financing and workflows for APCs as for any subscription in order to improve overall cost control and prevent double-dipping, and at the same time collaborates with other stakeholders in the creation of new open access journals (such as *eLife* with the Wellcome Trust and the Howard Hughes Medical Centre).

Czech Republic, **France**, the **Netherlands**, **Austria**, **Poland**, **Romania, Slovenia**, **Slovakia**, **Finland, Sweden** and the **United Kingdom** undertake centralised negotiation of licensing agreements at national level with major scientific publishers ([28]). This may ensure more transparency in publishing costs. Pressure on price transparency is strong. Already in **Finland** an administrative court ruled that the act on the openness of government activities outweighs non-disclosure clauses in licensing agreements.

In **Germany**, funding organisations such as the Max Planck Society, the Fraunhofer Society, the Helmholtz Association and the Leibniz Association are able to establish tailor-made funding programmes designed specifically to cover APCs in key areas of research, alongside the Green model. They have felt the rise in prices of toll-based journal subscriptions more dramatically and the important constraints this causes to their institutional budgets. They are strong advocates for achieving more efficient publication business models.

The **Netherlands** has repeatedly stated that it intends to embrace a pure Gold open access model without it entailing specific further investments from the national research budget. The strategy has been to negotiate with publishers over a sustainable transition from a traditional publication model to a purely Gold open access publication model. This has been successful in some instances, but not always. Coupled with an increase in the number of scientific journals, this has highlighted the rising burden of publication costs as part of research budgets and raised awareness of (and concerns about) the costly and inefficient existing system of publication in hybrid journals. The Netherlands also reported that 'at this moment the bigger picture is that research performing institutes (RPOs) and universities rely heavily on Green Open Access . . . their repositories are also the source of policy information . . . Publishers are thought to play at two different chess boards simultaneously: they create a number of Golden Road journals and in some cases they allow articles in Toll Access journals to be bought free for Open Access. In general, however, they hold on to their profitable business models of toll access journals and "big deals" that get some percentages more expensive every next round of negotiations.' The letter dated 23 January 2015 from the Dutch State Secretary for Education, Culture and Science to the Dutch Parliament ([29]) on open access progress states that 'the transition to open access does not have to lead to inflated costs, a conclusion confirmed by an Ecorys survey, which calculated what the costs would be if all Dutch knowledge output were to be channelled through open access, paid for by means of APCs. This amount was estimated to be in the range of EUR 35-50 million, making it approximately equal to (or less than) the amount currently being paid for publishers' services by the public market as a whole (EUR 45 million)'. In the **United Kingdom** this type of analysis is undertaken at institutional level by, for example, the Wellcome Trust or RCUK.

France signed a new national licence agreement in February 2014 between Couperin and Elsevier financed by the Ministry of Higher Education and Research (MENESR) providing access for over 600 public research and higher education institutions to the Science Direct Freedom Collection with a clause establishing an annual review of the volume and value of publication in open access, and also with a view to avoiding the issue of double-dipping.

([28])   The issue is dealt with for concrete best examples in Member States in Section 2 of this report which deals with stakeholders.
([29])   http://www.openaccess.nl/en/in-the-netherlands/what-does-the-government-want

Slovenia reported that regarding licensed access to toll journals 'a lot of effort is put into the negotiations with publishers to match the needs of researchers and students as well as the current Slovenian financial situation. Unfortunately, the non-disclosure clauses in agreements with publishers are still preventing the improved transparency by informing the public'. Regarding open access publications it further states that 'Negotiations with publishers on licensing of open access publications, authored by Slovenian researchers, to obtain the best possible terms for access to publications, including use and re-use, have not been undertaken yet.' The National strategy of open access to scientific publications and research data in Slovenia 2015-2020 requires that 'Joint negotiations with publishers of open access journals regarding Article Processing Charges of open access articles should be carried out for the consortium of Slovenian research organisations to ensure economically most favourable publishing.' [30]

Several Member States are devising CRIS systems or bibliographic tools at national level in order to track and follow-up publicly funded publications and their related costs, if applicable. These are crucial tools in order to understand and adapt the open access needs of the research communities to the open access strategies, policies and mandates.

Finally, some Member States participate in community subject-based initiatives in order to tackle the double-dipping issue. One example is the Sponsoring Consortium for Open Access Publishing in Particle Physics (SCOAP³) [31], to which partners from EU and non-EU states contribute, representing about 3 000 libraries and research organisations.

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[30] http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Znanost/doc/Zakonodaja/Strategije/National_strategy_for_open_access_21._9._2015.pdf

[31] http://scoap3.org/. This project started in January 2014 but it would be worthwhile following its implementation and impact on the business models of scientific publishing.

3. Policies on open access to scientific research data and their implementation

Overall, policies on open access to research data are less developed across EU countries than policies and strategies on open access to research publications. However, individual Member State feedback shows a general acknowledgement of the importance of open research data and of policies, strategies and actions addressed at fostering the collection, curation, preservation and re-use of research data.

A classification of countries into three groups is suggested below, according to the existence of policies on open access to data, to their level of implementation and to the existence or not of supporting infrastructure and/or initiatives specifically established to foster open access to scientific data.

Very little or no open access to research data policy in place at national, regional or institutional level and no plan for a more developed policy in the near future

The lack of proper infrastructure and appropriate digital skills are the two most important reasons why open access to data is still in its infancy in some countries.

In the recently drafted policy paper from **Cyprus** regarding open access, although the focus is on open access to publications, it is also recommended that research data is deposited in repositories whenever possible. In addition to this, the University of Cyprus (UCY) Library is already involved in some initiatives and has identified 'a limited number of local data collections'. It also mentions that, again, the UCY Library is providing support to institutions that hold datasets for digitising or hosting such data in open formats.

Latvia referred to a project being financed by the European Regional Development Fund entitled 'Creation of a Unified Latvian Academic Network of National Significance for Ensuring Scientific Activity', which aims at creating a CRIS-type portal. The library of the University of Latvia is responsible for training and advice on open access matters.

Luxembourg reported that despite the fact that it 'is currently focusing on open access to publications', the ORBIlu open repository and bibliography system of the University of Luxembourg already links publications to research data.

In **Malta**, efforts have been directed at implementing an institutional repository for the University of Malta. 'The University Library had set up a Working Party to select the required software, liaise with foreign institutions to identify best policies and practices while drafting its own policies, and prepare the legislative framework. Once these tasks were completed, the library moved on to identify the best practices and address the issue of dissemination of and open access to research data resulting from publicly funded research'. The institutional repository, which was branded OAR@UoM, was launched in September 2014.

As for **Poland**, 'the issue of open access to research data is currently under investigation by the Polish National Open Access Desk'. Nevertheless, the country has in recent years undergone an important capacity building of research infrastructures and participation in important cross-border initiatives on open science and big data ([32]), showing readiness for adopting more advanced policies and strategies for open access to data.

([32]) To name just a few, the Centre for Open Science at the Interdisciplinary Centre for Mathematical Modelling of the University of Warsaw (ICM Warsaw) (www.ceon.pl), the new national research datacentre focusing on Big and Open Data (OCEAN), the Poznan Supercomputing and Networking Centre (PSNC), which is involved in some EU-funded projects addressing long-term preservation of

Very little or no open access policy in place at national, regional or institutional level but some plans for a more developed policy in place or to be developed in the near future

Austria 'is in the beginning of discussions' although 'up to now there is no policy'. Nevertheless, the e-infrastructures Austria project ([33]), which has been running for three years starting in 2014, discusses the topic of research data and proposes to establish a network for exchange of research data. The Austrian Science Fund (FWF) is also considering establishing some form of mandate on open access to research data by 2016, depending on the results achieved by Science Europe working group on open access to data.

In **Belgium**, the topic of open access to data is still being investigated at federal level and no policies are yet established, although open access to research data is acknowledged in the Brussels Declaration and is item 7 of the mission statement declared by the Interfederal Open Access Consultation Workgroup. At the regional level, there is an initiative on open access to research data as 'data about research', the Flanders Research Information Space programme (FRIS) ([34]). This is a CRIS platform which goes beyond information about research, as it also includes economic and innovation information generally. Further, the FRIS portal was combined with unstructured information from the internet (full-text publications, websites, etc.) in an already finished pilot project called Research Information Linked Open Data (RILOD) which applied automated analysis to FRIS and other data.

Croatia refers to the Strategy for education, science and technology adopted by the Croatian Parliament in October 2014. According this strategy 'open access to the existing and new research infrastructures will be established' and 'activities related to the creation of open repositories which will collect knowledge and educational materials in different forms' are planned. Referring to the Croatian Open Access Declaration ([35]) (2013) one of the planned activities is a project for open access to research infrastructures and the results of publicly funded research. Also the Croatian Research and Innovation Infrastructures Roadmap from April 2014 underlines *'promotion of open access to research data, especially data funded from public sources'.* In April 2015 Croatia's largest research institute, the Ruđer Bošković Institute (RBI) adopted the first institutional open access mandate in Croatia according to which 'all employees of the RBI are obliged to deposit in the institutional OA repository FULIR a digital copy of all their publications, and should provide Open Access whenever possible' ([36]).

Czech Republic, reports that 'unfortunately, generally OA to research data is not dealt with as much as OA to scientific publications' and that 'research organisations are strongly encouraged to deal with research data', possibly through the Czech Open Access Recommendation, a position paper from the Czech Research, Development and Innovation Council, which was sent as advice to the Government of Czech Republic. However there is national e-infrastructure for science, research and education (project Cesnet ([37])) which deals with research data and offers data storage capacities ([38]). The Cesnet e-infrastructure might be a starting point for research data policy in relation to national large research infrastructures activities.

In **Estonia** 'No general policy on open access to research data has been elaborated yet'. Nevertheless, the Estonian Ministry of Economic Affairs and Communications launched a Green Paper on Open Data (public sector open data in general) for public consultation at the end of 2013.

research data such as SCAPE, DCH-RP and Wf4Ever.
[33]   http://e-infrastructures.at/en/the-project/
[34]   FRIS research portal can be accessed at http://www.researchportal.be/en/index.html
[35]   http://www.fer.unizg.hr/oa2012/declaration
[36]   http://lib.irb.hr/web/hr/projekti/fulir/item/1897-rudjer_boskovic_institute-self_archiving_mandate.html
[37]   https://www.cesnet.cz/?lang=en
[38]   https://www.cesnet.cz/e-infrastruktura-3/data-storage/?lang=en

In **Hungary**, 'as open data is a novel idea for the institutions and scientists . . . a slow pickup by the scientific community in Hungary [is foreseen]. The idea should be publicised before significant data publication and preservation activity will occur'. A separate document for research data should be produced and available at the MTMT (the Hungarian Scientific Bibliography system). As for stakeholders, the Library and Information Centre of the Hungarian Academy of Sciences (MTA) joined the DOI assigning agency DataCite in September 2013, and therefore has the capacity to assign DOIs to datasets.

In 2014, **Italy** launched a pilot programme called SIR (Scientific Independence of young Researchers), which mandates open access to all publications, including the corresponding data. This programme has been drafted following closely the MGA clauses of H2020, which establish the open access to data pilot. Specific instructions on meta-data are also included. The Ministry of Education, Research and University 'has decided that the SIR Pilot will become the new standard for all national research calls to be published in the future', although no further details on this are given.

In **Portugal,** FCT, I.P. leaves the decision on whether to make research data available in open access to the researchers, but encourages them to do so if and when they judge it possible and appropriate (as for instance in the nucleotide sequences and protein structure databases DDBJ/EMBL/GenBank RSCB-PDB/MSB-EBI/PDBj, and others). Furthermore, it is recommended that data resulting from research activities partially or totally funded by the respondent (FCT, I.P.) should be shared with other researchers in a timely manner, while ensuring that privileged or confidential information be released only in a form that protects the privacy of the subjects involved. It also asks that that future project proposals include a Data and other Products Management Plan. Questions of privacy, trade secrets, security, legitimate commercial interests, national security and the rule of law must be properly accounted for before making research data available. In conclusion, FCT, I.P. does not wish to establish a mandatory policy for open access to research data for now.

In **Romania**, the National Strategy for Research and Innovation 2014-2020 states that access to scientific results shall be included for all research organisations in each call, although without specifically mentioning open access to data. To this end, Romania is planning to set up a virtual campus and a virtual repository. 'It is envisaged the offering of virtual repositories, within the national repository, for institutions to preserve their name and, at the same time, to benefit of a long lasting centralised electronic infrastructure to minimize operational costs'. Romania is mostly focusing on capacity building to enable ICT infrastructures for research, and open access to data could very well also be included. There are other initiatives undertaken by stakeholders such as Kosson, the Open Society Foundation and Transparency International.

Slovakia refers to policies on infrastructures and initiatives relating to research data as 'data about research', that is, the data typically contained in CRIS systems. Both the Slovakian CRIS system (SK CRIS) and the central bibliographic database of electronic information resources (SciDAP) have a role to play. In addition, a centralised repository project by the Slovak Centre of Scientific and Technical Information (SCSTI) is in place. Both SciDAP and the national repository ensure persistent storage of full-text scientific publications that could also potentially be used in the future for storage of the underlying data.

In **Sweden,** the government asked the Swedish Research Council (SRC) to propose national guidelines for open access to research results, including both publications and data. Subsequently, a draft report entitled National Guidelines for OA to Scientific Information was produced in 2014 in collaboration with the National Library of Sweden and other stakeholders, which was submitted to the government in January 2015. The Guidelines state that 'as a rule, research data is to be regarded as a public document since it is stored or was produced at a public authority, which has consequences for the guidelines'. It further establishes that 'the Research Council recommends that open access to research data that is produced, either wholly or partly, with public funding should be

considered the norm. In certain cases, however there are legal, ethical or commercial considerations that need to be further considered'. During the period 2015-2020, there will be pilot calls to make scientific research data openly available.

In **Turkey,** the Turkish Higher Education Council (HEC) initiated the National Academic Repository Project in 2014 to gather the scientific output in the institutional repositories developed in Turkish universities and to harvest them by a national repository hosted by HEC. They also recommended university managements to adapt institutional open access policies.

Open access policies already in place at national or regional level and/or several institutional strategies in place or important subject-based initiatives

In **Denmark**, though only a national policy on open access to scientific articles has been implemented, in February 2014 the Danish Rectors College, DeIC (Danish E-infrastructure Cooperation) and DEFF (Denmark's Electronic Research Library) set up The Steering Group for National Data Management with members appointed from universities in Denmark, the Danish Royal Library, the State and University Library and the Danish National Archives, with the purpose of ensuring, that Denmark, in a collaboration between the prime stakeholders, got a national strategy for research data management. The vision is to ensure better and more competitive research for Denmark through efficient collection, securing, dissemination and re-use of relevant research data. The strategy was adopted by DeIC and DEFF at the end of December 2014. Furthermore, the Danish Council for Independent Research has implemented a policy in terms of dissemination and access to research data handled by its grant holders. By this policy, 'if proposed data sets within the fields of medical and social sciences are found to be of specific value for other researchers . . . the Council may require archiving of said research data at the Danish Data Archive'. The Danish Data Archive (DDA) is a social science data archive that acquires, preserves and disseminates data (primarily quantitative) in the fields of social and health sciences and history. DDA data is freely available, subject only to a special permit when the datasets are of a personal nature. The DDA participates in the Data Documentation Initiative, which is an international collaborative effort to define standards for meta-data documentation.

Finland features many activities regarding research data, either ongoing or being planned by the Finnish government and other actors in Finland. The Finnish Ministry of Education and Culture set up a working group in 2013 which published a report with recommendations for a national open access policy. This report contained several recommendations on open access to research data, among which: openness for data should be established when ethically, legally and contractually possible; openness for data should also cover the tools and methods used to ensure replicability; standard, machine-readable licences should be used. In 2014, CC BY 4.0 licence received a Public Administration Recommendation in Finland. Future Finnish policy on open access to data will cover open data policy and guidelines, career rewards for researchers, training and skills, national and international standards to be followed to ensure inter-operability of datasets, attribution and data ownership set at early stages of data collection, amendment of copyright laws and use of open interfaces to allow text and data-mining. Furthermore, the Finnish National Research Data Programme 2011-2014 (TTA) set up a working group on open access to research data. This was followed by the Open Science and Research Initiative ([39]) (ATT) for the period 2014-2017. The ATT Roadmap ([40]) state that Finland's vision for 2017 is 'Open research leads to surprising discoveries and creative insights. This means a situation in which research data and materials move freely throughout society; from one researcher or research team to another, between disciplines, to innovative businesses, and to decision-makers and citizens'. In 2013, the working group on open

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([39])   http://www.minedu.fi/OPM/?lang=en;
([40])   http://openscience.fi/fi/web/openscience/frontpage;
         http://openscience.fi/documents/14273/0/Open+Science+and+Research+Roadmap+2014-2017/e8eb7704-8ea7-48bb-92e6-
         c6c954d4a2f2

access to research data produced a Data Management Guide which was aimed as a tool to assist researchers and repository managers to focus in key areas of data management through a checklist and also contained other background information. The TTA initiative established several important services that have been further developed in ATT. The IDA (⁴¹) service to researchers for secure and easy-to-use storage services for digital data and related meta-data, useful also for data management and data sharing. The AVAA (⁴²) platform was launched in 2013 and publishes research data in open access format, offering ICT tools and applications for the use of open access data, such as downloading, analysis and visualisations. Registered users can also suggest their own online applications and tools as a way to promote data publishing and machine-readable licences. The Etsin (⁴³) service was launched in 2014 and is a meta-data online catalogue (not a data repository itself) which can be used by researchers for collaborative research purposes. Also worth noting is the REMS system (Resource Entitlement Management System), which is an electronic access authorisation service for the management of access rights to research data and resources (the system also has a very useful reporting function on applications of access and granted data access rights). The Finnish Ministry of Education and Culture offers further ICT and data support services to the Finnish research community through a contract with the public enterprise CSC — IT Centre for Science Ltd (in 2014 the value of the contract was EUR 17.5 million). Finally, long-term preservation issues are addressed through a Long-term Preservation Solution for Data (Tutkimus-PAS (⁴⁴)) service. Several piloting actions on meta-data packaging for preservation took place during 2014, which also cover cultural heritage and aim at redundancy minimisation. The Academy of Finland has an open access to research data policy in place (⁴⁵) which requires a data management plan to be included in funded projects and recommends that researchers store and make available data resulting from funded project in international or national open access repositories.

In **France '**No actual policy has been adopted at a national level for research data yet, but several organisations are developing policies and measures for Open Access to data, including pilot programmes'. As far back as 2011, France set up the Etalab (⁴⁶) project, whereby more than 13 000 PSI datasets are made freely available through the national online portal data.gouv.fr (⁴⁷). In December 2014, the French Ministry for Higher Education and Research published the report *Mieux partager les connaissances: Une strategie ouverte pour une information scientifique et technique d'avenir* (⁴⁸) containing a comprehensive policy on open access to publications and research data. Its Orientation 6 relates specifically to the valorisation and sharing of research data. Segment 10 of the *Bibliothèque Scientifique Numérique* (⁴⁹) (BSN10) addresses in detail the topic of open access to data and related issues and gave recommendations to the government. In particular, the *Centre Informatique Nationale de l'Enseigneiment Superior* (⁵⁰) (CINES) aims to become a long-term preservation archive for research data, offering HPC support to the scientific community. Further, French research institutions such as INRIA (⁵¹) or CNRS (⁵²) have either already set out open access policies for research data or are in the process of establishing them. The Ministry of Higher Education and Research (MENESR) has created the first French open data platform of education and research resources (⁵³). This OpenDataSoft (⁵⁴) platform is a comprehensive aggregator of French research data repositories and datasets for the research community. Furthermore, France states that a digital strategy has very recently been developed by the government, *La République numérique en actes*

(⁴¹)   https://www.tdata.fi/ida
(⁴²)   https://www.tdata.fi/avaa
(⁴³)   https://www.tdata.fi/kata
(⁴⁴)   https://www.tdata.fi/pas
(⁴⁵)   http://www.aka.fi/globalassets/awanhat/documents/liitteet/oa_ohje_en.pdf
(⁴⁶)   https://www.etalab.gouv.fr/en/qui-sommes-nous
(⁴⁷)   https://www.data.gouv.fr/fr/
(⁴⁸)   http://www.cnrs.fr/dist/z-outils/documents/STRATEGIE.pdf
(⁴⁹)   http://www.bibliothequescientifiquenumerique.fr/?Open-access
(⁵⁰)   https://www.cines.fr/en/overview/missions/
(⁵¹)   http://www.inria.fr/en/institute/inria-in-brief/inria-in-a-few-words
(⁵²)   http://www.cnrs.fr/
(⁵³)   http://data.enseignementsup-recherche.gouv.fr/explore/#
(⁵⁴)   https://www.opendatasoft.com/fr/2015/04/07/donnees-publiques-ouvertes-les-reutilisations-du-menesr/

(Actions for a Digital Republic — 18 June 2015) as a follow-up to the digital road map from February 2013. Measure No 5 will promote open science through the free circulation of publications and research data through a law to support these key measures, *Pour une République numérique* (For a Digital Republic).

In **Germany**, there are no policies identified at national level, but funders, research institutions and stakeholders are devising and fostering open access to research data. For example, the German Research Foundation (DFG) participates in European (Knowledge Exchange, Science Europe) and international fora ([55]) (Global Research Council, Research Data Alliance). The DFG is also a partner in the Knowledge Exchange Initiative ([56]) which has an important expert group and focus work on research data. Since 2012 the DFG has also funded the Registry of Research Data Repositories ([57]) (re3data.org) which indexes over 1 200 research data repositories and has recently joined the DataCite ([58]) organisation, which manages Digital Object Identifiers (DOIs). As far back as 2010, the Alliance of German Science Organisations adopted its Principles for the Handling of Research Data ([59]) and a working group on research data was also created as part of its priority initiative Digital Information ([60]) which was extended to run for a second phase from 2013 until 2017. As for research institutions, the Helmholtz Association is quite active on open access to research data. Not only is it a key provider of diverse large-scale research infrastructures but it also provides access to the research datasets that such infrastructures host. Further, it has an extensive training programme for data management and open science, as well as being the chair of the research data working group of Science Europe and an important contributor to the Research Data Alliance.

