Deliverable D6.1:

Feasibility of using existing open access networks to support the harmonization of open access

Author(s):	Peter Linde (Blekinge Institute of Technology); Bridgette Wessels, Rod Smallwood & Lada Price (University of Sheffield); Merel Noorman & Sally Wyatt (e-Humanities Group, Royal Netherlands Academy of Arts and Sciences – KNAW); Jeroen Sondervan (Amsterdam University Press)
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EXECUTIVE SUMMARY

The aim of this Deliverable is to provide guidance for how the stakeholders in the open data ecosystem can mobilise open access to research data. It outlines strategies for mobilising the Policy RECommendations for Open access to research Data in Europe (RECODE) recommendations for stakeholders. In the last 10 years there have been several statements from both governments and other major stakeholders indicating interest in making research data openly available. What was signed as a letter of intent to "free internet access to and use of publicly funded scientific publications and data" in the Berlin declaration[1] is now starting to be implemented through directives in policies and recommendations from the European Commission[2], The US government[3], Organisation for Economic Co-operation and Development (OECD)[4], The Royal Society[5], The League of European Research Universities (LERU) Roadmap[6], Wellcome Trust[7] etc. The RECODE recommendations now provide a template for fully developing open access to research data, however, this raises the question of how best to mobilize the open access ecosystem to ensure that open access to research data is fit for purpose. To this end, this deliverable focus on key areas for mobilization, such as creating a favorable ecosystem for all Open Access (OA) stakeholders with a focus on objectives for achieving change in practice and objectives for achieving impact by evidenced benefits. Strategies aimed at cooperative and coordinating activities that combine both change in attitude and practice are likely to be most successful in advancing open access, data preservation, dissemination and use of research data. Mobilization objectives of this type have the greatest impact on and bring the most benefit to stakeholders.

In this report we identify and assess different options for bringing together and mobilizing relevant stakeholders in the open access arena. This builds on previous work done in the RECODE project about the open access stakeholder ecosystem, the barriers and the enablers for open access to research data as well as on the RECODE overarching policy recommendations set out in the RECODE work package 5.[8] We have identified a sample of existing networks and organizations to determine whether they are able to meet stakeholder needs and mobilization objectives for open access, data preservation, dissemination and use,

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[1] Max Planck Society, *Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities*, 2003. http://oa.mpg.de/files/2010/04/berlin_declaration.pdf

[2] European Commission, Commission Recommendation on access to and preservation of scientific information, C(2012) 4890 final, Brussels, 17 July 2012, p.13. http://ec.europa.eu/research/science-society/document_library/pdf_06/recommendation-access-and-preservation-scientific-information_en.pdf

[3] Obama, Barack, Executive Order -- Making Open and Machine Readable the New Default for Government Information, May 09, 2013. http://www.whitehouse.gov/the-press-office/2013/05/09/executive-order-making-open-and-machine-readable-new-default-government-

[4] Organisation for Economic Cooperation and Development, *OECD Principles and Guidelines for Access to Research Data from Public Funding*, OECD, Paris. 2007. http://www.oecd.org/dataoecd/9/61/38500813.pdf

[5] The Royal Society, *Science as an open enterprise*, The Royal Society, London, 2012. http://royalsociety.org/uploadedFiles/Royal_Society_Content/policy/projects/sape/2012-06-20-SAOE.pdf

[6] League of European Research Universities, *LERU Roadmap for Research Data*, Advice paper no. 14 – December 2013. http://www.leru.org/files/publications/AP14_LERU_Roadmap_for_Research_data_final.pdf

[7] Wellcome trust, Data sharing, no date. http://www.wellcome.ac.uk/About-us/Policy/Spotlight-issues/Data-sharing/

[8] Tsoukala, Vicoria, Marina Angelaki,, Bridgette Wessels, Peter Linde, Jeroen Sondervan and Rachel Finn *Policy guidelines for open access and data dissemination and preservation,*, RECODE D5.1, January 2015.

and what these organizations can or must do in order to better mobilize stakeholders in order to meet the policy recommendations.

We have identified not only examples of good practice but also the barriers not addressed by any currently available structures or organizations. While there are many forces striving to make data sharing common practice, there is still a lack of an overarching, international initiative to implement necessary requirements for making data sharing a truly international community asset. Within the European community the prerequisites and the ambitions are very different among the member states. Even amongst those countries where open access has long been on the agenda, there remain issues and barriers to be addressed. For example, training is needed in most of the stakeholder groups; investment in infrastructure building and funding is required in most institutions dealing with open access to research data; much work remains to be done to convince researchers that sharing data is a good idea. These are just a few of the obstacles that still need attention despite good, on-going efforts by individuals, organizations and states.

The organizations we have chosen to include in this report are those that either have a broad positive approach towards open access or a focus on open access to government or research data. We have included organizations and networks of different sizes and structures. The first two RECODE deliverables have been used as a selection tool. We chose organizations mentioned in the deliverables but also used the RECODE contact list for a broad sample. There is a concentration on European organizations, especially from the UK, Germany and the Netherlands, where open research data is most advanced within the EU.

Section 2 of this report identifies stakeholder needs for open access data, data preservation, dissemination and (re)use. It provides an overview of important mobilizing objectives for each stakeholder function. What we have found is that objectives aimed at cooperative and coordinating activities that combine both change in attitude and practice are to be preferred for meeting the needs of advancing open access, data preservation, dissemination and use of research data. Examples of such a mobilizing theme for funders and creators of data are to support education and advancement of young scientists. Another objective that goes across these functions is to increase and improve scientific collaboration using open data. For disseminators and curators of data, examples of collective objectives are access, security and preservation of data, and training.

How then do we promote our recommendations to the stakeholder groups? In section three we identify key groups and networks and their relations in each of the five stakeholder functions, describing the mechanisms used to influence decisions, cooperate towards common goals and to disseminate and receive information. We have found that a number of well-tried channels and mechanisms are available for cooperative initiatives. For RECODE, umbrella organizations like the Federation of All European Academies (ALLEA) or Research Councils United Kingdom (RCUK), professional associations like Council of European Social Science Data Archives (CESSDA) and Association of European Research Libraries (LIBER), and public sector knowledge networks (PSKN) like the Research Data Alliance (RDA), Committee on Data for Science and Technology (CODATA) and Confederation of Open Access Repositories (COAR), are especially suited for information and knowledge sharing across organizations and functions as they involve many members and are used to participating in international projects and issues. Using and supporting these kinds of networks is one way to further harmonize the open access eco-system and mobilize the RECODE recommendations.

Our conclusion is that it is feasible to use existing open access networks to support harmonization of open access policies across Europe. There are several strong and qualified networks already at work in the open access eco-system. But, in order to achieve a researcher-centred, ethical, coherent and flexible approach to open access, we suggest that the key stakeholders need to be mobilized to form collaborative partnerships to ensure that open access principles govern the open data ecosystem. The aim of these three mobilizing recommendations is to support key stakeholders in engaging in collaborative partnerships to further define and improve their particular functions in the ecosystem with the help of the RECODE policy recommendations. The European Commission should therefore take initiative to:

1.   Develop a high-level strategy for mobilization that takes into account the varied motivations and needs of stakeholders.
2.   Establish a sustainable network of mobilization actors to coordinate and deliver the high-level strategy.
3.   Develop a platform/project to integrate and oversee the mobilization of OA, in order to reduce duplication of effort, reduce fragmentation, and share best practice among stakeholders.

The mobilization actors mentioned in recommendation #2 could be a relevant set of stakeholder specific umbrella organizations, professional associations and PSKNs. Their goals are to support and serve members and member organizations; to lobby for policies, and to share information about best practices. Umbrella organizations are major organizers of conferences, workshops and training seminars where the RECODE recommendations could be discussed and advanced. The project/platform would use the recommendations via these organizations representing each of the five stakeholder functions advancing policy making and policy change on all levels.

1   INTRODUCTION

The aim of this Deliverable is to provide guidance for how the stakeholders in the open data ecosystem can mobilize open access to research data. It outlines strategies for mobilising the RECODE recommendations for stakeholders. In the last 10 years there have been several statements from both governments and other major stakeholders indicating interest in making research data openly available. What was signed as a letter of intent to "free internet access to and use of publicly funded scientific publications and data" in the Berlin declaration is now starting to be implemented through Directives in policies and recommendations from the European Commission, the US government, OECD, The Royal Society, LERU Roadmap, Wellcome Trust, and others. Yet, in various scientific fields there remain different types of barriers hindering open access, including technological factors, infrastructural issues, lack of metadata and training, use of heterogeneous formats. These and other barriers have been explored in the RECODE Deliverable D2.1.[9] Legal and ethical challenges such as privacy, copyright and license issues were covered in RECODE Deliverable D3.1.[10] Challenges faced by institutions, such as archives, libraries, universities, data centers and funding bodies, in making open access to research data possible are studied in the RECODE deliverable D4.1.[11] Based on these analyses of barriers as well as the good practices that are currently being developed and experimented with RECODE has formulated a set of overarching as well as specific recommendations for various stakeholders to provide a template for fully developing open access to research data.

