EUROPEAN UNION

**EUROPEAN RESEARCH AREA
AND INNOVATION COMMITTEE**
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**– ERAC –
Secretariat**

**Brussels, 22 February 2018
(OR. en)**

ERAC 1202/18

NOTE

From:	ERAC Secretariat
To:	ERAC and ERAC SWG OSI delegations
Subject:	ERAC SWG OSI's Assessment of the Amsterdam Call for Action

Delegations will find annexed to this note the ERAC SWG Open Science and Innovation's assessment of the Amsterdam Call for Action on Open Science, as adopted by written procedure.

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ERAC STANDING WORKING GROUP
ON OPEN SCIENCE AND INNOVATION (ERAC SWG OSI)
ASSESSMENT OF THE AMSTERDAM CALL FOR ACTION ON OPEN SCIENCE

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1.   THE ERAC STANDING WORKING GROUP ON OPEN SCIENCE AND INNOVATION

The Council conclusions adopted at the 3431st meeting held on 1 December 2015, established a new group with a broader mandate replacing the former ERAC WG on Knowledge Transfer to take on the responsibility concerning the ERA roadmap priority 5 (optimal circulation, access to and transfer of scientific knowledge).

In May 2016, ERAC approved the mandate of the new ERAC Standing Working Group on Open Science and Innovation (SWG OSI). Its main activity is: *"to advise on the development and implementation of policies and initiatives to enhance access to scientific information, and the   circulation and use of knowledge for research and innovation for the benefit of scientists, research   institutions, education, businesses, citizens and society at large, with the issues being considered primarily from the perspective of these end-users"[1]*.

With respect to this mission, the SWG OSI shall:

- Promote the top action priority 5 of the ERA Roadmap 2015-2020: implementing open access and knowledge transfer policies at national level in order to maximize the dissemination,   uptake and exploitation of scientific results;
- Promote the implementation of the agreed top action priorities in the ERA Communication (COM (2012)392 final) and its related Roadmap 2015-2020;
- Provide forward looking policy advice to ERAC on knowledge circulation in Europe, including the framework conditions and regulatory issues affecting knowledge circulation in   Europe, and address emerging issues linked to knowledge circulation, especially when identified by ERAC;
- Share good practices across Member States and Associated Countries on how to ensure and foster optimal knowledge circulation and suggest EU-level relevant initiatives;
- Consider and recommend ways to overcome significant legal, economic, political and technical or other barriers associated with knowledge circulation to increase the economic and

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[1]   ERAC 1206/16

Social/societal impact of the scientific results and research data generated and develop recommendations for international principles;

- Provide advice to ERAC on any other topic related to digital and open science and innovation that ERAC may consider of interest

- The Work Program 2016-2017 of the ERAC Standing Working Group on Open Science and Innovation is based on its mission; it has been developed with the inputs from delegations after the discussions held at both its first meeting held in Brussels on June 18th 2016 and second meeting held in Brussels on October 6th 2016.

The Work Program 2016-2017 covers both present and potentially emerging questions related to priority 5 of the ERA Roadmap 2015-2020. It takes into account of the work already carried out by the ERAC Task Force on Open Research Data and the former ERAC WG on knowledge transfer, and **considers as an initial special focus for an assessment of the Amsterdam Call for Action**, of those actions related to open research data and infrastructures and open access to publications.

Finally, the Council through its Council conclusions on the transition towards an Open Science system adopted on 27 May 2016:

"INVITES the ERAC Standing Working Group on Open Science and Innovation to assess the proposed actions on the Amsterdam Call for Action on feasibility, effectiveness and prioritization, and to report on this; STRESSES the need for concerted action by all partners involved: the Commission, the Member States, civil society and the stakeholders"

2.	THE AMSTERDAM CALL FOR ACTION ON OPEN SCIENCE

The Amsterdam Call for Action is the main result of the Amsterdam conference on 'Open Science – From Vision to Action' hosted by the Netherlands' EU presidency on 4 and 5 April 2016. It includes twelve action items aimed at contributing to the transition towards open science and is grouped around five cross-cutting themes (Figure 1).

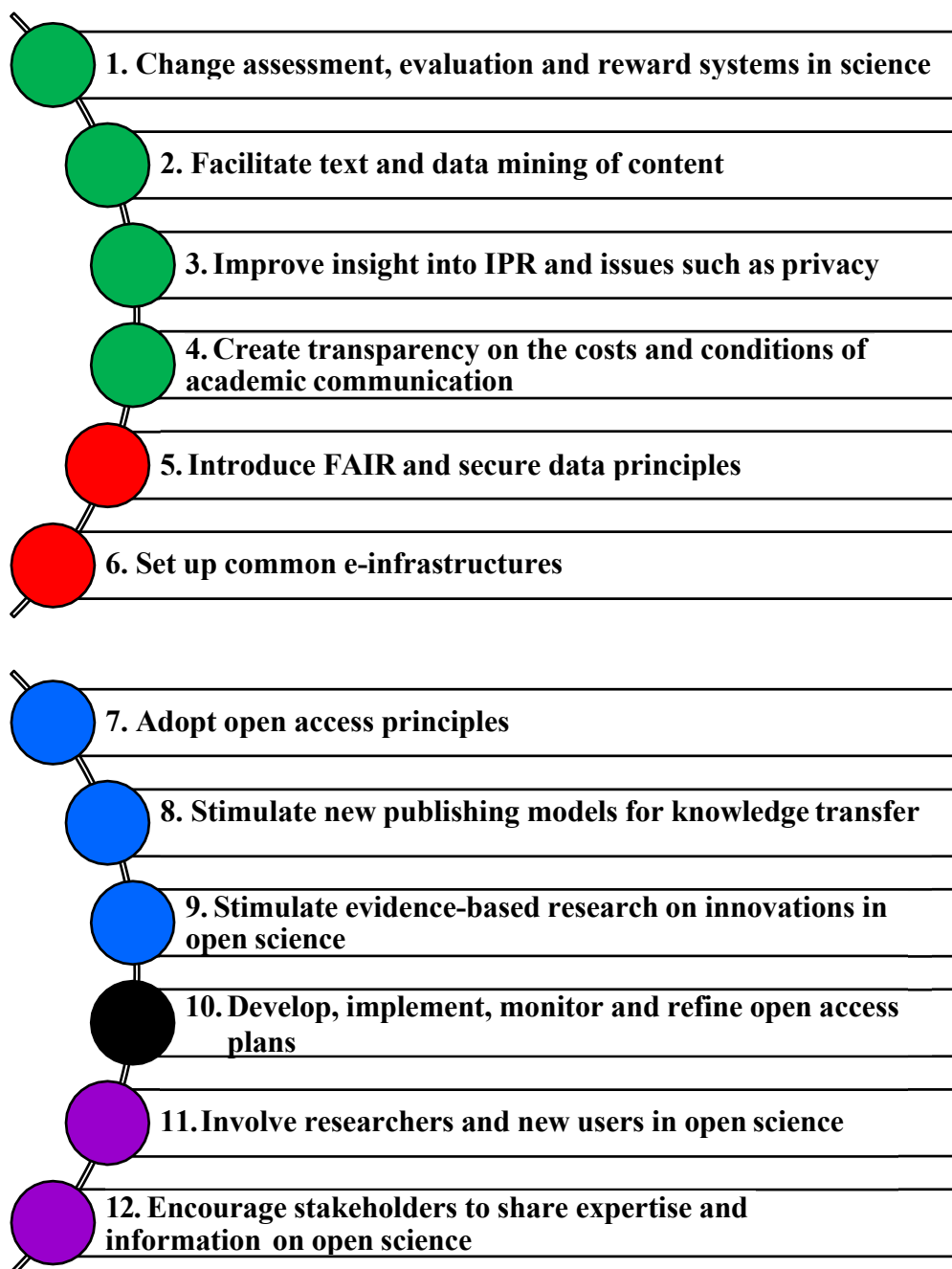Figure 1. **Amsterdam Call for Action cross-cutting themes**
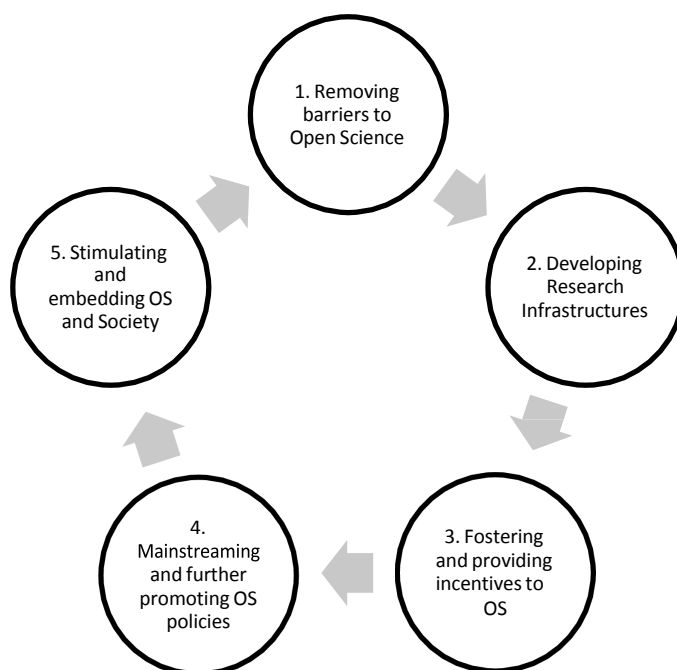
The twelve actions identified (Figure 2) involve active policies, actions and funding from the Commission, Member States and stakeholders, mainly Research Performing Organizations, Research Funding Organizations, but also a large number of associations and professionals devoted to the promotion of research from different perspectives. The ultimate goal of the Amsterdam Call for Action is to accelerate the transition and leading role of Europe towards Open Science to capitalize on the opportunities and advantages related to open science and to reach by 2020: (1) **Full open access for all scientific publications**, and (2) **Optimal reuse of research data.**

This assessment exercise is based on contributions provided by Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Ireland, Latvia, Malta, Moldova, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and United Kingdom[1]. Annex I includes the methodological note of the analysis conducted by members of ERAC SWG OSI. Annex II includes the questionnaires from which detailed information was gathered.

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[1] Due to its ownership role of the initiative during the Presidency, Netherlands did not provide input in this part of the exercise.

Figure 2**. Amsterdam Call for Action main areas for policy action**

1. **Change assessment, evaluation and reward systems in science**

2. **Facilitate text and data mining of content**

3. **Improve insight into IPR and issues such as privacy**

4. **Create transparency on the costs and conditions of academic communication**

5. **Introduce FAIR and secure data principles**

6. **Set up common e-infrastructures**

7. **Adopt open access principles**

8. **Stimulate new publishing models for knowledge transfer**

9. **Stimulate evidence-based research on innovations in open science**

10. **Develop, implement, monitor and refine open access plans**

11. **Involve researchers and new users in open science**

12. **Encourage stakeholders to share expertise and information on open science**

3. THE AMSTERDAM CALL FOR ACTION: NATIONAL GOVERNMENTS' PERSPECTIVE

Open Science captures the transformation of the scientific research enterprise and it refers to "efforts to make the scientific process more open and inclusive to all relevant actors, within and beyond the scientific community" (OECD, 2016; https://www.fosteropenscience.eu/taxonomy/term/7). Open science involves new ways for scientists to collect evidence, including huge data sets provided by the digitalization of knowledge, but also new processing and analysis techniques from big data to machine learning and machine readable, and to disseminate the results of scientific research thru channels different from scholarly journals and publications.

Open Science has an impact on the entire research cycle, from the inception of research to its publication, and on how this cycle is organized. Each step in the scientific process is linked to ongoing changes brought about by Open Science, such as the emergence of alternative systems to establish scientific reputation, changes in the way the quality and impact of research are evaluated and open access to data and publications (EC, 2016).

In a context of dramatic changes in the way scientific research and knowledge is being produced and used, collective action is also required to accelerate the pace of such changes and to capitalize up on the opportunities Open Science brings to Europe's robust research base. Furthermore, Open Science also represents a challenge and an opportunity to redesign public policies aiming at fostering knowledge creation as a public good and its wide dissemination and use as the main rationale for the provision of public funding. This includes:

1. The removal of existing barriers to open access and open science and the definition of the right set of incentives to achieve the desired goals.
2. The provision of the required infrastructures, standards and mechanisms that the digitalization of scientific knowledge and its openness require.
3. The necessary embeddedness of societal actors and their problems into the research cycle.

The Amsterdam Call for Action aims to provide a roadmap to guide research public policies towards Open Science and it claims that it is now time for action. However, the organization of the research base differs widely across Europe, and even across research communities. Consequently there is not a one size fits all approach. The exercise carried out by the ERAC SWG on Open Science and Innovation represents a first step to provide insight on the challenges for science and innovation policies on which policies should be preserved, modified or even disregarded, and which need to be formulated (that are missing) in order to respond to the new context of Open Science.

In this section, we gather evidence on the heterogeneity across national research systems concerning the vision and implementation of open science policies as well as the main policy, institutional and behavioral constraints identified at national level. Results provided are organized according to the five chapters and twelve areas for policy action described in the table of contents of the Amsterdam Call for Action.

3.1. REMOVING BARRIERS TO OPEN SCIENCE

Main policy challenges in science and innovation, to accelerate the transition towards open science and innovation, refer to necessary incentives and practices upon which the science and innovation policy implementation are based upon and have (not) evolved over the past decades. In this context, the Amsterdam Call for Action considers four main areas in which policy action is needed to remove existing barriers:

- **CHANGE ASSESSMENT, EVALUATION AND REWARD SYSTEMS IN SCIENCE (1)**
- **FACILITATE TEXT AND DATA MINING OF CONTENT (2)**
- **IMPROVE INSIGHT INTO IPR AND ISSUES SUCH AS PRIVACY (3)**
- **CREATE TRANSPARENCY ON THE COSTS AND CONDITION OF ACADEMIC COMMUNICATION (4)**

Therefore, based on the Amsterdam Call for Action, national authorities and the European Commission are asked to:

a) *Acknowledge that national initiatives are reaching their limits, and that this is an area for a harmonized EU approach.*

b) *Reform reward systems, develop assessment and evaluation criteria, or decide on the selection of existing ones (e.g. DORA for evaluations and the Leiden Manifesto for research metrics), and make sure that evaluation panels adopt these new criteria.*

c) *Adopt and implement rules and legislation that make TDM easier for academic purposes and preferably also for societal and commercial purposes.*

d) *Actively stimulate authors to retain control over their research output, including articles and books. This can be achieved by setting preconditions for funding and by introducing licensing systems.*

e) *Set open data as the default standard for publicly funded research and communicate clearly that this does not equate to relinquishing intellectual property in public-private and public-public partnerships.*

f) *Think actively about what to share and what not to share and avoid automatically choosing the safest option (i.e. not sharing).*

g) *Develop and set standards on privacy by design also in negotiations with other partners on*

h) *Re-use of data.*

- **CHANGE ASSESSMENT, EVALUATION AND REWARD SYSTEMS IN SCIENCE (1)**

There is a consensus on the benefits deriving from adopting a harmonized EU approach concerning assessment, evaluation criteria and reward systems. However, the rationale for such harmonized EU approach does not rest up on the recognition that national initiatives have reached their limits.

Moreover,

- Such harmonized approach at EU level should take into account national initiatives since research evaluation and rewards systems are an intrinsic part of the governance of national (and regional) research policies, and funding. There is uncertainty about the setting of new standards and criteria that may have unintended and undesirable collateral effects.

- Research evaluation is a collective endeavor and it has to be legitimated by national stakeholders and research communities. Incentives and rewards cannot be disentangled from research careers and promotion, and there are still wide differences across EU at national and even institutional level.

– Research (and individual researchers) incentives and rewards are a core element of research policies and challenging current long established practices calls for an inclusive, bottom-up approach. Dialogue at national level is needed to ensure a smooth and effective transition of the reward system.