In **Ireland**, the Irish National Steering Committee on Open Access Policy put forward the National Principles for Open Access Policy Statement ([61]) (2013) and the Irish government embraced these principles in 2014. General Principle 5 refers to research data and it establishes that 'Research data should be deposited whenever this is feasible, and linked to associated publications where this is appropriate. European and national data protection rules must be taken into account in relation to research data, as well as concerns regarding trade secrets, confidentiality or national security. At a minimum, meta-data describing research data and its location and access rights should be deposited. It is recognised that managing access to research data may be a new approach for many research organisations. This policy is intended to encourage the improvement of discoverability and development of open access to research data over time'.

Lithuania refers to article 45 of the Lithuanian Law on Higher Education and Research of 30 April 2009. This legal provision establishes that 'the results of all research works carried out in state higher education and research institutions must be communicated to the public (in the Internet or in any other way), to the extent this . . . is in compliance with the legal acts regulating the protection of intellectual property, commercial or state and official secrets'. It further establishes the same regime for research results conducted by non-state bodies but funded by the state budget. The report also refers to sections 81 to 85 of the Descriptions of the procedure for the funding of projects of the Research Council of Lithuania (RCL), which establish the contract arrangements with the RCL for the promotion of open access. Section 81 mainly reproduces article 45 of the Lithuanian Law on Higher Education and Research. Section 82 states that 'The principal investigator and the implementing institution shall undertake . . . to ensure a proper storage and the use of the data received in the course of the project implementation, and following three years from the end of the project implementation shall ensure an access to such data'. Section 84 in turn establishes that 'All

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([55])   The multi-stakeholder initiatives both at European and international level will be explained in more detail in section 6 below.
([56])   http://www.knowledge-exchange.info/
([57])   http://www.re3data.org/
([58])   https://www.datacite.org/about-datacite/what-do-we-do
([59])   http://www.allianzinitiative.de/en/core_activities/research_data/principles/
([60])   http://www.allianzinitiative.de/en/start.html
([61])   http://openaccess.thehealthwell.info/sites/default/files/documents/NationalPrinciplesonOAPolicyStatement.pdf

copyright and related rights set forth in Lithuanian legislation and international agreements belong to project researchers'.

The **Netherlands** have, together with the **United Kingdom**, prepared a joint Non-paper on open science: open access to publications and data, dated 3 March 2015, which contains as shared common goals 'to strive for and support open access to the underlying data, make data interoperable and easy to re-use' and 'to promote a universal, simple and straightforward approach to re-use of data and publications without restriction (as described by the CC-BY licence)'. The ERAC Task Force on open access is being led by a Dutch representative and it planned to publish a report with recommendations on open access to data towards the end of 2015. Although there is no national policy in place yet for open access to data, the Netherlands is very active in this field. For example, it has set up long-term preservation data archives, such as the Data Archiving and Networked Services ([62]) (DANS) and 3TU.Datacentrum ([63]). The NARCIS ([64]) gateway to scientific information also holds datasets (nearly 200 000 of them), as well as publications and other scholarly information. Universities are expected to address the curation and data management of scientific data, and thus some universities have become very active in organising awareness-raising and training activities, workshops and conferences, as well as in setting up specific data management and re-use policies (worth mentioning are the Universities of Leiden, Radboud, Amsterdam, Delft, Twente and Eindhoven. Several Dutch universities and research institutions have formed the Dutch Dataverse Network ([65]) (DDN), an open source tool used for archiving and free re-use of research data by the scientific community. Dutch funders are equally active on the topic of research data. The Netherlands Organisation for Scientific Research ([66]) (NWO) started an Open Access to Data Pilot ([67]) in January 2015 whereby data management costs are eligible for reimbursement in several research programmes. Input from this pilot will be used by the NWO to devise and further develop a comprehensive policy on open access to data to be applied in all its future funding programmes. The main principles are that research data should be 'Open where possible, protected where needed' and the role of data management plans for data sharing. For its part, the Netherlands Organisation for Health Research and Development ([68]) (ZonMW) has already developed a data management culture and has several pilot projects on open access to research data.

In **Norway,** the white paper 'Long-term perspectives: knowledge provides opportunity' of March 2013 makes reference generically to 'all research' in the chapter 'Knowledge provides opportunity' and therefore, research data as well. It states that 'Productive cooperation is also dependent on access to research results. In principle, it is the Government's view that all research that is wholly or partially funded through public allocations must be made openly available'. The Norwegian Research Council published its policy on open access to research data in 2014. The policy guidelines broadly follow the policy of the commission, but differ in the question of costs. Here the guidelines follow the recommendation of OECD that 'Openness means access on equal terms for the international research community at the lowest possible cost, preferably at no more than the marginal cost of dissemination.' Norway stresses its involvement as an active partner in several of the ESFRI Roadmap projects. The Norwegian Social Science Data institution hosts the Cessda consortium which aims at fostering access to data across repositories for the SSH. Equally, Norway also has policies and initiatives on data preservation and dissemination, such as the Svalbard Integrated Arctic Earth Observing System (SIOS), the HUNT and HUSK projects for long-term preservation and re-use of health and population data, the Norwegian Marine Data Centre containing openly available data on the Norwegian seas, the service platform www.yr.no with meteorological data or the highly relevant

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([62])   http://www.dans.knaw.nl/en
([63])   http://datacentrum.3tu.nl/en/home/
([64])   http://www.narcis.nl/
([65])   https://dataverse.nl/dvn/
([66])   http://www.nwo.nl/en
([67])   http://www.nwo.nl/en/policies/open+science/data+management
([68])   http://www.zonmw.nl/en/about-zonmw/

digital e-infrastructure research platform NorStore ([69]), which is a pilot infrastructure project for collection, management, curation and long-term archiving of digital scientific data.

In **Slovenia**, 'no policies for the dissemination of and open access to research data resulting from publicly funded research have yet been adopted . . . nationally or sub-nationally at the research funding organisations and the research performing organisations'. Notwithstanding this, the Open Data Project (2010-2013) 'produced a draft open research data policy and a draft action plan for the establishment of national open research data infrastructure'. The Ministry for Research is planning to consult relevant stakeholders in order to adapt their open access to data policy to the H2020 Open Data Pilot and OECD guidelines on the subject.

The **United Kingdom** has for some years now been very proactive on open access to research data. In its 'Innovation and Research Strategy for Growth' report of December 2011, the Department for Business, Innovation and Skills (BIS) expressed the UK's commitment to making publicly funded research data accessible to all, as part of the Government's Transparency Agenda ([70]). Further, the Research Sector Transparency Board was created by the UK's previous government to advise it on how to increase access to research data and publications. BIS also published a report entitled 'Seizing the data opportunity: a strategy for UK data capability' ([71]) which focuses on three areas: human capital (skilled workforce and data-confident citizens); tools and infrastructure available to store and analyse data; and data as an enabler (the ability for all to access and re-use data). The UK government and private investors have also funded the Open Data Institute ([72]), a not-for-profit body aiming at catalysing the evolution of open data culture to create economic, environmental and social value. In addition, the Royal Society published the report Science as an Open Enterprise ([73]), which highlighted the need to deal with the exponential growth of data and the huge potential for science, innovation and public policy that modern technologies can offer when they are applied to this data deluge. RCUK has also set out its own Common principles on open access to data ([74]) in which each Research Council has built on its own data policy. The common requirement is for research projects to establish a research data management plan detailing the data to be collected and how this can be accessed, as well as for institutional data management policies to be in place. It does not require that data should always be made open, and recognises certain cases in which research data may not be able to be opened. Further to this, the Open Research Data forum published a draft concordat ([75]) in September 2015 with key principles agreed with by representative bodies from the UK research community that set out the key objectives for successful open research data in the UK. Finally, the UK has committed substantial investments in medical bioinformatics and public health research: 'the UK Government also have a strong interest in developing effective medical and social sciences research whilst respecting the European General Data Protection Regulation. Anonymised research data resources are able to support studies to identify the risk factors and preventive strategies for diseases such as Alzheimer's, which form a key part of the Government's Dementia strategy'.

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[69]   www.norstore.no
[70]   https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32450/11-1387-innovation-and-research-strategy-for-growth.pdf
[71]   https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/254136/bis-13-1250-strategy-for-uk-data-capability-v4.pdf
[72]   http://opendata.institute/
[73]   https://royalsociety.org/topics-policy/projects/science-public-enterprise/report/
[74]   http://www.rcuk.ac.uk/research/datapolicy/
[75]   http://www.rcuk.ac.uk/research/opendata/

4. Preservation of scientific information

Member States clearly make a distinction between policies aimed at preservation and policies aimed at dissemination. Usually, the former are more developed and enjoy more support and funding. This trend is especially observable in those Member States which at first lacked e-infrastructures or in which repositories for scientific preservation were not well developed or not developed at all. Among the last waves of enlargement countries, some have experienced a rapid development of e-infrastructures aimed at preservation, curation, long-term preservation and increase in computing supporting capabilities for research. Clear examples of this are **Czech Republic, Estonia**, **Hungary, Poland** and **Slovakia**. These countries have invested considerably in digital infrastructures for research and general use, either from national budgets, EU funds (ERDF, EU project funds or others) and/or, to a lesser extent, form private investment. Other Member States from the last waves of enlargement, in particular smaller countries or countries with fewer financing capabilities, opted for a more modest e-infrastructure development and instead chose to pursue other alternatives, such as, for example, embracing a Gold open access model for publications which does not necessarily require the use of institutional repositories. This could be the case, for example, for **Croatia**, **Cyprus**, **Latvia** and **Romania**. For the majority of Member States, though, institutional repositories are very well developed and pursue the goal of curation and preservation of scientific information, although some NPR reports stress that, in many cases, institutional repositories are not certified to properly guarantee the long-term preservation of scientific information. NPR reports also show that many Member States have made a clear effort to become more efficient and transparent regarding scientific information and research activities in general. Thus, a whole array of platforms, portals and aggregators has been devised in Member States with a view to harvesting, linking and inter-operability via a single access point of all information on scientific research activities and on webpages hosting such information. This effort has also served to meet transparency purposes in public governance and funding decisions for research activity, as well as tracking, monitoring and reporting purposes.

Some Member States underline research information purposes rather than the objective of open access to research results. While some of the CRIS systems in place contain not only links but also the research results themselves, in most cases they are information tools on research activity containing meta-data, very useful for the researchers' collaborative efforts and for transparency purposes, but independent, strictly speaking, from a 'dissemination' or 'access aspect' of scientific results. Portals offering scientific information are usually harvesters and aggregators of meta-data, rather than repositories hosting and providing access to the research results themselves, especially in the case of research data. Nevertheless, a tendency can be observed among the latest wave of EU enlargement countries that they are focusing efforts on developing centralised national repositories for preservation to be connected to the existing national CRIS systems and to be inter-operable across the EU with, for example, OpenAIRE protocols. These future national repositories will then provide easy-to-use single access platforms which might be used both by public authorities for monitoring research and development, tracking and evaluation purposes, as well as by researchers and research institutions for access to research information (projects, grants, researchers' profiles) and research results alike. Please refer back to Section 1 of this report dealing with the CRIS systems implemented in most Member States.

On the other hand, other countries with an earlier and more developed tradition in digitisation policies and strategies have, in general, further increased investment in digital e-infrastructures for research and policies on the creation and use of research e-infrastructures. This would be the case, for example, in **Denmark**, **Finland**, **France**, **Germany**, **Ireland**, **Italy**, **Netherlands**, **Norway** and the **United Kingdom**. In most of these cases, Member States have put forward specific programmes, strategies and objectives covering ICT development in the mid- to long-term period, in order to prepare their research and innovation activities for rapid technological advances in automated analysis, large-scale computing and the exponential growth of data.

However, even where repositories are in place, they do not always provide access to full-text articles or data, except for theses and dissertations, which can usually be accessed freely online.

In **Austria**, since 2010 the Austrian Science Fund (FWF) has been a partner funder of Europe PubMed Central ([76]), a health and biomedical open access repository, and also supports the e-print open access archive arXiv ([77]). In 2013 FWF launched its FWF-E-Book-Library ([78]), which is an open access repository for all stand-alone publications funded by FWF (so far it contains over 220 books). The NPR report states that the Austrian Academy of Sciences ([79]) has its own repository and is working to expand it. It also states that Austrian universities have servers for deposition of master's and doctoral theses (12 out of 21), but only two have their own institutional repositories in place, the Phaidra repository of the University of Vienna and the Visual library ([80]) of the Austrian Library Network Ltd (OBVSG). Nevertheless, some universities take part in the Phaidra repository and the number of repositories in Austria is expected to increase. The OBVSG will ensure full cooperation among repositories in Austria.

In **Belgium,** there is a projected repository for archiving and long-term preservation purposes by the Federal Authority, BELSPO ([81]). The Belgian NPR report explains that 'All Belgian universities have now an institutional repository and actively promote the self-archiving of research outputs (Green open access)'. Repositories such as ORBi ([82]) (Liege University, which firstly implemented the IDOA depositing model) and Ghent University Academic Bibliography (Biblio) or the BICTEL Project ([83]) which harvests all theses and dissertations from French-speaking universities, were mentioned in the report. The report also makes reference to the open access mandate implemented by the Flanders Research Foundation (deposit mandate in a public open access archive within one year of publication). The Belgian NPR report also refers to other research institutions, such as the Health Care Knowledge Centre ([84]) (KCE), which has its own repository and is working with other institutions (the Scientific Institute of Public Health and the Belgian Nuclear Research Centre) for setting up joint infrastructures. It is not clear yet how all these repositories will be coordinated, especially between the different regional governments, although there is a nationwide legal deposit mandate for the Royal Library. On this, the NPR reports that 'the Royal Library boasts a legally binding deposit for all Belgian written material.Extending legal deposit obligation to online material is planned'*.*

In **Croatia**, the focus is mostly on development of e-infrastructures for preservation of scientific results, although some initiatives are already in place. To date, OpenDOAR lists six institutional repositories in Croatia (mostly from universities). The National and University Library has two digital repositories: the Croatian Web Archive ([85]) (HAW) and Digital Academic Repository ([86]) (DAR). Also, since 1996 Croatia has its first national repository, the Croatian Scientific Bibliography ([87]) (CROSBI) which also holds some full-text publications (over 30 000). Finally, in March 2014 an important initiative emerged from a Digital Repositories Day workshop held at the University of Zagreb to create a common platform for Croatian digital repositories, DABAR Platform ([88]) which was launched in August 2015 and is managed by the University Computing Centre (SRCE) of Zagreb University as

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([76]) http://europepmc.org/
([77]) http://arxiv.org/
([78]) https://e-book.fwf.ac.at/
([79]) http://www.oeaw.ac.at/en/austrian-academy-of-sciences/
([80]) https://www.obvsg.at/kataloge/verbundauswahl/
([81]) http://www.belspo.be/belspo/coordination/stis_en.stm
([82]) http://orbi.ulg.ac.be/
([83]) http://www.bictel.be/
([84]) http://kce.docressources.info/opac/index.php?search_type_asked=extended_search&onglet_persopac=5&limitsearch=1
([85]) http://haw.nsk.hr/en. The mission of the HAW archive is to gather Croatian archived web resources for long-term preservation of national cultural heritage.
([86]) http://dar.nsk.hr/. DAR is a digital archive of electronic master's and doctoral dissertations from Croatian universities
([87]) http://bib.irb.hr/index.html?lang=EN
([88]) http://www.srce.unizg.hr/en/dabar/. The DABAR Platform functions as an inter-operability solution for and an aggregator of Croatian repositories.

a system repository solution to academic and research institutions for long-term storage and dissemination of digital objects. The DABAR platform is OpenAIRE compliant and ensures inter-operability of repositories established by institutions. In two months since becoming publicly available, the DABAR infrastructure has been used for the creation of the 21 new institutional repositories ([89]).

Smaller countries such as the **Czech Republic**, **Cyprus**, **Latvia**, **Luxembourg** and **Malta** rely heavily on their universities' repositories and libraries for preservation (archiving) purposes, although the long-term preservation needs are generally not yet addressed. In relation to this, in **Luxembourg** 'For the long term preservation a national repository (i.e. national library, national archives) linked to individual institutional repositories is envisioned', whereas in **Malta** 'the UoM Library has implemented an IR which is the first OpenAIRE compliant digital repository in Malta ([90]). This repository was upgraded to serve as a national digital platform for the uploading of national intellectual output and heritage'. In most cases, institutional repositories use the OAI-PMH protocol for appropriate harvesting and are OpenAIRE compliant: NOADs in the OpenAIRE project are the University of Cyprus Library, the Technical University of Ostrava, the University of Malta Library, University of Latvia and University of Luxembourg. These countries also rely on thematic-based and orphan repositories to cover their archiving needs. Thus in **Cyprus** 'Zenodo which is also a European repository (orphan repository) . . . is also promoted in Cyprus as an alternative hosting area', whereas in **Latvia** 'also the scientists publish their works in institutional and subject repositories — BioMed Central, Arxiv, Cogprints, etc.' It can therefore be seen that EU projects or EU funds have an important impact on these countries' policies and infrastructures. In the **Czech Republic**, 'there is a programme devoted to support Research, Development and Innovation (financed from structural funds) — part of the funds will be used to support development (or establishment where necessary) of electronic repositories'. On this, it is worth noting that not only ERDF can be used to raise infrastructure capabilities, but also for example the European Fund for Strategic Investments ([91]) (EFSI) approved by the co-legislators on 28 May 2015 could be considered by Member States for getting support in this area.

In **Denmark**, 'all Danish universities have established working repositories via our current research information system'. The Danish National Research Database ([92]), run by DEFF (Denmark's Electronic Research Library), harvests its members' repositories through a single point of access. Data providers are mostly universities, although other research institutions, councils, governmental and private bodies can also participate, as data providers join the portal on a voluntary basis. Further, The Royal Library and The State and University Library are entrusted with legal deposit functions in Denmark, both for physical and digital published materials.

In **Estonia** there is a financial scheme set up by the Estonian Ministry of Education and Research with an annual budget of EUR 841 350 specifically to address the collection, curation and preservation of scientific information and to ensure access to it by the scientific community.

In **Finland**, the Ministry of Education and Culture launched the National Research Data Initiative ([93]) (TTA) in 2011 to last until 2014. This was followed by an even more holistic initiative called Open Science and Research ([94]) (ATT) for the years 2014 to 2017. Both initiatives have developed services that address the challenges for collection, curation, archiving, re-use and long-term preservation of data. The Tutkimus-PAS segment deals specifically with the long-term preservation of data, to which the Finnish government is very committed and which is seen as a joint effort to reduce redundancy

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[89]   https://dabar.srce.hr/repozitoriji
[90]   https://www.um.edu.mt/library/oar/. The OAR@UoM repository was launched by the Library of the University of Malta in September 2014.
[91]   http://ec.europa.eu/priorities/jobs-growth-investment/plan/efsi/index_en.htm
[92]   http://www.forskningsdatabasen.dk/
[93]   https://www.tdata.fi/fi
[94]   http://openscience.fi/

and to increase cost-efficiency. It is to be jointly implemented by different actors, not only for scientific research but also for cultural heritage purposes. Other segments deal with network inter-operability and cooperation, data safe and integrated archive and storage system (IDA) or meta-data cataloguing (Etsin). According to the NPR report, cultural heritage is already being preserved for the long term as the Finnish National Digital Library (⁹⁵) is entrusted by law with the duty of digital preservation of Finnish cultural materials.

France has two main research infrastructures. First, *Hyper-Articles en Ligne* (HAL) (**⁹⁶**), is the national open access repository and online platform for scientific information and results. It is a multi-disciplinary harvester which hosts over 80 institutional scientific archives for which it is inter-operable with both local repositories and international subject-based repositories such as ArXiv or PubMed Central. For long-term preservation purposes, the 'National Computing Centre for Higher Education' (CINES) has a perennial archive ('Supercomputing and Long-term Preservation' archive) (⁹⁷) which is also aimed at addressing future archiving needs of research data. CINES is part of the national high-performance computing and research infrastructure roadmap, and thus has a pluri-annual budget allocation.

In **Germany** a lot is being done regarding preservation. The NPR report refers to 170 open access repositories existing in Germany, many of which are being operated by universities or research institutions, and which gives an idea of the complexity and challenges for their coordination. To this end, the NPR report makes reference to several coordinating initiatives. For example, the German Initiative for Network Information (DINI) promotes the development of research infrastructures at HEIs and the joint discussion on standards and task distribution among the infrastructure architecture. Secondly, a Council for Information Infrastructures was set up in the summer of 2014 with the aim of identifying synergies, fostering cooperation between the different repositories and improving self-coordination, with a focus on long-term preservation, open access and research data. The German Research Foundation (DFG) is also active on preservation issues, as it funds a federation of repositories (a national core network of certified institutional repositories) and existing or new subject-based repositories (such as the open access servers EconStor in economics or OstDok in East European studies). Finally, Germany also has a legal deposit mandate, which is the task of the digital library of the German National Library (⁹⁸) (DNB), for the long-term preservation of non-physical electronic publications.

For **Greece,** it is worth noting the Hellenic Academic Libraries e-Link (⁹⁹) platform (HEAL-Link), which is a federated consortium comprising 38 HEIs, 14 technological education institutes, eight other libraries, the Academy of Athens and the National Library of Greece. The platform is a single point of access to a portal hosting about 11 000 full-text electronic journals. Users have access to electronic resources through authentication by the institution to which they belong.

In **Hungary** 'all major universities already have up-to-date open access repositories or have one in the final stages of development'. There is also the HUNgarian Open Repositories (¹⁰⁰) (HUNOR) consortium, which is aimed at building a network of institutional repositories in Hungary to make their research publications openly available. HUNOR is an OpenAIRE partner. The report further states that Hungary has plans to link such repositories to its Hungarian Scientific Bibliography (MTMT) portal. MTMT is a content aggregator which contains publication and citation meta-data and links comprehensively harvested from its members' repositories (about 21 members from academia and other research institutions, including the Hungarian Academy of Sciences (¹⁰¹) (MTA). The latter

(⁹⁵)   http://www.kdk.fi/en/
(⁹⁶)   https://hal.archives-ouvertes.fr/
(⁹⁷)   https://www.cines.fr/en/long-term-preservation/archive-at-cines/
(⁹⁸)   http://www.dnb.de/EN/Home/home_node.html
(⁹⁹)   http://www.heal-link.gr/?lang=en
(¹⁰⁰) http://www.open-access.hu/hunor
(¹⁰¹) http://mta.hu/english/

has a repository which also has the function of an orphan repository for those institutions which lack one, as well as aggregating open information available from Hungarian repositories which are OAI-PMH compliant.