The 10 overarching RECODE recommendations are:
1. Develop aligned and comprehensive policies for open access to research data in consultation with the relevant research communities, assigning clear responsibilities to different stakeholders
2. Ensure that appropriate funding is available to enable researchers and institutions to comply with open access to research data policies and mandates.
3. Develop policies and initiatives that incentivize researchers to open access to data through reward systems for high-quality data
4. Identify key stakeholders and relevant networks and foster collaborative work for a sustainable ecosystem for open access to research data
5. Plan for the long-term, sustainable curation and preservation of open access data
6. Develop comprehensive and collaborative technical and infrastructure solutions that afford open access to and long-term preservation of high-quality research data
7. Consult with key stakeholders and where appropriate agree on technical and scientific data quality standards
8. Develop and utilize harmonized open licensing frameworks, especially creative commons or similar open licenses

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[9] Bigagli, Lorenzo, Thordis Sveinsdottir, Bridgette Wessels, Rod Smallwood, Peter Linde, Jeroen Sondervan, *Infrastructure and technology challenges*, Recode D2.1, March 2014. http://recodeproject.eu/wp-content/uploads/2014/04/D2.1-Infrastructure-and-technology-challenges.pdf

[10] Finn, Rachel, Kush Wadhwa, Mark Taylor, Thordis Sveinsdottir, Merel Noorman, Jeroen Sondervan, *Legal and ethical issues in open access to research data*, Recode D3.1 April 2014. http://recodeproject.eu/wp-content/uploads/2014/05/D3.1-legal-and-ethical-issues-FINAL.pdf

[11] Noorman, Merel, Vasso Kalaitzi, Marina Angelaki, Victoria Tsoukala, Peter Linde Thordis Sveinsdottir, Lada Price and Bridgette Wessels. *Institutional barriers and good practice solutions,* RECODE D4.1, September 2014. http://recodeproject.eu/wp-content/uploads/2014/09/RECODE-D4.1-Institutional-barriers-FINAL.pdf

9. Make better use of internal review processes to meet requirements related to particular legal and ethical practice
10. Support the transition to open access through educational and training programmes

The question then is: how best to mobilise the open access ecosystem to ensure that open access to research data is fit for purpose and in accordance with the RECODE recommendations? A key finding of the RECODE project is that the development of open access to research data needs to be informed by the research practices and processes in the different disciplines and characterised by a partnership approach among key stakeholders in order to ensure a firm embedding of open access to research data in wide range of research communities.[12] In this report we, therefore, identify and assess different options for bringing together and mobilizing relevant stakeholders in the open access arena. More specifically, we examine various network organizations with strong foothold in the various scientific practices that can help to mobilize particular stakeholders.

1.1   METHODOLOGY

This report examines the feasibility of using existing open access networks to support the harmonization of open access. In order to do this we have used a literature review of technical reports, guidelines, policies and other grey literature, scholarly literature and results from RECODE related projects. Besides the literature review we have investigated the activity of relevant organizations by exploring web-pages, blogs, discussions, mailing lists and other internet based communication channels, gathering information about activities, existing solutions, barriers, needs, good practice and other initiatives to propagate open access to research data. We also used the experience and the information we have gathered during the RECODE project from interviews with researchers and the feedback gained from stakeholders during several accomplished workshops. The organizations we have assessed as relevant for this study are listed in the appendix tables.

1.2   STAKEHOLDER TAXONOMY

In the RECODE deliverable *D1: Stakeholder Values and Ecosystems*[13] we presented a version of the stakeholder ecosystem using a functional taxonomy consisting of five entities or functions with interconnected performers. It can be visualized as a layered cake where stakeholders operate and interact in different layers at the same time. Creators can also be Users and Disseminators. Curators can be Disseminators and Users and so on. The flows of the ecosystem go in many directions and can involve the same performers in more than one function.

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[12] Tsoukala, et al, op. cit.,2015.

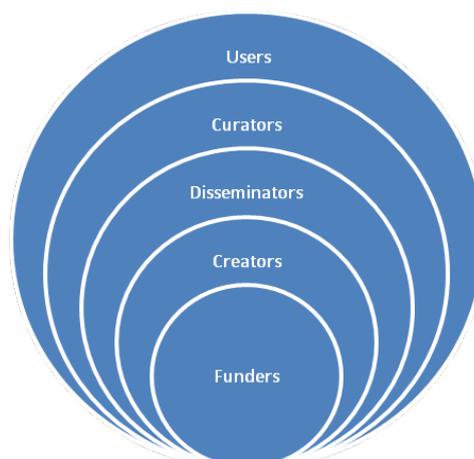[13] Sveinsdottir, et al, op. cit., 2013, p 21-31

Fig. 1. RECODE Functional taxonomy

The stakeholders in the Funders & Initiators function have a high interest in opening up data and also have the power to influence decisions in that direction. The main performers in the Funders & Initiators function are distributing funds as research foundations, councils, national funding agencies or charities. They are quite a diverse group both structurally and in terms of their motives to fund science. Other performers in this function like advocacy groups, policy makers and civil society organizations (CSO) are concentrating on influencing decisions and initiating processes. They are organized in a much more heterogeneous way but share the same motives as the funders. Creators refers to a wide influential and wide ranging group of organizations and individuals, including researchers, research institutes, service providers, and standards organizations. Disseminators are likewise a heterogeneous group of stakeholders. Data centers and publishers are key members of this group. Datacenters have a strong interest in and knowhow of open research data, but have medium power to influence. Publishers on the other hand have shown a modest interest in open research data, but have a high possibility to influence implementation and use of data. Curators include libraries and archives. Curators are a more solid group of stakeholders with a high interest in, and know-how of, curation and dissemination of scientific publications but also of data sets. Their influence on decisions in the academic world is moderate but their role as initiators of open access publishing is undisputed. The media and Information aggregators are stakeholders with a primary function in the User function. The media has an obvious interest in creating news using, for example government data, but is not using much influence to push for open data. The same goes for information aggregators like Google, Mendelay, the Digital Science Company etc. Stakeholders in the User category are often commercial players and are clearly waiting for policies and recommendations from policymakers and governments on the future of open access to data sets.

In this report we will focus on the funder, creator, disseminator and curator functions since they are the most influential in the push for open access to research data. Among all of the stakeholders there is a common understanding that science is a public good, of great value to society and that science is a cumulative process where transparency, reviewing, testing, reuse and discussion are positive drivers. From this understanding stakeholders derive most of the motives. Examples of such motive are that open access to data delivers faster progress in science; it minimizes duplication efforts and offers possibilities for re-analysis, comparison, integration and testing.[14]

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[14] Sveinsdottir, et al, op. cit., 2013, p 8

1.3   NETWORKS, MOTIVATIONS AND THE ECOSYSTEM

The term ecosystem is used in this context as a way of describing a community of performers with different functions and drivers and heterogeneous interests, but with overarching values and motivations. These values and motivations link the functions and performers together and form the boundaries of the ecosystem. Ecosystems in nature are controlled both by external and internal factors.[15] In the open access ecosystem, the external factors could translate to things like political, social, economic, scientific and cultural systems while internal factors are political will, economic and academic competition, social solidarity, technical infrastructures, laws, ethics, etc. The values and motivations in the ecosystem are products of a combination of external and internal factors. While the external factors control resource input to the system, the internal factors control the availability and distribution of these resources. Using this ecosystem analogy from biological science makes it easier to understand how the functions and performers interact and why they do. In our context, the open access ecosystem encompasses a variety of stakeholders who each perform different functions in this ecosystem. They interact or not for a common good or to achieve their own goals.

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[15] Wikipedia, Ecosystems, no date. http://en.wikipedia.org/wiki/Ecosystem
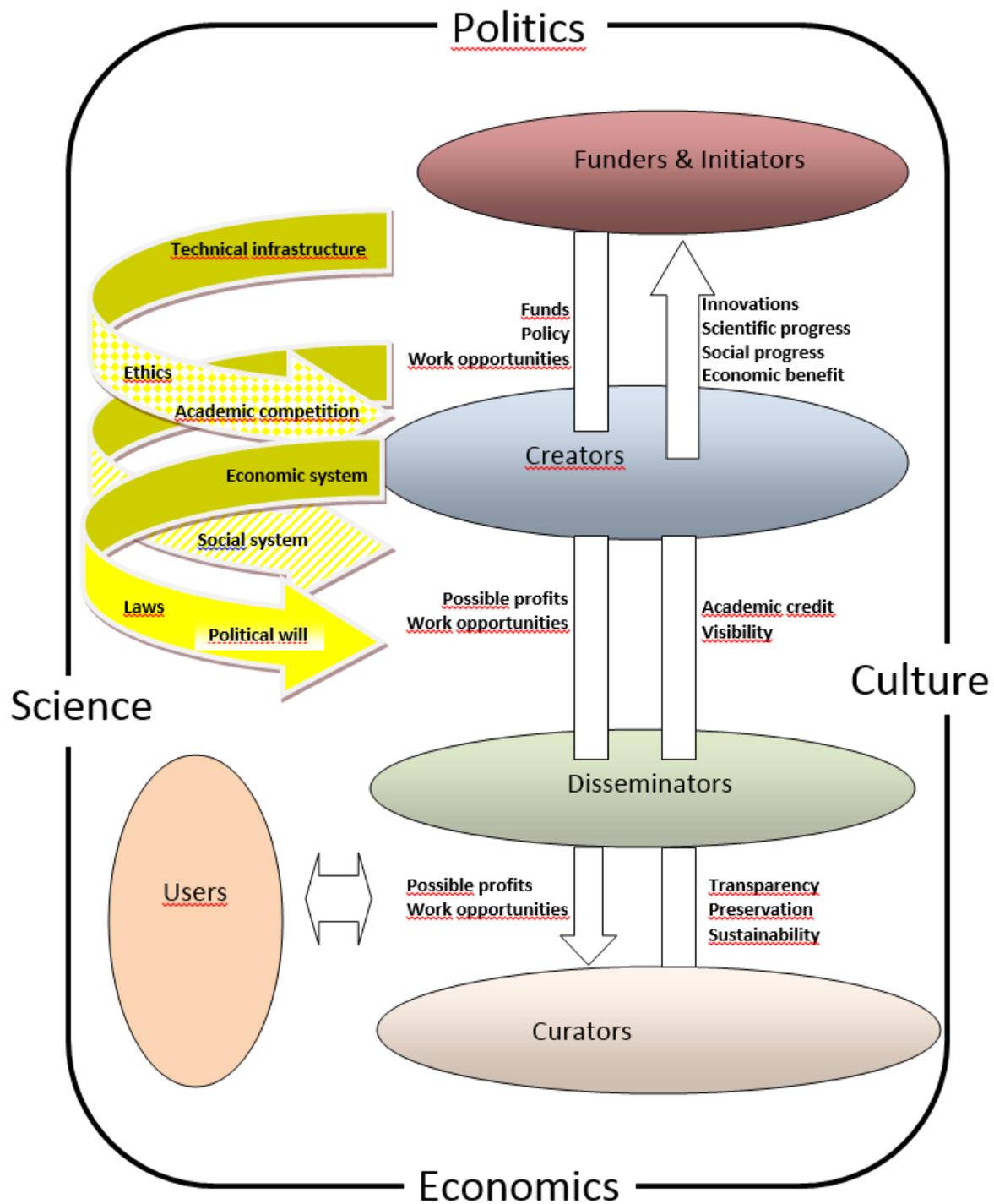
Figure 2. The research data ecosystem with the main functions and their performers and how external (social/economic/political systems) and internal factors (political will/law/infrastructure etc.) produces values/motivations affecting the system.