On the other hand, the setting of a harmonized EU approach will be beneficial considering:

– The adoption of a new set of rules and standards, acceptable by researchers at EU level, and its adaptation at national, regional and institutional levels given the existing characteristics. It will foster policy and institutional learning across different research systems and units while contributing to unlock those systems from national constituencies.

– Researchers' mobility across different European research institutions. It will assure that evaluation and recognition of their research work will be carried on under a common set of criteria.

– The dissemination of a new and open research culture across EU countries and institutions. It will accelerate the catching up process in those countries and institutions that are lagging behind.

There is a broad consensus on the necessity of reforms relating to the current research evaluation and reward system. At the present, the "publish or perish" dominant model has the greatest influence in the funding and rewards systems, constituting a serious barrier to support new rules of engagement in open science and FAIR principles. At national level, it remains a big challenge to get scientists to adhere to FAIR principles in the absence of specific funding incentives.

EU research systems are locked in a suboptimal trajectory clearly dependent on criteria used in past decades and the inertia in the application of those criteria supported by the research community. The dominant research culture also shapes the set of actions available at national, regional and institutional levels, and it will remain unchallenged in the absence of national open science policy agendas. The common basis for carrying on research evaluation rests upon peer review, and peers – scientific communities - enjoy high levels of freedom in the application of criteria. Furthermore, although new metrics may be an alternative to standard bibliometric indicators, such as the Impact Factor, they still require further analysis to prove their robustness and acceptance at international level. Metrics and indicators that will have an impact on rewards, recognition and funding must be set upon international consensus, based on transparent, well defined and measurable variables and accessible to the whole community to avoid biases and ambiguity in the information they provide.

New attempts and examples are provided at country and institutional levels to base research performance on the principles of DORA and the Leiden Manifesto as opposed to an excessive focus on quantitative (and internationally widespread) indicators, mostly provided by commercial   publishing houses and based on traditional publishing metrics. Research evaluation and recognition   are increasingly global, and it is necessary that research communities consider the new indicators to be used as part of the evaluation process as legitimate ones.

Box 1: Transition and new OS/OA indicators

The transition towards open science represents a window of opportunity for exploring new evaluation criteria and indicators. Recent examples are found in:

- *The Austrian Transition to Open Access*
- *The "Priority Initiative Digital Information" of Germany concerning DORA*
- *The UK Open Research Data Concordat on data citation and crediting*
- *Pilot exercises carried on by RFOs to explore and facilitate different forms of scientific   communication (SV and ES)*
- *Use of evaluation criteria based on quantitative and qualitative indicators (PT, EE)*
- *Use of altmetrics as part of the national scientific bibliometric data (SI)*

Box 2: Recognition of preprints as research outputs in France

In France, Alliances Aviesan (life sciences and health) and AllEnvi (environment) have declared that they will recognize the preprint as an admissible form of scientific communication, particularly for communicating the results of basic research. Therefore, their production can be taken into account, according to specific procedures, in the recruitment process, evaluation and promotion of researchers as well as in the management of collectives or the evaluation of the projects.

However alternative metrics, and more specifically those capturing broader social impact – through social media counts, or as new indicators of new Open Science activities -, are still under definition and common definitions and standards are not yet available. Hence some RFOs are not in a position to bear the risk of being the "experimental playground" for altmetrics developers.

Main policy conclusions from this section

The adoption of a harmonized EU approach concerning assessment, evaluation criteria and reward systems may contribute to accelerate the transition towards Open Science in the European Research Area. In such process national governments and RFOs have to engage into an inclusive dialogue with stakeholders and researchers. It is important thus that every policy approach at the EU-Level has to be made in close coordination with the MS and AC. Research evaluation and rewards systems are indeed very specific for different MS and AC especially in those research systems with different funders and federal systems where it is not possible to adopt a general top-down approach. Researchers' recognition, promotion, etc. represent a highly sensitive policy issue for most of the countries in which national constituencies may hinder the process of adoption and implementation of a renewed Open Science paradigm.

▪ **FACILITATE TEXT AND DATA MINING OF RESEARCH CONTENTS (2)**

The digitalization of science facilitates access to main research outputs thru different digital platforms including commercial platforms of scholarly communication, academic journals, etc. However, publishers' pricing policies raise substantial entry barriers to access contents, limiting the wide impact and use of existing scientific knowledge. Digitalization of science also raises a number of issues on existing regulations and publishing practices (i.e. copyright of academic publications) while opening a new set of opportunities to access, monitor and disseminate information, administrative records and data.

Text and data mining (TDM) represents one of the existing technologies to develop new analytics to better understand the very nature of open science - in a science of (open) science perspective - and to open already published results to other agents, preferable for academic but also for social and commercial purposes. TDM facilitates access and promotes among other elements machine learning technologies contributing to (i) a better understanding of what is published; (ii) perform analysis of quality and integrity or alternative methodologies for assessing the value and impact of research results; (iii) identify research patterns, and (iv) conduct meta-research projects and to transform archive records into valuable information.

Nevertheless, there are substantial differences concerning copyright laws and the use of TDM which is still underdeveloped with a few exceptions (see the recently amended Austrian Copyright Law, the UK exception of TDM, the introduction of TDM concerns in the copyright laws in DE, FR and SE, etc.). Other countries mentioned their participation in TDM projects at the EU level, such as the EU OpenMinted e-infrastructure "that fosters and facilitates the use of text mining technologies in the scientific publications world, builds on existing text mining tools and platforms, and renders them discoverable and interoperable through appropriate registries and a standards-based interoperability layer, respectively." (http://openminted.eu/about).

Box 3: French Regulation and TDM

The French law for a Digital Republic, promulgated on 7 October 2016, organizes open access to scientific publications financed from public funds and access to data as well as the processing of "text and data mining" (TDM). It provides for the possibility for authors of scientific writings to deposit their texts (in their accepted version for publication) on open access platforms after short embargo periods of 6 and 12 months depending on the discipline. The law is superior to the contracts of publishers, regardless of copyright clauses. This law is an important incentive for the researchers to deposit their publications in repositories. The TDM is a topic that takes a large scale in France. The digital law includes an article for the ability to conduct TDM operations. The best way for implementing the law is being under debate at the present.

▪ IMPROVE INSIGHT INTO IPR AND ISSUES SUCH AS PRIVACY (3)

Intellectual property rights (IPR) issues relate to who is the owner of the copyrights of a publication or a dataset on the one hand, and to the limits of sharing practices in the context of a research project with trade implications on the other hand. Already emerging as one of the barriers to overcome concerning the EOSC, current IPR and legal and regulatory dimensions differ across countries, constituting a significant barrier for Open Science and Open Innovation.

Initiatives to stimulate authors to retain control on copyright have been initiated in many European countries (AU, BE, CY, DK, FI, PT, SE, SI, UK). In BE, a clause has been added to publishers' contracts with regard to OA archiving while in the UK, according to the "UK Scholarly Communications License", RFOs and RPOs assert a "non-exclusive license" to the publications of their grantees or employees, allowing them to control distribution and reuse. It is worth mentioning though that according to some respondents, researchers do not seem always eager to use these opportunities available to them.

With regard to public-private partnerships, a public consultation in ES (2017) has clearly showed that an absolute priority should go towards commercial exploitation rather than in data sharing practices. This does not prevent Open Data to be considered as the default standard by RFOs (AU, CY, ES), RPOs (DK, SI), and ORD policies to be in development in other countries (FI, IE, LV).

The issues that relate to privacy have to be considered in the context of the new EU General Data Protection Regulation. Moreover, privacy issues in the context of scientific research are most often case- and/or subject specific. Initiatives begin to develop that enable researchers to reuse sensitive data while respecting privacy, such as the Safe Share initiative at the UK Data Service Secure Lab (UK).

- ## CREATE TRANSPARENCY ON THE COST AND CONDITIONS OF ACADEMIC COMMUNICATION (4)

There is a trend observed in several European countries such as DK, PT, SE, ES and UK, to form national or library consortia in charge of negotiating the terms and conditions of subscriptions with main publishers, including in some cases offsetting policies from subscription fees to open access. It is deemed though, that small national consortia do not have the necessary bargaining power, and consequently a concerted action at EU scale is considered as much needed, especially with regards to the non-disclosure clauses on which some publishers rely sometimes. Initiatives worth mentioning that aim at creating transparency on the cost and conditions of Academic communication are the DFG-funded project "OpenAPC" (DE) (interoperable with future Jisc system, UK) as well as the Diavgeia e-portal (GR).

Box 4: Slovenian Conference of Rectors

Research evaluation system is predominantly based on impact factor. To implement alternative scholarly communication models would also require changing the research evaluation system. National strategy of open access to scientific publications and research data in Slovenia 2015-2020 determines that journals published by publishers, based in Slovenia, incorporating peer-reviewed articles and receiving national public funding for their activities, have to be openly accessible (i.e. gold open access).

To achieve better use of public funding and following the Commission's and national provisions regarding negotiations with publishers, the Slovenian Rectors' Conference adopted the resolution for the basis for negotiations with publishers for a new business model as follows:

– *Free reading of all publisher's subscription journals has to be enabled.*
– *Open accessibility of articles in publisher's journals where employees at the members of a consortium in Slovenia are corresponding authors is paid but with no implications for the university.*
– *The right for text and data mining in all publisher's journals is granted.*
– *One joint contract is concluded for a new business model.*

Box 5: Diavgeia e-portal Greece

In Greece beginning October 1st, 2010, all government institutions are obliged to upload their acts and decisions on the Internet with special attention to issues of national security and sensitive personal data. Each document is digitally signed and assigned a unique Internet Uploading Number (IUN) certifying that the decision has been uploaded at the "Transparency Portal". Following the latest legislative initiative (Law 4210/2013) of the Ministry of Administrative Reform and e-Governance, administrative acts and decisions are not valid unless published online. This includes costs that relate to public expenses for scientific publications.

3.2. DEVELOPING RESEARCH INFRASTRUCTURES

The development of digital platforms and research e-infrastructures for accessing, archiving, preserving and processing research results and specifically research data are at the core of open science and open innovation policies. The development of common research e-infrastructures represents the basic building block for progressing in the new data driven economy. This chapter - and the related actions stressed by the Amsterdam Call for Action - is considered by delegates of the ERAC Standing Working Group on Open Science and Innovation of paramount importance. This includes the development of the European Open Science Cloud, which ranks at the top on the prioritization of policy actions.

Digital research infrastructures must leverage on European, national, regional and institutional initiatives, and its technical characteristics, governance and funding models should provide a truly interoperable digital ecosystem.

This is a collective endeavor in which stakeholders, user' communities, data centers, digital libraries, research performing organizations, high-speed networks, digital services' providers, already existing research infrastructures, etc. play a relevant role. In such framework, national governments', the European Commission and RFOs' main responsibilities included in the Amsterdam Call for Action are:

- **INTRODUCE FAIR AND SECURE DATA PRINCIPLES (5)**
- **SETTING UP COMMON RESEARCH E-INFRASTRUCTURES (6)**

- **INTRODUCE FAIR AND SECURE DATA PRINCIPLES (5)**

This principal includes the following specific actions:

a) *To adopt public funding policies leading to research outputs being, in principle, accessible for reuse, including (a) the promotion of FAIR principles, and (b) providing a bottom-up and discipline-based approach.*

b) *To implement Data Management Plans (DMPs) as an integral part of the research process, make them a precondition for funding, standardize them and make the costs incurred eligible for funding.*

c) *To put in place an institutional data policy which clarifies institutional roles and responsibilities for research data management and data stewardship.*

d) *To promote education for data stewardship experts, recognizing their profession and providing them with career opportunities.*

e) *To introduce positive incentives for FAIR data sharing by valuing data stewardship and efforts to make data available and by acknowledging and rewarding those who compile the data, and require data to be cited according to international standards. Encourage the sharing of expertise that enables disciplines/ regions to learn from each other.*

f) *Set the default in data sharing to open access, but allow a choice of access regimes: from open and free downloads to application and registration-based access. Conditions can be dependent on the nature of the data, common practice within a specific academic discipline, legal (privacy) frameworks, and legitimate interests of the parties involved.*

The distribution shows that national policies to promote open research data are already in place (5) or they will be adopt as result of work in progress (4) for 11 out of 18 Member States.

Main policy conclusions point out that in spite of a number of significant initiatives specific aspects such as providing a bottom-up and discipline-based approach, the promotion of FAIR principles or the implementation of open research data institutional policies are lagging behind. Moreover, specific public policy measures consistent with the implementation of open research data policies (i.e. Data Management Plans as a precondition for funding, open research data by default) and specially actions designed to train and incorporate data stewardship experts are underdeveloped in most national frameworks. Therefore, the implementation of open research data and FAIR principles entails costs, and in the absence of a clear and sustainable funding framework policies, will not progress in any satisfactory manner.

Although in the European Open Research Data landscape there are experiences and initiatives within the setting of disciplinary projects, significant progress is further expected, in particular concerning research and higher education institutions that, with the exceptions of those illustrated below, do not show clear policies and institutional initiatives to manage and share research data.

Table 1 shows the number of answers received and distribution along a five points Likert type of scale in which 1= Not feasible at all; 2= Slightly feasible; 3= Somewhat feasible; 4= Moderately feasible, and 5= Extremely feasible (already in place).

Table 1. **Assessment of specific actions by National Governments on FAIR principles**

| Assessment of specific actions by National Governments on FAIR principles	1	2	3	4	5
Adopt public funding policies leading to research outputs being, in principle, accessible for reuse		5	2	5	6
Provide for a bottom-up and discipline-based approach and elaboration	1	2	5	6	2
Promote the FAIR principles	4	2	9	1	2
Implement DMPs as an integral part of the research process, make them a precondition for funding, standardize them and make the costs incurred eligible for funding	4	8	1	3	2
Implement an institutional data policy which clarifies institutional roles and responsibilities for research data management and data stewardship.	4	5	5	3	1
Educate data stewardship experts, recognize their profession and provide them with career opportunities.	6	6	4	2	
Positive incentives for FAIR data sharing by valuing data stewardship and efforts to make data available. Require data to be cited according to international standards. Encourage the sharing of expertise	8	5	3	2	
Set the default in data sharing to open access, but allow a choice of access regimes: from open and free downloads to application and registration-based access.	7	4	3	4	

Figure 3 illustrates the level of development and feasibility of the actions listed concerning the adoption and implementation of FAIR principles.

Answers provided and assessment on short-term implementation contrast with the number of initiatives in place in several countries, reflecting current debates at national and institutional level around the new open science paradigm.

Box 6: Go Fair

The Global Open (GO) FAIR Initiative is among the initiatives aiming at putting Open Science into practice, and is based on the FAIR principles of findability, interoperability, accessibility and reusability. This bottom-up initiative aims at addressing a diversity of issues, encompassing social limitations and obstacles as well as technological ones. In practice, the GO FAIR implementation approach is based on three interactive processes/pillars: "Go change" relating to the needed cultural changes; "Go train" considering the certification of data experts in each Member State and disciplines; "Go build" that relates to the need for interoperable and federated data infrastructures and the harmonization of standards, protocols, and services. See https://www.dtls.nl/fair-data/go-fair/ for more details.