In **Ireland**, the National Principles for Open Access Policy Statement also recognises, in relation to infrastructures and sustainability, the importance that 'repositories should support interoperability with other repositories and research information systems, and take steps toward long-term preservation'. In 2007 ([102]), the Irish Universities Association launched the Irish Open Access Repositories Support Project, a three-year project whereby the seven Irish universities and the Dublin Institute of Technology received government funds to build open access institutional repositories and to develop a federated harvesting and discovery service via a national portal. Such a national portal, Pathways to Irish Research ([103]) (RIAN), was launched in 2010, and harvests contents from all the Irish institutional repositories.

In **Italy**, preservation will be dealt with by the Italian National Open Access Committee. Several projects for digital preservation are funded by the Ministry of Education and Research, such as for example, the Science and Cultural Heritage Digital Preservation Network ([104]) funded by the *Consiglio Nazionale delle Ricerche*. It is worth mentioning the Portal for Italian Electronic Scholarly Literature in Institutional Repositories ([105]) (Pleiadi), an open access platform launched in 2004 by two Italian super-computing consortia, Caspur ([106]) and CILEA, now Cineca ([107]) and providing centralised access to digital content deposited in the Italian Open Archives.

In **Lithuania** there are two repositories in the making. The National Open Access Research Data Archive ([108]) (MIDAS), funded by the European Structural Funds, aims to establish the e-infrastructure for a national research data archive. The project includes 13 institutions, including HEIs and research and medical institutions. The Lithuanian Data Archive for Social Sciences and Humanities ([109]) (LiDA) contains social sciences survey data, historical statistics and data about the Lithuanian political system. Its services are also available through the catalogue of the Lithuanian Virtual Library ([110]) (eLABa), which is the search gate of the Lithuanian Academic Electronic Library.

In the **Netherlands**, there is a distinction between the preservation of publications and of data, as well as between short-term and long-term preservation. As for publications, the report refers to the Dutch National (or Royal) Library ([111]) (KB) as the long-term preserver of scientific information, as it harvests the national scientific aggregator NARCIS ([112]), a scientific repository and database that harvests content from Dutch universities and research institutions: over 423 000 full-text open access articles, over 145 000 datasets, and meta-data on closed-access articles, on researchers, research projects and institutions. On long-term preservation of research data, the NPR report refers to data archives DANS ([113]) and 3TU.Datacentrum ([114]) which work together with SURFsara ([115]) for the physical location of electronic data. SURFsara develops and offers advanced and sustainable e-infrastructure, services and expertise to the Dutch research community. On the other hand, the NPR report states that 'The curation of data and the short term preservation during a research project's

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([102]) http://blog.okfn.org/2014/10/29/open-access-in-ireland-a-case-study/
([103]) http://rian.ie/
([104]) http://ec.europa.eu/europe2020/pdf/contributions/positionpapereng_v21.pdf
([105]) http://www.openarchives.it/pleiadi/
([106]) http://www.caspur.it/
([107]) http://www.cineca.it/en
([108]) http://serials.lt/wp-content/uploads/2015/03/Dzemyda_Maskeliunas_MIDAS_Vilnius_20150318.pdf
([109]) http://www.lidata.eu/en/index.php?file=files/eng/lida_en/about.html
([110]) http://www.lvb.lt/primo_library/libweb/action/search.do?dscnt=0&dstmp=1434015478194&vid=ELABA&vid=ELABA&backFromPreferences=true
([111]) https://www.kb.nl/en
([112]) http://www.narcis.nl/search/Language/EN/coll/publication/pageable/0
([113]) http://www.dans.knaw.nl/en
([114]) http://datacentrum.3tu.nl/en/home/
([115]) https://surfsara.nl/mission-and-vision

life, we consider to be the task of researchers themselves together with their university libraries and their repositories'. Furthermore, in September 2014 DANS made a deal with Mendeley for the long-term storage of research data.

Norway has the Norwegian Storage Infrastructure ([116]) (NorStore), a national infrastructure for the management, curation and long-term preservation of digital scientific data. It is a pilot research data archive providing services for the easy and secure access to distributed storage resources. It fosters the creation and use of digital scientific repositories and provides large-scale aggregate capacities for storage and data transfer ([117]). NorStore addresses the concern expressed by the Norwegian NPR report that 'Institutional repositories cover the need for archiving of research results, but have not been specifically designed for long term preservation and curation'. Norwegian Open Research Archives ([118]) (NORA), is a single access portal for both Norwegian repositories and open access journals. It harvests about 70 repositories using the OAI PMH transmission protocol and is in its final stage of being interoperable with OpenAIRE. Work is in progress on synchronising the content of NORA with the data in CRIStin.

Poland has heavily invested and developed e-infrastructures with the aim, among others, of meeting the preservation needs of the scientific community. On the topic of preservation of scientific information and cultural heritage, Poland has about 100 digital libraries which contain scientific publications, and also several scientific repositories such as those of the Institute of Occupational Medicine in Lotz (ECNIS), of the University of Warsaw (FPA), of the Polish Academy of Sciences (IBB PAS), of the Wroclaw and Cracow Universities of Technology (ENY and STROKE, respectively), or the important nationwide repository, archive and virtual library of scientific information (CeON ([119])) operated by the ICM institute ([120]) of the University of Warsaw. ICM UW is also member of EuroCRIS and a core partner of OpenAIRE open access e-infrastructure, as well as a founding member of the Confederation of OA repositories ([121]) (COAR). The Polish NPR report also mentions the Polish Digital Libraries Federation ([122]) (DLF) project, which is managed by the Poznan Supercomputing and Networking Centre ([123]) (PSNC). There are about 100 digital libraries in Poland and the DLF aggregates digitised Polish cultural heritage from over 80 Polish digital libraries (over 770 000 publications counted in 2011). On research data, the PSNC centre also coordinates a National Data Storage research project which aims to build a national storage system using the Pionier consortium ([124]) (the national Pionier research network and the metropolitan area networks (MAN) which use their own dark fibre optics). This consortium forms an integral part of the Polish national research e-infrastructure and provides free country-wide data archiving services for the Polish research community. Long-term preservation of research data is also addressed by other EU-funded projects in which PSNC is also involved, such as SCAPE or Wf4Ever. On public sector information, the Ministry of Administration and Digitisation launched at the end of 2014 a beta version of an Open Government Data Portal ([125]) (CRIP), a central national repository especially aimed for the social sciences and humanities. In Poland, there is a central CRIS system which aggregates information on HEIs and research outputs called POL-on ([126]) and which has been extended to cover also a bibliographic management system, known as the Polish Scholarly Bibliography ([127]) (PBN), and a beta version of a Central Archive of the Master Thesis (CRPD), which has implemented a deposition mandate for all master's and doctoral theses defended at all Polish universities from October 2014

([116])   https://www.norstore.no/about
([117])   https://www.norstore.no/
([118])   http://nora.openaccess.no/; http://www.cristin.no/english/open-access-eng/nora/
([119])   https://ceon.pl/en/resources
([120])   http://ocean.icm.edu.pl/en/;jsessionid=CA586BABFA70F106740699000D016645
([121])   https://www.coar-repositories.org/
([122])   http://fbc.pionier.net.pl/owoc?action=ChangeLanguageAction&language=en
([123])   http://www.man.poznan.pl/online/en/
([124])   http://www.pionier.net.pl/online/en/
([125])   https://mac.gov.pl/files/oecd_luiz_de_mello_-_poland_ogd.pdf
([126])   http://polon.nauka.gov.pl/
([127])   https://pbn.nauka.gov.pl/?siteLanguage=en

onwards, with the aim not only of archiving scientific production but also in particular of detecting fraud and plagiarism.

In **Portugal**, the OA Scientific Repository of Portugal (128) (RCAAP) is a repository infrastructure network which collects, aggregates and indexes open access scientific content produced by Portuguese institutional repositories, and this content is made available through a single-point entry search portal. OpenDOAR shows that Portugal has 46 open access repositories, mostly at Portuguese universities and polytechnic institutes. RCAAP provides a number of digital services for the research community, namely its *raison d'être*, the SARI — *Serviço de Alojamento de Repositórios Institucionais* (Hosting Service of Institutional Repositories). The institutional repositories present in SARI (the majority of national repositories) are centrally hosted by RCAAP and provided through a digital infrastructure run by the FCCN — National Scientific Computation, an FCT department that manages the entire NREN. This infrastructure complies with the highest security, digital preservation and overall quality standards, thus making scientific content hosted in the centrally hosted RCAAP repositories long-term digitally preserved by default. Also, the entire network of repositories is compliant with the OpenAIRE guidelines and is fully integrated in the OpenAIRE network.

As for **Romania**, the NPR report states that according to the 'Open Government Partnership National Action Plan and the National Strategy for Research and Innovation 2014-2020, electronic repositories are already in the process of implementation and the infrastructure is large enough to host scientific data, not only publications. However, the preservation of scientific information (not publications) should be better promoted in the future; international assistance is needed as well as examples of best practice'. The virtual campus AnelisPlus (129) aims at becoming a national repository for scientific results too, as well as a virtual library offering access to international scientific journals. The NPR report further states that 'the national repository will be used for Open Access repositories (national and institutional) and to provide access to the archives acquired by the academic and research community from different publishers'. The issue of long-term preservation is not explicitly addressed though, which may be explained by the fact that Romania is currently focusing on development of e-infrastructure for institutional repositories.

In **Slovakia** there are different tools, platforms and research information systems managed by the Slovak Centre of Scientific and Technical Information (130) (SCSTI), such as the Slovak Current Research Information Centre (SK CRIS), the Central Bibliographic Database of Slovak Electronic Information Resources for Research and Development (131) (SciDAP), the Central Registry of Publication Activity (132) (CREPC), which is a publicly accessible bibliographic database of publication activity of compulsory registration by all Slovak HEIs (public or private) for a centralised evidence system of publication activity and a basis for funding decision-making, and the Central Registry of Theses and Dissertations (133) (CRZP), to which registration of ETDs is also mandatory to guarantee a national anti-plagiarism system. Further, the report explains that the SCSTI is undertaking a national project for the development of a national repository of digital, science-related documents, which will be acquired with European Structural Funds.

Likewise, **Slovenia** is developing a national open research data infrastructure, stemming from the Research Infrastructures Development Plan 2011-2020 (134) (chapter on digital resources) and from the Open Data Project 2010-2013. The latter produced a draft open research data policy and a draft action plan. According to the Slovenian NPR report, 'the four universities have established pilot

(128) http://www.rcaap.pt/about.jsp
(129) http://www.anelisplus.ro/
(130) http://www.cvtisr.sk/en.html?page_id=58
(131) http://scidap.cvtisr.sk/?fn=main&lang=eng
(132) http://cms.crepc.sk/
(133) http://www.crzp.sk/
(134) http://www.arhiv.mvzt.gov.si/fileadmin/mvzt.gov.si/pageuploads/pdf/znanost/RISS/SIR.pdf

national open access infrastructure for ETDs and research publications in 2013. The Ministry of Education, Science and Sport is planning to ensure the sustainability of e-infrastructures for open access to research results', although it also recognises in other paragraph that 'these repositories are not certified for long term preservation' and that 'Policies have not yet been defined and implemented for the curation and long term preservation of research results in the form of primary research data and all other results, including publications.' On the other hand, electronic versions of scientific and professional journals wholly or partly funded by the Slovenian Research Agency ([135]) are preserved by the Digital Library ([136]) of the National and University Library ([137]) (NUK) of Slovenia. According to the openaccess.si ([138]) portal, there are currently five OAI-PMH compliant inter-operable repositories in Slovenia but no national repository yet, which is envisaged for scientific publications and for raw research data, also to be connected to the national CRIS system (SICRIS ([139])) as well as to EU repositories and platforms. The National strategy of open access to scientific publications and research data in Slovenia 2015-2020 determines that 'Openly accessible scientific information in the form of publications and research data has to be securely preserved to prevent loss, damage and misuse' ([140]).

In **Sweden,** 'digital repositories […] are established at all Swedish universities' but the long-term preservation aspect is not explicitly addressed. The recently proposed draft report National Guidelines for Open Access to Scientific Information ([141]) submitted to the government in January 2015 addresses aspects of archiving and long-term preservation of research data, whereby 'the higher education institutions are responsible for archiving and long-term preservation of research data produced by researchers employed by them'. The NPR report further states that 'a natural second step, when the national guidelines are in place, is to participate in discussions on a sustainable funding model for e-infrastructures (both technical and knowledge) for data dissemination with the universities'.

At the time of writing, **Spain** has 120 open access repositories listed in OpenDOAR. They mostly belong to a broad network of Spanish universities, but also to libraries based in governmental departments of regional and national governments, foundations and other research institutes. The Spanish Foundation for Science and Technology ([142]) (FECYT) is a public foundation which aims, among other things, at supporting information and scientific resource management structures. FECYT has been a member of COAR since 2010 and is the Spanish partner in a number of EU-funded projects, in particular the Mediterranean Open Access Network ([143]) (MedOANet) and OpenAIRE projects. FECYT also participates in preservation initiatives at national level, the most important to date being Recolecta ([144]) or Open Science Harvester. Recolecta is a national platform that harvests all the national scientific repositories together (currently 79) and offers a single access point to research communities, as well as services to repository managers, researchers and decision-makers (for example, repository certification services). It was launched in 2007 as a result of the collaboration between FECYT with the Network of Spanish University Libraries (Rebiun). It is not clear whether there are any policies or strategies in place to ensure the long-term preservation of scientific information, as the institutional repositories are supposed to cover the short-term storage needs.

([135]) https://www.arrs.gov.si/en/novo.asp
([136]) http://www.dlib.si/v2/Default.aspx?&language=eng
([137]) http://www.nuk.uni-lj.si/nukeng.asp
([138]) http://www.openaccess.si/open-access-in-slovenia/
([139]) http://www.sicris.si/public/jqm/cris.aspx?lang=eng&opdescr=home
([140])http://www.mizs.gov.si/fileadmin/mizs.gov.si/pageuploads/Znanost/doc/Zakonodaja/Strategije/National_strategy_for_open_access_21._9._2015.pdf
([141])http://www.vr.se/inenglish/aboutus/activities/analysisevaluationandfollowup/nationalguidelinesforopenaccesstoresearchinformation.4.18f425dd146e9437d292db46.html
([142]) http://www.fecyt.es/
([143]) http://www.medoanet.eu/
([144]) http://recolecta.fecyt.es/?language=en

Finally, in the **United Kingdom,** the RCUK policy on open access states that when Green open access is followed, articles need to submitted to a repository, and this choice is left to the researchers themselves, with some exceptions such as the mandatory deposit of research results funded by the Medical Research Council ([145]) (MRC) in Europe PubMed Central, as one of its funders (see sections 3.6 and 3.8 of the RCUK open access policy ([146]), dealing with embargoes and repositories respectively); or the depositing mandate by the Economic and Social Research Council ([147]) (ESRC) to deposit in its own repository, the ESRC Research Catalogue. Further, following a consultation by HEFCE for the post-2014 REF exercise, HEFCE will require that papers accepted for publication after 1 April 2016 should be deposited in repositories. The report explains that 'Repositories are therefore seen as an important facility for preservation of research results'. Finally, the British Library ([148]), by a legal deposit obligation that came into effect in April 2013, now has the mandate to collect and preserve freely available UK online publications through the UK Web Archive ([149]), and also the means to tackle the 'link rot' problem of inactive, expired or historical UK internet sites.

([145])   http://www.mrc.ac.uk/research/research-policy-ethics/open-access-policy/
([146])   http://www.rcuk.ac.uk/RCUK-prod/assets/documents/documents/RCUKOpenAccessPolicy.pdf
([147])   http://www.esrc.ac.uk/research/research-catalogue/index.aspx
([148])   http://www.bl.uk/aboutus/legaldeposit/index.html
([149])   http://www.webarchive.org.uk/ukwa/

5. Development of e-infrastructures, interoperability and supporting national and transnational collaboration

Many Member States have devised global policies and strategies for developing e-infrastructures in a comprehensive way. Such strategies often contain specific chapters or sections addressing scientific information, research and innovation, covering both storage and high-performance computing capabilities as well as the appropriate dissemination, access and visibility of research results. It is worth noting in this section that, as is the case in other areas, the stage of e-infrastructure development varies greatly among Member States, and there are differences in funding capabilities in this area. The support provided by EU-funded projects and initiatives is of significant importance in this area, which helps in particular those Member States with less developed e-infrastructures. It is worth noting the effort and effectiveness provided by the consecutive OpenAIRE projects, and the support and awareness raising provided by the NOADs network. Similarly, other thematic digital EU-wide research infrastructures that form part of the European ESFRI roadmap are worth mentioning, such as EuroCRIS for Current Research Information Systems, BBMRI ([150]) for bio-banking EU-wide research infrastructures, Cessda for data archives in social sciences and humanities, Clarin ([151]) for Common Language Resources and Technology Infrastructure, Dariah ([152]) for Digital Research Infrastructure for the Arts and Humanities, DART-Europe ([153]) for European e-theses, ECRIN ([154]) for European Clinical Research Infrastructures Network, Elixir for life-sciences research information or ESS for the European Social Survey, are key initiatives in this area, not only for smaller EU countries with less developed capabilities, such as those coming from the last wave of enlargement (**Czech Republic**, **Croatia**, **Cyprus**, **Latvia, Hungary** or **Malta**), but also to ensure that synergies and collaboration across Europe are maintained. For the latter countries and others with less-developed research infrastructures, access to structural and/or regional development funds is also key to raising capabilities, as mentioned by **Czech Republic**, **Estonia** and **Latvia**. Finally, EU-funded projects such as Foster, PASTEUR4OA, Recode or Serscida also offer support, training, awareness-raising activities and information on best practices related to e-infrastructure development for science and research. The Research Data Alliance ([155]) (RDA) is mentioned by many as a key international actor in driving collaboration and synergies forward in this field, as in others, relating to research data.

In **Austria,** the Ministry of Science, Research and Economics sponsors a national e-infrastructure partnership project for 2014 to 2017 called E-Infrastructures Austria ([156]). This project is coordinated by the University of Vienna and 25 partners participate in it. The aim is to coordinate the development and networking necessary to establish repository infrastructure for supporting digital resources in scientific research and to create a Network of Knowledge and Expertise to assist technically in the implementation of such an infrastructure. The project also considers the topic of interoperability and collaboration among e-infrastructures in Austria, which is enhanced by the Austrian Library Network ([157]) run by the Austrian Library Network Ltd (OBVSG). Every scientific library in Austria is a member of this network.

In 2014 **Croatia** adopted the Croatian Innovation and Research Infrastructure Roadmap 2014-2010 ([158]) aiming to boost scientific excellence, innovation culture and the application of scientific knowledge to benefit society. Enabling strategic and efficient development of e-infrastructure is considered as a prerequisite for reaching this goal and will be provided by close collaboration among

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([150])   http://bbmri-eric.eu/
([151])   http://clarin.eu/
([152])   https://www.dariah.eu/
([153])   http://www.dart-europe.eu/About/info.php
([154])   http://www.ecrin.org/
([155])   https://rd-alliance.org/
([156])   http://e-infrastructures.at/en/the-project/
([157])   https://www.obvsg.at/kataloge/verbundauswahl/
([158])   http://public.mzos.hr/fgs.axd?id=21801

existing and future research infrastructure in Croatia. This Roadmap also includes the research infrastructure investment plan for the period 2014-2020 and planned activities will be supported mostly from EU structural funds. Successful implementation the Roadmap needs to be harmonised with European infrastructures and Croatian participation in numerous European and international projects, such as Clarin, Dariah, C-ERIC, Elixir, SHARE, etc. has great importance.

In the **Czech Republic**, the national e-infrastructure (Cesnet) is open to any scientist and is part of a national large research infrastructure roadmap.

In **Denmark**, the Danish e-infrastructure Cooperation ([159]) (DeIC) was launched in April 2012 under the auspices of the Ministry for Higher Education and Science and which belongs to the Danish Agency for Science, Technology and Innovation. This is a virtual network where all Danish universities as well as many university colleges and other educational institutions participate with the aim of supporting Denmark as an e-science nation through delivery of e-infrastructure (computing, storage and network) to research and research-based teaching. DeIC is a virtual organisation, which means that all staff are employed in other organisations, primarily at the Danish Technical University and to some extent at Aarhus University, Aalborg University, University of Southern Denmark and University of Copenhagen.

Estonia has also adopted National Research Infrastructure Roadmaps since 2010, which are being funded mostly from EU Regional Development Funds, until 2015 through the Core Facilities financing instrument (EUR 500 000 per year). These programmes have helped in developing several e-infrastructures in Estonia such as the Natural History Archives and Information Network (Natarc) which hosts biodiversity and earth sciences data archives, the Estonian e-Repository and Conservation of Collections ([160]) (E-varamu portal) for preservation and digitisation of research information, the Estonian Centre for Genomics in charge of the Estonian National Gene Bank, and the Estonian Scientific Computing Infrastructure ([161]) (ETAIS) which was established in 2011 to increase the competitiveness of Estonian research and innovation in high-performance and data-intensive computing infrastructure. Further, according to the NPR report, Estonian e-infrastructures are integrated and collaborate with other EU-wide research infrastructure networks such as BBMRI, Elixir or Clarin, as well as with other international consortia such as DataCite ([162]).