2   STAKEHOLDER NEEDS AND MOBILIZATION OBJECTIVES

One of the objective of the RECODE project is to find ways to leverage stakeholder organizations to provide better support for pan-European policies on open access and data dissemination and preservation. We now have an environment where open access to publications has advanced to become a familiar concept. Even if this is not true for open access to research data, it makes stakeholders very receptive to the arguments of open data. We therefore already have most of the circumstances that make it possible to mobilize stakeholders – we have identified an issue, we have interested parties, we have technology (even though some aspects are missing), the same goes for resources like funding and labour and we have organizations and commitment to the ideas. Mobilization is often dependent on intermediaries such as professional associations, media, enthusiasts, institutional support, policies and dense networks between actors.[16] In this case most of the stakeholders that have dense network connections have a history in promoting/advocating open access to publications.

2.1   STAKEHOLDER VALUES AND MOTIVES

There seem to be a consensus among stakeholders that science is of great value to society. This consensus is based on an ongoing dialogue, and the knowledge that research is cumulative. It is also based on the assumption that scientific results should be further scrutinized, re-analysed and tested. Such critical scrutiny is one of the founding principles of science. It is such scientific principles that much of the stakeholder literature draws on when discussing open research data. Another motivation for implementing open data is the promise that it will accelerate science by minimizing duplication of effort and offering scientists a wider range of data to use and reuse. Also the promise of social and economic benefit and furthering public access to science is a strong motivating factor.

Besides the above-described overarching motives, various stakeholders have their own reasons for pursuing wishing to make research data more openly available. Such motives can be generalized on a functional level:
- Motives of funders, policymakers and initiators:
  - Increased amounts of data has the potential to advance science and discovery
  - Is a necessity for the funding of large-scale equipment for experiments
  - Inspires innovation
  - Reforming and developing public service
  - Addressing societal challenges
  - Fostering participation of citizens in political and social life and increasing transparency of government
- Motives of creators:
  - Reduce duplication of effort
  - Error testing
  - Robustness of research outputs is increased by access to larger datasets
  - Sharing of data and methods helps solving increasingly complex problems

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[16] Friedman, Andrew L. and Samantha Miles, *Stakeholder:Theory and practice*, Oxford University Press, 2006, p. 97.

- Facilitates international cooperation
- Fulfill funder requirements
- Increase recognition
- Motives of disseminators and curators:
  - Adds value to organization/products
  - Increased opportunity to raise the visibility of researchers, repository host institutions and funders, by linking them to valued resources
  - Reduce information inequality within and between developed and developing countries
  - Strengthens the public role of libraries and help them fulfil their responsibility as generators, distributors and guardians of knowledge derived from scientific research
  - Strengthen research libraries as active agents central to the process of the transmission and creation of knowledge
  - Added value to customers - researchers, readers and authors.
  - Increases visibility

2.2 STAKEHOLDER BARRIERS AND NEEDS

Activities to enable open access to research data are often of a vanguard or pioneering nature since they relate to a relatively new phenomenon and are rarely supported by adequate funding, political and cultural unity or existing technical infrastructure. This is why individuals and organizations working towards open access for research data experience many different barriers in their endeavors.

In previous deliverables we identified a number of barriers that stakeholders experienced when involved in open data exercises. Stakeholders in different functions as funders, creators, disseminators, curators or users often share these barriers. The major barriers listed in the table below are collected from the RECODE deliverables[17] and other reports and documents studying stakeholder barriers to Open Access Data.[18] Quite a few of these studies are focusing on government data.[19]

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[17] Sveinsdottir, et al, op. cit. 2013; Bigagli, et al, op. cit. 2014; Finn, et al, op. cit. 2014; Noorman, et al, op. cit. 2014.

[18] Opportunities for Data Exchange, *Baseline Report on Drivers and Barriers in Data Sharing*, October 28th, 2011, pp. 61-72. http://www.alliancepermanentaccess.org/wp-content/uploads/downloads/2011/11/ODE-WP3-DEL-0002-1_0_public_final.pdf; van Veenstra, Anne Fleur and van den Broeki, Tijs. "Opening Moves – Drivers, Enablers and Barriers of Open Data in a Semi-Public Organization", *Lecture Notes in Computer Science* vol. 8074, 2013 pp. 50-61; IGLO, *ERA in Action on open access to research data: key findings from the surveys and the experts' discussion*, no date. http://recodeproject.eu/wp-content/uploads/2013/05/20130422_Recommendations-OA-to-research-data_final.pdf; PARSE.Insight, *Science Data Infrastructure Roadmap*, Deliverable D2.2, 2010. http://www.parse-insight.eu/downloads/PARSE-Insight_D2-2_Roadmap.pdf

[19] Martin S., M. Foulonneau, S. Turki and M. Ihadjademe, "Open Data: Barriers, Risks, and opportunities", in *Proceedings of the European Conference on e-Government*, 2013, Como, Italy.; HM Government, Open Data White Paper: Unleashing the Potential, Cabinet Office, Great Britain, 2012. http://data.gov.uk/sites/default/files/Open_data_White_Paper.pdf; Barry, Emily and Frank Bannister, *Barriers to open data release: A view from the top*, Conference paper – European Group for Public Administration, Edinburgh 9 September, 2013. https://www.scss.tcd.ie/disciplines/information_systems/egpa/docs/2013/BarryBannister.pdf

Using the material mentioned above, it is possible to sort the barriers into four main categories: Organizational/Financial, Legal/Ethical, Cultural and Technological. The label "Cultural" is used to capture disciplinary differences and ongoing paradigm changes in science and scientific publishing. The table below, where different barriers are color coded according to the categories above, gives a rough view on the barriers and needs within the open data eco system. It also tries to visualize possible mobilizing objectives connected to the needs and the organizations involved in reducing the needs and the barriers. It is not possible to draw definitive lines between specific stakeholder functions or performers and specific barriers or needs. Stakeholders can fit in several functions and the barriers and needs are often collective and do not necessarily belong to only one stakeholder group. But stakeholder needs are easier to attach to functions rather than to performers so the charts below must be explored with this in mind. In the table below we have tried to identify major stakeholder barriers and needs, together with objectives and organizations in order to visualize what possible mobilization objectives can relieve needs and what the key organizations and networks involved in this process could be.

Barriers, Needs, Mobilizing objectives and key organizations within the open data eco system

	Barriers	Needs	Key org. Group	Mobilising Objectives
Funders	Attitude towards data varies between disciplines.	Data policy that considers data differences between disciplines.	ERA, ERC, EUROHORC, ESF, RIN	Address the need for public investment. Long term preservation of data. Coordinate and cooperate. Provide career boosting activities.
	No policy for open access.	Clear Open Access Policy.	SPARC, APA. RDA, ERA, ERC, ESF, RIN, RCUK, Science Europé	
	Several Definitions of open data.	Consensus definition of open data.	RDA, APA, ERA, ERC, EUROHORC, ESF, RIN	
Creators	Sensitive data.	Clearifying the conditions for OA.	DCC, JISC, RDA	Maximize visibility and impact of research and data. Increase scientific collaboration. Ensure compliance with the funding bodies' requirements on OA.
	Problem of combining research data with data from public authorities, which come with a set of legality issues surrounding the use and integration of data.	Cooperation across borders.	ALLEA, LERU, SURF, EGU, UkOLN	
	No career incentive for publishing data.	New career paths for data professionals. Make data citeable.	CERN, DDGT, GEOSS, OECD, ICSU	
	Fear of being scooped.	Make data citeable.	CERN, DDGT, GEOSS, OECD, ICSU	
	Attitude towards data varies between disciplines.	Practical bottom-up solutions.	CERN, DDGT, GEOSS, OECD, ICSU	
	Research is competitive leading to lack of willingness to share data.	Promote actions for sharing data.	KNAW, Royal Society, RDA, JISC, DANS	
	Research data, derived from different producers and owners, does invite complexities regarding licencing, ownership, IPR and copyright issues	Cooperation across borders.	ALLEA, LERU, SURF, EGU, UKOLN	
Disseminators & Curators	The longevity of the data is not ensured.	Funding for preservation policies.	RDA, CESSDA, DCC, DPE, TRAC, ELIXIR	Promoting best practices through curation and collaboration. Improve access to and uses of data. Raise standards in data management and security. Drive archival innovation. Close collaboration with research groups and university libraries. Provide appropriate services to other stakeholders in the ecosystem. Ensure future preservation of data. Develop teaching and learning resources and user training and tools. Demonstrate effective and transparent governance arrangements. Develop strong career-related incentives for creators. Facilitate data exchange.
	Massive amount of training needed.	Development of courses. Cooperative use of resources.	CESSDA, LIBER, EBLIDA, ALA, IFLA, ARL, RDA,	
	Publishing & Visibility.	New forms of publications that accept and encourage open data.	EIFL, OASPA, STM, COAR, RDA, DataCite, CODATA	
	Need to trust that the Open Access system will protect data and secure responsible use	Accreditation & certification. Sustainable systems of usage and access restriction.	CESSDA, OCLC GEOSS, DINI, ELIXIR, CODATA	
	No single clear choice of repository, wich may render search and use of data difficult	Encourage generic and subject repositories for open data.	COAR, OpenAIRE, re3data.org, CESSDA	
	Unavailable infrastructure	Data flow and infrastructure improvements.	RDA, CESSDA, DCC, DPE, COAR, OpenAIRE	
	Difficult to make sense of the data without contacting the creator	Better tools for improving metadata	OASPA, STM, COAR, RDA, DataCite	
	Not enough funding.	More funding.	CESSDA, LIBER, EBLIDA, ALA, IFLA, ALLEA, LERU	
	Time and cost of metadata.	Funding metadata and data creation. Using joint systems.	COAR, OpenAIRE, LIBER, ALLEA, LERU	
	Lack of standard procedures and formats.	Standard procedures and formats.	CC, ISO, DINI, GEOSS, W3C	
Users	Inconsistable funding.	Development of sustainable business models.	OKF	Achieve an understanding and awareness of OA to data and publications.
	Lack of relevance to the general public.	Training of data intermediaries.	OKF, W3C	
	Organizational/Financial	Ethical/Legal	Technical	Cultural

TABLE 1: Major stakeholder barriers and needs. Barriers are color coded according to the categories in the last row.