Figure 3. **Assessment of specific actions by National Governments on FAIR principles**
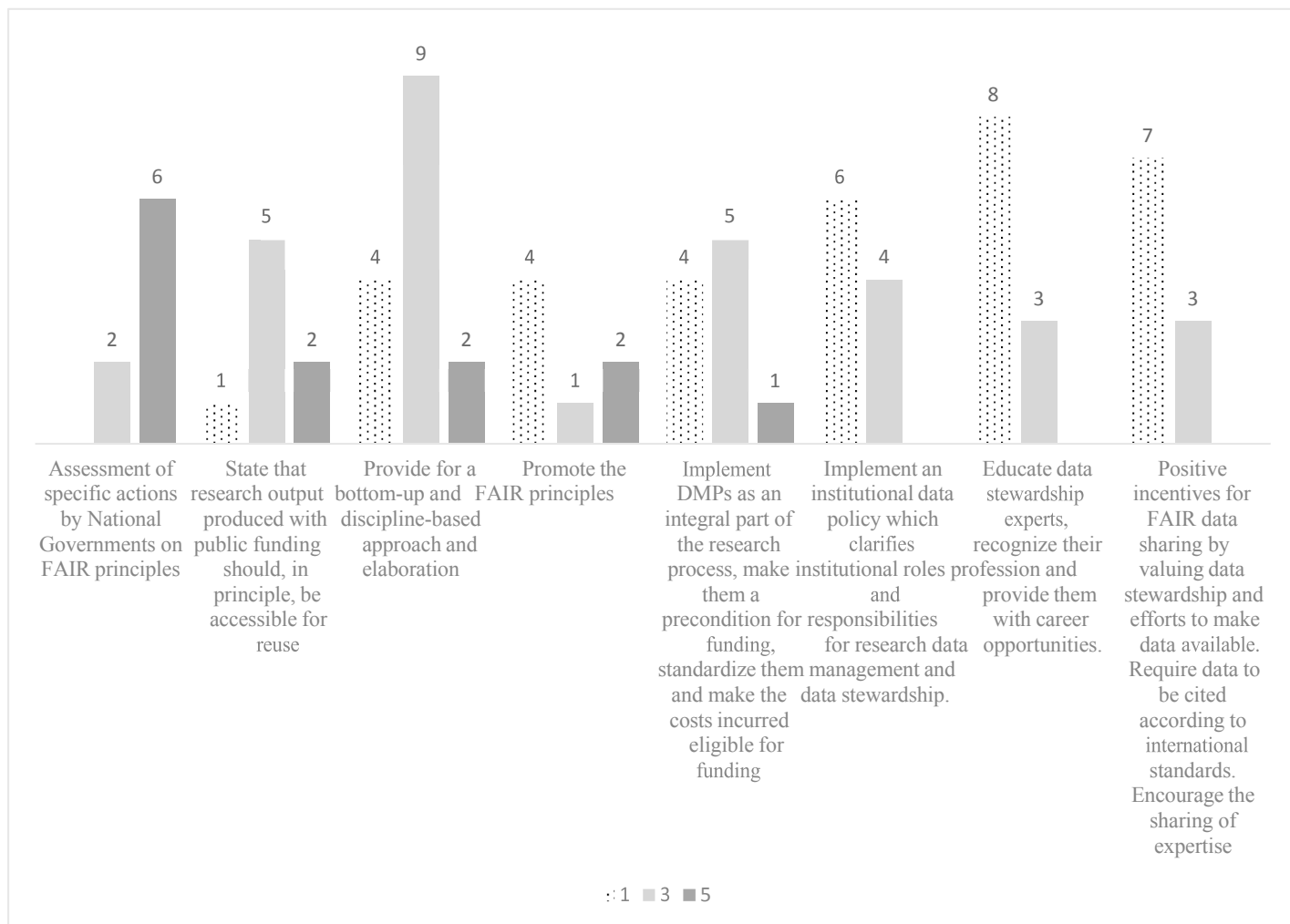
Box 7: Finland Data Management Planning Tool

The Academy of Finland and Business Finland (the Finnish Funding Agency for Innovation) both require a data management plan as part of the funding proposal. Funded by the Ministry of Education and coordinated by Helsinki University Library, the Tuuli project involves over 40 experts from 22 different organizations and it provides a national tool to help researchers manage and share their data as well as meet funding agency requirements. The DMP tool is based on an open source software solution provided by Digital Curation Center (DCC, UK) called DMPonline https://www.dmptuuli.fi/, https://wiki.helsinki.fi/display/Tuuli/DMPTuuli-project, http://aka.fi/en/funding/how-to-apply/appendices-required/guidelines-for-data-management-plan/

Box 8: UK Concordat on Open Research Data

UK has had an open access policy for publications since 2005 (http://www.rcuk.ac.uk/research/openaccess/policy/). The most recent update was in December 5, 2016. UK policy supports both 'Gold' and 'Green' routes to Open Access. The Concordat on Open Research Data (http://www.rcuk.ac.uk/research/openaccess/concordat-on-open-research-data/) published in July 2016 provides aims to ensure that research data gathered and generated by members of the UK research community is, wherever possible, made openly available for use by others.

Research Councils are developing e-Infrastructure strategies. For example STFC is developing an e-Infrastructure strategy that aims to provide a state-of-the-art research infrastructure for the STFC community "to develop and deliver cutting-edge solutions for academia and industry to advance data intensive science and innovation".

The UK Open Research Data Taskforce will, in the first half of 2018, deliver to the Minister a roadmap for open research data infrastructure. This is based on the national Research Data Concordat, signed by RFOs and RPOs. It is likely to note extensive work needed on technical, skills and financial frameworks. Because these have a strong international dimension, the UK is also participating strongly in international developments such as EOSC and the Group of Senior Officials group on Global Research Infrastructures.

The new consolidated research funder, UK Research and Innovation (UKRI), will review its Open Access policies to set a direction for the next few years. This will in part be informed by advice from the national OA coordination group to be given to the Minister in early 2018. The coordination group fosters structured dialogue on OA between stakeholders. UKRI will harmonize monitoring and reporting on OA policies, with Jisc, building on established services and standards and align with international practice.

Box 9: German Research Institutions and research data management

With regard to data science expertise, the Max Planck Society has already cross institutional initiatives such as in materials sciences, Big Data Driven Material Sciences including about 10 institutes and Max Planck Computing and Data Facility. The Helmholtz Incubator supports skills and training in research data management across the Helmholtz Association. And the RDA-DE Potsdam conferences (organized by Helmholtz) regularly tackles the definition of professional skills needed and curricula definition.

Box 10: Denmark National Forum for Research Data Management

In 2014, the Danish Rectors College, the Danish e-Infrastructure Collaboration and Denmark´s Electronic Research Library established a Steering Group for National Data Management presenting a data management strategy in 2015, and though it does not have a specific focus on open access as such, it advocates a structured approach to data management, data preservation and data infrastructures. Implementation of the strategy is under the responsibility of the national Forum for Research Data Management. In parallel, the Danish Ministry of Higher Education and Science adopted a Danish Code of Conduct for Research Integrity (2015) stressing the need to ensure that research performed in Denmark should be reproducible and that the research results should be verifiable by other actors. This implies that research data underlying a research articles has to be stored and that such data must be accessible.

Box 11: Austria Open Research Data Policies and Infrastructures

Currently there are 7 national publicly funded projects covering governance, service, data and infrastructure. These projects could serve as a basis for the further development in the context of existing e- infrastructure and research data policies and strategies.

- *Since 2014 e-Infrastructures Austria and its successor project e-Infrastructure Austria Plus: website http://e-infrastructures.at/en/startpage/*
- *AT2OA (Austrian Transition to Open Access) started in January 2017 (2017-2019)*
- *OEA: Open Education Austria (2015-2017)*
- *"Portfolio/Showroom – Making Art Research Accessible" (2017-2019): Setup of CRIS systems*
- *AuSSDA (Austrian Social Science Data Archive, 2017-2019). The aim is to set up an Austrian-wide data archive for social science data, development of services, identification of stakeholders, promotion of services, alignment with European infrastructure CESSDA (ESFRI-Project)*
- *Pilot programme Open Research Data (ORD) by the Austrian Science Fund (FWF) with 12 funded projects in 2017, https://doi.org/10.5281/zenodo.803234*
- *Synthese Networks is a plannend programme (2018) by the FWF that brings together large amounts of digital research data on the basis of a research question on topics of high relevance incl. assuring quality and openness of the research data for subsequent (re-) use*

See also: Data Market Austria (DMA) https://datamarket.at/

Box 12: CNRS DMP support

French CNRS Institute for Scientific and Technical Information (INIST) has launched the online service DMP OPIDoR http://dmp.opidor.fr to assist research scientists and operators to set up Data Management Plans.

Box 13: Portugal DENDRO

Dendro, led by INESC-TEC is an institutional initiative for the development of research data management tools, based on a researcher- centred approach, is a platform and an integrated mobile application - LabTablet –, developed as a system that combines different data management functionalities, i.e. collection, organization and description of data, design of a metadata model, creation of metadata and deposit and publication of data. These tools associate the metadata to the data from the outset and are deposited on a long term data preservation platform based on CKAN, which in turn is linked to EUDAT.

▪ SET UP COMMON RESEARCH E-INFRASTRUCTURES (6)

The development of common e-infrastructures to support the new model for open science and the digitalization of research is a key element of public research and innovation policies at European, national (and regional) levels. The Amsterdam Call for Action includes a set of specific measures to address security, accessibility, the provision of advanced services to exploit the full potential of open science, including reuse of research data and its potential positive spill-over effects on innovation, etc. These specific measures refer to the European Open Science Cloud and the digital ecosystem it might represent to benefit European and global research, innovation and society by expanding the potential of already existing European, national and regional research infrastructures and initiatives.

The assessment on the feasibility and effectiveness of the proposed set of measures as well as main opportunities and threats identified by national governments includes:

a) *Setting up effective and inclusive governance of the EOSC*

b) *Funding concerted initiatives to develop data expertise*

c) *Mapping the main characteristics of the infrastructure landscape (hardware, computing, storage, software, services, governance, etc.)*

d) *Managing local and national e-infrastructures in the context of EOSC*

e) *Financial viability and user-friendly services (selection and organization)*

f) *Supporting and developing Principles of Open Scholarly Infrastructures aimed at concerted mechanisms and funding initiatives to maintain a register of key open access services (sustainability, governance, usage and interoperability)*

g) *Recommendations on funding and risks in a workshop in order to derive a generic approach for such services in general.*

h) *Rules of engagement for all contributors (users, e-infrastructure providers, funders etc.) in the EOSC, including certification schemes for e-Infrastructure service providers.*

Table 2 includes the distribution of values accordingly to the five points Likert type of scale in which 1= Not feasible at all; 2= Slightly feasible; 3= Somewhat feasible; 4= Moderately feasible, and 5= Extremely feasible (already in place).

Table 2. **Assessment of specific actions by National Governments on setting up common e-Infrastructures** (frequency distribution)

	1	2	3	4	5
To set up effective and inclusive governance of the EOSC	1	2	8	5	2
To set up concerted funding initiatives to develop data expertise	3	7	3	3	2
Assess what is needed in the infrastructure landscape (hardware, computing, storage, software, services, governance, etc.)		4	2	4	8
To set up and manage local and national e-infrastructures		2	4	4	8
Financial viability and user-friendly services (selection and organization)	1	2	8	6	1
Support work in progress and develop Principles of Open Scholarly Infrastructures to set up concerted mechanisms and fund initiatives to maintain a register of key open access services (sustainability, governance, usage and interoperability)		3	7	6	2
Publish the recommendations on funding and risks in a workshop in order to derive a generic approach for such services in general	2	2	7	5	2
Set up rules of engagement for all contributors (users, e-infrastructure providers, funders etc.) in the EOSC. For e-infrastructure service providers this includes certification schemes	1	4	7	4	2

Results provided confirm that for the European Open Science Cloud to be feasible the project has to be designed as a true partnership, based on trust, synergies and dialogue among the European Commission, national (and regional) governments and stakeholders.

The re-organization and mapping of existing capabilities at national and regional levels together with the planning and definition of the portfolio of services and activities to characterize the next generation of digital research platforms are the most feasible actions, ranking on top of policy agendas for most of respondents. E-Infrastructures for open science and open research data raise a range of policy issues in such areas as data standards and interoperability, ethics, intellectual property and legal barriers (e.g. privacy), data integrity (quality, traceability), certification, computational capabilities and flexible technical characteristics by making sure that the various components are aligned and provide a joint service.

It is commonly agreed that national (and regional) infrastructures and adopted solutions have to be interoperable in the context of the European Open Science Cloud in order to optimize existing resources and investments in place. However, the conceptual and technical architecture of the European Open Science Cloud has not yet been discussed with national authorities, creating uncertainty and limiting the potential gains from concerted courses of action at earlier stages. This lack of information and uncertainty is reflected in the assessment exercise by the number of answers that consider the EOSC related specific actions as "somewhat feasible".

The EOSC raises several concerns, and the involvement of national authorities in the process and tasks conducted in the past has been insufficient. In spite of uncertainty and the lack of a common understanding of what the European Open Science Cloud will be, some critical aspects emerge from the perspective of national governments and RFOs, including governance, long-term sustainability, business model and rules of engagement, services and accompanying activities relevant to monitor research impacts and research accountability, etc.

Funding initiatives can only follow a concerted approach towards the EOSC across all EU, and they have to be planned in advance given the national budgets structures and constraints. On the other hand, the setup of e-infrastructures funded through projects lacks a long-term perspective. There is also an urgent need to clarify if Structural Funds may be used in the context of EOSC and data expertise.

However, investments are directly conditioned by and subject to the necessary core skills and services needed and identified by scientific communities and stakeholders. Planning, implementing and investing in the development of the EOSC require a multi-actor, multi-layered governance approach, which adds enormous complexity to the project.

Furthermore, there are significant legal barriers to overcome including copyright laws, the protection of research data that may have potential commercial applications, legal barriers to open and share data generated by ESFRI and funded from national budgets, etc. The European Copyright Law is in transition, and the changes can greatly hinder the openness of research data if there is not an exception foreseen for research purposes.

Finally, several technical concerns also emerge concerning data standardization, treatment of different research outputs, integration, semantic interoperability, and the type of functionalities that will form the service portfolio and value added by EOSC to the research community.

Consequently, most advanced and proactive national policies concerning the development of e-Infrastructures are need to work on improving the national data infrastructure and related e- infrastructures and services, and support international collaboration on features and standards needed to build the EOSC. Nevertheless, a European vision is a precondition to overcome fragmentation and to establish professional data management and data use across disciplines and national borders.