Finland is one of the front runners in the EU with regard to e-infrastructure development and coordination, and the NPR report includes an exhaustive summary of initiatives and programmes. The Ministry of Education and Culture is legally entrusted with ensuring interoperability of information systems and thus is investing heavily in the development of research infrastructures. For a start, it has a contract with the IT Centre for Science Ltd ([163]) (CSC) with a value of EUR 17.5 million in 2014 with the aim of supporting research infrastructure development and collaboration, but other important data services already mentioned in this report were also launched such as IDA, Etsin, REMS, AVAA, Tutkimus-PAS, etc. Its most recent Open Science and Research Initiative (ATT) focuses on six sections, among which open research methods and environments, tools and skills are mentioned. One of the goals of ATT is to foster efficient use of open public data in research, as well as to support renewal and management of the wide Finnish research infrastructure landscape and data material. Finland has had research infrastructure roadmaps since 2009 and a Finnish Research Infrastructure Committee (FIRI) was established in 2012, composed of representatives from government, academies, universities, polytechnics and research institutes. Its mission is to coordinate Finnish research infrastructure development and related policies and to put forward

([159])   http://www.deic.dk/node/141?language=en
([160])   http://e-varamu.tlulib.ee/E-varamu/E-varamu.html
([161])   http://etais.ee/en/
([162])   In Estonia a DataCite consortium (DataCite Eesti) was established in 2015. Through the consortium, any researcher can attach a DOI to their research data.
([163])   https://www.csc.fi/en

recommendations on updating and funding of existing research infrastructures. The CSC currently participates in numerous European and international research infrastructure collaboration projects, such as Aparsen, Clarin, EGI, Elixir, Embrac, EPIC, EUDAT, GEANT3, the Nordic Data Grid Facility ([164]) (NDGF), ODE, PRACE and RDA, to name a few. There are also project opportunities for data exchange such as CERN, APA, STFC, etc. For a more in-depth analysis of the Finnish example, it is worth mentioning the report entitled *21 paths to a frictionless Finland. Report of the ICT 2015 Working Group* ([165]), which was delivered in January 2013 with the aim of establishing a roadmap for long-term efforts to make Finland a leader in information technology applications over the following 10 years.

France has also developed a Research Infrastructures — Roadmap 2012-2020 ([166]), as well as a National Digital Strategy which is being formulated by the MENESR. As part of the latter strategy, the *Ecole Numerique* ([167]) contains a number of initiatives funded by MENESR (*Investissements d'Avenir*) in order to bring digital innovation to the French national education system. The French government also funds a number of subject-based research infrastructures such as a virtual observatory for astronomical data in Strasbourg (CDS), several data centres for climatology and global warming (IPSL/IPCC), biodiversity (BBEES) and digital humanities (HUMA-NUM). On interoperability efforts, the national repository HAL is interoperable with OpenAIRE, ArXiv, PubMed Central (but not Europe PubMed Central) and others. Further, collaboration takes place both at European level, with French participation in many EU research infrastructures including the ESFRI roadmap, the European e-infrastructure Reflection Group (e-IRG) and Science Europe working groups, as well as international initiatives such as the Research Data Alliance ([168]) (RDA) for data sharing.

Of national importance in **Germany** is the strategy for research infrastructures, the Roadmap for research infrastructures ([169]) which was launched in 2013 by BMBF in order to establish efficiency gains, synergies and collaboration among existing and planned research infrastructures in Germany, as well as to align policies with EU strategies and the ESFRI roadmap (such as Clarin, Dariah or ECRIN). Thematic-based initiatives are also funded by the BMBF such as the eHumanities programme ([170]) to encourage innovative research initiatives using digital tools in the social sciences and humanities. The BMBF has also launched a strategy for digital development, the Digital Agenda 2014-2017 ([171]). Further, the DFG also funds information infrastructures for supporting researchers in Germany, such as the open data servers EconStore and OstDok. For further information on DFG support in this area, the DFG infrastructures portal RIsources ([172]) provides more detailed information about scientific research infrastructures. In November 2014 a Council for Information Infrastructures ([173]) with 24 members was further established jointly by the German federal and regional governments to run until 2018, with the aim of strengthening collaboration and networking as well as identifying potential synergies among existing research infrastructures and the need for new ones. Both the Council for Information Infrastructures and the DFG are also active on collaboration and interoperability efforts. For example, the DFG is a partner in the Knowledge Exchange ([174]) expert network which has the objective of providing support for the development of the digital infrastructures for research and university library sectors. Other German

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([164])   https://neic.nordforsk.org/about/areas/nt1/
([165])   https://www.tem.fi/en/current_issues/publications/21_paths_to_a_frictionless_finland._report_of_the_ict_2015_working_group.98158.xhtml
([166])   http://www.enseignementsup-recherche.gouv.fr/cid70554/strategie-nationale-infrastructures-de-recherche-2012-2020.html
([167])   http://www.education.gouv.fr/cid85208/-investissements-d-avenir-des-projets-de-services-numeriques-innovants-pour-l-education-nationale.html
([168])   https://rd-alliance.org/
([169])   https://ec.europa.eu/research/infrastructures/pdf/germany_roadmap_research_infrastructures_en.pdf
([170])   https://www.bmbf.de/de/informationsinfrastrukturen-745.html
([171])   http://www.bmbf.de/de/24356.php
([172])   http://risources.dfg.de/home_en.html
([173])   http://www.gwk-bonn.de/index.php?id=205
([174])   http://www.knowledge-exchange.info/

research institutions also participate to EU-wide projects and international initiatives, such as Aparsen, Driver, PEER, OAPEN, ODE, COAR, etc.

In **Hungary**, most universities already have their own repositories or are in the process of creating new ones. The aim is for such repositories to be linked to the national aggregator Hungarian Scientific Bibliography (MTMT) or to use the orphan repository hosted by the Hungarian Academy of Sciences (MTA). Most of these repositories are interoperable with EU-wide infrastructures, as they are compliant with the OAI PMH meta-data harvesting protocol ([175]).

In **Italy,** the triennial National Research Plan ([176]) contains a section on National Research Infrastructures and states that Italian research infrastructures will be made compatible with the ESFRI roadmap and European Research Infrastructure Consortium ([177]) (ERIC) legal conditions.

In **Latvia**, repositories are compliant with the OAI-PMH meta-data harvesting protocol.

The final decision lies with the government of **Lithuania** on the proposal by the Ministry of Education and Science, in accordance with the Law on Higher Education and Research and Order No V-1068 of 2 July 2012 of the said Ministry. Also, the Research Council of Lithuania (RCL) specified in its Resolution No VII-127 of 17 December 2012 the procedure to be followed by Lithuanian institutions to participate in international research infrastructures, as well as approving the formation of a specific research infrastructure Commission to deal with this topic. Lithuania has been particularly active in the field of social sciences and humanities and thus participates in EU-wide research infrastructures in this sector such as Clarin, Cessda, and ESS, although the NPR report states that 'However, the funding scheme of the infrastructures has not been finalised and agreed upon by the authorities'. Finally, on collaboration and interoperability, Lithuanian authorities and institutions (in particular, the Lithuanian National Library eLABa and the RCL) participate in EU projects and initiatives such as the OpenAIRE projects, DART-Europe, Driver or the Mapping of the European Research Infrastructure Landscape ([178]) project (MERIL), which is an EU-wide effort to provide a comprehensive inventory of the most important cross-national research infrastructures in Europe in all scientific domains, and which is publicly accessible through its online interactive portal.

Luxembourg recognises that apart from 'the ORBilu repository that links publications to research data, no common infrastructure is currently in place'. Nevertheless, coordination efforts are greatly facilitated by the prominent role of the National Library of Luxembourg as the leading institution of the Consortium Luxembourg ([179]), and of the University of Luxembourg which is the OpenAIRE NOAD and the key node of the PASTEUR4OA project. The relative lack of e-infrastructure in Luxembourg may also contribute to its choice to follow the Gold model for its open access strategy and Consortium Luxembourg is in fact entrusted with the national negotiation of licensing agreements with major international publishers.

In **Malta** the University of Malta ([180]) (UoM) and its library (UoM Library) are key actors in the area of research infrastructures. For example, the UoM launched the first OpenAIRE compliant repository in Malta, the OAR@UoM ([181]), which was upgraded to serve as a national digital platform for the uploading of national intellectual output and heritage. And its library is member of LIBER, which together with SPARC and COAR is developing a roadmap for repository interoperability among its membership. In February 2014, the Maltese government endorsed the National Research and

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([175])   http://oaikereso.sztaki.hu/kereso/
([176])   http://hubmiur.pubblica.istruzione.it/web/ricerca/pnr
([177])   http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=eric
([178])   http://portal.meril.eu/converis-esf/publicweb/startpage?lang=1
([179])   http://www.bnl.public.lu/fr/bibliotheque/consortium/index.html
([180])   http://www.um.edu.mt/
([181])   https://www.um.edu.mt/library/oar/

Innovation Strategy 2020 policy document, recognising that Malta needs, as part of the identified goals of 'Achieving a stronger knowledge base' and 'Achieving smart, flexible specialisation', to invest further in order to update its existing local research infrastructure, as well as in ICT generally as a horizontal enabler for excellent research and innovation. The strategy also highlights that 'Open access to publications resulting from publicly funded research remains a principle which Malta supports as a means to achieve optimal circulation of knowledge.'

The situation in the **Netherlands** is presented as follows: 'Scientific data infrastructure should be part of large research infrastructure financing arrangements, but that is not the case yet. Costs of data storage, maintenance and preparations for re-use are not very clear yet. Criteria of proper education of data specialists have not been developed yet also in the last phase of academic and post-academic education the proper handling of research data should be part of the curriculum. Data stewardship should be common knowledge in every generation of researchers and all stakeholders'. It also refers to the important aspect of trust and quality for repositories: 'For quality mechanisms for e-infrastructures the keyword is "trustworthy repositories"'. The Netherlands is following internationally approved quality markers such as the Dutch Data Seal of Approval ([182]) (DSA), the German DIN Seal of Approval for long-term archiving or the ISO standard 16363 ([183]). Many Dutch e-infrastructures and related initiatives aimed at supporting scientific research and data-intensive science were previously mentioned in other sections of this report: to name just a few there are DANS, 3TU, DSA, EASY, Narcis and others. Specifically, the SURFsara ([184]) foundation provides hosting, networks, high-performance computing and high-end visualisation services to the Dutch academic community, and has been in operation since 1970 when SARA was firstly created. SURFsara is a Dutch foundation that provides supercomputers, colocation, networks and high-end visualisation to academic institutions. SURFsara has extensive expertise, both in use and management of the facilities. Another important facility supporting researchers is the Dutch Dataverse Network ([185]) (DDN), formed by several Dutch universities and research performing organisations and which manages the OpenSource application Dataverse Network used for data re-use and short- and long-term archiving of research data by researchers themselves. The NPR report finally acknowledges the collaboration and synergy efforts with regard to research data and therefore states that, although most disciplines, organisations and stakeholders are focused on achieving data management and preservation for their own purposes, 'concrete synergies realised among e-infrastructures with regard to research data are scarce: Elixir is an example'.

In **Norway,** the national infrastructure NorStore ([186]) is a pilot research data archive used for curation, management, large-scale computing and long-term preservation of scientific data. This pilot is mainly aimed at addressing the long-term preservation issue, as the report itself recognises that 'institutional repositories cover the need for archiving of research results, but have not been specifically designed for long term preservation and curation'. Further, the Norwegian Metacenter for Computational Science ([187]) (NOTUR) provides a modern, national high-performance computing (HPC) infrastructure and computational science support to the computational science community in education and research at Norwegian universities, colleges, research and engineering institutes and industry who contribute to the funding of NOTUR. Interoperability among e-infrastructures at national and European level is fostered by CRIStin ([188]), the Norwegian member of EuroCRIS, which will implement a full CERIF-compliant protocol for Research Information Systems, as well as the use of the transmission protocol for meta-data harvesting OAI-PMH by the approximately 60 Norwegian

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([182])   http://datasealofapproval.org/en/
([183])   www.iso16363.org
([184])   http://surfsara.nl
([185])   https://dataverse.nl/dvn/
([186])   www.norstore.no
([187])   https://www.notur.no/about
([188])   http://www.cristin.no/english/

repositories, which ensures interoperability with both the national community-based resource Norwegian Open Research Archives ([189]) (NORA) and the EU project OpenAIRE.

In **Poland**, as already mentioned, many e-infrastructures and platforms have been created, for example OCEAN (the big and open data centre), SYNAT, Infona, PBN, 86 open access repositories, the 21 Metropolitan Area Networks (MAN) which form part of the Pionier network, five HPC centres across Polish universities, POL-on, the Virtual Library of Science (WBN), the Polish Digital Libraries Federation, the CEON centre of the ICM at the University of Warsaw, the Poznan Supercomputing and Networking Centre, the CRIP and the CRPD central repositories, etc. Most of these e-infrastructures and platforms have been the fruit of Polish strategies and projects, such as the Platon — Science Services Platform ([190]) project, which took place between 2008 and 2012 with the objective of developing a national modern ICT infrastructure for science, by providing innovative ICT applications, solutions, tools, infrastructures and services to support the scientific community. On interoperability, the ICM centre of the University of Warsaw seems quite active, as a key partner of the OpenAIRE projects, as it was one of the original developers of the European open repository e-infrastructure Driver, now part of OpenAIRE, and currently 'being responsible for the development of its data and text-mining components and for the daily operations of the production infrastructure'. Most Polish digital libraries which are part of the Pionier Digital Libraries Federation are members of the Europeana ([191]) project. At the international level, ICM is a founder of the Confederation of Open Access Repositories ([192]) (COAR) and a member of the EuroCRIS standards organisation (it plays a central role through its Linked Open Data Task Force).

In **Portugal**, FCT created a National Roadmap of Research Infrastructures which is the result of a call launched in 2013 in order to support research infrastructures of strategic interest that sustain scientific and technological advancements and strengthen the scientific Research, Development and Innovation community in Portugal, thus stimulating its active participation in European and international projects. Also in the infrastructure domain, RCAAP ([193]) is the national open access repository infrastructure and the *Biblioteca do conhecimento online* ([194]) (b-on) provides unlimited and permanent access within research and higher education institutions to full texts of scientific international publications from 15 publishers, through subscriptions negotiated at national level. Reinforcing and adding to the information previously provided about RCAAP, this infrastructure is fully integrated in the OpenAIRE network of repositories through full adoption of the OpenAIRE guidelines by all of its repositories. This means that FCT is currently the single public research funder in Europe for which information regarding the research publications it funds can be extracted from the OpenAIRE portal, for monitoring purposes: https://www.openaire.eu/fct-stats. The national CRIS system, PT-CRIS, compliant with the CERIF norms and currently in its implementation phase, will allow integration of and interoperability between all cited national research infrastructures — RCAAP, b-On, DeGóis, FCT's grant management systems, etc. Portuguese research teams and institutions are also active participants in research data infrastructures at European level, such as Cessda (APIS: http://www.ics.ul.pt/instituto/?ln=p&mm=3&ctmid=3&mnid=1&doc=31816887474) and Elixir (Biodata.pt: https://www.elixir-europe.org/about/elixir-portugal), among others.

Romania acknowledges that 'the preservation of scientific information (not publications) should be better promoted in the future; international assistance is needed as well as examples of best practice. So far only the reports of the research projects are publicly available on various databases (owned by the funding bodies) but not the scientific data'. Nevertheless, the report also states that the e-infrastructure for disseminating scientific data is already under development. According to the report, the AnelisPlus national repository (including open access functionalities) should already be in

([189])   http://nora.openaccess.no/
([190])   http://www.platon.pionier.net.pl/online/?lang=en
([191])   http://www.europeana.eu/portal/
([192])   https://www.coar-repositories.org/
([193])   http://www.rcaap.pt/
([194])   http://www.b-on.pt/

place. It also explains that the infrastructure has been designed in a distributed mode to facilitate redundancy and that it is connected to the Romanian National Research and Education Network (^{195}) (NREN) which is part of the EU-funded project GEANT, the pan-European research and education network. Further, the NPR report states that the national open access repository to be operated by AnelisPlus should be using the DSpace software suite to ensure interoperability and that it will be registered to international open access repository directories (for example, OpenDOAR).

In the case of **Slovakia**, several e-infrastructures have already been described in the previous section of this report, such as SK CRIS, SciDAP, CREPC, CREUC and CRZP. Similarly to other Member States, the Slovak NPR report refers to the EuroCRIS (^{196}) organisation on the issue of operability. The Slovak Centre of Scientific and Technical Information (SCTI) is currently the Slovak member of EuroCRIS and ensures that the SK CRIS system is fully compliant with the international CERIF standard (Common European Research Information Format). Further, the Slovak ISSN National Agency takes part in the Unesco project Directory of Open Access Scholarly Resources (ROAD) which started in December 2013 and was developed by Unesco's Division of Communication and Information with the aim of identifying old and new titles of international scientific resources.

In **Slovenia**, the NPR report refers to the national strategies Research Infrastructures Development Plan 2011-2020 and Open Data Project (2010-2013) (^{197}) as the main policy documents for the development of e-infrastructures in the country. The first contains a chapter on national digital resources and it assures that publication repositories as well as data archives will be made OpenAIRE compliant to ensure quality, meta-data harvesting and interoperability. It further envisages the adoption of measures to ensure sustainability and long-term preservation of e-infrastructures for scientific research, although no specific details were provided. Likewise, the Open Data Project establishes a programme for a draft open research data policy and a draft action plan for development of open research data infrastructures, although no further details were given as to the level of implementation of these policies. The NPR report further states that the four Slovenian universities established in 2013 pilot national open access repositories and infrastructure for ETDs and research publications and these should also be made OpenAIRE compliant to ensure interoperability.

Sweden also makes reference to the funding of e-infrastructures. The Swedish Research Council is a key funder of important e-infrastructures in Sweden, including those providing network and HPC support to the scientific community. Sweden focuses on data management e-infrastructures for specific subject-based scientific areas such as the climate/environment, humanities/social sciences and some life sciences. The National Guidelines for Open Access to Scientific Information (^{198}) set out several recommendations on e-infrastructures, and the aim for further discussion among key Swedish stakeholders on the crucial aspect of achieving a sustainable funding model for e-infrastructures (both at technical and skills levels) for data collection, curation, management, sharing, re-use and long-term preservation of research data, mostly among universities and research institutions.

The **United Kingdom** is also particularly active in the area of e-infrastructures for research, and important funding allocations have been made and will continue. The NPR report states that 'The UK recognises that we are experiencing a fundamental change in the way that research and development are being undertaken. The use of modelling and simulation, and the manipulation of massive and dynamic data sets from experiment, is now central to discovery and innovation. Having access to the necessary e-infrastructure is therefore essential for academic and business excellence'.

(^{195})   http://www.geant.net/About/partners/Pages/Home.aspx
(^{196})   http://www.eurocris.org/
(^{197})   http://www.openaccess.si/open-access-in-slovenia/
(^{198})http://www.vr.se/inenglish/aboutus/activities/analysisevaluationandfollowup/nationalguidelinesforopenaccesstoresearchinformation.4.18f4
        25dd146e9437d292db46.html

The 2011 report entitled A strategic vision for UK e-infrastructures ([199]) set out a 10-year strategy plan for the development of e-infrastructures in the UK. The UK has established the E-infrastructure Leadership Council (ELC) to advise government on all aspects of e-infrastructure development, including networks, data, advanced computing power, software, tools and skills. Its members are drawn from academia, industry, government and sector bodies. Since 2011 over GBP 500 million has been invested by the UK government in e-infrastructure and data, including the Alan Turing Institute for advanced mathematics and algorithm research and the Hartree Centre for industry-academia collaboration and innovation. Further investments include the Open Data Institute ([200]), the Clinical Practice Research Datalink ([201]) by the National Health Service (NHS), as well as a DNA sequencing database, also by the NHS. On big data, the Data Capability Strategy ([202]) sets out the UK strategy for big data, highlighting the need for a coherent data infrastructure, investment in skills and opportunities for innovation. Several new Centres for Doctoral Training have been created at several universities, Nottingham, Edinburgh and Oxford, to advance the provision of high-end data skills. On interoperability efforts, the UK participates in several EU-wide initiatives such as the Digital ERA Forum, the e-infrastructure Reflection Group and is a partner to large e-infrastructure projects such as PRACE, EGI, EUDAT and ESFRI roadmap infrastructures such as Elixir.

([199]) https://www.gov.uk/government/publications/e-infrastructure-strategy-roadmap-for-development-of-advanced-computing-data-and-networks
([200]) http://opendata.institute/
([201]) http://www.cprd.com/intro.asp
([202]) https://www.gov.uk/government/publications/uk-data-capability-strategy

6. Participation in multi-stakeholder dialogues at national, EU and international level

At the national level, several countries have set up national coordination bodies or networks (**Belgium, Denmark, Germany, Italy, Austria, Poland, Portugal**). Other countries rely on a university or a university library (or an association of libraries) to coordinate national stakeholders (**Czech Republic, Lithuania, Luxembourg, Malta**) or on their Research Promotion Agency/Research Councils (**Cyprus, Sweden,** the **United Kingdom**) or their Academy of Science (**Slovakia**). Specific events, such as open access workshops or activities around the yearly open access week have also been identified as a way to galvanise stakeholder interaction at the national level (**Czech Republic, Croatia, Italy, Romania**).

At the EU level, a number of existing groups have been mentioned by almost all respondents, namely ERA and associated with it ERAC and the taskforce for open access as well as the National Points of Reference for Scientific Information (NPR). The Digital ERA Forum and E-IRG were mentioned less often.

European projects and infrastructures were also highlighted by many participants. OpenAIRE was the most often referred to and other projects and infrastructures mentioned include Foster and PASTEUR4OA as well as PEER, Dariah and Serscida.

A variety of European initiatives outside the EU context were also referred to. Most frequently mentioned were the activities of the OECD on open science (Working Group on Innovation and Technology Policy) and Science Europe.

In a global perspective, Unesco was repeatedly identified as a key actor, as was the policy impetus from the G7/8. The Global Research Council was mentioned once. For open access to research data, the Research Data Alliance was frequently mentioned.

France in particular referred to infrastructures such as OAPEN, PubMedCentral as well as ArXIV and COAR and initiatives such as Knowledge Exchange and SCOAP3.

Only **Belgium** and the **Netherlands** mentioned bilateral consultations on open access between their countries.

Among the Nordic states (Denmark, Finland, Iceland, Norway and Sweden) part of the dialogue on open science is conducted within the framework of the NordForsk organisation. Nordforsk facilitates and provides funding for Nordic research cooperation and research infrastructure.

7. Appendices

Reporting Guidelines related to Commission Recommendation on Access to and preservation of scientific information

In line with article 9 from C (2012) 4890, pp. 8-9:

'A national point of reference whose tasks will be to: .
Inform the Commission 18 months from the publication of this Recommendation in the *Official Journal of the European Union*, and every two years thereafter, of action taken in response to the different elements of this Recommendation, in accordance with formalities to be defined and agreed.'