It is not surprising to find that most of the barriers are experienced by the creators, curators and disseminators of data and that the barriers to implementing open data seems to be quite an even mix of the categories. Legal and ethical barriers are found mainly within the creator function. Here are also quite a few barriers of the cultural type. This might imply that policy recommendations aimed towards creators must address cultural and ethical/legal issues and recommendations towards curators/disseminators need to address more technological and organizational issues.

Disseminator and Curator needs are much the same since there is no clear dividing line between the two functions. They both disseminate data but curators are focusing more time on preservation problems. For disseminators there is an obvious need to offer a greater variety of exposure channels like repositories that can handle the flow of open data in a secure and sustainable way. There are already initiatives looking into best practices in terms of using metadata, accreditation and certification schemes. Many necessary and important standards are already there, like Standards for Digital Archives (DAS), Trustworthy Repositories Audit and Certification (TRAC) and Deutsche Initiative für Netzwerkinformation (DINI). What is needed is funding for implementation, training and co-working.

Publishers need to develop more journals accepting open data and support activities that make it possible to cite and give creators credit for data sharing.

The only primary performers in the curator function are libraries and archives. Performing curatorial activities with print is a classic task for academic libraries and archives. Digital curation of born digital and digitized collections has become a core library activity over the last 20 years. But curating and managing open data sets is a new task for libraries. Here training will be imperative in order to enable libraries to become a major facilitators of open research data. Libraries generally do have a good basic infrastructure for making information useable and available in cooperation with researchers. This makes libraries a good candidate as disseminator and curator of open research data. Bottom-up solutions to the management and curation of data sets are already being implemented at pioneering libraries particularly in the US and the UK.[20] Grants and funding programs for library data curating activities are very important.

User needs with the focus on research data is mainly the need for a sustainable business model for information aggregators like Securing a Hybrid Environment for Research Preservation and Access (SHERPA), The Directory of Open Access Repositories (OpenDoar), Registry of Research Data Repositories (re3data.org) etc. There is also a need for training on how to interpret, use and popularize open research data and mediate this to the public.

2.3   STAKEHOLDER MOBILIZATION OBJECTIVES FOR OPEN ACCESS – INTRODUCTION

The RECODE recommendations address the barriers and needs described above. They argue for cooperation and collaboration in order to align policies, ensure appropriate funding, and enable sustainable preservation and curation of data. Moreover, they focus on instituting change by encouraging the creation of incentives, the development of technical and infrastructure solutions and establishing new organizational and scientific practices and

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[20] Noorman, et al., op.cit., 2014, pp. 52-55.

licensing frameworks. Finally, the recommendations draw attention to the need to educate and create awareness about open access to research data.

The next step then is to leverage existing networks to implement these recommendations. In this section we provide a brief overview of some of the objectives in mobilizing stakeholder organizations and their members and examine how these objectives align with existing approaches.

 Existing approaches to mobilization can be summarised broadly as: "Building Bridges"[21] – connecting data (institutions and other institutions) and connecting people (researchers and other researchers, researchers and users, users and researchers). The goal of 'building bridges' includes several levels of mobilization objectives that overlap for different stakeholders. They can be grouped into three broad areas that the RECODE recommendations address, namely: ecosystem, change, and impact. These three areas each play a distinctive and vital role in the mobilising stakeholders to make research data openly available. The development of an ecosystem is essential in that it will enable open access in practical terms, however there needs to be a change management focus that supports and fosters change in terms of the practices of making data open. Further, to ensure support and sustain the mobilisation of open access, the impact of open access must be registered and evidenced in some way so that stakeholders can see the benefit. It is therefore important to address all three aspects in a coherent and joined up way in a mobilisation strategy.

Ecosystem
Mobilization objectives in this category are dedicated to creating a favourable ecosystem for OA for all stakeholders. This includes all coordination and cooperation objectives, such as:
- Finding ways to improve and combine existing efforts of different stakeholders in varied research communities worldwide that are implementing objectives successfully.
- Exchange of know-how so that those who are late starters in developing objectives can learn and borrow from good practice.
- Minimize impact of fragmentation between stakeholders on ecosystem by:
  - Building interdisciplinary links - connecting researchers across different disciplines;
  - Reaching out to existing and potential research partners – networking, conferences, workshops to facilitate common objectives and showcase good practice;
  - Collaborating on building infrastructure and developing and disseminating data management tools;
  - Building registries and search tools;
  - Cooperating in aligning policies and legal frameworks.

Achieving coordination and cooperation objectives will aid the establishment of favourable ecosystems for OA in the long-term. The prospect of such ecosystem is a strong driver for adopting mobilization objectives leading to change.

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[21] Bicarregui, J., "International Initiatives of Research Data Management". Presentation delivered at the E-IRG Conference, Athens, 2014. See RDA (Last accessed on 21 July, 2014)

Change – in practice and attitude

Objectives in this category focus on instituting change in existing scientific and organisational practices and in the attitudes of researchers as well as within institutions. They can include:

- Improve seamless data sharing across disciplines and regions;
- Establish new quality management practices;
- Establish common standards for consistent and careful management of sensitive datasets without putting up barriers to openness;
- Integrate and find effective solutions for re-use of data and information;
- Ensure appropriate funding;
- Develop incentives for researchers to share data;
- Promote data citation;
- Advocating the creation of viable legal and ethical models aimed at reducing the barriers to OA among different types of stakeholders;
- Promoting sustainable access;
- Work towards future data preservation – establishing digital repositories – online; "open knowledge environment" ;[22]
- Making users aware of the existence of data and teaching them how to use it for their own benefit and for the overall benefit of society.

Impact

The combined effect of objectives aimed at improving ecosystem for OA, which drives changes in attitudes and practice among all stakeholders can bring us closer to achieving the broader goal of open access - data sharing without barriers. Key mobilization objectives that relate to impact, must therefore include cooperative as well as practice and attitude changing objectives. Examples of such objectives include:

- Maximize visibility and impact of research and data by building and maintaining repositories, portals and registries;
- Provide career-boosting activities across disciplines for young researchers as well as data scientists;
- Making results of various efforts visible, for instance, by improving data citation practices or enhancing evaluation systems;
- Increasing profile of OA to data through creating coherent dissemination strategies to improve understanding and increase awareness of the wide benefits of OA and free access to data;
- Facilitating dissemination and replication of successful examples.

One focus of this report is to identify different kinds of mobilizing objectives that can be used to mobilize several stakeholders, also across functions, to engage in cooperative actions supporting the project policy recommendations issued. In the following, we will discuss several objectives per stakeholder function.

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[22] Paul F. Uhlir and Peter Schröder, "Open Data for Global Science", *Data Science Journal*, Volume 6, 2007, Open Data Issue.

2.3.1 Funders and initiators

Currently the most important motivation for funders is the policy push from national and European policy makers, who are seeking maximize the investment in research funding through making data open. These funders address **the need for appropriate funding** of the production, management and sustainability of research data and seek to ensure that the expectations and needs of both researchers and the public are met in relation to OA to data. This push has prompted funders to adopt several specific mobilization objectives in the Ecosystem area which include: considering **the long-term preservation of data at the outset of each new project**, and in particular determining the **most appropriate archival facilities for the data;**[23] working towards future sustainable data preservation.[24]

In addition, the mobilization objectives of funders are generally geared towards the overall improvement of the ecosystem for OA. As noted, those objectives are related to **coordination and cooperation**. The Deutsche Forschungsgemeinschaft (DFG), for example provides comprehensive support to all DFG programs that are designed to foster international cooperation.[25] This includes support for international projects, help in establishing international collaboration, and facilitating visits by highly qualified international researchers to German universities. The DFG has an open standing call, which encourages researchers to collaborate with international partners. The RCUK report-evaluation on the status of the UK e-science programme notes that the largest academic impact of this programme is found in the interdisciplinary efforts of its projects, which is most important in the long-term data sharing. Such efforts have fostered new social academic networks and collaborations.[26] RCUK states that the emerging interdisciplinary communities have generated significant impact so far in relation to access of resources and creation on social networks and their objective is to continue developing links between disciplines.