Figure 4. **Assessment of specific actions by National Governments on setting up common e-Infrastructures**
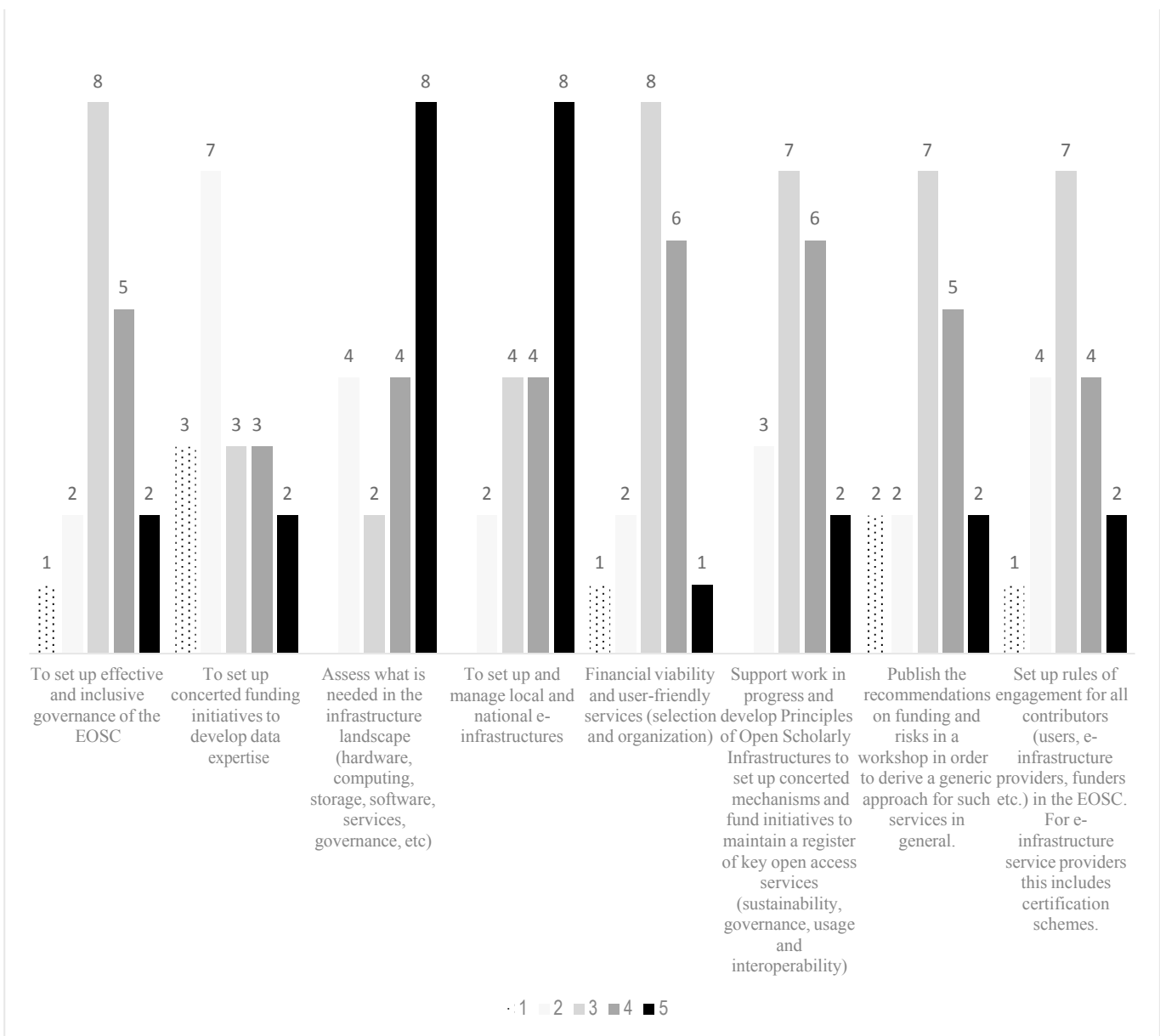
In summary, main policy conclusions refer to *the feasibility of setting up and managing local and national e-infrastructures. However, MS agree that setting up effective and inclusive governance of the EOSC and the delivering of user-friendly services (selection and organization) by the EOSC are only somewhat feasible. Hence, in order to make the EOSC a success, policy action should be focused on how to govern EOSC. The EOSC should be federated and be built on regional and national e-infrastructures that already exist or that can be set up, while at the same time EOSC standards and the services defined and delivered should be centered on users' needs.*

Box 15: Finland: Approaches to e-infrastructures that support open science

The Finnish Research Infrastructure Committee has published Finland's Strategy and Roadmap for Research Infrastructures 2014–2020. The research infrastructure ecosystem will be governed by this strategy, including major national research infrastructures, Finnish actors' partnerships within European infrastructure projects (ESFRI), memberships of other international infrastructures and research organisations' strategically significant infrastructures. One of the aims is to develop research infrastructure solutions that promote the creation of open science and knowledge. In the other hand, the Framework for Open Science and Research is a target architecture that guides the national principles of openness that govern the data and services used in science and research, the exchange of information, and the development of e-services that support openness. http://www.aka.fi/globalassets/awanhat/documents/firi/tutkimusinfrastruktuurien_strategia_ja_tiekartta_2014_en.pdf. For English version of the framework see http://openscience.fi/framework-for-open-science

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Box 16: Greece HELIX facility to support Open Science

The OpenAIRE NOAD (Athena Research Center, in collaboration with HEAL-Link, the Greek national library consortium based in the Aristotle University of Thessaloniki) will start from Jan 1, 2018 to draft a detailed roadmap of Open Access and Open Science policies for Greek funders and research organizations. This roadmap will include references and recommendations for national e-Infrastructure. The activities to draft the plan will be an inclusive process involving all major universities and research centres. In addition, GSRT has already included in the national research infrastructure roadmap HELIX, the National Infrastructure for Research initiative, which is actually the national e-Infrastructure for research, led by GRNET and Athena Research Center. HELIX will support the creation of open science aspects, ranging from AAI (EduGain), PID systems, an OA aggregator for publications (similar to OpenAIRE), a national repository for publications, a national data repository with accompanying RDM services. With the assistance from OpenAIRE, HELIX will provide a helpdesk support for IPR in relevance to OA and open research data.

Box 17: Portugal National Open Science Policy

A specific WG on Infrastructures and digital preservation, comprising researchers from active institutions and scientific communities and other national stakeholders, such as the National Library, was formed as part of the process to develop a National Open Science Policy. This group has produced a chapter of the report diagnosing the current state of affairs and issuing recommendations on how to improve Open Science in Portugal (http://docs.wixstatic.com/ugd/a8bd7c_3274046fc8ce42c78db2ec1707c0a0fd.pdf). How to apply the FAIR Data Principles for publicly-funded research data and active engagement with the EOSC are among the aims of the work done by this group. The final report will be available for public consultation. The process will culminate on the publication of the National Open Science Policy. Promotion of digital open access was a key goal of the process conducted to define the National Roadmap of Research Infrastructures of Strategic Relevance published in 201,4 and applicants were required to have well defined and widely advertised policy conditions for access by national and international researchers that are external to the infrastructure, which should be written into the aims and action plan of the RI.

Box 18*: Germany National Research Data Infrastructure (NRDI)

In 2014, the German Joint Science Conference (GWK) set up the "Council for Scientific Information Infrastructures (RfII)" formed by experts from the science community, including both data users and data providers and states officials. The RfII published its first position paper "Performance from Diversity" (2016) from whose recommendations the National Research Data Infrastructure (NRDI) has been set-up. The GWK entrusted a GWK committee (October 2016) for joint action considering the cost structure of the recommended NRDI. In parallel, the RfII will devise potential governance models of the NRDI in close coordination with the GWK committee.

A number of projects aiming at federating local and national research infrastructures are to be found in Germany including GeRDI, Helmholtz Data Federation, the Council for Scientific Information Infrastructures (RfII) that aim at federating local e-infrastructures and therefore contribute to a national Research Data Infrastructure (NRDI). The Max Planck Society is engaged in Pan-European and international initiatives such as EUDAT2020, Research Data Alliance (RDA), European Science Cloud (EOSC PILOT) and domain specific projects as for example Novel Materials Discovery Laboratory (NOMAD) and Life Science Oriented (BioExcel) European Excellence. The Helmholtz Association has already envisaged this necessary step and is starting to implement the Helmholtz Data Federation (HDF) as a cornerstone of such a national infrastructure and as a national building block for the EOSC. From 2017 until 2021, it will invest 50 Million Euro in multi-thematic data centres and cutting-edge data management. Six of its centres will participate: KIT, FZJ, DESY, DKFZ, AWI, GSI. This Federation builds up on existing e-Infrastructure projects like EUDAT and INDIGO (among others) and can be seen as a blueprint for a national infrastructure which will be an important element for the European Open Science Cloud. In addition, Helmholtz issued a position paper (https://www.helmholtz.de/os-positionspapier/) on Research Data, including direction on open access, funding of infrastructures and education. Furthermore, the pilot Scientific Big Data Analytics (SBDA) is a part of the NIC calls for supercomputing resources.

Relevant case studies include:

- *Funding research data management and related infrastructures. Knowledge Exchange and Science Europe briefing paper May 2016 http://repository.jisc.ac.uk/6402/1/Funding_RDM_%26_Related_Infratsructures_MAY2016_v7.pdf*
- *DFG-Project RADIESCHEN – Framework Conditions for an inter-disciplinary research data infrastructure: Synthesis http://dx.doi.org/10.2312/RADIESCHEN_009*
- *Buddenbohm, S. / Enke, H. / Klar, J. / Hofmann, M. / Neuroth, H. / Schwiegelshohn, U. (2015): Success Criteria for the Development and Sustainable Operation of Virtual Research Environments. In: D-Lib Magazine. September/October 2015 Volume 21, Number 9/10. http://dx.doi.org/10.1045/september2015-buddenbohm*
- *Buddenbohm, S. / Enke, H. / Klar, J. / Hofmann, M. / Neuroth, H. / Schwiegelshohn, U. (2015): Success Criteria for the Development and Sustainable Operation of Virtual Research Environments. In: D-Lib Magazine. September/October 2015 Volume 21, Number 9/10. http://dx.doi.org/10.1045/september2015-buddenbohm*

3.3. FOSTERING AND CREATING INCENTIVES FOR OPEN SCIENCE

In this context, the Amsterdam Call for Action considers four main areas for active policies at the level of national governments, Research Funding Organizations and Research Performing Organizations:

- **ADOPT OPEN ACCESS PRINCIPLES (7)**
- **STIMULATE NEW PUBLISHING MODELS FOR KNOWLEDGE TRANSFER (8)**
- **STIMULATE EVIDENCE-BASED RESEARCH ON INNOVATIONS IN OPEN SCIENCE (9)**

- **ADOPT OPEN ACCESS PRINCIPLES (7)**

In this section, the question on open access policies refers more specifically to coordinated actions corresponding to RFOs and RPOs , and in particular to the *alignment and coordination of activities, as both funders and research organizations pay for subscriptions and APCs.* This action is already under implementation by several national governments, as seen as being potentially implemented in the near future.

The section also refers to the questions relating to the creation of transparency on the costs and the conditions of academic communication. It points out as main policy conclusion, *the existence of alternative exploratory models aimed at changing the dominant business model set up by large commercial publishing houses to rationalize both the costs of subscriptions and the lack of transparency on national and institutional agreements*. However, the assessment fails to take into account the model of cost-free Gold Open Access. This model, sometimes called "Diamond Open Access", can be achieved through institutionally funded journals, scientific societies, so-called "freemium" business models and so forth.

Table 3 **Assessment of specific actions to "Adopt OPEN SCIENCE principles"**

	1	2	3	4	5
Realign and coordinate activities, as both funders and research organizations pay for subscriptions and APCs	2	1	5	3	7

Box 19: Estonia: Alternative Publishing Models

Many universities provide the researchers with repositories, and there is the Datacite Estonia consortium to provide the research universities and other partners with DOIs. Also many universities, research communities and the Estonian Academy of Sciences have the so-called diamond Open Access journals that are APC-free.

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Box 20: Belgium IDOA

In Wallonia-Brussels Federation a decree is being prepared that will extend the so called "Liège model" for Open Access to all the scientific articles that are published by publicly funded researchers in French speaking Belgium. This means that, in the wake of the Open Access mandate of the University of Liège (ULg), these articles should be immediately deposited in a repository, and become freely accessible in Open Access as soon as possible (IDOA principle).

</div>

▪ <u>**STIMULATE NEW PUBLISHING MODELS FOR KNOWLEDGE TRANSFER (8)**</u>

New publishing models to overcome the limits, costs and restrictions imposed by large publishers of scholarly communication, are a central element in current discussions which concerns national governments and public authorities as well as RFOs, RPOs, researchers and publishers. The assessment of the proposed set of actions includes these to be implemented by national governments and RFOs, and in the other hand, the actions corresponding mainly to RPOs, researchers, libraries and publishers.

Table 4. **Assessment of specific actions to "Stimulate new publishing models for knowledge transfer" by National Governments and RFOs**

	1	2	3	4	5
Mobilize stakeholders for a fair, balanced and innovative publishing system by fostering structured dialogue among all stakeholders and sharing expertise and best practices (together with RPOs and any other relevant actors)	0	4	7	2	5
Take stock of the information needs among SMEs and explore how open science can help fill those needs (together with RPOs and any other relevant actors)	1	6	7	3	1
Give political backing to universities (and RPOs) in their negotiations with publishers about access to content	0	2	4	6	6
Encourage parties to develop new models for knowledge distribution using start-up money, and guarantee sustainability in the long term by adequate funding	4	7	4	1	2
Broaden the Open Library of Humanities to the Open Library of Sciences for	1	5	5	4	

Current alternatives to the traditional subscription model include (but are not restricted to): APC model (offsetting or flipping to Gold), APC-free Gold OA, Green OA archiving, contribution models (Open Library of Humanities, Knowledge Unlatched, etc.), and preprint and open peer review models (Wellcome Open Research, F1000 like platforms, etc.). The questionnaire allowed respondents to highlight a diversity of innovative initiatives at national level, such as the Kotaliva project of OA journals publishing (FI), the Scientific Journal Hosting Service (SARC) (PT), the e-publishing services from EKT (GR) or the alternative funding model for Norwegian based OA-journals in the SSH-field (NO).

Box 21: Denmark SPOMAN Open Science platform at Aarhus University

At the Interdisciplinary Nano Science Centre, Aarhus University, an Open Science platform - SPOMAN Open Science Community - has been created as a public-private experiment. The platform is intended to work as a facilitator for open collaboration between industry and university. Right now, the scientific focus of all projects will be on smart polymer materials and nano-composites: http://inano.au.dk/industry/collaborate-with-us/open-science/. The aim is to facilitate open collaboration between the industry and the university, a collaboration where inputs from everyone are welcome. The initiative might inspire other Danish Universities. See also more specific details about the project: [http://spoman- os.org/](http://spoman-os.org/)

Box 22: Finland: Kotilava Project

As an "alternative" publication business model, Finland has a project called Kotilava that aims to guide Finnish academic journals towards immediate Open Access. A consortia model is being set up to fund it. The service includes a platform for editing and publishing OA journals. For more information see https://journal.fi/index/index

Figure 6. **Assessment of specific actions to "Stimulate new publishing models for knowledge transfer" by National Governments and RFOs.**
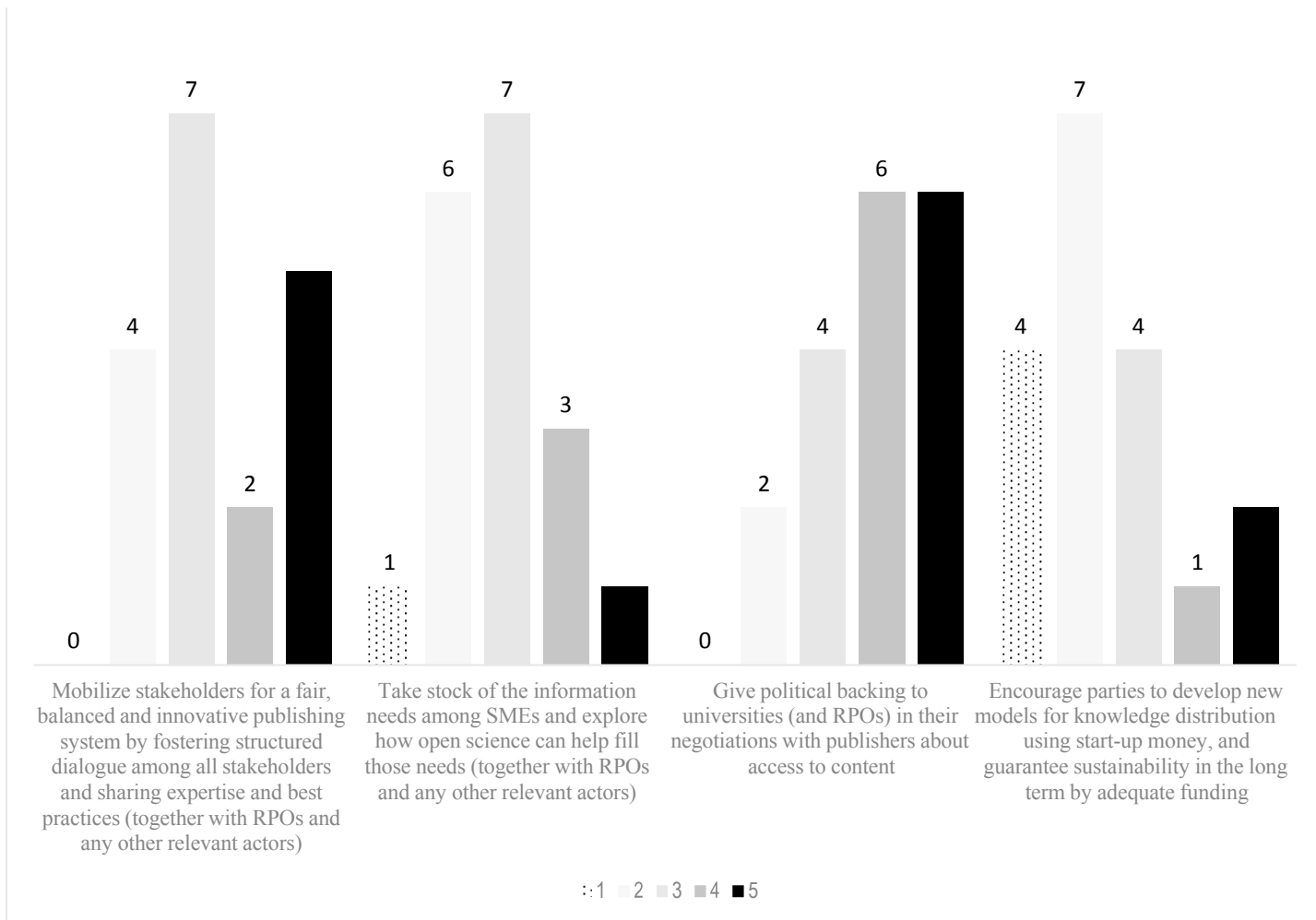
Table 5. **Assessment of specific actions to "Stimulate new publishing models for knowledge transfer" by Research Funding Organizations (RFOs), Research Performing Organizations (RPOs), Universities and researchers**