Having discussed this task at the first meeting of the National Points of Reference on 4 December 2013, it was agreed that a report would be submitted in early 2014 based on a template to be provided by the Commission.

This template serves as a guide for reporting back to the European Commission on the current state of affairs in the Member States regarding access to and preservation of scientific information. The relevant sections have been paraphrased for ease of reading and clarity, but the full recommendation still remains the reference in terms of scope.

Please fill in with as much detail and reference as necessary the following sections:

1. **Policies for the dissemination of and open access to scientific publications resulting from publicly funded research**

What Policies have been or will be adopted to address the issue of open access to scientific publications in your Member State? For policies or policy proposals please specify concrete objectives, plans for implementation and any relevant financial planning.

Please also indicate how you have ensured that the following issues will be addressed: embargo period, licensing, academic careers, transparency, SMEs.

2. **Implementation of open access policies**

What plans are there to ensure the successful implementation and uptake of the above polices. In particular, what funding allocations have been made? What changes to the evaluation system for careers and grants have been made? What efforts have been made to negotiate with publishers and what technical measures are foreseen for tracking?

3. **Policies for the dissemination of and open access to research data resulting from publicly funded research**

What policies have been or will be adopted to address the issue of open access to research data in your Member State? For policies or policy proposals please specify concrete objectives, plans for implementation and any relevant financial planning.

Please also indicate how you have ensured that the following issues will be addressed: access, meta-data, institutional involvement and data training.

4. **Preservation of scientific information**

Have or will any policies been defined and implemented for the curation and long-term preservation of research results? Are electronic repositories foreseen for this purpose?

5. Developing e-infrastructures underpinning the system for disseminating scientific information

What steps have of will be taken to support scientific data infrastructures, train new data specialists, develop value tools to be based on data, and ensure sustainable funding and quality mechanisms for e-infrastructures?

6. Ensure synergies among national e-infrastructures at European and global level by contributing to the interoperability of e-infrastructures and supporting transnational cooperative efforts

What steps have or will be taken to promote interoperability and collaboration?

7. Participate in multi-stakeholder dialogues at national, European and/or international level on how to foster open access to and preservation of scientific information

What multi-stakeholder dialogues have or will be participated in, on what topic and with what (foreseen) outcome?

Summary tables

Summary table by country of main actors, policy strategies and mandates, and relevant digital OA platforms and tools (*) (28 EU Member States plus Norway and Turkey — If relevant, information from second to fifth columns refer to main actors by their numbering in the first column)

COUNTRY (EU 28)	Main actors	Policy strategies and initiatives	OA mandates	Green/Gold/ Hybrid models	Embargo periods for Green OA ([203])
BELGIUM	1. Federal Authority (BELSPO) — http://www.belspo.be/belspo/index_en.stm. Groups: - a) Inter-federal OA Consultation Workgroup b) Federal OA Strategy Working Group c) BELSPO OA unit 2. Flemish Authority — http://www.flanders.be/en 3. Wallonia-Brussels Federation — http://www.federation-wallonie-bruxelles.be/ 4. Fonds National de la Recherche Scientifique (FNRS) — http://www.fnrs.be/ 5. Flanders Research	1. Signed the Brussels Declaration on OA. The BELSPO OA unit and the Belgian Royal Library (which has the legally binding deposit mandate for all Belgian written material) have set up an integrated Library Management System • BICTEL project a common online free repository for theses • PoPuPs a common portal for OA scientific journals (15) 2. Organises annually a stakeholders' and experts' meeting (EWI FOCUS OA) (http://www.ewi-vlaanderen.be/ewi/wat-doen-we/de-samenleving/workshops-	1. Mandate to publish immediately in OA (Gold) or to deposit in repositories (examples are ORBi of University of Liege or Biblio of the Ghent University). 4. Since June 2013 they apply the IDOA depositing mandate model (see 6 below). 5. Mandate to deposit in an OA repository within 1 year of publication, advisable for other grey literature and research data 6. First to establish the innovative IDOA depositing model, implemented since 2008 (now also known as the 'Liege model'). IDOA stands for 'Immediate Deposit, Optional Access' and such mandate is a condition to performance and evaluation of	Belgium generally, favours Green OA (deposit mandate in repositories, accepts publishers' embargoes), although the Belgian Health Care Knowledge Centre (KCE) has a specific fund for Gold OA and most research projects allow publishing in immediate Gold OA using the projects' funds.	1. Not mentioned 4. Not mentioned 5. 12 months

([203]) In this column, embargo periods shown as two consecutive numbers (e.g. 6/12 months) refer to Science, Technology, Engineering and Mathematics (STEM) and to Arts, Humanities and Social Sciences (AHSS), respectively.

			researchers' careers		
	Foundation (FWO) — http://www.fwo.be/en/ 6. Liège University — https://www.ulg.ac.be/cms/c_5000/en/home 7. Gent University biblio.ugent.be	ewi-focus/ewi-focus-15-open access, to which representatives from 2 and 3 also attend 3. It is studying the possibility to launch a common portal for OA in the SSH. Open Access Belgium — http://openaccess.be/			
BULGARIA	1. Ministry of Science and Education- http://www.minedu.government.bg/ 2. Bulgarian National Science Fund (NSF) — http://www.nsfb.net/ 3. Association of University Libraries (AUL) — http://aub-bg.org/index_en.html 4. Bulgarian Academy of Sciences (BAS) — http://www.bas.bg/bulgarian-academy-of-science 5. Institute of Mathematics and Informatics at BAS (IMI-BAS) http://math.bas.bg/index.php/en/	1. National Reform Programme (2012-2014), focus on infrastructure and HPC development, but no OA national or institutional OA policy 3. Outlined steps to build open repositories (libraries are more aware of OA issues) 4. Plans to establish a network of scientific OA centres 5. Will launch a national project to develop research infrastructures and digital repositories (Implementing Open Access Mandates in Europe, 2012)	Not mentioned	Not mentioned, but a certain lack of repositories may indicate a de facto preference for Gold OA 2. Has a specific programme covering Gold OA costs	Not mentioned

| CZECH REPUBLIC | 1. Czech Ministry of Education, Youth and Sport — http://www.msmt.cz/research-and-development-1?lang=2

2. Deputy Prime Minister for the Science, Research and Innovation, (and his department) at the Office of Government - http://www.vlada.cz/en/clenove-vlady/pavel-belobradek-115422/

3. Research, Development and Innovation Council, advisory body to Czech government — http://www.vyzkum.cz/FrontClanek.aspx?idsekce=630

4. Technology Centre AS CR - http://www.tc.cz/en

5. Czech Academy of Sciences (CAS) - http://www.cas.cz/index.html

6. Association of Libraries of Czech Universities (AKVS) — (LERU and IFLA member) — http://www.akvs.cz/en/

7. Technical University of Ostrava – https://www.vsb.cz/en | 2. **Czech OA Recommendation** (Research, Development and Innovation Council's Recommendations on Open Access to published research results funded by the public funds in Czech Republic). This is a position paper with recommendations for the future and is still uncertain whether the Czech government has approved it or not.

3. It has an OA policy in place (ASAP policy) and its library is in charge of its implementation

4. **Strategic Plan 2013-2015**, key activity 1 Open Access and changes in scholarly communication (policy support initiative)

5. It is an OpenAIRE partner (NOAD) | No mandates existing, only soft law measures and declarations | 3. Not mentioned explicitly, but its terms relate mainly to self-archiving (Green OA) | 3. Respect of publishers' embargoes ('as soon as possible') |

| DENMARK | 1. Danish Council for Independent Research (DFF) — http://ufm.dk/en/research-and-innovation/cooperation-between-research-and-innovation/open-science/open-access-to-research-publications: an Open Access Committee was commissioned to recommend best transition mode to OA in Denmark

2. Danish 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

3. Danish Ministry for Higher Education and Science — http://ufm.dk/en: A National Strategy on Open Access to scientific articles was announced in 2014. Furthermore a National Steering Committee on OA was appointed with representatives from Danish universities, research councils and other stakeholders such as Denmark's Electronic Research | 1. Conclusions on Scientific Information in the Digital Age (2008) and a four-year plan Recommendations for implementation of OA in Denmark (2011)

2. Joint Open Access policy (2012)

3. National Strategy for Open Access (June 2014): 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

The strategy implies that from 2022 onwards, unimpeded, digital access for all to 100 per cent of all Danish peer-reviewed scientific articles should be realised. The National Steering Committee on Open Access coordinates the implementation of the strategy. | 1. The Committee recommended focusing on Green OA

2. Requires researchers to negotiate with publishers securing rights to make research articles available in institutional or subject-based repositories with maximum embargo periods (5 out of 8 Danish universities have implemented OA policies) | 1, 2 and 3. Green Open Access combined with negotiations with publishers to ensure maximum embargo periods. No funding provided for Gold OA | 1, 2 and 3. A maximum of 6/12 months from publication |
|---|---|---|---|---|---|

	Library (DEFF) 5. The State and University Library and Royal Library — http://www.kb.dk/en/nb/ 6. Danish e-infrastructure Cooperation (DeIC) — http://www.deic.dk/: a central portal for published Danish research 7. DFF and Danish Data Archive — http://samfund.dda.dk/dda/default-en.asp	6. In cooperation with DEFF will establish a research data platform for use by research institutions, public institutions, businesses and SMEs			
GERMANY	1. Federal Ministry of Education and Research (BMBF) — http://www.bmbf.de/en/ 2. German Research Foundation (DFG) — http://www.dfg.de/en/ 3. Alliance of German Science Organisations — http://www.dfg.de/en/dfg_profile/alliance/ 4. Max Planck Society (MPG) — http://www.mpg.de/en 5. Helmholtz Association — http://www.helmholtz.de/en/h	1. A diverse and differentiated landscape exists in German due to its federal system. **Digital Agenda Strategy** at federal level (August 2014), sets out a commitment to develop a comprehensive OA strategy, including plans to implement an OA clause to its funding 2. One of the main research funding bodies in Germany. Funds projects to raise awareness of OA. Its **OA Publishing Programme** provides funds to German universities to cover APCs	1. 2. Beneficiaries are expected to publish, where possible, in OA (no hard mandate) 4. Beneficiaries are expected to publish, where possible, in OA (no hard mandate, but includes OA principles in its governance rules, the Rules of Good Scientific Practice) 5. OA mandate in its Initiative and Networking Fund 6. Soft OA mandate, either Green or Gold	1. 2. Its funding supports both the Gold (OA journals) and Green routes (OA repositories) 4. Supports both Green and Gold. On Green OA, it supports self-publication in its Living Review Journals and the MPG Research	1. 2. 6/12 month embargo period may apply 3. 4. 6/12 month embargo period recommended 5. 7. Up to one year embargo period may be respected

	ome/ 6. Leibniz Association — http://www.leibniz-gemeinschaft.de/en/home/ 7. Fraunhofer-Society — https://www.fraunhofer.de/en.html 8. OA Information Platform is run by a network of German funders and research organisations which offers extensive information on AO activities and events. The network organises the annual OA conference 'OA Days' – http://www.open-access.net/DE-EN/germany-english/	(Gold). Since 2010 it funds **Alliance Licences** to improve licensing standards when depositing in OA repositories. A call for proposals was launched in 2014 for the design of transition models to pure Gold OA 3. In 2008 it launched the important **Priority Initiative Digital Information** focusing on 6 priority areas (ensure broadest access possible to digital scientific publications and data, long-term preservation and support to ICT-based research) 4. In 2003 it initiated the **Berlin Declaration on OA to knowledge in sciences and humanities** and since then many German research organisations and HEIs have implemented OA policies for transition to OA paradigm 5. In 2014 it launched the **Initiative and Networking Fund** for which it contained an OA obligation in its grant agreement. It also has an	7. Soft OA mandate, respecting confidentiality obligations and up to 1 year embargo period (for Green). A mandate to deposit into Fraunhofer's ePrint repository if the Gold route is chosen (with possibility of up to 1 year embargo)	Library has an OA edition. On Gold OA, the MPG Digital Library organises financing and workflows as for any subscription, in order to facilitate overall cost control and prevent double-dipping. It offers a centralised support scheme for payment of APCs to remove administrative burdens. Also, it collaborates in the creation of new OA journals (e.g. eLife, with Wellcome Trust and Howard Hughes Medical Institute) 5. Gold OA in its Initiative and Networking Fund	

		Open Science coordination office with OA advisors and operates OA repositories 6. It issued its Guidelines on OA in 2007. It hosts a centralised OA portal for all Leibniz institutes (**LeibnizOpen,** http://www.leibnizopen.de/en/home/). It co-edits and provides OA journals (Gold), it hosts specialists OA repositories (Green) and offers support and advice on OA topics (i.e. the transformation of subscription into OA journals) 7. It has its own OA policy and from 2008 (https://www.fraunhofer.de/content/dam/zv/en/Publications/Fraunhofer_open-access-policy.pdf) it hosts an ePrints institutional repository and an institutional repository (Green) called Fraunhofer-Publica (http://publica.fraunhofer.de/starweb/pub09/en/index.htm)		6. Not specified (the Guidelines on OA state 'as soon as possible'). 7. An embargo of up to one year may be respected, if applicable

ESTONIA	1. Estonian Ministry of Education and Research - https://www.hm.ee/en 2. Estonian Research Council — http://www.etag.ee/en/estonian-research-council/ 3. Estonian Libraries Network Consortium ('ELNET Consortium') http://www.elnet.ee/index.php/en and research libraries	1. Organization of Research and Development Act (relevant amendments in 2012) Estonian Research and Development and Innovation Strategy 2014-2020 encourages open access of publicly funded scientific results 1 and 3. Centralised national negotiation of licensing agreements with major publishers. 1. Programme of Electronic Scientific Information (2009) and National Research Infrastructures Roadmap: Estonian Scientific Computing Infrastructure ETAIS (2011) — https://taat.grid.ee/ 3. Estonian e-repository and conservation of collections programme: portal **E–**	1, 2 and 3. State free access to results of publicly funded research, be it institutional or personal, by way of deposit to the Estonian Research Information System (ETIS). The public section is called Estonian Research Portal https://www.etis.ee/index.aspx?lang=en	1. Green OA is mandatory (self-archiving of full-text to ETIS), but costs of APCs are eligible cost of research grant. No specific fund is set up for Gold OA	1. No embargo periods set (respects publishers' embargoes). Impact factor of journals are not taken into account for career evaluation of researchers

		varamu (2011)			
IRELAND	1. Irish Universities Association — http://www.iua.ie/ 2. National Steering Committee on Open Access (website Open Access Ireland – http://openaccess.thehealthwell.info/) 3. Science Foundation Ireland (SFI) — http://www.sfi.ie/ 4. Dublin Institute of Technology (DIT) and Trinity College Dublin — http://www.dit.ie/ and https://www.tcd.ie/ 5. Higher Education Authority (HEA) — http://www.hea.ie/ 6. Irish Research Council (IRC) — http://research.ie/ In 2012 merged the Irish Research Council for HSS (IRCHSS) and the Irish Research Council for Science, Engineering and Technology (IRCSET)	1. In 2014 it endorsed the **National Principles for OA Policy Statement (2013**) http://openaccess.thehealthwell.info/sites/default/files/documents/NationalPrinciplesonOAPolicyStatement.pdf 2. Implements the above policy statement. Supports OA to publications by encouraging repositories to adhere to OA principles. Some of its members have implemented OA policies (see 3 to 6 below) 3. SFI Open Access Policy (effective 2009) http://www.sfi.ie/funding/grant-policies/open-access-availability-of-published-research-policy.html 4. DIT Open Access Self-Archiving Policy (effective 2009) — http://arrow.dit.ie/mandate.html Trinity College Dublin Open	1, 5 and 6. It contains, among other principles, a deposit mandate in OA repositories 2. Encourages deposit in OA repositories 3. Mandates OA either self-archiving (Green) or immediate publication (APCs are eligible cost for reimbursement from project funds) 4. Self-deposit mandate into DIT institutional repository Arrow@dit Self-deposit mandate into Trinity College Dublin Library e-repository TARA (Trinity's Access to Research Archive) — http://www.tara.tcd.ie/	1, 2 and 6. Green OA 2. Green OA 3. Green and Gold OA are allowed 4. Mostly Green OA 5. Mostly Green OA 6. Mostly Green OA	1, 2, 5 and 6. 'As soon as possible', ideally no later than at the time of publication, BUT publishers' embargoes are respected BUT 'should not normally exceed 6/12 months' 3. If possible, 6 months but copyright rules take precedence over OA policies 4. Not specified, but publishers' embargoes are explicitly respected

	7. National portal of Irish scientific publications (RIAN) — http://rian.ie/ 8. Digital Repository Ireland — http://www.dri.ie/about 9. Digital Humanities Observatory — http://dho.ie/	Access Publications Policy (effective 2010) — www.tcd.ie/research_innovation/assets/TCD_%20Open_%20Access_%20Policy.pdf 5. HEA Open Access Policy (effective 2008) — **National Principles for Open Access Policy Statement (November 2013**) — Same policy document as in 1 above - www.hea.ie/files/files/Open_%20Access_%20.pdf 6. IRC Open Access Policy (revised 2012) — http://research.ie/aboutus/open-access 7. A centralised portal providing access to national research publications harvested from the institutional repositories of the seven Irish universities and the Dublin Institute of Technology 8. A centralised national e-infrastructure for education and research in the humanities and social sciences, built by a research consortium of six academic			

		partners. 9. A centralised researchers' platform on humanities e-scholarship			
GREECE	1. General Secretariat for Research and Technology (GSRT — http://www.gsrt.gr/central.aspx?sId=119I428I1089I323I488743, from the Ministry of Culture, Education and Religious Affairs) 2. National Documentation Centre (EKT)- http://www.ekt.gr/en/ 3. Panteion University — http://www.panteion.gr/ (in Greek only) 4. Archimedes Centre for Modelling, Analysis and Computation (ACMAC) — http://www.acmac.uoc.gr/ 5. The Hellenic Academic Libraries Link (HEAL-link, http://www.heal-link.gr/)	1. Currently, neither mandate nor national strategy on OA, but it supports OA since 2013. It set out a working group for the implementation of OA policies. It is the NPR for OA. It has the mandate to elaborate a National Strategic Reference Framework for Research covering topics such as OA to publications and data, preservation and reuse of scientific information and e-infrastructures with an emphasis on OA and a digital agenda. Legislative changes to funding terms in order to set the appropriate framework for OA are in progress. 2. Encourages OA. It runs the EU-funded project Mediterranean OA Network (MEDOANET, http://www.medoanet.eu/) aimed at enhancing OA strategies and	2. Soft law deposit mandate 3 and 4. They have explicit OA mandate (soft law). ACMAC has a PrePrint repository but the depositing policy is not specified (whether deposit is mandatory or not)	1. Probably Green, but not defined explicitly 2, 3 and 4. Green OA	1, 2, 3, 4, 5 and 6. Not specified

		infrastructures for OA and at creating new ones in six Mediterranean countries (Greece, Italy, France, Spain, Portugal and Turkey) 5. A consortium comprising 38 HEIs, 14 technological education institutes, 8 other libraries, the Academy of Athens and the National Library of Greece. It offers 11 000 full-text electronic journals. The Consortium negotiates at national level subscription agreements with publishers			
SPAIN	1. Ministry of Education and Competitiveness — http://www.mineco.gob.es/portal/site/mineco/?lang_choosen=en 2. Spanish Foundation for Science and Technology (FECYT) — http://www.fecyt.es/ 3. Spanish National Research Council (CSIC) — http://www.csic.es/ 4. Network of Academic and Research University Libraries of	1. The **Spanish Law on Science, Technology and Innovation** (**Law 14/2011**) contains a self-deposit mandate in article 37 entitled Open Access Dissemination which states that public research organisations and HEIs should promote OA repositories which are interoperable nationally and internationally. It contains a depositing mandate for scientific articles from wholly or partially funded public research. A digital	1. Art. 37 of Law 14/2011 contains a self-depositing mandate for research articles resulting from wholly or partially publicly funded research 5. There are 15 institutional OA policies and mandates: Barcelona Autonomous University, Alcalá de Henares University, Alicante University, Barcelona University, Cantabria University, Lleida University, Girona University, Vic University, Zaragoza University, Oberta Catalunya University, Polytechnic University Cartagena, Polytechnic University Cataluña,	1. Spain favours the Green OA route 5. Spain has a strong community of OA institutional repositories (58 across the country, that is, 80 % of Spanish universities have their own institutional repository)	By legal mandate, there is a maximum embargo period of 12 months

| | | Spain (REBIUN) — http://www.rebiun.org/Paginas/Inicio.aspx

5. Spanish universities with OA policies and mandates | version of the final version accepted for publication has to be archived in institutional or thematic-based repositories and be made publicly available as soon as possible, or no later than 12 months after publication. It also allows evaluation agencies to take into account OA publication for evaluation of researchers' careers. The Law finally makes the Ministry responsible for the provision of a centralised access point to the Spanish repositories network. The **Spanish Strategy for Science, Technology and Innovation (2013-2020)** (EESTI) (http://www.idi.mineco.gob.es/stfls/MICINN/Investigacion/FICHEROS/Estrategia_espanola_ciencia_tecnologia_Innovacion.pdf) promotes OA to publications, data and other research results as an 'articulation mechanism' (the second out of a total of six), including guidelines for shared archives. The **Spanish State Plan for** | Polytechnic University Madrid, Polytechnic University Valencia, Pompeu Fabra University | | |

		Scientific and Technical Research and Innovation 2013-2016 (**PECTI**) (http://www.idi.mineco.gob.es/stfls/MICINN/Investigacion/FICHEROS/Plan_Estatal_Inves_cientifica_tecnica_innovacion.pdf) contributes to the promotion of OA principles through technological forums and platforms. Spanish institutions with OA policies and mandates support international declarations such as Berlin Declaration, Bethesda Open Access Statement and Budapest Open Access Initiative Two regional governments (Madrid and Asturias) have their own OA policies and OA platforms (the harvester **e-Ciencia** for Madrid and the regional repository **RIA** for Asturias) 2. Several Spanish institutions developed **The Alhambra Declaration on OA** (http://www.accesoabierto.net/sites/accesoabierto.net/files/OASouthEurope_10_Alh			

| | | ambraDeclaration.pdf), coordinated by FECYT and the Consortium of Academic Libraries of Catalonia (CBUC), with the support of CSIC. FECYT also facilitates access to international digital bibliographic research tools (SCOPUS and WoS)