The long-term existence of sustainable cooperation and interdisciplinary networks also depends on continuous influx of young researchers. Therefore an important mobilization objective of funders in the area of impact is to **provide career-boosting activities** across disciplines. The DFG, for instance has identified the education and advancement of young scientists and academics as one of its priority tasks – they place particular emphasis on supporting young researchers. This includes initiatives to support students, doctoral students, post-doctoral researchers and early career academics.[27]

2.3.2 Creators

Among the dominant mobilization objectives for creators is to **maximize visibility and impact of research and data**. This objective is detected in the growing interest of many research institutions in establishing and maintaining digital repositories. Digital repositories are viewed as a reliable solution for future data preservation, reducing duplication of effort

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[23] OECD, *Principles and Guidelines for Access to Research Data from Public funding*, Paris, 2007. http://www.oecd.org/sti/sci-tech/38500813.pdf
[24] WP4; See also http://www.epsrc.ac.uk/about/standards/researchdata/Pages/impact.aspx
[25] See http://www.dfg.de/en/research_funding/international_cooperation/international_cooperation/index.html
[26] RCUK Review of e-Science 2009. Research Councils UK The Royal Society
[27] See http://www.dfg.de/en/research_funding/research_careers/index.html

and ensuring continuous access to data[28]. From the creators point of view the major motive behind this objective is that OA to both research papers and research data will stimulate new research opportunities and collaborations, increase the number of citations and the re-use of data potentially leading to further discovery. Among the most successful open access digital repositories of multi-disciplinary research datasets in the UK are Edinburgh University's DataShare[29], University of Exeter's depository Open Research Exeter (ORE)[30] and Manchester University's eScholar.[31]

An important mobilization objective for creators in the Ecosystem area is **increasing scientific collaboration**. Creators have a strong motive to share data and methods as it contributes to solving complex scientific problems. Repositories provide access to large data sets. They help to avoid data loss and provide researchers with opportunities to validate research findings and give them the ability to re-use and share data. In addition digital repositories and their support staff provide several levels of information and support to authors including archiving research output and making it publicly available. Max Plank Society (MPS) and The Max Planck Digital Library (MPDL) for example, support scientists and institutes in all disciplines in the management and the digital curation of their publications, disseminating, and re-using publication data, full texts, and supplementary material. An initiative launched by the MPDL CoLaboratory (MPDL CoLab) aims to provide a platform for community building and knowledge exchange across (sub)projects and organizations.[32]

This category of stakeholders has another important mobilization objective – **to ensure compliance with the funding bodies' requirements on OA.** This is seen as paramount to maintaining research-funding income of creators. RCUK policy for example states that publicly funded research is a public good, and should be made openly available to the public when legally, commercially and ethically appropriate. This mobilization objective includes the need for higher education institutions and researchers to demonstrate good practice in the management and preservation of data acquired through public funding.[33]

2.3.3 Disseminators

Disseminators play a key role in mobilizing various stakeholders to embrace open research data. UK Data Archive (UKDA) provides an example of an organisation that has been actively involved in making the case for OA and that aims to become an international leader in curating and sharing data. The UK Data Archive Strategic Plan 2010-15 states: "we collaborate with national and international organisations to develop new data standards and tools. We also aim to build bridges between data creators and data users across different

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[28]   The University of Edinburgh, "Benefits of deposits", 5 Sept. 2013. http://www.ed.ac.uk/schools-departments/information-services/research-support/data-library/data-repository/benefits

[29] The University of Edinburgh, "What is Edinburgh Data Share?", no date. http://datashare.is.ed.ac.uk/

[30] University of Exeter, "Open research Exeter (ORE)", no date. https://ore.exeter.ac.uk/repository/

[31] Manchester University, "Manchester eScholar", no date.
https://www.escholar.manchester.ac.uk/images/sitepdfs/Flyer-ManchestereScholar_v1-0.pdf

[32] Max Planck digital library, "Open access", no date.
  http://www.mpdl.mpg.de/main/Open_Access_MPDL_Flyer_3.pdf

[33] Sveinsdottir, et al, op. cit., 2013, p. 50.

sectors and disciplines".[34] In its strategic plan it defines 5 key objectives that address the Ecosystem, Change and Impact aspects of enabling open access to research data:

1. Promoting best practice through curation and collaboration;
2. To improve access to and uses of data;
3. Raising standards in Data Management and Security;
4. To drive archival innovation;
5. Accountability.[35]

The strategic goals are designed to consolidate the Archive's repository status while maximising quality of service and impact of investment. UKDA's key objectives are a good illustration of mobilization objectives for all disseminators but they can also apply to other stakeholders such as creators and curators.

In the first RECODE report, we noted that while open access to publications is quickly advancing, the publishing of Open Data is taking off somewhat more slowly.[36] However, there are developments afoot, which can be seen, e.g., in the establishment of Elsevier's Research Data Group, whose principles focus on working towards Open Data and being transparent and collaborative.[37] For scholarly publishers, the importance of enriching publications lies primarily in the added value this can offer to other stakeholders such as researchers, both readers and authors. This immediately raises a number of questions. Which criteria must an enriched publication and its associated dataset(s) meet to actually be considered enrichment for an article or other type of publication? Are authors readily prepared to release their research data? Which applications can the reader use to read the data? What is the impact on current practice (e.g. reading and publishing)? These are all important questions that a scholarly publisher has to take into account when considering starting to offer this type of service to Creators and Users[38]. **Close collaboration with research groups and university libraries** is therefore an essential mobilization objective for publishers.[39]

The first RECODE report states that in terms of publishing datasets in relation to Open Access journal publications it is acknowledged by publishers that it will be both time and cost consuming to build infrastructure and sustainable business models around this practice.[40] Cultural barriers play a part here as it is pointed out that researchers are currently not rewarded for sharing or publishing datasets, only peer reviewed publications. The pressure among researchers to publish, to compete for and win grant funding, and to repeat the cycle, is strong and very persistent. Researchers' career trajectories largely depend on their success in these activities.[41] The career-related rewards for sharing or publishing datasets are still

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[34] UK Data Archive, *UK Data Archive Strategic Plan, 2010-2015*, 16 June 2010. http://www.data-archive.ac.uk/media/196518/ukda-strategicplan20102015full.pdf

[35] Ibid

[36] Sveinsdottir, et al, op. cit., 2013, p. 52.

[37] Marques, David, "Research Data Driving New Services", *Research Data Management*, Vol. 1, No.1, 2013. http://libraryconnect.elsevier.com/articles/best-practices/2013-02/research-data-driving-new-services

[38] Sveinsdottir, et al, op. cit., 2013, p. 54.

[39] Ibid, p. 29.

[40] European Commission, *Riding the wave: How Europe can gain from the rising tide of scientific data*, 2010, p.4.

[41] Swan, Alma and Sheridan Brown, *To Share or not to Share: Publication and Quality Assurance of Research Data Outputs, A report commissioned by the Research Information Framework,* RIN, London, 2008.

largely absent, which will make it even more difficult to develop a healthy publishing model based on the enrichment of publications. Therefore, another mobilization objective for publishers is to develop strong **career-related incentives** for creators to share and publish datasets and to develop new publishing models. Publishers are adapting to the open publishing environment and are developing new types of business models to facilitate that. Here the question of where the cost for open access publishing will rest is still undecided.[42]

2.3.4 Curators

The most significant mobilization objectives for curators (mostly libraries and archives) are in the Change area and are to **ensure future preservation of data** and **provide appropriate services to other stakeholders in the ecosystem.** Stakeholders in the Creator category aim to provide online data either free of charge or applying a nominal handling charge for large, time-consuming data requests. Their policies are often aimed at enabling access to data by *bona fide* scientific researchers at no more than direct administrative costs.[43]

Another mobilization objective for curators to change existing practices is **facilitating data exchange** for research purposes where it is clear that the research will lead to a beneficial contribution to the ecosystem, to research and development, and/or economic development of society. Similarly to creators, some curators, such as the Marine Institute (MI) in Ireland acknowledge their responsibility to provide open data and ensure that the recipients of the datasets give back to the community the benefits they derive from these datasets.[44] Curators usually have to comply with international obligations to make data available while recognising that data sets are a significant resource in their own right. This points to a mobilization objective to help ensure the impact of these efforts. The proper management and preservation of the data has the potential to be re-processed and re-used for a variety of purposes. **Further uses of data sets** are part of all curators medium to long-term impact objectives.

Often there is an overlap between the mobilization objectives of curators and creators. For example digital libraries aim to provide open access to all material published or disseminated to researchers and the general public. The California Digital Library (CDL), for instance integrates its objectives with the mobilization objectives of University of California as a creator of research data – providing digital publishing service to its community is a means of increasing the reach and visibility of the scholarly work.[45]

Another mobilization objective for curators is **ensuring that open access publishing is fully compatible with both peer review practices and copyright laws**. This objective helps to strengthen the ecosystem and is aimed at enhancing the ability to provide researchers, students and the public access to information and support the exploration of new service models. **Preservation and digitization** is viewed as an important objective in strengthening student and faculty research as well as increasing awareness of the content in all collections and facilitating easier access not only to the research community but also the public. Preservation and digitization is also seen as a necessary step in fulfilling public service

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[42] Sveinsdottir, et al, op. cit. 2013, p. 59.

[43] Marine Institute, "Data Policy", no date. http://www.marine.ie/home/publicationsdata/data/DataPolicy.htm

[44] Ibid

[45] California Digital Library, "Mission, vision and values", no date. http://www.cdlib.org/about/mission.html

mission – content to be accessed by anyone, anywhere at any time as well protecting of collections from loss.

2.3.5 Users

Progress towards achieving mobilization objectives of stakeholders is very much dependent on the degree and nature of user engagement with this process. Therefore this category of stakeholders - media and information aggregators - deserves more focus and attention from other stakeholders. In many ways the mobilization objectives of all other stakeholders should always take into account the needs and values of users. Users are an important stakeholder group, but arguably the one that proves most challenging in persuading to cooperate with other stakeholders.

There are several levels of engagement but the most relevant mobilization objective of users is in the Impact area and is to **achieve an understanding and awareness of OA** to data and publications. This objective is fundamental to other possible objectives like creating financial/news values. Stakeholders in the other stakeholder categories have a strong motive to develop and implement dissemination strategies to improve understanding and increase awareness of the wide benefits of OA and free access to data. The media have an obvious interest in creating news using, for example, government or other scientific data, but they are not using much influence to push for open data. In their report to the European Commission the high level expert group on scientific data envisioned that by 2030 "The public has access to and can make creative use of the huge amount of data available; it can also contribute to the data store and enrich it. All can be adequately educated and prepared to benefit from this abundance of information".[46] This vision is very much dependent on the involvement of the media and information aggregators.