	1	2	3	4	5
Bring in new users, allow for new forms of funding (i.e. crowdfunding) and develop Joint Open Science Initiatives (JOSIs) around a societal challenge	5	6	4	2	1
Make cross-border funding easier and fund risky projects more aggressively.	7	7	4	1	0
Be critical in financing commercial entities with a poor record on open science adoption	4	7	5	3	0
Provide start-up money for alternative open access publishing models so that they can become established and sustainable	8	3	5	1	2
Provide less specific funding tracks, more flexible funding (including OS components in research proposals, faster calls), better promotion of funding possibilities for young/ new/innovative stakeholders, including small-scale initiatives	3	3	3	6	2
Have specific research output translated to specific target groups, such as patients	0	4	9	4	1
Include citizen science into the mainstream	2	4	9	2	2
(Together with individual researchers and publishers) Experiment with new, faster ways of publishing, such as immediate publishing based on open peer review (flipped publishing)	3	4	6	3	3
(Together with individual researchers and publishers) No longer accept disclosure clauses	3	4	1	5	4
(Together with individual researchers and publishers) Promote widespread application of citizen science as a knowledge transfer (including accessible output of citizen science projects)	1	9	6	2	1
(Together with individual researchers and publishers) Allow for the publication of negative results/data	2	6	6	4	1
(Together with publishers and research/university libraries) Support discipline based foundations that help flip subscription journals to FAIR open access by providing funds for APCs and transition by 2020	2	4	3	5	5
(Together with publishers and research/university libraries)Promote 'bulk' processing of APCs to reduce administration overload among researchers	1	2	3	7	5

Figure 7a. **Assessment of specific actions to "Stimulate new publishing models for knowledge transfer" by Research Funding Organizations (RFOs), Research Performing Organizations (RPOs), Universities and researchers.**
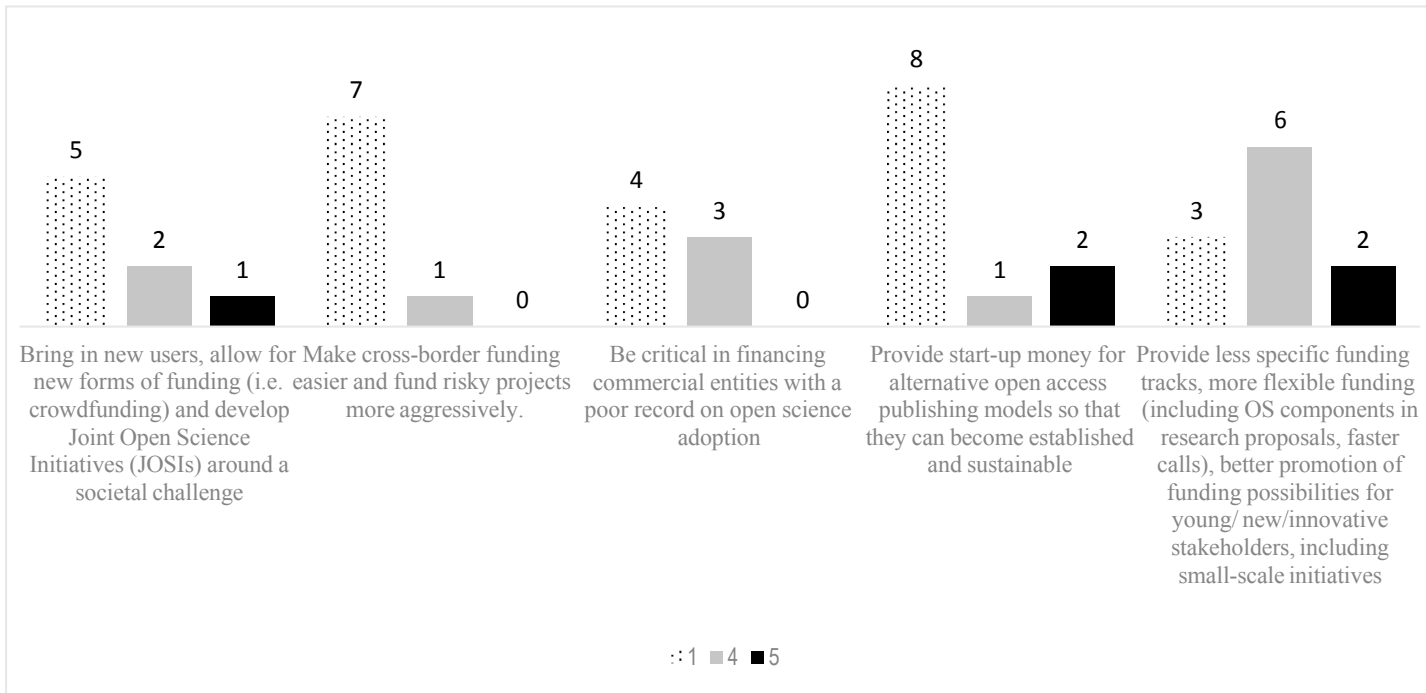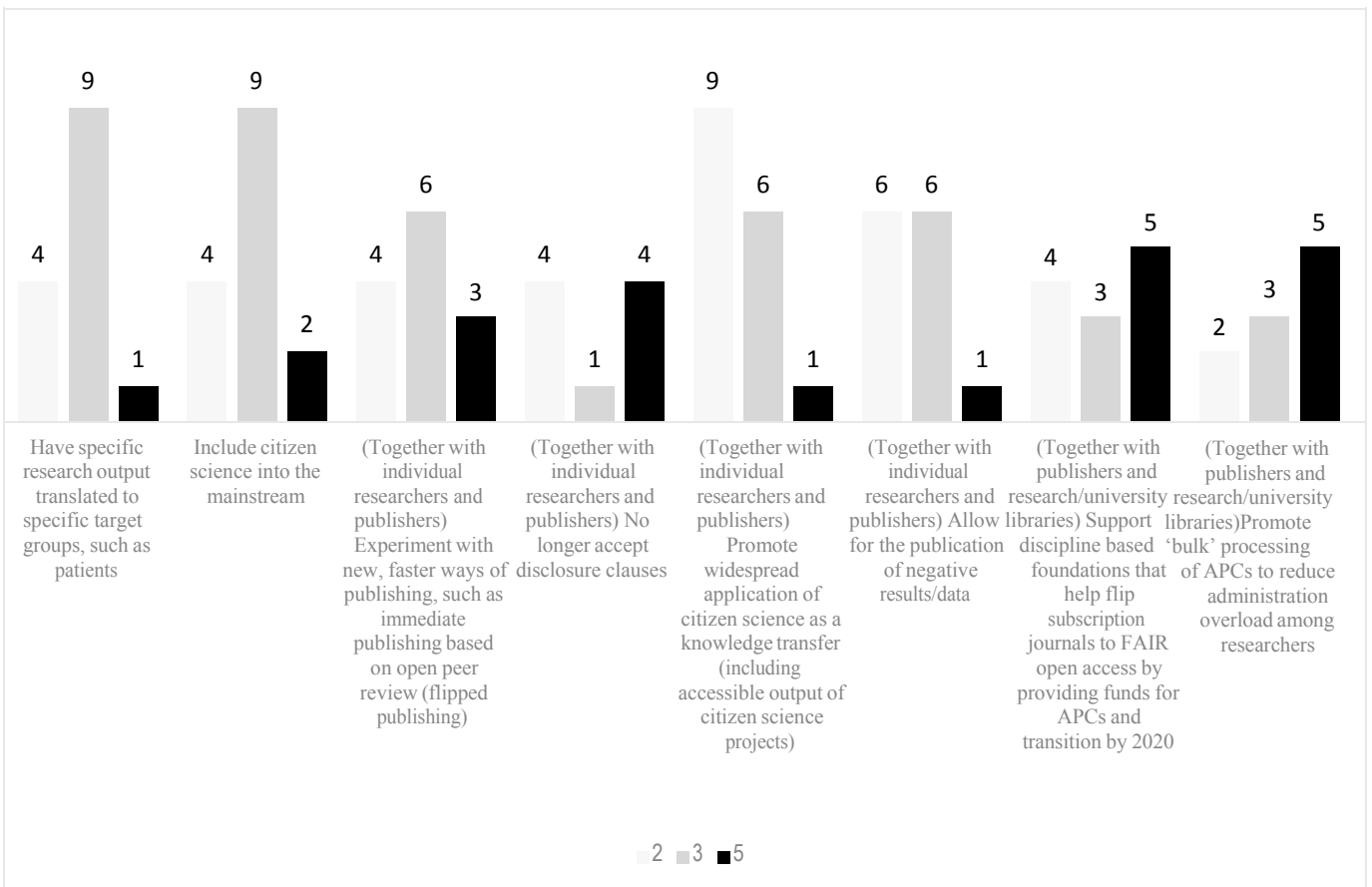

Figure 7b. **Assessment of specific actions to "Stimulate new publishing models for knowledge transfer" by Research Funding Organizations (RFOs), Research Performing Organizations (RPOs), Universities and researchers.**

Box 23: Episciences France

The Episciences.org project is involved in the open access movement (https://www.episciences.org/) and is staying on the national repository HAL. It provides a technical platform for peer-reviewing; its purpose is to promote the emergence of epijournals, namely open access electronic journals taking their contents from preprints deposited in open archives such as arXiv or HAL, that have not been published elsewhere. The editorial boards of such epijournals organize peer reviewing and scientific discussion of selected or submitted preprints. Epijournals can thus be considered as "overlay journals" built above the open archives; they add value to these archives by attaching a scientific caution to the validated papers. The objectives are to achieve the publication of free journals and to implement free access to electronic versions of articles. The epijournals could be new titles or existing ones wishing to join the platform. The Episciences.org platform will host epijournals covering all types of scientific subjects. The authors are not requested to sign restrictive agreements and retain their copyrights on their papers.

The main barriers concerning changes in publishing models identified include:

1) First, there is not a common and single vision among National (governments and RFOs) and RPO with regard to how to achieve and fund Open Access. In some MS OA is mainly considered as a scholarly communication paradigm that implies different kinds of dissemination tools beside scholarly journals, such as, in particular, self-archiving in repositories (the so-called Green OA) and those wanting to achieve first and foremost more cost-effectiveness in the journal market (through offsetting or flipping to Gold OA).

2) Second, there is uncertainty on the sources of funding for developing new publishing models, although there is a common understanding that changes in the publishing model will not be budgetary neutral.

3) Third, RPOs underline the pervasiveness of the Impact Factor based reward system within Academia, which favours the status quo in the publication system and the publication of articles in so-called international top journals (often published by Major publishers). Hence the adoption of new publishing models may often represent a threat rather than an opportunity. Also researchers more and more use to rely on "rogue" dissemination tools such as SciHub, or more generally dedicated commercial social media for scientists (such as Research Gate) that also allow them to share their publications between them (i.e., remaining non-accessible to other potentially interested end-users) without engaging in the Open Access paradigm as such.

Therefore, the European Commission, the Conference of European Schools for Advanced   Engineering Education and Research, the European Association of Research and Technology   Organizations, the European University Association, the League of European Research   Universities, and Science Europe, based on their joint statement on ERA partnership, should pre-   negotiate with international for-profit scientific publishers for a model that permits open   access articles, as well as strengthening non-profit efforts. High-level concerted action will be more efficient and will enable faster   transformation from a pay-to-read business model to a pay-to-publish business model

The **conclusions** from this section indicate that *the level of implementation of the listed actions is limited except for ministerial and RFOs support to RPOs in their negotiations with publishers.*

Initiatives of RPO's to negotiate with publishers, in order to reach agreements in which fair open access is the default standard, are reaching their limits. On the other hand policy actions concerning the provision of funding for new publishing models to guarantee long-term sustainability are not much developed yet. It is also worth mentioning the low level of implementation and feasibility for those actions that aim at connecting open access and open science policies with business (and in particular SMEs) potential needs. The Danish SPOMAN Open Science Initiative might inspire more universities to invite companies into their research projects giving them access to the latest research.

- ## STIMULATE EVIDENCE-BASED RESEARCH ON INNOVATIONS IN OPEN SCIENCE (9)

Actions to stimulate evidence-based research on innovations in Open Science refer to:

a) *Actively contribute to peer learning about national policies, e.g. within the framework of the development of the European Research Area (ERA)*

b) *Set up research programmes on developments in OA/OS to answer questions regarding the optimal road to OS, the advantages of OS for society at large etc.*

c) *Explore other ways of sharing result outputs, to serve OS*

d) *Let the public participate in the selection of scientific topics through online platforms*

e) *(RFOs and RPOs) Research and University libraries. Research and University Libraries raise awareness, participate in EU projects, collect best practices, create a forum to share experiences.*

As Table 6 shows, mutual and peer policy learning is a widespread practice contributing to the diffusion of best practices within the European Research Area. In the other hand, funding and implementing research programs to provide empirical evidence to the promotion of open access and open science (the so-called "science of open science", which includes cost-benefit analysis of the different options at hand) is less frequent. However, the most difficult action to implement from a governments' perspective corresponds to the engagement of society in the selection of research and innovation priorities. That entails that open science as a mechanism to promote social engagement (science with society) and how it will be articulated deserve more attention, and research and innovation policy agendas and priority setting mechanisms have to evolve from their current format.