2 and 4. FECYT is the Spanish NOAD for OpenAIRE project. In collaboration with Rebiun, it manages Spain's national harvester and service provider for the repositories community called **Recolecta** or Open Science Harvester (http://recolecta.fecyt.es/?language=en). It is a platform that harvests all the national scientific OA repositories together in one place and provides advocacy and dissemination activities, as well as support and services to repository managers, researchers and policymakers. Both FECYT and Rebiun support the International Open Access Week and organise several events to promote OA and share best practices. They | | | |
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		organise workshops, online seminars and panel discussions with experts. Also, Recolecta is currently working in the implementation of a national statistics module for getting repositories' usage-data 3. A key actor on OA, is a member of COAR. It hosted the seminar which led to the Alhambra Declaration. In 2008 it launched **Digital.CSIC**, a repository coordinated by CSIC Unit of Scientific Resources for Research (URICI). This repository organises, preserves and enables access to a wide variety of scientific outputs in which CSIC's 73 research libraries and scientific community actively participate. It manages a large digital collection (9 000+ e-journals, 220 000 e-books, databases and scientific portals, and more than a million digitised images from CSIC's heritage collections. Digital.CSIC repository raises awareness and trains CSIC community on a broad			

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range of OA issues (open standards and interoperability, copyright and author's rights, advocacy and policymaking, dissemination efforts). It is the largest and most widely visited open access repository of scientific resources in Spain

4. It is a sectorial commission created in 1998 by the **Spanish Universities' Rectors' Conference** (**CRUE**), which brings together 76 CRUE members (50 public universities, 26 private universities) and CSIC, and connects their institutional repositories. It provides information and support on authors' rights and copyright. It connects Rebiun created, together with FECYT, the Recolecta portal. It also manages **Dulcinea** portal, which summarises publishers' policies and mandates of Spanish journals towards OA self-archiving. Information included is bibliographic data, access policies, self-

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		archiving policies in relation to specific copyright terms and classification of journals following the Sherpa/Romeo coloured taxonomy (http://www.accesoabierto.net/dulcinea/?idioma=en)			
FRANCE	1. Ministère de l'Education nationale, de l'Enseignement supérior et de la Recherche (MENESR) — http://www.education.gouv.fr/ 2. Agence Nationale de la Recherche (ANR) — http://www.agence-nationale-recherche.fr/ 3. Bibliothèque scientifique numérique (BSN) — http://www.bibliothequescientifiquenumerique.fr/ 4. Institute Nationale de Recherche en Informatique et en Automatique (INRIA) — http://www.inria.fr/en/ 5. Centre Nationale de la Recherche Scientifique ('CNRS') http://www.cnrs.fr/ 6. ETALAB (French mission in charge of opening and sharing	1. Minister stated support to open access defining a national OA programme in 7 action items. 2. In 2007 stated support for OA without a mandate (recommendation to deposit). It signed the partnership agreement (alongside over 25 educational and research institutions) to foster OA depositing in local institutional archives or the national platform Hyperarticles en Ligne (HAL, https://hal.archives-ouvertes.fr/), a national multi-disciplinary, interoperable and open national archive repository, which harvests institutional archives and accounts for 22 % of the total national	1. No mandate but soft measures of support through any OA model (Green, Gold, Platinum) 2. Recommendation to deposit (no hard mandate in place yet) 4. This agency has an OA mandate to deposit either in HAL or in other OA repository for consideration in funding and researchers' career evaluation	1. France supports Green, Gold and a third so-called Platinum road. Hybrid is discouraged 2. Any OA model is supported 4. Any OA model is supported	1. A consultation on embargo periods has been launched, the aim being to cap embargo periods on STM in coherence with H2020 provisions. Currently, publishers' embargo periods are respected

	public sector information) https://www.etalab.gouv.fr/en/ 7. High Council for Research and Higher Education Evaluation (HCERES, the research assessment agency) — http://www.hceres.fr/	scientific publication 3. The BSN 4 Segment undertakes national debates on OA to publications. It recommends a national reference repository for the French scientific production (CONDITOR) and develops guidance tools to facilitate meta-data entry when depositing publications and to increase its visibility 5. It conducted a survey (results published in March 2015) among its scientific and technological institutes on its strategy paper Mieux partager les connaissances: Une stratégie ouverte pour une information scientifique et technique d'avenir (Ed. décembre 2014) — http://www.cnrs.fr/dist/z-outils/documents/STRATEGIE.pdf 6. It established a Roadmap for openness and sharing of public data, focusing on high-impact social data and/or with high potential for social and economic innovation —			

		https://www.data.gouv.fr/en/organizations/etalab/ 7. This agency takes into account, among other things, dissemination of scientific results in the evaluation of projects			
CROATIA	1. Ministry of Science, Education and Sports (MZOS) — http://public.mzos.hr/default.aspx?sec=2428 2. Croatian Science Foundation (CSF) — http://www.hrzz.hr/ 3. Agency for Science and Higher Education (Council for Financing Scientific Activity and Higher Education) — https://www.azvo.hr/en/council-for-financing-scientific-activity-and-higher-education 4. National and University Library — http://www.nsk.hr/en/ 5. Ruđer Bošković Institute 6. University of Zagreb (University Computing Centre SRCE, Faculty of Electrical	6. **Croatian OA Declaration** (October 2012) — signed by 20 state Ministries, universities, libraries and over 800 researchers — goal: to ensure the broadest possible access to scientific digital information and R and D and its long-term preservation; advocates for an OA mandate 6. **OA Information Platform** — offers practical information and advice on OA in Croatia with Wiki technology 1. National Strategies for Science and Technology Policy (2006/10, 2010/2014) — the 2014 version promotes OA (with a declaration for the future, not stated when it will be	Existing institutional repositories operate without mandates 1. MZOS funds the portal HRCAK, a publishing platform of over 370 Croatian OA journals and over 120 000 full-texts. MZOS also funds the first central national repository for OA publications (CROSBI, the Croatian Scientific Bibliography, with over 460 000 records of which over 30 000 in full text) 4. The Law of Science and Higher Education (November 2013) mandates the legal deposit of graduate and doctoral theses at the Digital and Academic Repository of the National and University Library 5. Ruđer Bošković Institute adopts first OA mandate	1. Gold OA (MZOS subsidises Croatian OA journals, their inclusion in HRCAK is criteria for their evaluation). 6. Green OA is provided with common infrastructure DABAR 2. Green with some funds for APCs too, mainly for international journals	2. 6/12 months

	Engineering and Computing)	implemented) 1. Croatian Research and Innovation Infrastructures Roadmap 2014-2020 5. First OA mandate 6. DABAR infrastructure for institutional repositories			
ITALY	1. Ministry of Education, Research and Universities (MIUR) — http://www.istruzione.it/ 2. Agency for the Evaluation of the University System (ANVUR) – http://www.anvur.org/index.php?lang=it 3. OA working group of the Conference of Italian University Rectors (CRUI OA Gruppo di Lavoro) — http://www.crui.it/english/ 4. Institutional Points of Reference Network (National IPRs) 5. National Open Access Committee 6. Consiglio Nazionale delle Ricerche (CNR) — http://www.cnr.it/sitocnr/Englishversion/Englishversion.html	1. * Article 4 of Law 112/2013 *The research call **Scientific Independence of Young Researchers (SIR 2014)** — http://sir.miur.it/ — This pilot programme will become the standard for all research calls in the future ***Horizon 2020 Italia** (HIT2020, March 2013) — www.researchitaly.it/uploads/50/HIT2020.pdfS - Supports implementation of OA to reach H2020 target of 60 % of publicly funded publications to be available in OA * **National Plan for Research (PNR), National**	1. A legal mandate to make available in OA all research outputs, including data, resulting from publicly funded research (over 50 % of funds used). Art. 9 of the call SIR mandates OA very similarly to the OA clauses of the Model Grant Agreement of H2020 3. As a result of CRUI's policies on OA, nearly half out of the 97 Italian universities have put in place institutional OA policies (voluntary adoption)	1 and 3. Both Green and Gold	1. 18/24 months maximum embargo periods allowed if Green OA followed 3. Not specified

	7. Platform Pleiadi (Portal for Italian Electronic Scholarly Literature in Institutional Archives) — http://www.openarchives.it/pleiadi/	**Plan for Research Infrastructures (PNIR)** and **National Infrastructures Roadmap** will incorporate OA goals and rules for publications and data 2. Asked by MIUR to establish plans to take OA practices into account for evaluation of researchers' careers. From 2015 OA practices will be considered as criteria in the assessment of research quality (funding will be addressed specifically for research quality) 3. **Guidelines on theses deposit (2007)** by CRUI **Library Commission Position Statement on OA to research outputs in Italy (2013)** **Guidelines document on OA policies for universities (June 2013)** 4 and 5. They will work together towards advancing OA goals and principles (will meet at least once a year)			

		6. **Science and Cultural Heritage Digital Preservation Network**, a project developed by CNR on digital preservation 7. A centralised aggregator providing access to over 500 000 documents deposited in Italian academic and research institutional repositories and OA journals			
CYPRUS	1. Research Promotion Foundation- http://www.research.org.cy/EN/index.html/ 2. University of Cyprus (http://www.ucy.ac.cy/en/) and its Library (http://library.ucy.ac.cy/en) 3. Cyprus University of Technology – http://www.cut.ac.cy/?languageId=2 4. Cyprus Academic Library Consortium (CALC) 5. Directorate General European Programmes, Coordination and Development	**Cooperation Network** to raise OA awareness 1. It is the Cypriot NPR and coordinates OA in Cyprus (regular emails to Cypriot coordinators of H2020 projects) 2 and 3. Signed the Berlin Declaration on OA in 2008 and 2011 respectively. The Library of the University of Cyprus is the OpenAIRE NOAD since 2009 1, 2 and 5 Consultation with the National Documentation Centre within the PASTEUR4OA European	Lack of institutional explicit OA mandates and few institutional repositories 3. It has an OA Author Fund 1. In preparation of a mandate/soft law/recommendation for OA, in line with the national policy on OA, within the next Framework of Programmes for Research and Technological Development and Innovation.	1. Mostly Green and Hybrid OA — provides funding through its programmes for publications in Gold OA (as an eligible cost of funded projects). 3. It signed with pharmaceutical company Remedica an agreement for publications in Gold OA 4. It signed a national	1, 3 and 5 The relevant provision in the draft National Policy respects the publisher's embargo periods.

	— http://www.dgepcd.gov.cy/	project, with a scope to develop a national policy on OA. 1, 2 and 5. Development of a draft national policy for OA with a focus on Green OA and consultation with stakeholders.		subscription contract with BioMedCentral for Gold OA	
LATVIA	1. Ministry of Education and Science 2. University of Latvia (Academic Library) – http://www.acadlib.lu.lv/index.php?&56 3. Riga Technical University (Scientific Library) — http://www.rtu.lv/en/ 4. National Library of Latvia — https://www.lnb.lv/en 5. Latvian Academy of Sciences http://www.lza.lv/index.php?mylang=english	1. Government initiative to implement Commission Recommendation 2012 postponed due to change of government. In September 2014, an ERDF project with the Academic Library Creation of a Unified Latvian Academic Network of National Significance for Ensuring Scientific Activity. **Culture Information Systems Centre**, a consortium of 43 members from academia, government and libraries, operates under the supervision of the Ministry of Culture of Latvia. Its objective is to provide access to information	1.It signed a national collaborative initiative with Thompson Reuters Web of Sciences and InCites (February 2015) 2. It established in 2011 an OA mandate (full access to full texts) for self-depositing into the University's repository. Theses must also be deposited in the University's repository 3. It encourages deposit in its repository, but it does not provide full access	1. Green and some Gold 2 and 3. Green OA (e-resource repositories under copyright contracts). Both institutional repositories are OAI-PMH compliant	1. Not specified 2 and 3. Full respect of publishers' embargoes.

		resources and cultural heritage stored in archives, museums and libraries and undertake digitalization projects and deal with electronic licensing issues — http://www.kis.gov.lv/ 3. It has its own journal, Scientific Journal of RTU, their abstracts and meta-data are published in its institutional publication database 4. NLL has a digital library called Latvian Digital Library (Letonika) — http://www.letonika.lv/ 5. It has its own OA journal Proceedings of Latvian Academy of Sciences. Section B: Natural, Exact and Applied Sciences			
LITHUANIA	1. Agency for Science, Innovation and Technology (MITA) - http://www.mita.lt/en 2. Lithuanian Research Council (LMT) — http://www.lmt.lt/en/about.ht	1. No concrete and coherent OA policy in Lithuania, but institutional repositories are emerging. **Open Access to Science and Research Project (MITAP)** — 14 project partners together for	2. **Descriptions of the procedure for the funding of projects** — Grant agreement with LMT promotes OA (arts. 81 to 84): principal investigators and their institutions shall ensure research results are made available in OA, and project	2. Green and Gold OA (APCs cost eligible for reimbursement from project funds). Also, since 2012 small specific pilot Gold OA	2. Maximum embargo period of 3 years after end of research project 3 and 4. Not specified

ml 3. Lithuanian Academic Libraries Network (LABT) — http://www.labt.lt/?Language=en_EN& Lithuanian Academic e-Library (eLABa) — http://www.elaba.lt/elaba-portal/en/pradzia 4. Vilnius University — http://www.vu.lt/en/ 5. Lithuanian Research Library Consortium — http://www.lmba.lt/en 6. Open Journal System — http://www.ecoman.ktu.lt/index.php/index	devising OA centres and advice to Lithuanian researchers on technology transfer and OA to scientific results - http://www.mita.lt/en/general-information/projects/open-access-to-science-and-research-mitap/ **Programme for the development of Lithuanian Research and Studies Informational Infrastructure (2013-2016)** — Target: 40 % of research publications and 10 % of research data should be publicly available in OA by 2016. Total budget of EUR 18 million 2. Nominated in 2013 by Ministry of Education and Science as responsible entity for OA topics in Lithuania. Since 2006 it set up, together with Lithuanian educational institutions and libraries, the **Lithuanistika** database on SSHs 3. Since 2003 it set up an initial e-resource database	summaries and reports 3. Self-deposit possible in eLABa, but not compulsory. 4. OA section in the Vilnius University Library, but specific OA policies undefined — http://www.mb.vu.lt/en/research-and-studies/scholarly-communication/open-access	fund to cover APCs in high impact journals (less than EUR 50 000) 3. Green OA 4. Not specified 6. Gold OA	

| | | for electronic theses and dissertations (**Lit-ETD**) https://etd.elaba.lt/

It is the Lithuanian Science and Study Integrated Information Environment Development task of the **Lithuanian Virtual University (LVU)** programme http://www.lvu.lt/cms/liedm /app?service=external/index &sp=1705

Since 2006, LABT maintains and develops the national aggregated OA repository **'eLABa'** (OAI-PMH compliant). It consists of about 29 000 articles in 6 science and study e-document collections, including the Lit-ETD database

4. **'National open access archive of research information' (MIDAS) —** 4.3 million EUR project to be implemented by Vilnius University

5. A libraries consortia of 55 members, Implemented the | | | |
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		project **'Promoting OA in Lithuania' (2011)** with an EIFL OA grant — http://www.lmba.lt/en			
LUXEMBOURG	1. National Library of Luxembourg — http://www.bnl.public.lu/fr/index.html 2. University of Luxembourg - http://wwwen.uni.lu/ 3. Fonds National de la Recherche (FNR) - http://www.fnr.lu/ 4. **Consortium Luxembourg**: 1, 2, 3 and other research institutes: Luxembourg Institute of Science and Technology (LIST) and Luxembourg Institute of Health (LIH) — Manages the **Findit.lu** repository	1. Involved in the Creative Commons initiative and active in Digital Humanities topics. The Consortium funds the acquisition and management of electronic publications, made available in the Consortium Luxembourg portal **Findit** (http://www.findit.lu/V/81XHD44C3H2DFCBVMF7314LFRNAH956LA6EQF4BD2JMAA3H3CR-00097?RN=656031615&pds_handle=GUEST) free of charge to all Luxembourg residents (over 53 000 articles, 93 500 e-books and datasets). No access to unaffiliated researchers or SMEs 2. Part of Consortium Luxembourg, nominated 'key node' for EU project PASTEUR4oa and NOAD for EU project OpenAIRE. It implements the **ORBiLu** repository system, offering responsive help-desk and	2. A depositing mandate in its electronic centralised OA repository **ORBILu** (http://orbilu.uni.lu/), repository based on the model of the University of Liège but adapted to the UL context. 3. APC costs in full OA journals are reimbursable as part of the project grant, with a maximum cap of EUR 3 000 and a minimum quality threshold.	2. Green OA 3. Gold OA	2. Not specified, but respects publishers' embargo periods 3. Plans for the future to require immediate OA or delayed access with maximum embargo periods of 6/12 months

		targeted training to researchers on OA and copyright topics 3. Member of Science Europe, it signed in April 2013 Science Europe's Principles for the Transition to OA to research publications			
HUNGARY	1. National Research, Development and Innovation Office (NKFIH), previously National Innovation Office (NIH) — http://nkfih.gov.hu/english 2. Hungarian Academy of Sciences (MTA) — http://mta.hu/english/ 3. Hungarian Scientific Research Fund (OTKA) — http://www.otka.hu/en/ 4. Hungarian Scientific Bibliography Project (MTMT) — https://www.mtmt.hu/ 5. National Technical Information Centre and Library (BME OMIKK — BME Archives-http://www.omikk.bme.hu/en/	1. **National Research, Development and Innovation Strategy (2013-2020)**. Hungary has an OA deposit mandate by Government Decree No 33 (7 March 2007) on doctoral dissertations 2. It specifically sets out an OA policy as a strategic means to achieve the goals of its **Strategy 2013-2015** which applies to its research network (15 centres and institutions and about 3 000 researchers) 3. It participates in the Science Europe working group on OA to scientific	1. Its Strategy 2013-2020 establishes an OA mandate to be implemented in the near future 2. From 2013 established an OA depositing mandate (in OA repositories), but respecting publishers' embargoes 3. Since 2009 it established an OA depositing mandate (contract support rules, clause 7.10), but compliance has not yet been monitored. It includes both an overhead fund for APCs and an institutional Green OA fund 4. The Hungarian government is preparing a legislative change for 2015 to establish compulsory registration of publications in MTMT	1. Mostly Green OA but with some funding for Gold OA 2. Mostly Green OA but in 2013 established an experimental small centralised Gold OA fund for those scientists whose institution / project cannot cover the APCs 3. Mostly Green OA but some support for Gold	1. None 2. Not specified but it concluded an agreement with Elsevier governing the Green OA rules of the MTA with this publisher 3. Not specified

				OA is offered	
	magunkrol.html) of the Budapest University of Technology and Economics 6. University of Debrecen 7. University of Corvinus	publications 4. National aggregator portal provided by a consortium of 21 members, universities and other centres of research. It contains publications and citations meta-data, as well as tools for recording, monitoring and tracking the OA status of each publication: statistics on compliance can be calculated and a yearly compliance aggregated report is produced (over 90 % complete since 2007). Research evaluation relies on the information held by MTMT 2, 6 and 7. Members of the Confederation of Open Access Repositories (COAR) ([204])			
MALTA	1. Malta Council for Science and Technology (MCST) - http://www.mcst.gov.mt/	1. **National Research and Innovation Strategy 2020** http://www.mcst.gov.mt/policy-strategy/national-	1. Electronic copy of publicly funded research publications should become freely available at most within six months of publication (OA publication costs	1. Green OA 2. Green OA. Malta has no commercial OA	1. 6 month maximum embargo period