In relation to OA to data and publications stakeholders should recognise and work towards including programmes, courses, or training workshops for journalists and journalism students to address challenges such as poorly informed audiences. For example, as the United Nations Educational, Scientific and Cultural Organization (UNESCO) states serious efforts should be directed to training working journalists and journalism students to deal successfully with science topics.[47] This can also include initiatives to raise awareness and understanding of OA to data so that media and journalists can 'get this to the public' successfully.

Commercial information aggregators like Google, ProQuest and others have yet to find any viable audience and commercial use for open research data. Public initiatives like the W3C's exploration of semantic technologies with linked data have the capability to aggregate data but are hampered by data heterogeneity and a complicated diversity of xlm-schemata and semantics of websites and repositories.[48] In this stakeholder group mobilizing objectives would be in the ecosystem area collaboration on building infrastructure and developing and disseminating data management tools. In this case the focus would be on standardization and

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[46] European Commission, *Riding the wave: How Europe can gain from the rising tide of scientific data*, final report of the High level Expert Group on Scientific Data, October 2013.

[47] McIlwaine , S., Journalists and Journalism Education Must Grasp the Democratic Science Opportunity Paper presented at the first JourNet international conference on Professional Education for the Media in Newcastle, Australia, on 16-20 February 2004. http://portal.unesco.org/ci/en/ev.php-URL_ID=19081&URL_DO=DO_TOPIC&URL_SECTION=201.html

[48] Al-Safadi, Lilac, Nour Alkhatib, Rawan Babaier and Lama Assum. "Semantic Aggregator of Public Professional Events", *Journal of Applied Sciences* 12 (7): 653-660, 2012.

quality of meta-data, semantics, schemata and data formats. This, of course, coincides, with objectives of stakeholders in the disseminator and curator groups.

2.4 SUMMARY

In this section we have identified major stakeholder barriers and needs and linked them to mobilization objectives and to stakeholder organizations in order to uncover who the key organizations and networks involved in the process of forwarding open access to research data might be. The barriers and needs uncovered in this chapter will act as the starting point for the mobilization objectives outlined below. These objectives encompass cooperative and coordinating activities that combine both change in attitude and practice and are a preferred way of meeting the needs of advancing open access, data preservation, dissemination and use of research data. One example of such a mobilizing theme for funders and creators of data are to support education and advancement of young scientists. Another objective that cuts across these functions is to increase and improve scientific collaboration using open data. For disseminators and curators of data, examples of collective objectives are access, security and preservation of data, and training. Some of the most urgent needs are in funding, training and building infrastructure. In the next chapter we will take a closer look at how stakeholder organizations tackle the needs and barriers, assess their objectives and how they interact and communicate in the eco system and give examples of good practices.

3 STAKEHOLDER NETWORKS AND ORGANIZATION MOBILIZATION ASSESSMENT

3.1 OPEN ACCESS ORGANIZATION AND NETWORKS ECOSYSTEM

As in all relations the existence of ties between and within stakeholder groups facilitates communication and the transfer of norms and expectations. Stable networks also encourage joint actions. The strength and amount (density) of connections between stakeholders as well as the centrality of position within the network are two factors that need to be considered when analyzing stakeholder influence and impact. A central position offers a more powerful base for actions. As the density of relations between stakeholders grows it strengthens coordination and communication and promotes shared behavior increasing the chance of joint action. This network theory is originally developed within the field of business management[49] but it also works for our purposes of getting an overview of the network relations in the five different functions categories of the ecosystem. Moreover, it can help identify those organizations that have a significant influence within these categories and can help to mobilize other stakeholders.

In the following sections we will identify per function categories of influential organizations that currently serve as open access networking organization and examine their relations and interactions. We highlight several organizations that provide good examples of objectives and strategies that align well with the RECODE overarching recommendations.

3.2 FUNDER AND INITIATOR NETWORKS

In our sample of Funders and initiators networks we have stakeholders divided into Research councils, Advocacy groups, Policy makers, Foundations and Intergovernmental Organisations (IGOs). The stakeholders that have as their primary function to provide funding, such as research councils are mainly government organizations distributing funds to universities and research institutes. Or they are consortia or foundations, like DFG, A distributed infrastructure for life-science information (ELIXIR), Open Society European Policy Institute (OSEPI), Wellcome Trust that are usually privately funded or a mix of private and government initiatives. Policy makers in this category are usually politically formed organizations to advance research like European Research Area (ERA); umbrella organizations of research councils like European Research Council (ERC) or Science Europe or government- funded cutting edge organizations for developing certain research areas like Joint Information Systems Committee (JISC).

Advocacy groups and Open Access initiatives include organizations like Scholarly Publishing and Academic Resources Coalition (SPARC), Alliance for Permanent Access (APA/APARSEN), RDA, Knowledge Foundation, Force 11 and 2nd Generation of Open Access Infrastructure for Research in Europe (OpenAirePlus). The main goal of these organizations is to create sustainable science e-infrastructures, sharing, exchange and access to scientific publications and data sets and they are acting both as initiators and advocates towards these goals. APA is membership driven with members involved in performing, funding or disseminating research on a national or international level. Preservation issues are the main focus and the alliance members have contributed in various major projects to

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[49] Friedman, Andrew L. and Samantha Miles, Op. cit., 2006, p. 97.

preservation issues in open access like persistent identifiers, repository issues, etc.[50] SPARC is an international alliance of academic and research libraries working both ends of the Atlantic. SPARC finances its efforts through coalition member fees. These fees are used to support operating expenses and help build a capital fund to provide start-up money for its programs.[51] RDA began its activities in 2012 with the establishment of an international steering group by funding agencies in the US, EU and Australia. The established working/interest groups, the council and the advisory board all include high-level officials from renowned data centers, universities, research institutes, libraries etc. around the world.[52]

3.2.1 Relations and interactions

Research councils together with policy makers have the most central position in the funding category. Research councils are often members of umbrella policy-issuing organizations like Science Europe, ERC, European Heads of Research Councils (EUROHORC), European Science Foundation (ESF), Research Information Network (RIN) etc., which make for dense relations between officials of both stakeholder groups. Through their membership research funders get access to cross border cooperation and an extensive network to expand research-funding issues. Such umbrella organizations are therefore in a good position to mobilize funding agencies and policy makers.

Umbrella organizations like ERA, ERC, etc., have several means of interacting with, influencing and supporting their members or affiliated organizations. They, for instance, often use newsletters and interactive web pages to inform and keep in touch with members. ERC also has different working groups. One of these is dedicated to Open access issues and has organized workshops on issues like open access infrastructures with participants from major European universities and research funding agencies.[53] Moreover, these organizations can issue guidelines and principles as policies.

Advocacy groups are lobbying for their interests towards policy makers but also towards funders. The board/council members of the advocacy groups are very often high level officials/scientists that are in a position to influence colleagues of the research councils and foundations.

Other mechanism of influence, cooperation and networking are conferences organized by the different funder/initiator stakeholders to provide forums for discussion, debate and advice in funding and policy issues. Examples of such conferences are the Australian Academy of Technological Sciences and Engineering (ATSE) international workshop series[54], or conferences aimed to give scientists the opportunities to discuss and inform about the most recent developments in their fields.[55]

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[50] Alliance for permanent access, About APAARSEN, no date,
http://www.alliancepermanentaccess.org/index.php/about/

[51] SPARC, About Us, no date, http://www.sparc.arl.org/about

[52] Research Data Alliance, Organisation, no date, https://rd-alliance.org/organisation.html

[53] ERC, Workshop on open access infrastructures in the social sciences and humanities, 6-7 February, 2013, http://erc.europa.eu/workshop-open-access-infrastructures-social-sciences-and-humanities

[54] ATSE International workshop series, Strengthening links between industry and public sector research organisations – Report, Sydney, 17-18 May, 2011,
http://www.atse.org.au/Documents/Publications/Reports/Education/Strengthening%20Links%20Between%20Industry%20&%20Public%20Research%20Workshop%20Report.pdf

[55] ESF, Conferences, no date, http://www.esf.org/serving-science/conferences.html

Sponsoring events like exhibitions, symposia, meetings related to boost the interest for science in a large variety of target groups are also a common mechanism to inform and to get feedback[56] for funders.

Funders & Initiators
Mobilization Objectives:

- Data preservation
- Coordinate and cooperate
- International cooperation
- Forging links between disciplines
- Provide career boosting activities across disciplines

Workshops, meetings, conferences

ERA, ERC, EUROHORC, ESF, RIN, Science Europe

DFG, RCUK, WELLCOME

Know how, People, Information

APA, SPARC, RDA
ELIXIR

Fig. 3. Mobilization objectives Funders & Initiators. Probable relations- centrality/density and channels of cooperation.

3.2.2 Good examples

RCUK, the strategic partnership of the UK's seven Research Councils, provides a good example of how alliances of funding agencies can encourage universities to develop policies and infrastructure. The RCUK issued its Common Principles on Data Policy, in which it placed an emphasis on open access and data reuse. This policy proved effective in harmonizing funders' data policy and stimulating all UK research councils to develop and implement policies on open access and data sharing.[57] The research councils' policies in turn

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[56] NERC science of the environment, Events archive, no date, http://www.nerc.ac.uk/latest/events/archive/

[57] Overview and links are presented at the relevant page of the Digital Curation Centre, http://www.dcc.ac.uk/resources/policy-and-legal/funders-data-policies. An analysis of the policies of the RCUK on the sharing of research data see Sarah Jones, *Developments in Research Funder Data Policy*, International Journal of Digital Curation (2012), 7(1), 114–125, http://dx.doi.org/10.2218/ijdc.v7i1.219

provided a push for UK Universities to develop the organizational and technical infrastructure to support researchers in adhering to funder requirements.[58]

Science Europe, an association of European Research Funding and Research Performing organizations, also committed to open access to research data in its Roadmap, published in 2013. Four strategic objectives are central to the roadmap: supporting borderless science, improving the scientific environment, facilitating science and communicating science. The Roadmap identifies "access to research data" as one of its "priority actions areas", but open access and sharing of research data also feature in other priority areas, such as research infrastructure, open access to research publications and cross border collaboration. It considers enhanced research data policies to contribute to the objective of supporting borderless science and facilitating science.