Table 6. **Assessment of specific actions to "Stimulate evidence-based research on innovations in open science"**

	1	2	3	4	5
Actively contribute to peer learning about national policies, e.g. within the framework of the development of the European Research Area (ERA)	0	0	7	3	9
Set up research programmes on developments in OA/OS to answer questions regarding the optimal road to OS, the advantages of OS for society at large etc.	1	8	2	3	5
Explore other ways of sharing result outputs, to serve OS	1	3	8	4	2
Let the public participate in the selection of scientific topics through online platforms	6	6	4	2	0
(RFOs and RPOs) Research and University libraries. Research and University Libraries raise awareness, participate in EU projects, collect best practices, create a forum to share experiences	0	0	6	3	8

Figure 8. **Specific actions to "Stimulate evidence-based research on innovations in open science"**
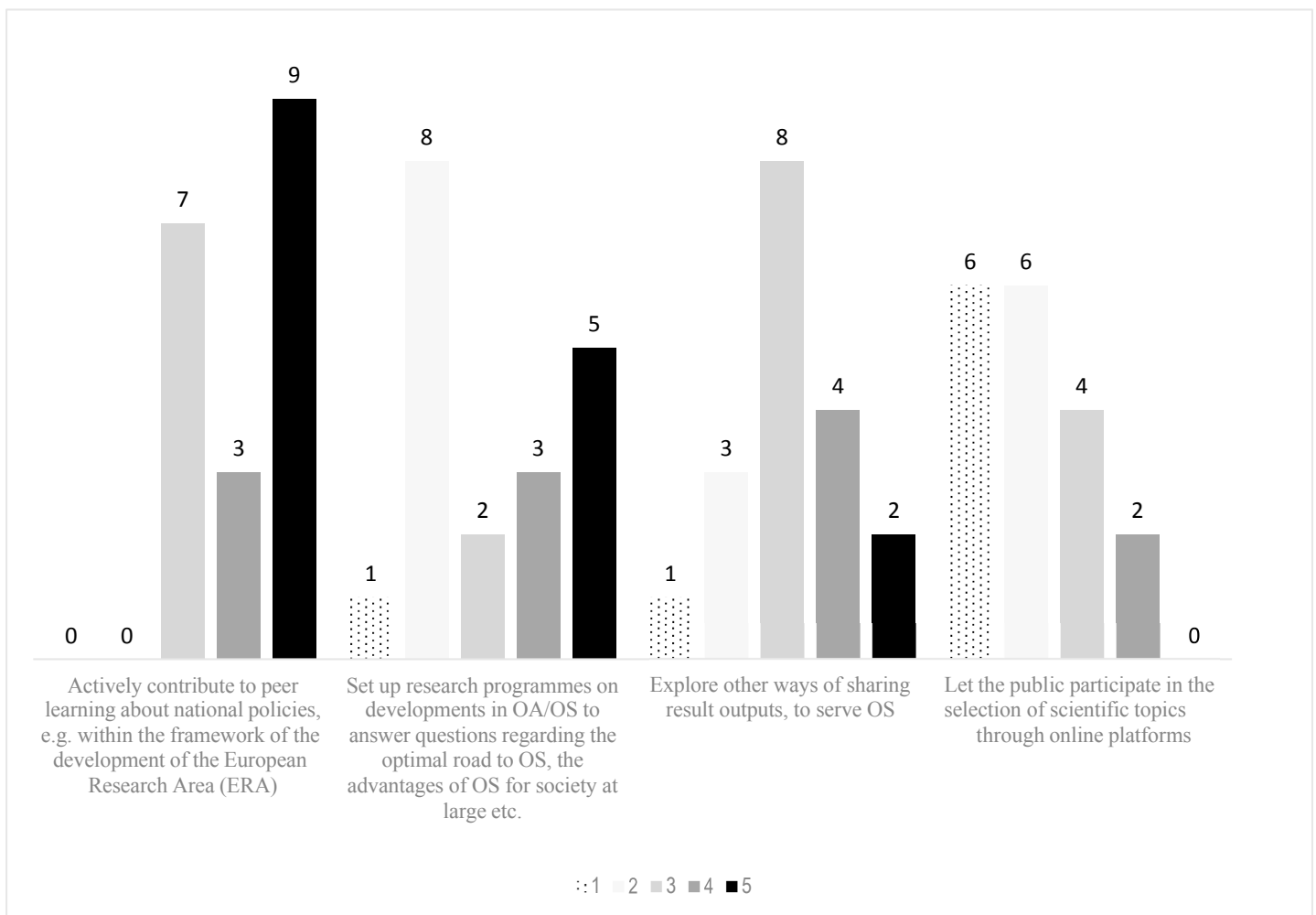
3.4. MAINSTREAMING AND FURTHER PROMOTING OPEN SCIENCE POLICIES

The transition towards Open Science needs proactive research and innovation policies to accelerate the process by contributing to lower the existing barriers (financial, cultural, behavioral, legal, technical, etc.) and incentivize new and emergent patterns of production, dissemination, evaluation and usage of scientific knowledge within the research community and a wide range of stakeholders. In the absence of concerted policy actions, fragmentation between national, regional and institutional initiatives may represent a significant obstacle for Europe to succeed towards Open Science. Open Science public policies should reflect a common understanding and join efforts on the way forward. The actions, included to mainstream and promote open science policies, are grouped together as part of the adoption and implementation of open access plans, though it should be clearly understood that open science entails other dimensions that open access to publications does not capture.

- **DEVELOP, IMPLEMENT, MONITOR AND REFINE OPEN ACCESS PLANS (10)**

The actions to be implement by National governments, RFOs, RPOs and other research institutions from the Amsterdam Call for Action include:

a) *Agree on a 100% target for 2020 and regular monitoring and stocktaking*

b) *Establish standards, systems and services for monitoring and reporting, and monitor progress through ERA Monitoring Mechanism and through the National Points of Reference on OA*

c) *(RPOs, institutions, etc.)Develop OA plans, including the provision of necessary infrastructures and services, share expertise and use harmonized data, e.g. by setting up and coordinating platforms for monitoring and networks of expertise*

There is a common vision and convergence on the need to establish standards at EU level and conduct regular monitoring on progress. With regard to Open Access to publications, there is no obvious predilection for one of the so called roads (Gold, Green or Platinum), and many Member States still favour the development of Green Open Access repositories to the flipping to a model of publication based on the payment of APCs.

On Open Access infrastructures –mainly repositories- at   institutional level there is also a common vision that it will be highly beneficial to joint efforts and   work towards standardization. However, it is worth mentioning that the 2020 target on 100% open   access will not be possible for the vast majority of respondents. In addition, some Member States feel that it is important to consider putting in place adequate instruments in order to assist Member States to deploy Open Science and Open Access policies. Such instruments could include among others awareness raising measures, necessary adequate technical capacity-building measures including training, together with financial support when opting for open science journals. At the present, monitoring open   access publications is not yet a common practice in a large number of countries at national level,   and in those cases in which monitoring is being accomplished, the proportion of open access scientific   publications remain low as compared to the entire scientific production in those countries. Though monitoring is very important, additional reporting obligations should be clearly defined and they should not be translated into additional administrative burdens for MS/AC. There is a   significant discrepancy between the vision and the policy narrative on Open Science and the actual   state of its implementation, which remains very low and it explains the main purpose of the   assessment exercise, carry on by the ERAC SWG OSI.

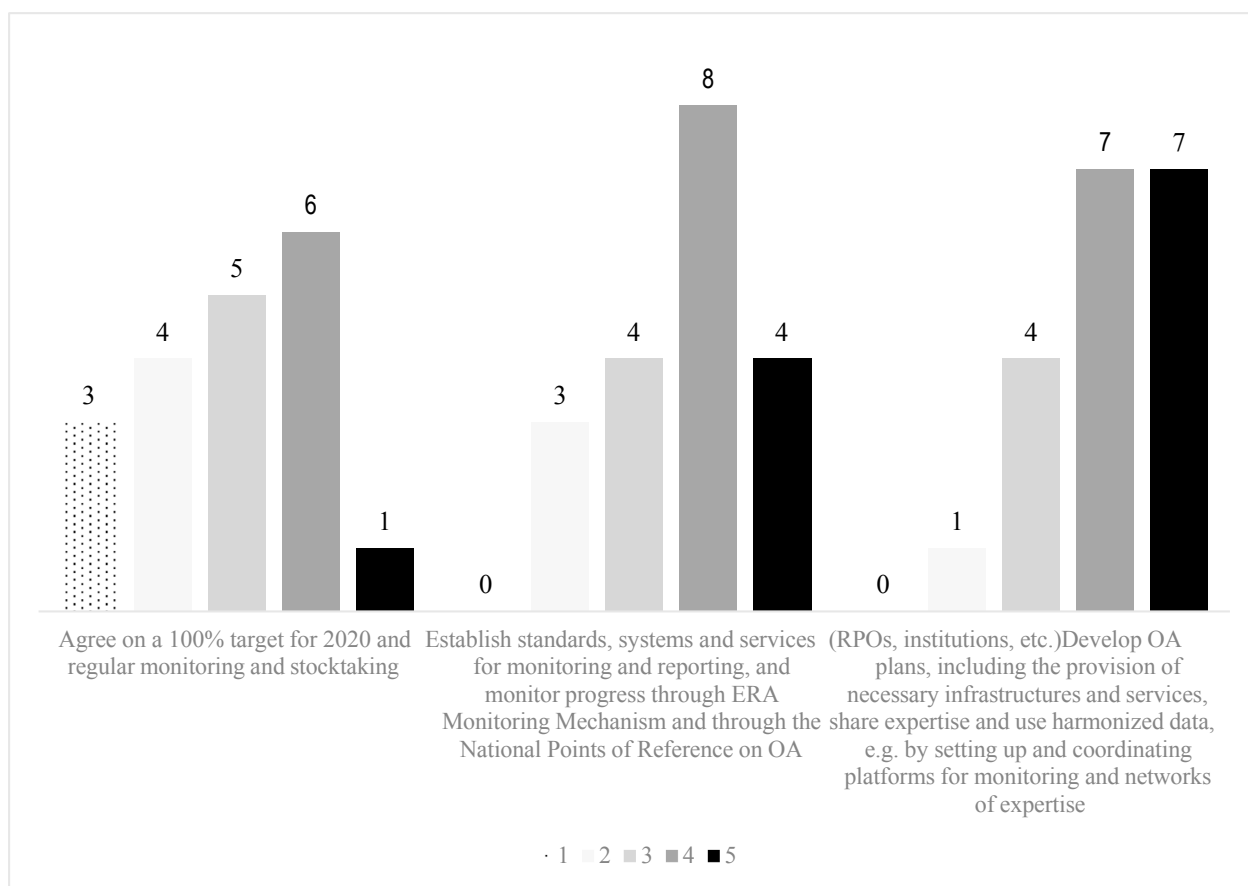Figure 9. **Assessment of specific actions to "Develop, implement, monitor and refine Open Access Plans"**

Table 7. **Assessment of specific actions to "Develop, implement, monitor and refine Open Access Plans"**

	1	2	3	4	5
Agree on a 100% target for 2020 and regular monitoring and stocktaking	3	4	5	6	1
Establish standards, systems and services for monitoring and reporting, and monitor progress through ERA Monitoring Mechanism and through the National Points of Reference on OA	0	3	4	8	4
(RPOs, institutions, etc.)Develop OA plans, including the provision of necessary infrastructures and services, share expertise and use harmonized data, e.g. by setting up and coordinating platforms for monitoring and networks of expertise	0	1	4	7	7

Relevant policy conclusions from this section refer to the fact *that 100 % full Open Access in 2020 is realistically not achievable in the majority of European countries participating in this exercise in the foreseeable future*.

Nevertheless, mainstreaming and promoting open access polices provide OPPORTUNITIES summarized below:

– ***Timing and policy alignment and coordination***. There is a general view that OS policies rank increasingly high in the research policy agenda. Consequently, there is a "window of opportunity" for implementation of Open Science further through national plans together with a clearly defined EU agenda and coherent set of policies. Alignment of OS policy agendas is necessary to avoid the current fragmented OS landscape, by fostering a structured dialogue among all stakeholders and through the sharing of best practices and expertise.

– ***Concerted OA and European OA policies*** may ensure economies of scale in an EU-wide sustainable scholarly communication environment and monitoring system, and foster at international level the work on innovative research indicators, while backing political support to RPOs in their negotiations with major publishers. A more coordinated approach may reduce the research community dependency on publishers' services, and challenge the current Impact Factor based rewards in Academia.

– ***Scope of Open Science policies***. Governments' further promotion and mainstreaming of Open Science policies should encompass the preservation and access to a broader diversity of research outputs, including cultural and educational material, and stimulate further entrepreneurship and innovation.

– ***Research Performing Organizations*** and researchers consider a broad set of opportunities in strengthened Open Science policies:

  ▪ At scientific level, they welcome any encouragement to publish negative results, reduce the duplication of efforts, and engage in new interdisciplinary endeavors.

  ▪ They welcome the emergence of a set of infrastructure components at international level (such as Jisc data UK, SHARE US, OpenAIRE-Connect, or DeepGreen DE) that have the potential to alter radically data exchange, and the role of EOSC as an enabler of Open Science.

  ▪ In RPOs and researchers' perspective, Open Science policies may support a "new academic research culture" that encompasses new skills and training opportunities for scientists, but also new opportunities to raise citizens' awareness on scientific research.

A number of threats also emerge as part of OS policies, including:

- *Implementation of Open Science policies*. Implementation is shaped by the lack of human resources and dedicated expertise in Open Science, including specialists in data management and in e-infrastructures. Furthermore, the narrative of Open Science policies is very appealing while implementation deserves more attention, time and resources.
- *Country, discipline-based and institutional heterogeneity*. There is also a shared understanding that the stage of advancement in Open Science is very diverse between countries, institutions and disciplines. The pervasiveness of the Impact Factor in the Academic culture is an important obstacle to further mainstreaming of Open Science, since it does not encourage researchers to take any risk. On the other hand, proper translation mechanism of Opens Science towards the industry – and in particular towards SMEs – are still lacking. There is a lack of critical mass (researchers, funders and business partners) to strongly support and contribute to the widespread of Open Science.
- *Publishing costs vs. OS*. RFOs and governments are often concerned about the market domination of big publishers - also for services and other Open Science related activities - and some consider that there is too much focus on concluding Open Access big deals with large and dominant publishers. This indicates an over simplification of a more complex process that refers to the re-organization of the research enterprise as a whole.
- *Open Science funding efforts*. The risk of underestimating the costs linked to Open Science constitutes another threat, particularly in situations of political instability and unsustainable research funding. More generally, RFOs and governments regret the lack of research based evidence on Open Access and Open Science, including cost-benefit analysis of the different options at hand.
- *Policy coordination*. National governments and RFOs stress the need of a **better coordination between Open Science and other related policies such as Open Innovation, Open Culture and Public Sector Information**. The rapid pace of changes in technical and research environments may be challenging for policy making.
- RFOs, RPOs and researchers are concerned about the current overlapping between the (many) public and private infrastructures that flourish in the Open Science context, but are not systematically interoperable and include some "rogue instruments" (such as SciHub).

3.5. STIMULATING AND EMBEDDING OPEN SCIENCE IN SCIENCE AND SOCIETY

This section includes specific actions to cope with some barriers identified in previous sections for the advancement of open science. It refers to policy actions aimed at coping with administrative, regulatory, and behavioral obstacles limiting the potential diffusion of open science and its broad positive effects. The set of actions include these two categories:

- **INVOLVE RESEARCHERS AND NEW USERS IN OPEN SCIENCE (11)**

  - **ENCOURAGE STAKEHOLDERS TO SHARE EXPERTISE AND INFORMATION ON OPEN SCIENC11. INVOLVE RESEARCHERS AND NEW USERS IN OPEN SCIENCE (12)**

The three actions to be implement by national governments, RFOs, RPOs and other relevant stakeholders include:

a) *Foster the existing relations between science, society and business, and develop training and skills for all parties to help them seize opportunities that promote OS*

b) *Acknowledge the value of OS in scientific evaluation and funding; develop strategies to involve new users in the scientific process through Horizon 2020*

c) *RPOS and other actors. Develop training and skills, tailored to each discipline, including ICT and library personnel etc. Involve new user groups through platforms and otherwise and give them the opportunity to take up a role when funding projects*

Table 8. **Assessment of specific actions to "Involve researchers and new users in OS"**

	1	2	3	4	5
Foster the existing relations between science, society and business, and develop training and skills for all parties to help them seize opportunities that promote OS	1	4	4	5	5
Acknowledge the value of OS in scientific evaluation and funding; develop strategies to involve new users in the scientific process through Horizon 2020	0	3	3	10	3
RPOS and other actors. Develop training and skills, tailored to each discipline, including ICT and library personnel etc. Involve new user groups through platforms and otherwise and give them the opportunity to take up a role when funding projects	1	3	3	8	3

In spite of the overall view on current implementation of OS there is consensus on the need to prioritize actions devoted to increase the level of involvement from the research community and other users.

Effectiveness (and impact) of actions concerning evaluation of OA through EU level initiatives - including Horizon 2020 and next FP - are emphasized, and such actions are considered as feasible by the majority of respondents.

Although Citizen Science may be the object of a dedicated policy at national level, Citizen Science is never as high in the policy agenda as Open Access and Open Research Data. On the other hand, many RPOs engage in such initiatives, some of them gaining an important critical mass. It has to be noted though that the links between Citizen Science and the other dimensions of Open Science –such as the data management of the data collected in Citizen Science projects -still have to be investigated further, and made more explicit.