([204])   https://www.coar-repositories.org/

	2. University of Malta (UoM) – http://www.um.edu.mt/ 3. University of Malta Library (UoM Library) — https://www.um.edu.mt/library	research-innovation-policy As part of a supporting R and I support ecosystem, it recognises and supports OA to publications from publicly funded research. But no overall national or institutional OA policy being formally implemented 2. The UoM website contains a statement in support of OA, but respecting IPR and publishers' contractually agreed embargo periods 3. In September 2014 it launched the first OA institutional repository in Malta, **OAR@UoM**, which is OpenAIARE compliant — https://www.um.edu.mt/library/oar/ Eventually this will possible become Malta's national OA repository. The OAR@UoM team at the UoM Library will ensure curation and long-term preservation of scientific output. With the support of the UoM Project Support Unit, the Library will	are eligible costs from project funds). No further information on monitoring and enforcement of this depositing mandate 2. Art. 54 of UoM Regulations establish an OA depositing mandate for UoM dissertations 3. The UoM Library has drafted specific policies to administer and maintain the OAR@UoM repository (access and use, content, submission, meta-data, preservation) – http://www.um.edu.mt/library/about/oar@uom_policies	journals (the UoM has 4 OA journals) 3. Green and Gold OA	2. Not specified 3. 6/9/12 month embargo periods for dissertations. Acceptance of publishers' embargo periods for research publications

		monitor and enforce OA mandates. The UoM Library is member of LIBER and OpenAIRE.			
NETHERLANDS	1. Ministry of Education, Culture and Science (OCW) – http://www.government.nl/ministries/ocw 2. The Netherlands Organisation for Scientific Research (NWO) (largest research funder in NL) – http://www.nwo.nl/en 3. FOM Foundation in Physics (NWO-FOM) — (runs 3 research institutes: AMOLF, DIFFER, Nikhef) — http://www.fom.nl/live/english/home.pag 4. The Netherlands Organisation for Health Research and Development (ZonMW) (funding agency for health research) – http://www.zonmw.nl/en/ 5. Royal Netherlands Academy	1. OA is enshrined as a key principle in the Dutch strategy paper **2025 — Vision for Science choices for the** future, where OA is defined as the 'catalyst of knowledge sharing' (http://www.government.nl/ministries/ocw/documents-and-publications/reports/2014/12/08/2025-vision-for-science-choices-for-the-future.html. **Gold OA policy** for scientific publications announced by Dutch State Secretary Sander Dekker in a formal letter to Dutch Parliament (November 2013) and in a speech to the APE conference in Berlin (January 2014). Targets set: 60 % of Dutch scientific publications in OA in 2019, 100 % in 2024. Seeking other MS alignment (see recent **NL/UK non-paper** submitted to EU	1. No specific fund for Gold OA is envisaged 2. The **NWO Subsidy Regulation** incorporates the **NWO OA Incentive Fund Publication** (a maximum of EUR 5 000) and the **NWO OA Incentive Fund for Conference Sessions** (a maximum of EUR 2 500 per conference application). NWO has a specific fund for starting up, or converting, traditional/hybrid journals into Gold OA journals. It also co-funds and contributes to OA publishing of books through the project now turned organisation **Open Access Publishing in European Networks (OAPEN)** (http://www.oapen.org/home). Financing envisaged for next NWO strategy period (2015-2018), (previous period had funding of EUR 5 million) 3. Mandate to deposit articles in a public OA repository (i.e. from a	1. Gold OA (but no extra budget for transition to a pure Gold OA model) 2. Supports OA principles aimed at Gold OA, although Green OA is allowed if Gold OA journals do not exist or are not well-developed in the specific scientific area 3. It favours Green OA, but Gold OA is also allowed 4. Gold OA 5. Green OA 6. Green OA and in parallel	1. Not applicable (as Gold OA is pursued) 2. Not specified for Green OA 3. Not specified for Green OA 5. 6/12 month embargo period, longer periods allowed only with the prior consent of the specific institute management 6. Green OA generally with important specific funds to cover APCs (Gold OA)

of Arts and Sciences (KNAW) (it groups 17 research institutes) – https://www.knaw.nl/en 6. Universities: 7. Health Funds 8. Dutch National Royal Library (KB) — https://www.kb.nl/en	Competitiveness Council (March 2015) which openly supports Gold OA). Negotiations with publishers (work conference in March 2014) to develop new business models for transition from hybrid to pure Gold OA journals (tested in June 2014 centralised big deal negotiations with publishers). **New Standard Evaluation Protocol 2015-2021** will shift away from citation index counting of articles and towards a broader evaluation of scientific quality and societal relevance of research. 2. OA policy follows the Gold OA route, but self-deposit in an institutional (university) or subject-based centrally managed repository is also allowed. Focus also on data management and data sharing (http://www.nwo.nl/en/policies/open+science)	university) or an international ePrint server (such as arXiv), or else to be published in an OA journal. 4. Not specified 5. Deposit mandate into the Academy's own publication repository (https://pure.knaw.nl/portal/) 6. All Dutch universities have a deposit mandate in university institutional repositories for PhD theses. They also rely heavily on Green OA as their repositories are also used as a source of research policy information. They are generally unaware of how exactly their 'toll-access costs are being off-set by their OA APCs contributions (especially university research libraries) **Utrecht University Library** has a mandate to deposit publications into their Igitur archive (http://igitur-archive.library.uu.nl/search/search.php?m=simple&language=en&p=1) now available via the national portal **National Academic**	specific funds for Gold OA 7. Not specified	7. Not specified

		3. In January 2012 the FOM Foundation in physics introduced its **OA Green policy** (but Gold OA is not excluded) 4. Linked to NWO OA Incentive Fund Publications. Currently mostly focused on OA to research data and data management plans. 5. Exhaustive OA policy published online (https://www.knaw.nl/en/topics/open-access-and-digital-preservation/open-access/policy). A data management form has also to be submitted on each research project 6. Different OA policies in place. Some universities are faster than others. Most advanced: **Amsterdam University** (recently joined Knowledge Unlatched project for the sharing of OA publishing costs of books), **Delft Technical University**	**Research and Collaborations Information System** (**Narcis**) (http://www.narcis.nl/about/Language/en), independently of publication into OA journals. Books made available in OA have to be registered too into the **International Directory of OA Books (DOAB)** http://www.doabooks.org/) 7. Not specified		

		Library has a specific OA fund for publications and monographs, **Utrecht University Library** has a specific OA fund for publications and for books and supports OA through **Igitur Archive** and **Igitur Publishing**. OCW will monitor from 2015 the progress on OA policies in universities and research institutions, and if it is too slow then OA may be incorporated into the Dutch Law on Higher Education and Scientific Research in 2016 7. Some subject-based funds have initiatives for the introduction of OA policies (e.g. KWF Fund on cancer or the Heart Foundation) 8. KB performs the legal deposit function in the Netherlands and is thus the long-term preserver of scientific information. It runs the **Narcis** national research portal whereby publications and other research information is harvested from repositories			

		of all Dutch universities and other research institutes. The entry into force of the **Public Library Provisions System Act (Wsob**) on 1 January 2015 has given a prominent role to the KB in the constitution of a **national digital library** during the next **KB Strategic Plan 2015-2018**			
AUSTRIA	1. Ministry of Science and Research2. Universities Austria (UNIKO) http://www.uniko.ac.at/index.php?lang=EN 3. Austrian Academy of Sciences (OAW) — http://www.oeaw.ac.at/en/austrian-academy-of-sciences/ 4. Austrian Science Fund (FWF) — https://www.fwf.ac.at/en/ 5. Institute of S and T Austria (IST Austria) — https://ist.ac.at/ 6. OA Network Austria (OANA) http://www.oana.at/en/home/ 7. Austrian Academic	1. No national centralised OA policy or strategy 2. Signed the Berlin OA Declaration in 2004 and its OA working group formulated in 2010 OA Recommendations to its member universities 3. OA policy enacted in 2011 4. One of the first signatories to Berlin OA Declaration (2003), contributed to Science Europe Principles on the Transition to OA to Research Publications (2013)	1. Agreements between the Ministry of Science and Research and universities and research institutions mostly state soft OA measures 4. Established an OA mandate in 2006, requires CC-BY licensing	3 and 4. Green recommended although hybrid allowed 5. Promotes Green OA via an e-Print repository	4. 6/12 months

	Consortium — http://www.oana.at/en/home/ 8. Austrian Library Network Ltd (OBVSG) — http://www.obvsg.at/				
POLAND	1. Ministry of Science and Higher Education (MNiSW) — http://www.nauka.gov.pl/en/polish-science-news/the-teaming-for-excellence-conference-in-warsaw.html 2. National Science Centre (NCN) — https://www.ncn.gov.pl/?language=en 3. National Centre for Research and Development (NCBiR) — http://www.ncbir.pl/en/ 4. Interdisciplinary Centre for Mathematical and Computational Modelling, University of Warsaw (ICM UW), http://www.icm.edu.pl/web/guest/home 5. Centre for Open Science (CEON) — http://ceon.pl/en/research, run by ICM UW	1. Main institution for directing the government's science policy, defining scientific frameworks and providing funding. Poland lacks OA institutional strategies and policies at the governmental, funders and research performing organisations. Rather, OA is a 'grassroots' movement implemented locally. Government policies aimed at good digitisation and access conditions for Polish researchers and research institutions. It commissioned a study report to ICM Warsaw University on **Implementation and promotion of OA to scientific and educational content (2012)**. In 2012 it established that Polish scientific journals would get extra points for their evaluation if they published OA online. In 2011 a draft	1 and 2. Not specified 3. NCBiR model agreement makes OA to publications mandatory. It also requires software to be free or open source.	1 and 2. Not specified. 3. Both Green and Gold OA allowed (APC costs eligible for reimbursement in most R and D programmes)	3. Not specified.

	6. Virtual Library of Science (WBN) — http://wbn.edu.pl/, run by ICM UW 7. Poznan Supercomputing and Networking Centre (PSNC) — http://www.man.poznan.pl/online/en/ 8. Digital Libraries Federation — Managed by PSNC http://fbc.pionier.net.pl/owoc?action=ChangeLanguageAction&language=en 9. Polish Scholarly Bibliography database system (PBN) — https://pbn.nauka.gov.pl/ 10. OCEAN — Big and Open Data Centre — http://ocean.icm.edu.pl/en/	bill was presented entitled **Act on Open Public Resources** with which any publicly funded output (scientific or not) should be made available online. 2. Set up in 2011, it funds basic research. It is the key node of PASTEUR4oa project. Provides training on OA topics. 3. It funds a national research content e-infrastructure project, **Science and Technology Information System (SYNAT)** (http://www.synat.pl/), involving over 12 top Polish research institutions. It also funds a common gateway to distributed scientific information resources **Infona** (https://www.infona.pl/), an open repository of publications and data 4. **Plan the implementation of OA to scientific content** went on consultation during August		

		and September 2014 by all stakeholders and a consultative and advisory team prepared the next version of the plan, discussed at Consultative Conference on December 2014. ICM UW. It also made agreements with over 200 journals to provide full-text OA to articles (237 OA journals are listed in DOAJ). National negotiator for licensing agreements with major international publishers (Elsevier, Springer, Wiley) allowing Polish authors to retain copyrights and licence their publications with OA licenses (see Infona platform above). Runs the Virtual Library of Science since 2010. It is Polish NOAD in OpenAIRE project. It published the report **Open Science in Poland 2014: a Diagnosis** (https://www.fosteropenscience.eu/content/open-science-poland-2014-diagnosis)			

		5. CEON runs **Otwartanauka.pl** (Open Science Platform in Poland, https://otwartanauka.pl/in-english), under the auspices of MNiSW, the Conference of HEIs rectors and the Polish Academy of Sciences 6. Run by the ICM and financed by MNiSW, provides Polish researchers with access to most important international publishers (Elsevier, Springer, Web of Knowledge, EBSCO, Nature, Science, Wiley, SCOPUS) aggregating commercial publication databases into a common platform 7. PSNC coordinates a national data storage research system **Pionier Consortium** (http://www.pionier.net.pl/online/en/) through the Pionier national research network and 21 Metropolitan Area Networks, provides country-scale data archiving services free of charge to Polish researchers and institutions (Europe's first			

| | | national academic network using its own dark fibre optics). The Pionier network comes from Platon-Science Services Platform project aimed at the development of national ICT infrastructures for science

8. Polish platform of distributed digital libraries (84 members top providers of digital content to Europeana, the European library of cultural heritage)

9. Introduced by the MNiSW provides updated information on Polish scientists' research output, promotes OA and aimed at becoming a repository for self-archiving of publications

10. A top class big data infrastructure for large scale data mining and long-term preservation and a centre of expertise and training for data scientists (interdisciplinary teams will develop and implement novel large-scale data analytic techniques) | | | |
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| PORTUGAL | 1. Ministry of Education and Science http://www.portugal.gov.pt/pt/os-ministerios/ministerio-da-educacao-e-ciencia.aspx

2. Fundação para a Ciência e a Tecnologia — FCT

http://www.fct.pt/;

http://www.fct.pt/index.phtml.en

3. OA Science Repository of Portugal (RCAAP) -

http://www.rcaap.pt/;
http://projeto.rcaap.pt/index.php/lang-en/sobre-o-rcaap/enquadramento

4. Online Knowledge Library (b-on)

http://www.b-on.pt/index.php?lang=en

5. DeGóis Curricula Platform (Plataforma DeGóis) — http://www.degois.pt/index.jsp?id=1 | 1. OA in Portugal has developed mainly through self-archiving (Green OA) in institutional repositories.

2. Single scientific public funding body in Portugal. Its Governing Board approved in January 2014 its OA policies (effective since 5 May 2014) **Policy on OA to Scientific Publications resulting from FCT-funded research** and **Policy on management and sharing of data and other results resulting from FCT-funded research** (https://www.fct.pt/acessoaberto/index.phtml.en)

It is preparing an **Implementation proposal plan** for the policy in 2 phases: in the first phase it aims to gather data on publication practices of Portuguese researchers and their related costs (APCs eligible only as part of the research project budget) while preparing the research | 1. Most universities have their own institutional repositories.

2. Mandate to deposit all peer-reviewed publications from FCT-funded research in any of the OA repositories hosted within RCAAP, as soon as possible or immediately after publication

3. Self-archiving (Green OA) | 2. Mostly Green OA, although Gold OA is possible (APC costs are eligible for reimbursement from research project funds) | 2. If Green OA is chosen, 6/12 month embargo periods for journal articles are allowed, in line with H2020 embargo periods. Open Access to books, book chapters and monographs is also mandated, with a maximum allowed embargo period of 18 months, as well as Open Access to doctoral theses, with a maximum allowed embargo period of 36 months. |

	6. National Foundation for Scientific Computing (FCCN) — now part of and under the auspices of FCT https://www.fccn.pt/en/; RCTS, the NREN is run and managed by FCT/FCCN: https://www.fccn.pt/en/academic-network/the-science-technology-and-society-network/ 7. PT-CRIS program — http://ptcris.pt/en/hub-ptcris-en/	community for creating Open Access routine procedures; the second phase, with the assistance of the collected data, aims to set a decision on the country's position in relation to the funding of Gold OA, i.e. whether to devise sustainable funding arrangements for Gold OA (probably setting up caps for APCs costs) or not 3. RCAAP portal collects, aggregates and indexes OA scientific resources from Portuguese institutional repositories. A single entry point harvesting thousands of scholarly publications (journals, conference papers, theses and dissertations) aggregated from several Portuguese repositories 4. Provides unlimited access to researchers to a large database of international scientific publications (over 16 750 full-text articles from 16 commercial publishers).			

		The Ministry of Education and Science has funded b-on with EUR 40.6 million for the years 2013, 2014 and 2015. Negotiator at national level of subscriptions with international scientific publishers. 5. An online OA platform which gathers, supplies and analyses the scientific and intellectual production, and other curricular information, of Portuguese scientific researchers. Supplied by the FCT under the auspices of the Ministry of Education and Science. 6. RCTS is a high-performance ICT collaboration platform providing support to educational, scientific, technologic and cultural institutions. Also an e-infrastructure for testing advanced communications services and applications 7. The PTCRIS programme from the FCT|FCCN aims to ensure the creation and sustained development of a			

		national integrated information ecosystem, to support research management according to the best international standards and practices. Central to this framework is the synchronisation framework PTCRISync that relies on ORCID as a central hub for information exchange between the various national systems and international systems. PTCRISync will enable researchers to register a given research output at one of the interconnected national systems, and automatically propagate that output to the remaining ones, thus ensuring global consistency of the stored information.			
ROMANIA	1. Ministry of Education and Scientific Research — http://www.edu.ro/index.php/base/frontpage 2. Transylvania University of Brasov — http://www.unitbv.ro/en/home	1. **National Strategy for Research and Innovation (2014-2020)**, supports OA. Each call funded by the Ministry will include a statement aimed at ensuring access to scientific results for all research	1. Publication in hybrid journals and Gold OA 5. It will include two categories of research results: OA and restricted access materials.	1. Gold OA Development of digital institutional repositories is under way and will be fully	

	.aspx 3. Romanian Library Association (ABR) — http://www.abr.org.ro/index.php?lang=en 4. National Research and Education Network (Romanian NREN Agentia ARNIEC/RoEduNet) — http://www.nren.ro/en/node/43 5. AnelisPlus Project — http://www.anelisplus.ro/ 6. Open Access Forum — OA community — www.access-deschis.ro/	organisations and supporting Gold OA. The **Open Government Partnership: Second National Action Plan (2014-2016), June 2014** (http://www.opengovpartnership.org/sites/default/files/Romania %202nd %20Action %20Plan %202014-2016.pdf) contains a separate chapter entitled **Open Access: Publication of the research studies and results funded using public funds.** National governmental or institutional OA policies expected to be drawn up in December 2015. 2 and 3. Promote OA via the **Kosson initiative** (http://www.kosson.ro/en/) A virtual community of information science specialists promoting OA events and dissemination of OA topics (together with other stakeholders such as Transparency International or Open Society Foundation) 4. A distributed infrastructure to support researchers and research		implemented once the centralised electronic infrastructure from AnelisPlus is in place, to which they will be aggregated	

		organisations. Connected to the European GEANT network 5. It consists of a virtual campus and a national repository. The **virtual campus** will be a one-stop sign-in portal providing access for Romanian researchers and institutions to online scientific resources, updated information on research projects and research institutions and a platform for scientific collaboration. The **national repository** is hosted by the central research portal and will integrate OA journals (over 300), the two existing operational electronic repositories of scientific publications, SCIPIO and ROMDOC, and new institutional OA repositories to be created. AnelisPlus staff has been involved in big deals with international scientific publishers to obtain promotional prices for OA publications by Romanian researchers			

SLOVENIA	1. Ministry of Education, Science and Sport (MIZŠ) — http://www.mizs.gov.si/en/ 2. University of Ljubljana (UL) — http://www.uni-lj.si 3. National and University Library (NUK) — http://www.nuk.uni-lj.si/nukeng.asp 4. Digital Library of Slovenia (dLib.si) http://www.dlib.si/v2/Default.aspx?&language=eng 5. Institute of Information Science (IZUM) — http://www.izum.si/default-en.htm 6. Slovenian Research Agency — https://www.arrs.gov.si/en/novo.asp 7. Slovenian universities (, DKUM/Maribor, RUL/Ljubljana,, RUP/Primorska, RUNG/Nova Gorica) 8. Josef Stefan Institute — http://www.ijs.si/ijsw/JSI	1. The **Law on Research and Development 2002 (OG 96/2002)** states that research results must be made publicly available. The **Research Infrastructures Development Plan 2011-2020** contains a chapter on digital resources: publication repositories and data archives will be made OpenAIRE compliant and connected to the Slovenian CRIS system SICRIS. The National strategy of open access to scientific publications and research data in Slovenia 2015-2020 determines that each beneficiary has to ensure open access to all peer-reviewed scientific publications that refer to the results from the nationally funded research. Before the adoption of the open research data mandate a national pilot programme **Open access to research data** will be carried out 2. It is the OpenAIRE NOAD 3 and 4. It is the body entrusted with legal deposit in Slovenia for conservation	1. The National strategy of open access to scientific publications and research data in Slovenia 2015-2020 determines that each beneficiary has to ensure open access to all peer-reviewed scientific publications that refer to the results from nationally funded research. Before the adoption of the open research data mandate a national pilot programme **Open access to research data** will be carried out. 6. Electronic versions of articles in nationally co-funded (subscription) journals need to be deposited into the Digital Library of the National and University Library (NUK)	1. Green or Gold OA 6. Green OA 7. Green OA	6 and 7. Not specified

| | | and preservation of Slovenian written cultural heritage and of Slovenian National Bibliography. In 2002, it started to build the **Consortium of Slovenian Electronic Collections** (**COSEC**)

(http://www.nuk.uni-lj.si/cosec/about.asp), an eIFL initiative, with the financial support of the Open Society Institute. Other participants were the National Council of Librarianship, Maribor University Library, CTK (see 2 above), the State Centre for Library Development at NUK, IZUM (see 5 below), the Association of Public Libraries and Library Association of Slovenia. A year later the agreement on the foundation and operation of COSEC was signed, joining in the University Library of Maribor University and the Josef Stefan Institute. COSEC aims to connect, lead and assist Slovenian libraries and to ensure coordinated and cost-effective | | | |
|---|---|---|---|---|---|

		acquisitions of electronic resources of international scientific publishers in order to support education, research and development of the society			
		5. IZUM is the Regional Centre for Library Information Systems and Current Research Information Systems. It develops and operates the Virtual Library of Slovenia, the **Co-operative Online Bibliographic System and Services** (**COBISS/OPAC)**, (http://www.cobiss.si/scripts/cobiss?ukaz=getid&lani=en), which is the core of library information services in Slovenia and which offers one-stop access to international scientific publishing resources to registered users from over 400 Slovenian libraries. It is also linked to other ex-Yugoslavian systems (**COBISS.net)** from Serbia, Macedonia, Montenegro, Bosnia and Herzegovina, Bulgaria and Albania. It also			

		develops the Slovenian CRIS system (**SICRIS**) (http://sicris.izum.si/default.aspx?lang=eng) 7. Four Slovenian universities have established pilot institutional OA repositories, but they are not certified for long-term preservation 8. It runs an information portal on OA in Slovenia (http://www.openaccess.si/open-access-in-slovenia/)			
SLOVAKIA	1. Ministry of Education, Science, Research and Sport (Section Science and Technology) — https://www.minedu.sk/about-the-ministry/ 2. Ministry of Culture (responsible for Slovak Author's Law) — http://old.culture.gov.sk/en/ministry 3. Slovak Scientific and Technical Information Centre	1. **Long-term objective of the State Science and Technology Policy up to 2015 (2007)** (https://www.minedu.sk/long-term-plan-of-the-state-science-and-technology-policy-by-the-year-2015/) and its two accompanying **Strategy documents (2007-2010** and **2011-2015)**. Basic policy documents for development of Slovak R and D system but OA is not directly dealt	1. No existing mandates, with the exception of electronic theses and dissertations which have to be made available by law to the CRZP central registry. Slovakia is currently focusing on supporting the development of OA scientific repositories and of an OA centralised institutional repository at SSTIC which will harvest Slovak institutional repositories 8. It publishes scientific articles in over 70 scientific journal titles. No OA mandates specified.	1. Not specified 8. Not specified	1. Not specified 8. Not specified