This initiative provides a boost to the open access movement as the Roadmap is intended to act as framework for collective activity of the member organizations, which include research funders in many European countries. It encourages these organizations to further develop and harmonize their policies and to exchange good practices and experiences between member organizations.

The Roadmap outlines seven objectives for Science Europe in reference to access to research data:

- "Promote the importance of data sharing principles – in reflecting the needs of the various disciplines, and in generally furthering research and innovation to gain maximum societal benefit – as well as guiding the definition and implementation of consistent data-sharing policies and practices;

- Contribute to the establishment of an 'ecosystem' of globally and disciplinarily interoperable, trustworthy and sustainable research data infrastructures, and explore appropriate funding structures adapted to national and organizational capabilities;

- Foster the development of relevant training and career paths, acknowledging that data-intensive research requires new and additional types of skill;

- Collaborate in developing appropriate incentive measures for scientists to archive and share their data, by promoting data management plans and support for research data collection;

- Advocate that data and scientific software contributions are treated as valuable research outputs and should play a significant role in the evaluation of research;

- Seek clarity on the legal conditions framing the envisaged re-use of research data and the possible harmonization and changes necessary to realize this; and

- Identify where protected environments, or 'safe havens', for data are necessary, and promote the creation of policies, technical concepts and, ultimately, safe infrastructure for such cases."[59]

The approach taken in the Science Europe's Roadmap are underlined and reaffirmed in Science Europe's recent response to the EC Consultation on 'Science in transition'. In this comment they stress that Science 2.0 is developed bottom-up within research communities and the job of policy makers is to "support these development by removing obstacles to the

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[58] This is clear in the analysis presented by the Digital Curation Centre and in Jones 2012, cf. above.

[59] Science Europe, "Science Europe Roadmap", December 2013, p. 10.
http://www.scienceeurope.org/uploads/PublicDocumentsAndSpeeches/ScienceEurope_Roadmap.pdf

creativity of researchers and by providing targeted support, backed by evidence of their contribution to excellence"[60].

Science Europe is a good example of an open access network in the funding and initiators category, because it brings together various funding agencies with the aim of sharing good practices and knowledge, developing and implementing collective strategies and collaboratively influencing policy. Moreover, its vision on the development of science underlines that there should be room for bottom-up approach, diversity and research-practice driven policy. Science Europe embraces open access to research data as part of integrated approach to supporting developments in Science, while acknowledging that there are legitimate reasons for delayed or restricted access. It also recognizes that research infrastructures involve "long-term financial commitments and take time to adapt one they have been set-up" and the need for an ecosystem that supports data stewardship (e.g. quality control, integration, curation, citeability, etc.). Finally, it underscores the need for clear assignment of responsibility.

What currently is lacking are aligned and comprehensive policies along with appropriate funding for infrastructure and training in the majority of the European Union member states so that the relevant stakeholders can focus on the work that must be done in order to make the data sharing vision come true.

A good example of an Initiator organization that advocates and supports open access to research data is the Research Data Alliance (RDA). The European Commission, the US National Science Foundation and National Institute of Standards and Technology (NIST), and the Australian Government's Department of Innovation initiated the RDA in 2003 with the aim of establishing a platform on which all aspects of data sharing and data management can be discussed and developed. The RDA aims to be community driven and inclusive, anyone can join as long as they subscribe to its guiding principles. It strives to be a "'neutral space' for coordinating organizational and individual efforts throughout the data community that have the potential of increasing the prevalence and impact of data infrastructure".[61] It now has over 1600 members from 70+ countries and has become a global forum for improving data sharing in science and scholarly practices.

The RDA, thus, provides a platform for a broad range of stakeholders and across disciplines to collaboratively and proactively address some of the grand challenges of open access to research data. It focuses both on the developing the technological as well as the social and organizational infrastructure. Interest groups and working groups are formed around a broad range of topics to, respectively, discuss ideas or produce and implement outcomes (e.g. standards, protocols, code, best practices, policy guidelines, etc.). Anyone can set up an interest group to discuss and explore a particular issue, if there is enough support to do so. A working group is set up to come to concrete outcomes. Working groups and interest groups have focused on solving ethical and legal issues, like the issue of long tail data Results of these efforts are now becoming available.

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[60] Science Europe, "Comments on "Science 2.0": Response to the European Commission Consultation on "Science in Transition"", 2014, p. 1.
http://www.scienceeurope.org/uploads/PublicDocumentsAndSpeeches/300912_scienceeurope_response_to_ec_consultation_on_science_2%200.pdf
[61] Berman, Fran, Ross Wilkinson and John Wood, "Building Global Infrastructure for Data Sharing and Exchange Through the Research Data Alliance", *D-Lib Magazine*, Vol. 20:1/2, 2014, p.4.

The RDA provides online resources for the interest and working groups. A working group can set up its own workshops. Once a year a general RDA meeting is held. Results of these activities are disseminated through the RDA website and at the annual symposium

An elected Council guides the activities in the RDA. The council works closely with an elected Technical Advisory board, Organizational members, and Affiliates to encourage and focus Working and Interest groups.[62]

In the future, the RDA will have to develop mechanisms to consolidate the outcomes of the interests and working groups and make them easily available to members, especially new members, such that they can build the work that has already been done.

3.3   CREATOR NETWORKS

The creator networks contains primary stakeholders representing universities and academies, research institutes, scholarly societies, IGOs, standard organizations and service providers. In the creator category, some stakeholder organizations, like ALLEA, LERU, and United Kingdom Office for Library and Information Networking (UKOLN), bring together academies and universities. Universities are generally institutions financed by governments to produce education and research. Other organizations initiating innovation, the advancement of digital technologies and research, such as SURF (a collaborative organization for Information and Communication Technology (ICT) in Dutch higher education and research) and the charity and company Jisc [previously known as the Joint Information Systems Committee (JISC)] also serve as open access network organizations. They fund and initiate research across stakeholder functions, but also provide support for research institutions and researchers to make research data openly available.

There are also standards organizations, like Creative Commons (CC), International Standard Organization (ISO), DINI etc. The aim of CC is to make creative works available to share in a legal manner. These are all quite heterogeneous organizations but all have a nonprofit ideal and a membership base.[63] DINI is a collective initiative by the German consortium of university media centers, the German library association, the association of German university computing centers and a number of research organizations.[64] ISO is a CSO made up of member representatives from 162 countries. World Wide Web Consortium (W3C) is an international community where member organizations, a full time staff and the public work together to develop and introduce web standards.

There are also other stakeholder organizations, often with a curating function, working on the standardization, such as the Data Archiving and Networking Services institute in the Netherlands (DANS) who developed the Data seal of approval. Other examples are the national and international Guidelines for digital data archiving developed by the Network of Expertise in Long-Term Storage of Digital Resources (NESTOR); TheDigital Repository Audit Method Based on Risk Assessment (DRAMBORA) published by the Digital Curation

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[62] Ibid, p.2.

[63] CC was founded by the American law professor Lawrence Lessig. Working alongside a small core of full time staff is a worldwide group of volunteers that support and promote CC activities around the world. Creative Commons homepage, about, no date, http://creativecommons.org/about

[64] DINI also originated through a user need for joint development of standards and recommendations around communication technologies. Deutsche Initiative für netzwerkinformation e.v., About DINI, no date, http://dini.de/english/#c1431

Centre (DCC) and DigitalPreservationEurope (DPE); and TRAC: Criteria and Checklist of the Research Library Group (RLG).[65]

Unidata, DigitalScience, Open Data Institute (ODI) can all be called service provider in that they provide different services to enhance the evolution of open data. Unidata is based on an academic community governance model and provides data services and tools in the geosciences.[66] DigitalScience is a commercial technology company with well-known products like figshare and Altmetric. ODI is a company trying to convene experts to collaborate and nurture new ideas that promotes innovation in open data founded by Tim Berners-Lee and Nigel Shadbolt.[67]

Scholarly societies like the the Royal Netherlands Academy of the Arts and Sciences in the Netherlands and the Royal Society in the UK are influential science organizations and national academies of science with long historic traditions. They are usually founded by scientists, self-governed and supported by the state.

GESIS-Leibniz-Institut for the social sciences is the largest research institute for the social sciences in Germany. It is a non-profit organization with a board of trustees and consists of member cadre of 59 universities.[68] The Helmholtz Association is registered association with 18 research centres as members. About two thirds of their funding comes from public sponsors.

IGOs like European Organization for Nuclear Research (CERN), Global Earth Observation System of Systems (GEOSS), OECD are all big international government organizations and are similar in their structure with a government membership with councils or boards as a policy platforms.

3.3.1 Relations and interactions

Academies and Research institutes have central positions among the stakeholders in the Creator function of the taxonomy. They produce the main part of the data and have the most versatile connections with other eco-system stakeholders. Individual researchers from universities and institutes together with politicians make up the majority of board members of both research councils and foundations. Members of Academies and research institutes represent the core members in scientific societies; they are represented in important positions in data centers, university management, IGOs, Civil Society Organisations (CSOs). They are the founders of service providers and companies doing information aggregation services. They are on the boards or working groups of standard organizations. As stakeholder groups they are very influential and cooperate via an extensive and wide facetted network.