Box 25: Denmark Project Diversity

The Natural History Museum of Denmark, University of Copenhagen is among the leading actors in citizen science in Denmark. Furthermore, as a concrete example, Project Biodivercity, the largest Citizen Science project in Denmark has approximately 27,000 participants. They help the Danish researchers with data from the Danish countryside, which helps the researchers to have an overview of the state of the art of it, including numbers of specific species. Project Biodervicity is done in a collaboration of researchers from Aarhus University and University of Copenhagen.

Figure 10. **Assessment of specific actions to "Involve researchers and new users in OS"**
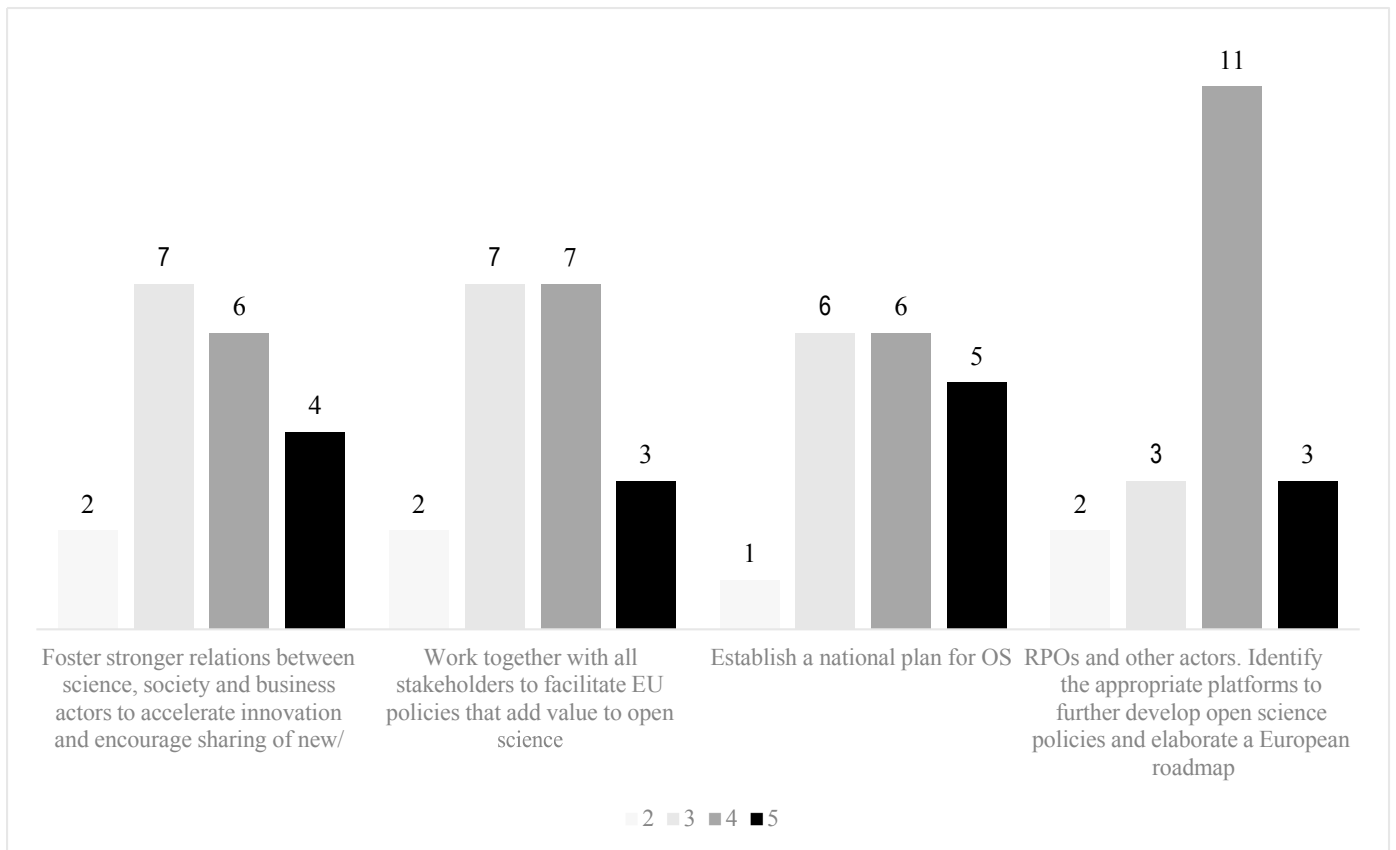
- **ENCOURAGE STAKEHOLDERS TO SHARE EXPERTISE AND INFORMATION ON OPEN SCIENCE (12)**

The specific actions assessed include:

a) *Foster stronger relations between science, society and business actors to accelerate innovation and encourage sharing of new/*

b) *Work together with all stakeholders to facilitate EU policies that add value to open science*

c) *Establish a national plan for OS*

d) *RPOs and other actors. Identify the appropriate platforms to further develop open science policies and elaborate a European roadmap*

Results included in Table 10 and Figure 11 emphasize the willingness of RPOs, researchers and other relevant actors at national level to engage into the construction of an European roadmap for Open Science, while the number of National governments and RFOs implementing already a National Plan for OS is significantly limited, though this is a feasible action to be put in place.

Table 9. **Assessment of specific actions to "Encourage stakeholders to share expertise and information on open science"**

	1	2	3	4	5
Foster stronger relations between science, society and business actors to accelerate innovation and encourage sharing of new/	0	2	7	6	4
Work together with all stakeholders to facilitate EU policies that add value to open science	0	2	7	7	3
Establish a national plan for OS	0	1	6	6	5
RPOs and other actors. Identify the appropriate platforms to further develop open science policies and elaborate a European roadmap	0	2	3	11	3

ANNEX I

Assessment of the Amsterdam Call for Action. Methodological Note

After May 2016 Competitiveness Council Conclusions on open access to scientific publications and the transition towards an open science system, and following the invitation to the ERAC Standing Working Group on Open Science and Innovation to ***assess the proposed actions on the Amsterdam Call for Action <u>on feasibility, effectiveness and prioritisation</u>,*** the Standing Working Group conducted its two-step analysis.

During the first phase (November 2016-February 2017), the ERAC Standing Working Group analysis refers to the specific actions included to develop research infrastructures. The second part of the exercise (March 2017-October 2017) concerns the rest of the concrete actions included in the original document of the Amsterdam Call for Action. Main results on the assessment of each specific and concrete action derive from two detailed questionnaires (Annex II) answered by delegates and following their own principles and rules for consultation with main national stakeholders**. Answers to the questionnaires were provided by Austria, Belgium, Cyprus, Czech Republic, Denmark, Slovenia, Estonia, Finland, Germany, Greece, Ireland, Latvia, Malta, Moldova, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and United Kingdom**. The Netherlands did not provide input due to its ownership role of the initiative during the Dutch Presidency of the EU in 2016, while France provided qualitative examples of initiatives that relate to the Call.

The exercise aims to provide a more coherent understanding of the courses of action included in the Amsterdam Call for Action to lead to better policies, given the fragmented landscape and heterogeneity of situations we face at different levels, including national policy frameworks and more particularly at the level of research performing organizations (and sometimes research funding organizations).

This report place suggested actions and priority setting for open science into context by taking into account differences in research policy frameworks, research policy priorities, decision-making processes, funding mechanisms, academic, business and social constituencies and forces.

The analysis has been conducted under the premises of feasibility and effectiveness and aims to contribute to priority setting in decision-making. It is aimed at adding new dimensions on how the process towards open access in research is being organized, discussed and implemented across countries. It therefore considers main policy, institutional and socio-cultural constraints to the advancement of the open science paradigm and to the shared belief that open access to research results and data publicly funded will contribute to increase the knowledge base of the entire European and global economy.

The exercise conducted by the ERAC Standing Working Group on Open Science and Innovation on the Amsterdam Call for Action uses delegates' inputs as a group as well as the inputs and opinions gathered by delegates in their own national context. Hence it benefits from discussions within the group along meetings (February 2017, June 2017 and September 2017).

Construction of the questionnaire

The exercise includes a structured questionnaire addressing feasibility as well as open questions to allow to list (and explain) new initiatives already in place, or new relevant aspects emerging since the Amsterdam Call for Action and contributing to open science. The methodology helps to identify delegates' concerns, needs, reasons, values and expectations, and the outcome is complementary to other stakeholders' vision, needs and concerns (i.e. Open Science Policy Platform).

However, there is a scope issue concerning the inclusion of stakeholder analysis as part of the exercise carried on. Typically, impact assessment exercises entail a rigorous involvement of stakeholders and all the significant impacts upon them. The Amsterdam Call for Action includes a set of actions to be implemented by different institutional actors (stakeholders) including research performing organizations, research funding organizations, libraries and publishers. Though we do not assess in depth the feasibility and effectiveness of the actions for such wide number of stakeholders, delegates were responsible for the specific mechanisms of stakeholders' consultation they have put in place accordingly to their own rules and procedures.

The concrete actions listed in the Amsterdam Call for Action are evaluated taking into account their feasibility and effectiveness.

It should be noted that feasibility is a broad concept and it may be taken as economic or technical feasibility, or alternatively as the political costs and opportunities of implementing specific actions. Along the exercise conducted within the ERAC Standing Working Group on Open Science and Innovation, it refers to specific constraints that prevent for implementation. Feasibility is difficult to judge in the absence of specific policy commitments and resources already in place, but it has several implications for policy learning and contributes to better policy planning and outcomes.

We have defined a 5 points Likert-type scale to test the degree of feasibility and effectiveness of the various items composing the Amsterdam Call for Action, where for an action to be considered as feasible (5) it has to be already under implementation, or directly addressed by policy initiatives, national strategies, policy debates or actions plans, etc. The rating is put in place on the basis of delegates' experience, their role within Administration, their expert knowledge on national policies, resource availability, etc. in the domain of open access and open science. Information provided by this report may thus be used to engineer a better fit between the actions described and the policy and institutional characteristics and conditions, and to increase legitimacy.

The particular value of this method is the *ordinality* of response categories, and it contributes to judge the relative strength of agreement intended in this exercise. This method allows us to provide an overall perspective by country as well as to select the actions under consideration that are being part of the debate on Open Science across countries.

The assessment on the AC4A and the type of questions require the use of individual (not summated) Likert-type items, mainly because we are measuring less concrete concepts. For these Likert-type scale data we cannot use the mean as a measure of central tendency. Differences between "3" and "4" or between "2" and "3" are not necessarily equal, and one cannot assume that the difference between responses is equidistant even though the numbers assigned to those responses are. Consequently, the most appropriate measure **is the analysis of frequencies**, and in the assessment carried out by the SWG OSI a frequency distribution of responses will likely be more helpful.

It is also important to notice that methodological constraints derive from the characteristics and attributes of the actions listed in the Call for Action. Although the results of our analysis suggest a structure among the actions and the value of actions suggested, some actions overlap and often they do not stick rigorously with the areas for policy action to which they relate, possibly contributing to create a biased pattern of responses.

In complement to the quantitative approach of the Likert scales, open questions have also been asked to get a more detailed idea of the arguments that are behind the assessment of feasibility done by the respondents. In particular, we conducted a thematic analysis of the qualitative answers provided by the respondents on the following themes: "Fostering and creating incentives for open Science", "Mainstreaming and further promoting open science policies", "Stimulating and embedding open science in science and society", "Reward System", "Text and Data Mining (TDM) and copyright control", "Intellectual Property Rights (IPR) and privacy issues" and "Transparency".

Open questions also allowed respondents to propose good practices and examples of relevant initiatives

ANNEX II

Assessment of the Amsterdam Call for Action. Questionnaires

Part I. **E-INFRASTRUCTURES** (contained in the Amsterdam Call for Action)

1. Assess the actions listed in the Amsterdam Call for action on the topic according to their feasibility (Likert scale).
Feasibility here means that at the present there are current policy initiatives; national strategies; policy debates; or actions plans, etc. addressing these issues.

Assessment of specific actions by National Governments	1	2	3	4	5
EC and National Governments					
To set up effective and inclusive governance of the **EOSC**					
To set up concerted funding initiatives to develop data expertise					
Assess what is needed in the infrastructure landscape (hardware, computing, storage, software, services, governance, etc.)					
National Governments, National Funders, RPOs, e-infra organizations					
To set up and manage local and national e-infrastructures					
Financial viability and user-friendly services (selection and organization)					
Support work in progress and develop Principles of Open Scholarly Infrastructures to set up concerted mechanisms and fund initiatives to maintain a register of key open access services (sustainability, governance, usage and interoperability)					
Publish the recommendations on funding and risks in a workshop in order to derive a generic approach for such services in general.					
Set up rules of engagement for all contributors (users, e-infrastructure providers, funders etc.) in the EOSC. For e-infrastructure service providers this includes certification schemes.					

1= Not feasible at all; 2= Slightly feasible; 3= Somewhat feasible; 4= Moderately feasible, and 5= Extremely feasible (already in place).

2. For actions listed above that are not feasible (1) or slightly feasible (2) summarize the main factors (barriers) for their implementation

3. List any other action relevant to open science infrastructures currently at stake in your country that is not covered by the listed set of actions derived from the Amsterdam Call?

4. Based on the template provided below refer to the most important opportunities (O) and threats (T) concerning the referred actions in the framework of your national policy context.

Assessment of specific actions by National Governments	O	T
EC and National Governments		
To set up effective and inclusive governance of the **EOSC**		
To set up concerted funding initiatives to develop data expertise		
Assess what is needed in the infrastructure landscape (hardware, computing, storage, software, services, governance, etc)		
National Governments, National Funders, RPOs, e-infra organizations		
To set up and manage local and national e-infrastructures		
Financial viability and user-friendly services (selection and organization)		
Support work in progress and develop Principles of Open Scholarly Infrastructures to set up concerted mechanisms and fund initiatives to maintain a register of key open access services (sustainability, governance, usage and interoperability)		
Publish the recommendations on funding and risks in a workshop in order to derive a generic approach for such services in general.		
Set up rules of engagement for all contributors (users, e-infrastructure providers, funders etc.) in the EOSC. For e-infrastructure service providers this includes certification schemes.		

5. Finally, we consider useful to gather information on a limited number of specific questions. Answers do not have to be lengthy and exhaustive (!). The aim is to map ongoing initiatives in this domain and if possible to grasper their main features (and characteristics) to foster mutual learning and knowledge exchange.

	YES	NO
5.1. Do you have any specific considerations on the European Open Science Cloud and the evolving model proposed by the Commission?		

Please indicate from the perspective of your country the main concerns on the EOSC (based on existing information). Though existing information is very vague at this moment on GOVERNANCE and FUNDING (and long term financial sustainability) it will be important to summarize and analyse main concerns from the perspective of different national governments. It may be useful to answer this point to gather information and opinions for your country representatives in the WG on the EOSC and Digital Market, RWP, etc.

	YES	NO
5.2. Is your country (government, funding agency or any other governmental body) working on a specific roadmap or document concerning e-infrastructures for Open Research Data? Or it is any planned action for 2017?		

If YES, please provide a brief description of the work in progress by referring to objectives, elaboration procedures (i.e. stakeholders involvement, etc.), number and some characteristics on technical solutions such interoperability, certification and standardization, services provided, etc, funding and sustainable business models). Comments by countries already working on the widening of ESIF to support e-infrastructures are particularly welcome. It is important to understand, and anticipate, barriers as well as solutions before February 2017 (WS on the topic).

	YES	NO
5.3. Does your country have any specific vision, strategy or plan to develop common principles for Open Scholarly Infrastructures?		

If YES please indicate very briefly their main features or if NOT what do you think (or your experts consider) those principles should be.

OPEN DATA PRINCIPLES AND MANAGEMENT cannot be totally disentangled from previous questions but the Amsterdam Call has some very specific "actions" attached to national governments (see section on *FAIR and secure data principles*). For the suggested actions:

1. Assess the actions listed in the Amsterdam Call for action on the topic according to their level of implementation (Likert scale).