	(**SSTIC**) — http://www.cvtisr.sk/en.html?page_id=58; http://www.cvtisr.sk/en/support-of-science/open-access.html?page_id=5077; http://www.infolib.sk/sk/trendy-oblastiach/eiz/open-access/ 4. Slovak Current Research Information System (**SK CRIS**) - http://www.cvtisr.sk/en/support-of-science/sk-cris.html?page_id=822 5. Central Registry of Publication Activity (**CREPC**) - http://cms.crepc.sk/ 6. Central Bibliographic Database of Slovak Electronic Information Resources for R and D and Portal Solution (**SciDAP**) — http://scidap.cvtisr.sk/?fn=main&lang=eng 7. Central Registry of Theses and Dissertations (**CRZP**) — http://www.crzp.sk/ 8. Slovak Academy of Sciences (SAS) —	with in any of these and there is no national legislation, policy or strategy specifically for OA in place 2. The Ministry of Culture is in the process of studying changes to Slovak Author's Law in order to add in the near future an OA mandate for publications resulting from publicly funded research. Negotiations with publishers and research and academic institutions are envisaged to take place but no timeline has been indicated for this 3. It was nominated the Slovak NPR in February 2013 by the Ministry of Education, Science, Research and Sport. It is also the Slovak NOAD in the OpenAIRE 2020 EU-funded project. It is the national institution entrusted with scientific and research support and promotes OA by providing information, mapping and analysis of current situation, using these results for input into	Currently, negotiations are taking place between the Central Registry of Publication Activity (CREPC) and SAS for the latter to provide CREPC with data on its research publication output		

	https://www.sav.sk/?lang=en 9. Slovak ISSN National Agency (at the University Library of Bratislava) – http://www.ulib.sk/english/issn-national-agency/	Slovak R and D OA policies. On this, it is conducting an overview of Slovak OA journals as indexed by SCOPUS or WoS (38 in DOAJ to date) but **project Dasper** aims to include other quality criteria for assessment of OA journals. It is both a specialised scientific library and a centralised repository project in the making, with EU structural funds. It manages very important OA-related information systems on R and D: SK CRIS, CREPC, SciDAP, CRZP. It co-finances with European Regional Development Funds an R and D Operational Programme entitled **NISPEZ** since 2008 and currently **NISPEZ II** (http://www.cvtisr.sk/en/projects/nispez-ii.html?page_id=5151) for the centralised purchase of licences (access) to the most important electronic international information resources 4. It collects and maintains R and D data on			

		researchers, research projects and research organisations. It is used for the evaluation of HEIs and for statistical analysis of R and D. It is a member of euroCRIS and it follows EU recommendation on international standards (compliant with CERIF format) 5. It is a publicly accessible bibliographic database for evidence gathering on all Slovak HEI publication activity (provision of data to CREPC is compulsory). It covers 33 Slovak universities and it contains 375 227 entries from its inception in 2007 until 2014. It is used for the annual calculation of state subsidies to public universities 6. A multidisciplinary database and document processing tool for R and D, including OA scientific journals (78 journal and 65 626 articles) and grey literature (from scientific journals indexed in SCOPUS			

| | | and WoS). SciDAP and the central SSTIC repository will substitute currently missing institutional repositories and will become the single centralised access point to Slovak OA full-text publications (currently only bibliographic tool), ensuring long-term preservation of full-text articles

7. An anti-plagiarism system created by the Ministry of Education with a compulsory mandate of registration (both meta-data and full-texts, to be preserved for 70 years). By end of 2013 it contained nearly 300 000 works and about 70 000 new entries are added yearly

9. It is involved in Unesco's **Project ROAD: Directory of OA scholarly resources** (http://road.issn.org/), whereby Slovak OA research results are being identified and catalogued in the ISSN system, such as e-journals, academic repositories of articles and conference proceedings) | | | |

FINLAND	1. Ministry of Education and Culture- http://www.minedu.fi/OPM/?lang=en 2. Finnish Council of University Rectors (UNIFI) — http://www.helsinki.fi/halvi/srno/english/index.html 3. Rectors' Conference of Finnish Universities of Applied Sciences (ARENE) — http://www.arene.fi/en 4. Academy of Finland (AKA) — http://www.aka.fi/en 5. National Library (KK) — http://www.nationallibrary.fi/ 6. Federation of Finnish Learned Societies (TSV) — https://tsv.fi/en/frontpage	1. Government Programme on open availability of publicly funded research and administrative data, 2011 Finnish Research Data Initiative, 2011-2013 Report for a national open access policy (see Roos et al. 2014) Open Science and Research Initiative 2014-2017 (ATT), establishes an Open Science and Research Strategy Group supported by an expert group and a collaboration forum, which will set out a national roadmap focused on six different sections — http://openscience.fi/ 2. Signed the Berlin Declaration on OA in 2006, although self-archiving is mandated only by University of Helsinki (Tampere and Jyvaskyla Universities	1. The main goal of ATT is for Finland to become one of the leading countries in openness of science and research by 2017 4. Recommends publication in Gold OA journals whenever possible (APCs costs are eligible for reimbursement). Other smaller funding agencies have the same OA policy	1. The Roos report recommends either institutional Green mandate or publication in Gold OA journals (but discourages hybrid publication because it causes overlapping costs) 1, 5 and 6. A specific OA funding scheme is in the making (international publication costs will be determined and OA fees paid to publishers will be analysed)	Embargo periods are respected (information not clearly defined)

		support OA) 3. Statement establishing self-archiving of its funded research output in an institutional repository (but it only accounts to 5 % of global Finnish research articles). 5 & 6. A working group delivered a pilot project and a report for an OA funding model for Finnish scientific publications, end of 2014.			
SWEDEN	1. Ministry of Education and Research — http://www.government.se/government-of-sweden/ministry-of-education-and-research/ 2. The Association of Swedish Higher Education (SUHF) — http://www.suhf.se/inenglish 3. Swedish Research Council (SRC), a government agency of the Ministry of Education and Research —	1. The Swedish 2012 Research Bill entrusted the SRC to propose national guidelines for OA to research results. 2. It is composed of 37 universities and university colleges. SUHF has urged its members to adopt OA policies and mandates (all its members have already established institutional	2. It encourages its members to implement OA mandates 3. It has implemented an OA mandate since 2010 for research results from projects funded by it. (http://www.vr.se/inenglish/researchfunding/applyforgrants/generalconditionsforgrantapplications/openaccess.4.44482f6612355bb5ee780003075.html) 5. The KB website contains a comprehensive overview of OA	2. Not defined 3. Both Green and Gold OA are allowed, but a self-deposit mandate is required in all cases 6. Both Green and Gold OA are allowed, but a self-deposit	2. Not defined 3. 6/12 month embargo period for Green OA 6 and 7. 6 month embargo period if Green OA is chosen

	http://www.vr.se/inenglish.4.12fff4451215cbd83e4800015152.html 4. Royal Swedish Academy of Science (KVA) — http://www.kva.se/en/ 5. National Library of Sweden (KB) — http://www.kb.se/english/ and the Swedish Library Association (SLA) — http://www.biblioteksforeningen.org/index.php/2011/11/10/biblioteksdagarna-2012/ 6. Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) — http://www.formas.se/en/ 7. Swedish Council for Health Working Life and Welfare (FORTE) — http://www.forte.se/en/ 8. Swedish Governmental Agency for Innovation Systems (Vinnova) — http://www.vinnova.se/en/ 9. Swedish universities (Chalmers University of Technology, Lund, Malmö,	repositories 3. It is the largest Swedish funding agency for basic research. In 2005 it signed the Berlin Declaration on OA. It was commissioned by the Swedish government to propose national guidelines on OA. A draft report entitled **National Guidelines for OA to Scientific Information** (http://www.vr.se/inenglish/aboutus/activities/analysisevaluationandfollowup/nationalguidelinesforopenaccesstoresearchinformation.4.18f425dd146e9437d292db46.html) was produced in 2014 in collaboration with the National Library of Sweden and other stakeholders, and it was submitted to the Government in January 2015. 4. It is a signatory to the Berlin Declaration on OA It is the Swedish OpenAIRE NOAD. It administers and develops the national library catalogue system **LIBRIS** (http://libris.kb.se/?languag | mandates in Sweden which can be found at http://www.kb.se/OpenAccess_english/Open-Access-in-Sweden/OA-Policies—Mandates/ 6. Researchers who receive funding from Formas must guarantee that their research findings will be available through Open Access 7. Researchers who receive funding from FORTE must publish research findings in OA 8. It is the only Swedish research agency which does not have an OA mandate 9. These universities have already implemented OA repository mandates and they are listed in ROARMAP)	mandate is required in all cases for publications stemming from Formas-funded research 7.Both Green and Gold OA are allowed (funding with SEK 30 000 to cover publication costs in OA journals are included in project grants)	

	Stockholm, Umeå)	e=en). It is the coordinating body for the Swedish e-licensing consortium **Bibsam** (http://www.kb.se/bibliotek/centrala-avtal/BIBSAM-Consortium/) that, among other duties, supports good terms and conditions for OA publishing of Swedish researchers. It coordinates, funds and runs the programme **OpenAccess.se** (http://www.kb.se/openaccess/) which provides information services, cooperation and policy development on OA. The programme is supported by a group with external representatives from SUHF and national funders. The National Library of Sweden also runs the search and analysis portal **SwePub for analysis and bibliometrics** (http://info.swepub.kb.se/), a single access point which collects and harvests scientific publications from Swedish universities and government agencies. The database can also be used		

		to make withdrawals for data processing and retrievals for statistical analysis. 6. It has an OA policy in place established in section 4.4.1 of its **Formas Handbook 2014** ([http://www.formas.se/Page Files/14596/Formas %20handbook %202014.pdf](http://www.formas.se/PageFiles/14596/Formas%20handbook%202014.pdf)) 7. It has an OA policy in place (only in Swedish) (http://www.forte.se/sv/Soka-bidrag/Open-access/) 8. It is the only Swedish research agency which does not have an OA policy in place 9. These universities have all OA depositing mandates and institutional OA repositories in place			
UNITED KINGDOM	1. Department for Business, Innovation and Skills (BIS) – https://www.gov.uk/government/organisations/department-for-business-innovation-skills	1. In December 2011, the previous UK Government published its **Innovation and Research Strategy for Growth** (https://www.gov.uk/govern	2. RCUK funds OA primarily with block grants for APCs of its funded research (GBP 17 million in 2013/2014, GBP 20 million in 2014/2015 and GBP 20 million in	1. A strong preference for Gold OA with acceptance of Green OA	1. In the cases where funding for APCs is not found, researchers can publish in

	2. Research Councils UK (RCUK) – http://www.rcuk.ac.uk/ 3. Four UK Higher Education Funding Councils, such as HEFCE – http://www.hefce.ac.uk/ 4. Universities UK (UUK) — http://www.universitiesuk.ac.uk/Pages/default.aspx 5. British Library (BL) — http://www.bl.uk/ 6. E-Infrastructure Leadership Council (ECL) — https://www.gov.uk/government/groups/e-infrastructure-leadership-council 7. Research Sector Transparency Board (RSTB) — https://www.gov.uk/government/groups/research-sector-transparency-board 8. Open Data Institute (ODI) — http://opendatainstitute.org/ **ODI: Finding the Value in Open Data — Business Plan**	ment/uploads/system/uploads/attachment_data/file/32450/11-1387-innovation-and-research-strategy-for-growth.pdf). Sections 6.6 to 6.10 summarise the UK's commitment to Open Access: 'overarching commitment to transparency and open data, ensuring that publicly funded research should be accessible free of charge. Free and open access to taxpayer-funded research offers significant social and economic benefits by spreading knowledge, raising the prestige of UK research and encouraging technology transfer'. In July 2012 the Government accepted the key recommendations by the **Finch Group report** (http://www.researchinfonet.org/wp-content/uploads/2012/06/Finch-Group-report-FINAL-VERSION.pdf) and in January 2014 responded to the Finch Group's review of the implementation of OA (https://www.gov.uk/govern | 2015/2016) 3. Research outputs will need to be deposited in institutional or subject-based repositories. Also, the quality of papers will be assessed based on citation and other indicators, rather than journals' impact factor indexes 6. As part of this strategy, the ELC was established and substantial investment of GBP 160 million was made into high-performance computing (HPC) and of GBP 189 million into Big Data and energy-efficient computing		Green OA with 12/24 month embargo periods allowed, except for biomedicine (6 months) 2. If Green OA is followed, 6/12 month embargo periods

| | 2012-2017 (http://e642e8368e3bf8d5526e-464b4b70b4554c1a79566214d402739e.r6.cf3.rackcdn.com/odi-business-plan-may-release.pdf) | ment/uploads/system/uploads/attachment_data/file/32493/12-975-letter-government-response-to-finch-report-research-publications.pdf).

Specific funding (GBP 10 million) was made in 2012 to help universities with the transition to implement OA in the UK

2. The seven UK research councils published their unified **RCUK Policy on OA and Supporting Guidance** in April 2013

(http://www.rcuk.ac.uk/RCUK-prod/assets/documents/documents/RCUKOpenAccessPolicy.pdf) and a **Review of the implementation of the RCUK policy on OA** in March 2015 http://www.rcuk.ac.uk/media/news/150729/In December 2013 it launched an internet platform (**Gateway to Research** (http://gtr.rcuk.ac.uk/), aimed at increasing the | | | |
|---|---|---|---|---|---|

| | | transparency of UK publicly funded research. This is a single access portal offering freely accessible information online about research funded by the seven UK Research Councils and the Technology Strategy Board. It is CERIF compliant for EuroCRIS exchange of information.

3. The four UK Higher Education funding bodies, including HEFCE, introduced in July 2014 an OA requirement for research articles and conference proceedings accepted for publication from 1 April 2016, in order to count for the post-2014 Research Excellence Framework (i.e. evaluation of researchers' careers) (http://www.hefce.ac.uk/rsrch/oa/Policy/)

4. The Finch Group's one year review and the Government response set out the next steps for OA implementation in the UK, among which is the nomination of UUK as the | | | |
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coordinating body for implementation of OA in the UK. This is an informal group which brings together funders, institutions, publishers and other stakeholders to discuss and explore challenges and solutions towards implementation of OA in the UK. It has an **OA coordinating group** (http://www.universitiesuk.ac.uk/aboutus/whatwedo/PolicyAnalysis/ResearchInnovation/Pages/UUKOpenAccessCoordinationGroup.aspx)

which develops and coordinates research on evidence-based data and provides advice on OA topics

5. The BL collects, makes accessible and preserves UK web resources of scholarly and cultural importance. In April 2013 the BL was mandated to perform the Legal Deposit for UK online publications and make them freely available. **UK Web Archive**

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| | | (http://www.webarchive.org.uk/ukwa/) will preserve inactive and/or historical versions of UK websites, thus helping to solve the 'link rot' problem

6. A report was published in 2012 **A strategic vison for UK e-infrastructure: a Roadmap** (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32499/12-517-strategic-vision-for-uk-e-infrastructure.pdf) setting out a 10-year strategy for development and management of UK e-infrastructure. The ELC is the single coordinating body which owns the UK e-infrastructure strategy and which advises the government on all aspects of e-infrastructure, working closely with stakeholders

7. The RSTB was set up to 'advise the government on how to increase access to research data, with the aim of fuelling new discovery and innovation, and ultimately economic growth | | | |

		and societal benefit'. It will be key in improving coordination of repositories for preservation of and access to research data and in tackling the 'link rot' problem of self-deposit mandates (Green OA) 8. ODI was founded by Sir Tim Berners-Lee and Nigel Shadbolt. It is a not-for-profit organisation working towards long-term sustainability of open data. The UK Government has approved a GBP 10 million fund over five years from 2012 onwards 9 The UK Open Access Co-ordination Group was set up post-Finch to provide a central point of coordination and a forum for debate and discussion. It includes all key parties such as HEIs (e.g. Russell Group) and publishers. 10. In March 2015 RCUK published a report on progress in implementing OA (The Review of the Implementation of the RCUK			

		Policy on Open Access). RCUK responded to the report and have accepted all recommendations. http://www.rcuk.ac.uk/RCUK-prod/assets/documents/documents/BurgessReviewRecommendations.pdf 11. A UK Open Data Forum was established and has overseen the development of a Concordat for Open Research Data which for the first time will outline a set of principles to promote open access to research data. The Concordat is a milestone which has widespread support across the UK research community. It is due for publication late 2015/early 2016. http://www.rcuk.ac.uk/research/opendata/			
COUNTRY (NON- EU 28)					
NORWAY	1. Ministry of Education and Research — https://www.regjeringen.no/en/dep/kd/id586/	1. White Paper **Long-term perspectives — Knowledge provides opportunity, March 2013**	1. The Government will require all scientific articles partly or wholly publicly funded to be either published as OA articles or self-	1. Both Green and Gold OA are supported 2. Both Green	1. If Green OA is followed, publishers' embargoes are

	2. The Research Council of Norway (RCN) — largest research funder in Norway - http://www.forskningsradet.no/en/Home_page/11773157539 06 3. Norwegian Universities and University Colleges: Oslo, Agder, Bergen, Stavanger, Tromso Artic University 4. CRIStin (jointly run by Ministry of Education and Research and Ministry of Health and Care Services) — http://www.cristin.no/english/	— Open Access Policy Statement in Chapter 3 — https://www.regjeringen.no/en/dokumenter/meld.-st.-18-2012-2013/id716040/?docId=STM 201220130018000ENGEPIS &q=&navchap=1&ch=3 **Long-term plan for research and higher education 2015-2024 —** https://www.regjeringen.no/en/topics/research/innsikts artikler/langtidsplan-for-forsking-og-hogare-utdanning/id2353317/ 2. The RCN has set out OA as one of its 7 Strategy Plans. It has a specific policy on OA to publications (**Principles on OA to scientific publications**) and another policy on research data http://www.forskningsradet. no/en/Open_access/125400 8537671 4. National coordinator for OA policy. A current research information system (CRIS) used by researchers and research institutions as	archived, in agreement with publishers. The Government has also asked the Research Council of Norway to consider APCs as part of their research funding. 2. Self-deposit mandate for research articles wholly or partially funded by RCN, applying also to articles published in Gold OA journals. Monitoring for tracking the above self-archiving mandate is done through a parallel mandate for R and D project registration into Norwegian CRIS system CRIStin (failure to register may entail withdrawal of funds). Publication into Gold OA journals also allowed (a specific funding mechanism for the 2015-2019 period) 3. These universities have both self-archiving institutional mandates and also specific funding for APCs in Gold OA journals. By January 2014, 18 institutions had dedicated funds for APCs (some even accept hybrid publication, but the tendency is for pure Gold OA journals)	and Gold OA are supported. From 2019 onwards Gold OA costs should be covered by each research institution indirect costs for R and D projects	respected

		a single platform to record and promote publications data, projects, researchers' profiles and more. Thus an important tool for implementing research policies, among which OA. Additionally, CRIStin has been asked by the Norwegian government to become a centralised negotiator for licensing and consortium agreements with publishers, on behalf of research institutions. Member of EuroCRIS (full compliance to standard data model CERIF will be ensured). Partner in Pasteur4OA EU-funded project and in SCOAP3 CERN-initiated project			
TURKEY	ANKOS OAWG http://www.ankos.org.tr HEC http://www.yok.gov.tr TÜBİTAK ULAKBİM http://ulakbim.tubitak.gov.tr	HEC National Academic Repository Project http://www.yok.gov.tr/web/acikerisim OpenAIREplus Turkish NOAD Pasteur4OA National Force DergiPARK			

		http://dergipark.ulakbim.gov.tr			

Summary table by country of OA number indicators (*) as shown in OpenDOAR, ROARMAP, Sherpa/Juliet and DOAJ (28 EU Member States plus Norway and Turkey)

COUNTRY (EU 28)	Funders' mandates (Sherpa/Juliet)	OA repositories (OpenDOAR)	OA repositories' mandates and policies (ROARMAP)	OA journals (DOAJ)
BELGIUM	2 — Fonds de la Recherche Scientifique (FNRS); Research Foundation (Flanders) (FWO)	24	17	27
BULGARIA	N/A	6	N/A	29
CZECH REPUBLIC	N/A	11	3	88
DENMARK	3- Danish National Research Foundation); Danish Council for Independent Research;; Innovation Fund Denmark	12	8	40
GERMANY	3 — German Research Foundation (DFG); Fraunhofer-Gesellschaft; Helmholtz Association-Initiative and Networking Fund	169	22	351
ESTONIA	N/A	5	3	24
IRELAND	6 — Department for Employment and Learning, Northern Ireland (DELNI); Department of Agriculture, Food and the Marine (DAFM); Health Research Board (Ireland); Higher Education Authority (HEA); Irish Research Council; Science Foundation Ireland	21	8	13

	(SFI)			
GREECE	N/A	28	2	45
SPAIN	3 — Regional Community of Madrid (CM); Government of the Principality of Asturias; Congress of Deputies (House of Commons)	120	26	569
FRANCE	3 — Agence Nationale de la Recherche (ANR); EUR-OCEANS CONSORTIUM (EOC); Institut national de la santé et de la recherche médicale (INSERM)	91	17	180
CROATIA	N/A	7	1	100
ITALY	3 — Fondazione Cariplo; Telethon Foundation; Istituto Superiore di Sanita (ISS)	74	44	308
CYPRUS	N/A	4	N/A	5
LATVIA	N/A	3	1	6
LITHUANIA	N/A	10	6	34
LUXEMBOURG	N/A	1	1	1

HUNGARY	2 — Hungarian Academy of Sciences (MTA); Hungarian Scientific Research Fund (OTKA)	29	3	32
MALTA	N/A	1	1	6
NETHERLANDS	1 — Netherlands Organisation for Scientific Research (NWO)	28	8	96
AUSTRIA	1 — Austrian Science Fund (FWF)	19	5	42
POLAND	N/A	87	2	247
PORTUGAL	N/A	46	21	85
ROMANIA	N/A	2	N/A	314
SLOVENIA	N/A	6	3	43
SLOVAKIA	N/A	N/A	1	38
FINLAND	N/A	13	28	39
SWEDEN	5 — Swedish Research Council (SRC); Swedish Council for Health, Working Life and Welfare (FORTE); Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas); Knut and Alice Wallenberg Foundation; Swedish Foundation for Humanities and Social	43	11	64

	Sciences (RJ)			
UNITED KINGDOM	72 — Please follow the link http://www.sherpa.ac.uk/juliet/index.php for the disaggregated list	227	94	675
COUNTRY (NON-EU 28)				
NORWAY	1 — Norwegian Research Council	51	9	50
TURKEY	N/A	62	32	305

Source: Online resources ROARMAP, OpenDOAR, Sherpa/Juliet and DOAJ and reporting from MS.
* The number indicators represented in this table are accurate as of 24 April 2015

This report provides an overview on access to and preservation of scientific information in the EU Member States as well as Norway and Turkey. Concerning open access to scientific peer-reviewed publications, most EU Member States reported a national preference for one or the other type of open access to publications, that is, either the Green or the Gold model. However, the expressed preferences for one or the other model are not pure models whereby only one route is followed. Overall, policies on open access to research data are less developed across EU countries than policies and strategies on open access to research publications. However, individual Member State feedback shows a general acknowledgement of the importance of open research data and of policies.

As concerns the curation and preservation of scientific information, institutional repositories are very well developed in most Member States, although certification is sometimes lacking.

Concerning participation in multi-stakeholder dialogues and activities, several countries have set up national coordination bodies or networks. Others rely on a university or a university library (or an association of libraries), their Research Promotion Agency/Research Councils or their Academy of Science. Specific events or dedicated EU fora and/or projects have also been identified as a way to galvanize stakeholder interaction.

Studies and reports

![Publications Office]