EC and National Governments	1	2	3	4	5
State that research output produced with public funding should, in principle, be accessible for reuse					
Promote the FAIR principles					
Provide for a bottom-up and discipline-based approach and elaboration					
National authorities and RPOs					
Implement an institutional data policy which clarifies institutional roles and responsibilities for research data management and data stewardship.					
Educate data stewardship experts, recognize their profession and provide them with career opportunities.					
Research Funders					
Implement DMPs as an integral part of the research process, make them a precondition for funding, standardize them and make the costs incurred eligible for funding					
Positive incentives for FAIR data sharing by valuing data stewardship and efforts to make data available. Require data to be cited according to international standards. Encourage the sharing of expertise					
Set the default in data sharing to open access, but allow a choice of access regimes: from open and free downloads to application and registration-based access.					

1= Not at all implemented; 2= Slightly implemented; 3= Somewhat implemented; 4= Moderately implemented, and 5= Fully implemented (already in place).

2. For actions listed above that are not implemented (1) or slightly implemented (2) summarize the main factors (barriers) for their implementation

3. List any other action relevant to open research data in your country that is not covered by the listed set of actions derived from the Amsterdam Call?

4. Based on the template provided below refer to the most important opportunities (O) and threats (T) concerning the referred actions in the framework of your national policy context.

	O	T
EC and National Governments		
State that research output produced with public funding should, in principle, be accessible for reuse		
Promote the FAIR principles		
Provide for a bottom-up and discipline-based approach and elaboration		
National authorities and RPOs		
Implement an institutional data policy which clarifies institutional roles and responsibilities for research data management and data stewardship.		
Educate data stewardship experts, recognize their profession and provide them with career opportunities.		
Research Funders		
Implement DMPs as an integral part of the research process, make them a precondition for funding, standardize them and make the costs incurred eligible for funding		
Positive incentives for FAIR data sharing by valuing data stewardship and efforts to make data available. Require data to be cited according to international standards. Encourage the sharing of expertise		
Set the default in data sharing to open access, but allow a choice of access regimes: from open and free downloads to application and registration-based access.		

5. Finally, we consider useful to gather information on a limited number of specific questions. Answers do not have to be lengthy and exhaustive (!). The aim is to map ongoing initiatives in this domain and if possible to grasper their main features (and characteristics) to foster mutual learning and knowledge exchange.

	YES	NO
5.1. Has (or will) your country adopt(ed) an explicit policy on open research data? What are the main problems for its implementation?		

	YES	NO
5.2. Do you consider that aligning national initiatives on DMPs to Horizon 2020 is feasible for the period 2017-2020?		

5.3. Can you report on any pilot or case study conducted in your country and main lessons from it? What is the role of research performing organizations and their institutional policies on this domain? If there are institutional (RPOs) initiatives in your country please provide a brief information on their disciplinary orientation, engagement and organization.

	YES	NO
5.4. Is there a timeline for adoption and implementation of open research data policies or measures?		

5.5. How do you handle the main concerns on open research data raised by research that is done in public-private partnership or the potential damage on potential economic/commercial benefits and competition by opening up research data?

	YES	NO
5.6. Implementation of international standards for data citation, reuse, etc. Do you have common guidelines at national level in this domain?		

If YES please provide a brief summary of the main characteristics.

5.7. Please provide a brief summary on how research funders in your country have adopted or are planning to introduce DMPs. Is there a common and unique template on DMPs? How research funders plan to monitor DMPs? Are DMPs an integral part of the proposal and its evaluation? How do you evaluate DMPs?

	YES	NO
5.8. Is there any preliminary study, or ongoing activity, related to skills and training related needs on research data management for the near future?		

If YES please indicate how it is organized (stakeholders engagement) and its main goals.

	YES	NO
5.9. Are specific awareness raising activities organized in your country with regard to Open Research Data, and at which level? Which stakeholders do you target? Are there lessons to be learnt at this stage?		

Part II. The questionnaire is structured in two different parts. Part I shows all the actions that refer to National Governments, EC and Research Funding Organizations, including some that require strong cooperation with Research Performing Organizations (RPOs). Part II refers to actions listed corresponding mainly to Research Funding Organizations and Research Performing Organizations (including Universities) alone or in cooperation, and researchers. Please be aware that *feasibility* here means that are currently policy initiatives, national strategies, policy debates or actions plans, etc. addressing these issues are already implemented or that will be fully implemented in the next coming three years. It is important when assessing the feasibility of actions to bear in mind potential time constraints for effectively contributing to foster and create incentives for open science (OS).

National Governments, European Commission and Research Funding Organizations

1. **Assess the actions listed in the Amsterdam Call for action on the topic according to their feasibility** (Likert scale 1= Perceived as not feasible at all; 2= Perceived as slightly feasible; 3= Perceived as somewhat feasible; 4= Perceived as moderately feasible, and 5= There are current policy initiatives).

National Governments, European Commission and RFOs	1	2	3	4	5
ASSESSMENT OF SPECIFIC ACTIONS TO "STIMULATE NEW PUBLISHING MODELS FOR KNOWLEDGE TRANSFER"					
Mobilize stakeholders for a fair, balanced and innovative publishing system by fostering structured dialogue among all stakeholders and sharing expertise and best practices (together with RPOs and any other relevant actors)					
Take stock of the information needs among SMEs and explore how open science can help fill those needs (together with RPOs and any other relevant actors)					
Give political backing to universities (and RPOs) in their negotiations with publishers about access to content					
Encourage parties to develop new models for knowledge distribution using start-up money, and guarantee sustainability in the long term by adequate funding					
Broaden the Open Library of Humanities to the Open Library of Sciences for library consortia					
ASSESSMENT OF SPECIFIC ACTIONS TO "STIMULATE EVIDENCE-BASED RESEARCH ON INNOVATIONS IN OPEN SCIENCE"					
Actively contribute to peer learning about national policies, e.g. within the framework of the development of the European Research Area (ERA)					
Set up research programmes on developments in OA/OS to answer questions regarding the optimal road to OS, the advantages of OS for society at large etc.					
Explore other ways of sharing result outputs, to serve OS					
Let the public participate in the selection of scientific topics through online platforms					

ASSESSMENT OF SPECIFIC ACTIONS TO "DEVELOP, IMPLEMENT, MONITOR AND REFINE OPEN ACCESS PLANS"					
Agree on a 100% target for 2020 and regular monitoring and stocktaking					
Establish standards, systems and services for monitoring and reporting, and monitor progress through ERA Monitoring Mechanism and through the National Points of Reference on OA					
ASSESSMENT OF SPECIFIC ACTIONS TO "INVOLVE RESEARCHERS AND NEW USERS IN OS"					
Foster the existing relations between science, society and business, and develop training and skills for all parties to help them seize opportunities that promote OS					
Acknowledge the value of OS in scientific evaluation and funding; develop strategies to involve new users in the scientific process through Horizon 2020					
ASSESSMENT OF SPECIFIC ACTIONS TO "ENCOURAGE STAKEHOLDERS TO SHARE EXPERTISE AND INFORMATION ON OPEN SCIENCE"					
Foster stronger relations between science, society and business actors to accelerate innovation and encourage sharing of new/ effective ideas					
Work together with all stakeholders to facilitate EU policies that add value to open science					
Establish a national plan for OS					

2. **List any other action relevant to relevant to the abovementioned aspects of Open Science currently in place in your country that is not covered by the listed set of actions derived from the Amsterdam Call?**

3. **What are in your opinion the most important opportunities (O) and threats (T) concerning the referred actions in the framework of your national policy context.**

<u>OPPORTUNITIES</u>	<u>THREATS</u>

4. **Finally, we consider useful to gather information on a limited number of specific questions.** Answers do not have to be lengthy and exhaustive.

	YES	NO
Do you agree and consider that the open access to publications 2020 target is feasible in your country?		

If NOT please summarize the main factors/barriers hampering the process

	YES	NO
Does your country have a national license agreement for scholarly subscriptions or is there any planned action for 2017/2018?		

If YES please specify the entity in charge of negotiating the national license, the publishers with whom you have such national agreement and the year for termination

	YES	NO
Is your country (government, funding agency or any other governmental body) working on a specific roadmap or document concerning open access and alternatives to the current subscription model? Or it is any planned action for 2017/2018?		

Please indicate the main barriers to implement and alternative business model to current subscription model (scholarly/academic journals, and provide a summary of any exploratory "alternative" model existing in your country

	YES	NO
Do you consider the number of actions listed by the AC4A on Open Science and Open Access adequate to foster <u>knowledge transfer and innovation</u>?		

If NOT, please summarize the main arguments and provide a brief description of the work in progress concerning specific KT actions in place/progress in your country.

	YES	NO
Is any specific measure being implemented (or in progress) to include citizen science as part of the national agenda on OS?		

Please provide a brief description on the linkages already made operational in your country between citizen science and other aspects of Open Science, such as Open Access, Open Research Data or Open Education.

Research Funding Organizations[2], Research Performing Organizations (including Universities) and researchers

1. **Assess the actions listed in the Amsterdam Call for action on the topic according to their feasibility** (Likert scale 1= Perceived as not feasible at all; 2= Perceived as slightly feasible; 3= Perceived as somewhat feasible; 4= Perceived as moderately feasible, and 5= There are current policy initiatives).

Research Funding Organizations (RFOs), Research Performing Organizations (RPOs), Universities and researchers	1	2	3	4	5
ASSESSMENT OF SPECIFIC ACTIONS TO "ADOPT OPEN SCIENCE PRINCIPLES"					
Realign and coordinate activities, as both funders and research organizations pay for subscriptions and APCs					
ASSESSMENT OF SPECIFIC ACTIONS TO "STIMULATE NEW PUBLISHING MODELS FOR KNOWLEDGE TRANSFER"					
Bring in new users, allow for new forms of funding (i.e. crowdfunding) and develop Joint Open Science Initiatives (JOSIs) around a societal challenge					
Make cross-border funding easier and fund risky projects more aggressively.					
Be critical in financing commercial entities with a poor record on open science adoption					
Provide start-up money for alternative open access publishing models so that they can become established and sustainable					
Provide less specific funding tracks, more flexible funding (including OS components in research proposals, faster calls), better promotion of funding possibilities for young/ new/innovative stakeholders, including small-scale initiatives					
Have specific research output translated to specific target groups, such as patients					
Include citizen science into the mainstream					
Urge publishers and researchers to experiment with new, faster ways of publishing, such as immediate publishing based on open peer review (flipped publishing)					
Urge publishers and researchers to no longer accept disclosure clauses					
Urge publishers and researchers to promote widespread application of citizen science as a knowledge transfer (including accessible output of citizen science projects)					
Urge publishers and researchers to allow for the publication of negative results/data					
Together with publishers and research/university libraries support discipline based foundations that help flip subscription journals to FAIR open access by providing funds for APCs and transition by 2020					
Urge publishers and research/university libraries to promote 'bulk' processing of APCs to reduce administration overload among researchers					
Research and University Libraries act as publishers of open access for their institutions; create a database of open science best practices					
ASSESSMENT OF SPECIFIC ACTIONS TO "STIMULATE EVIDENCE-BASED RESEARCH ON INNOVATIONS IN OPEN SCIENCE"					
Research and University libraries. Research and University Libraries raise awareness, participate in EU projects, collect best practices, create a forum to share experiences					
ASSESSMENT OF SPECIFIC ACTIONS TO "DEVELOP, IMPLEMENT, MONITOR AND REFINE OPEN ACCESS PLANS"					
Develop OA plans, including the provision of necessary infrastructures and services, share expertise and use harmonized data, e.g. by setting up and coordinating platforms for monitoring and networks of expertise					
ASSESSMENT OF SPECIFIC ACTIONS TO "INVOLVE RESEARCHERS AND NEW USERS IN OPEN SCIENCE"					
Develop training and skills, tailored to each discipline, including ICT and library personnel etc. Involve new user groups through platforms and otherwise and give them the opportunity to take up a role when funding projects					

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2   Research Funding Organizations are included here since a large number of actions refer to strong collaboration between RFOs and RPOs.

ASSESSMENT OF SPECIFIC ACTIONS TO "ENCOURAGE STAKEHOLDERS TO SHARE EXPERTISE AND INFORMATION ON OPEN SCIENCE"					
Identify the appropriate platforms to further develop open science policies and elaborate a European roadmap					

2. **List any other action relevant to relevant to the abovementioned aspects of Open Science currently in place in your organization that is not covered by the listed set of actions derived from the Amsterdam Call?**

3. **What are the most important opportunities (O) and threats (T) concerning the referred actions in the framework of your national policy context.**

OPPORTUNITIES	THREATS

4. **Finally, we consider useful to gather information on a limited number of specific questions.** Answers do not have to be lengthy and exhaustive.

	YES	NO
Do you agree and consider that the Open Access 2020 target is feasible in your country? And for **your institutions[3]?**		

If NOT please summarize the main factors/barriers hampering the process

	YES	NO
Do your institutions provide specific incentives for researchers for publishing in open access? Or is there any planned action for 2017/2018?		

If YES, please provide a brief description of the set of incentives provided and actions to be in place

	YES	NO
Do your institutions provide specific support to researchers for publishing their results in open access? Is there any planned action for 2017/2018?		

If YES, please provide a brief description of support provided in terms of infrastructure, services, data management, etc. and how it is internally organized within your institutions

	YES	NO
Do your institutions monitor the evolution of open access publications by researchers? Is any planned action for 2017/2018?		

If YES please provide main figures on recent evolution

	YES	NO
Do you consider the number of actions listed by the Amsterdam Call for Action Open Science and Open Access adequate to foster knowledge transfer and innovation?		

If NOT, please summarize the main arguments for it

	YES	NO
Is any specific measure to mainstream citizen science being implemented (or in progress) in your organization?		

Please provide a brief description on how citizen science is currently addressed in your country/institutions.

Remaining topics

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[3] By « your institutions » we mean all the relevant institutions at your national level. Please use the open space to detail any significant difference between the different relevant institutions, where relevant.

In this last part of the questionnaire we will address some important topics that relate to Open Science but that have not been properly tackled by the two questionnaires. For each of the following actions mentioned in the Amsterdam Call for Action, please indicate which is <u>the main </u>barrier that you are facing in the implementation of the action or <u>the main</u> reason why you do not intend to implement the action in the near future.

Reward system

National authorities: acknowledge that national initiatives are reaching their limits, and that this is an area for a harmonised EU approach.

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National authorities and research funders: reform reward systems, develop assessment and evaluation criteria, or decide on the selection of existing ones (e.g. DORA for evaluations and the Leiden Manifesto for research metrics), and make sure that evaluation panels adopt these new criteria.

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Research Performing Organisations and research funders: further facilitate and explore the use of so-called alternative metrics where they appear adequate to improve the assessment of aspects such as the impact of research results on society at large. Experiment with new approaches for rewarding scientific work.

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Research funders: develop and adopt citation principles for publications, data and code, and other research outputs, which include persistent identifiers, to ensure appropriate rewards and acknowledgment of the authors.

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Research funders: facilitate and develop new forms of scientific communication and the use of alternative metrics.

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Text and Data Mining (TDM)

National authorities and national parliaments: adopt and implement rules and legislation that make TDM easier for academic purposes and preferably also for societal and commercial purposes.

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Research funders and Research Performing Organisations: actively stimulate authors to retain control over their research output, including articles and books. This can be achieved by setting preconditions for funding and by introducing licensing systems.

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Intellectual Property Rights (IPR)

Research funders: set open data as the default standard for publicly funded research and communicate clearly that this does not equate to relinquishing intellectual property in public-private and public-public partnerships.

Research Performing Organisations: think actively about what to share and what not to share and avoid automatically choosing the safest option (i.e., not sharing).

Research funders and Research Performing Organisations: develop and set standards on privacy by design also in negotiations with other partners on reuse of data.

Transparency

National authorities: give strong political backing to Research Performing Organisations in their negotiations with publishers.

Research Performing Organisations: collaborate closely, e.g. form consortia, to negotiate with publishers, in order to reach agreements in which fair open access is the default standard.

National authorities: work with all other stakeholders to create a comprehensive and transparent system for gathering and sharing information on the costs and conditions of academic communication.

National authorities, Research Performing Organisations: require details of public spending to be fully transparent and abolish non-disclosure clauses in contracts.