Umbrella organizations like ALLEA[69], EGU[70] and LERU[71] uphold and maintain their network cooperation through engaging members in working groups, committees, expert

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[65] Data Seal of Approval, About, no date, http://www.datasealofapproval.org/en/information/about/

[66] Unidata, no date, http://www.unidata.ucar.edu/

[67] Open data institute, About the ODI, no date, http://theodi.org/about-us

[68] GESIS-Leibniz Institute for the Social Sciences, no date, http://www.gesis.org/en/institute/

[69] ALL European Academies, no date, http://www.allea.org/Pages/ALL/5/074.bGFuZz1FTkc.html

[70] European Geosciences Union, no date, http://www.egu.eu/essi/

[71] LERU, Activities, no date, http://www.leru.org/index.php/public/activities

groups and communities. They also have the resources and a enough member-wide community to prioritize organizing conferences. This is also true for IGOs like CERN where they have something called the "knowledge transfer office" that plan an initiate knowledge transfer activities towards research institutes and companies to exchange technical, scientific and managerial expertise. They also create and coordinate knowledge exchange networks like the Enterprise Europe Network (EEN), CERN's interdepartmental knowledge transfer network INET and several others.[72] CERN and World Bank[73], OECD and other IGOs often uses projects or conferences of different magnitudes to influence and gain feedback into the organization. OECD Forum is a global platform for exchange of ideas, sharing knowledge and building networks including government ministers, representatives of international organizations, leader of business, trade unions and civil society.[74]

Big Research institutes like Leibniz Institute for the Social Sciences (GESIS) can also support conferences as a tool for sharing experiences.[75] But they seem to concentrate on offering internal training courses and seminars and using mainly EU-projects and other international cooperation initiatives for working with other universities and research groups.

Fig. 4. Mobilization objectives creators. Probable relations- centrality/density and channels of cooperation.

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[72] CERN accelerating science, no date, http://home.web.cern.ch/

[73] World Bank, Projects & Operations, no date, http://www.worldbank.org/projects/

[74] OECD, Members and Partners, no date, http://www.oecd.org/about/membersandpartners/

[75] Helmholtz association, no date,
http://www.helmholtz.de/en/helmholtz_centres_networks/international_projects/

3.3.2 Good Examples

In 2014, LERU published its *Roadmap to research data*[76]. This roadmap provides an outline of what the call for open access to research data means for Research Universities, according to LERU. It has a particular focus on University libraries, but it also addresses the leadership of research universities, funders, policy makers, scholarly societies and researchers. The roadmap provides an example of how a network organization can encourage its members to embrace open access to research data. It provides guidelines, recommendations as well as good examples of universities that have already taken concrete steps.

The Roadmap provides a useful guideline for institutions that want to take further steps in making research openly accessible. It gives an indication of the costs as well as the benefits to consider, and addresses the question of who should pay. It also identifies relevant parties involved within institutions and suggests an outline of their roles, responsibilities and skills. The Roadmap argues for knowledge exchange and collaboration between LERU universities.

To promote the Roadmap and its recommendations LERU organized a Launch Event, and maintained a "research data" expert group who oversees the implementation of the recommendations. It is unclear, however, what has happened since the publishing of the ROADMAP. LERU nevertheless maintains an extensive network of research organizations and organizes several meetings for specific groups as well as events, such as a seminar on Open Scholarship. Moreover, LERU provides a platform for research universities to discuss and align their open access policies. As a lobby organization it has a stronger voice to influence policy makers and relevant organizations in reserving funding for research institutions to develop the appropriate infrastructures and services.

A good example of a more practical approach is the Facilitate Open Science Training for European Research (FOSTER) project. This initiative is a two-year project that "aims to set in place sustainable mechanisms for EU researchers to FOSTER OPEN SCIENCE in their daily workflow, thus supporting researchers optimizing their research visibility and impact, the adoption of EU open access policies in line with the EU objectives on Responsible Research & Innovation".[77] The project aims to identify existing contents that can be reused for training activities and develop new training material. This material will be offered to researchers, institutions and other interested parties through an e-Learning Portal as well as through face-to-face training of researchers, information professional and especially trainers/multipliers that "that can carry on further training and dissemination activities, within their institutions, countries or disciplinary communities". The FOSTER project is an initiative of various European partners, including the Digital Curation Center in the UK, several universities and SPARC Europe. The project already has an extensive reach through the networks of its partner, but it has also issued two calls for Open Science Training. People with particular expertise in an Open Science area can apply for funds to develop training programmes, with a particular focus on practical training. Through these calls various workshops have been organized throughout Europe. The Portal serves to offer interested stakeholders resources and information on events to help them get started. Currently some topic lack content, but the project is still running.

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[76] League of European Research Universities, *Op.Cit. 2014*.
77 FOSTER project, "Home", https://www.fosteropenscience.eu/project/.

Similar examples are national initiatives like the DCC in the UK and the Research Data Netherlands (RDNL) in the Netherlands. These initiatives provide information and support to help researchers and their institutions get started with open access to research data.

These kinds of initiatives align well with the RECODE recommendations because they are aimed at providing support for researchers and institutions in getting acquainted with the possibilities of data sharing, data management and open access.

3.4   DISSEMINATOR AND CURATOR NETWORKS

The Disseminator and curator networks contains primary stakeholders representing CSOs, Professional Associations, Data Centers, libraries, projects and publishers. The central position in this stakeholder function is occupied by libraries and data centers. Libraries and data centers have a strong position serving the open access community with repositories, curation and preservations services and other resources for access to publications and do have several prerequisites to become a central player together with data centers supporting open access to data sets.[78] University libraries and data centers are building the infrastructure of open access and are administrating the day to day business of curating and disseminating together with publishers who have a long standing business relation with libraries.

Library umbrella organizations like LIBER, the International Federation of Library Associations (IFLA), and the European Bureau of Library Information and Documentation Associations (EBLIDA), and professional associations like the American Library Association (ALA) and the Association of Research Libraries (ARL) are member based organizations with the usual structure of boards or council with executive committees, task forces and working groups.

In our sample of disseminator organizations almost one third are CSOs. Many of these also act as advocacy groups like the RDA. Disseminator CSOs are organizations like Electronic Information for Libraries [low-cost access to developing countries (EIFL)], DataCite, Council on Library and Information Resources (CLIR), Knowledge Exchange (KE) and Confederation of Open Access Repositories (COAR). These organizations often have a main focus: EIFL is working for access to digital information in developing and transition countries; COAR is an association of repository initiatives, the RDA is focusing on building bridges that enable open sharing of data, DataCite wants to establish easier and sustainable access to research data on the internet, CLIR seeks enhance research, teaching, and learning environments in collaboration with libraries and other cultural institutions.

Data Centers are usually government financed institutions, supported and organized via public funded universities or research councils. Their task is to preserve, curate and disseminate research data provided by researchers. CESSDA is the informal umbrella organization for the European national data archives, financed by the individual member states' ministry of research. The major objective for the organization is to provide seamless access to data across repositories, nations, languages and research purposes. Thirteen European nations are members.[79]

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[78] Noorman, et al., op.cit., 2014, p 51 ff.
79 CESSDA, no date, http://www.cessda.net/

Organizations like JISC and DANS are important funders and initiators of preservation and curation as well repositories projects. These organizations are active also in the creator and funder function and doing that cut across most stakeholder functions.

Scientific Publishers are usually members of the professional association of scientific, Technical & Medical publishers (STM).[80] It is a member organizations with a board and several committees. Open access is now an accepted business model in publishing and STM publishers give members also advice on how to deal with the different aspects of open access through their web resources such how to make open access licensing work etc.[81] STM is not known for pushing the open access frontiers. Rather the opposite since the majority of their members still are dependent on the classical subscription model and need to be precautious in the new media landscape. On the other end of the publisher spectrum there is the open access scholarly publishers association (OASPA) representing the interests of open access journal and book publishers. Members are publishers like BioMedCentral, Public Library of Science, The Royal Society, Hindawi but also traditional publishers with large open access operations like Springer, Wiley and Taylor & Francis. You also find other disseminator organizations in the roster like EIFL, CLOCKSS and SPARC.

3.4.1 Relations and interactions

Library professional associations seem to be very active, judging by their publicly available information. Most of them encourage networking through conferences and workshops and several organize big international yearly conferences.

Advocacy groups and CSOs communicate with members using mailing lists, newsletters and blogs. Their focus is member driven and when their focus is coinciding it is not unusual that direct cooperation is used to push certain questions that engages all of them. Like for example the joint statement about green open access embargo periods issued by COAR, EIFL, LIBER, national Science Library of China, OpenAIRE and SPARC as a counteract to the publishing lobby push for longer embargo periods.[82]

In the UK the DCC is building capacity, capability and skills for data curation across all higher education institutions in the country but they also realize that this goal needs contribution of practitioners and networks beyond the DCC staff and the DCC therefore have appointed a customer relationship manager and a range of new communication channels on its website like webinars, training material, courses, how-to-guides etc.[83]

To understand how to handle, share and annotate data, open research data publishers have started projects with universities. Elsevier's Research Data Service group is collaborating with academic partners such as Columbia University, Duke University, Carnegie Mellon University and University College London (UCL). Together with the last partner the UCL Big data institute was established at the end of 2013.[84] Wiley is working with the Royal

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80 STM, International Association of Scientific, Technical & Medical Publishers, no date, http://www.stm-assoc.org/

81 STM, Open Access Licensing, no date, http://www.stm-assoc.org/open-access-licensing/

[82] COAR, COAR´s reply to STM Publishing Association´s statement on embargo periods (May 28, 2014), July 8, 2014, https://www.coar-repositories.org/news-media/coars-reply-to-stm-publishing-associations-statement-on-embargo-periods-may-28-2014/

[83] DCC, History of the DCC, no date, http://www.dcc.ac.uk/about-us/history-dcc/history-dcc

[84] Elsevier, Research Data Services, 2013. http://researchdata.elsevier.com/

Meteorological Society and the University of Leicester working on developing workflows for data publication for one of their Open Access Program journals, the Open Access Geoscience Data Journal. Wiley is doing this within the Peer REview for Publication & Accreditation of Research Data in the Earth sciences (PREPARDE) project which is a UK JISC funded international project aiming to produce data publication guidelines applicable across a range of research disciplines and data types.[85]

Projects like OpenAire, MedOANet, FOSTER and DataRes are examples on how librarians, data managers and researchers team together to advance different aspect of open access – repository infrastructure, policies, training. These projects draw competence from different stakeholders of the dissemination and curation functions and are a major mechanism for cooperation between different stakeholders, interests and ideologies in the open access ecology.
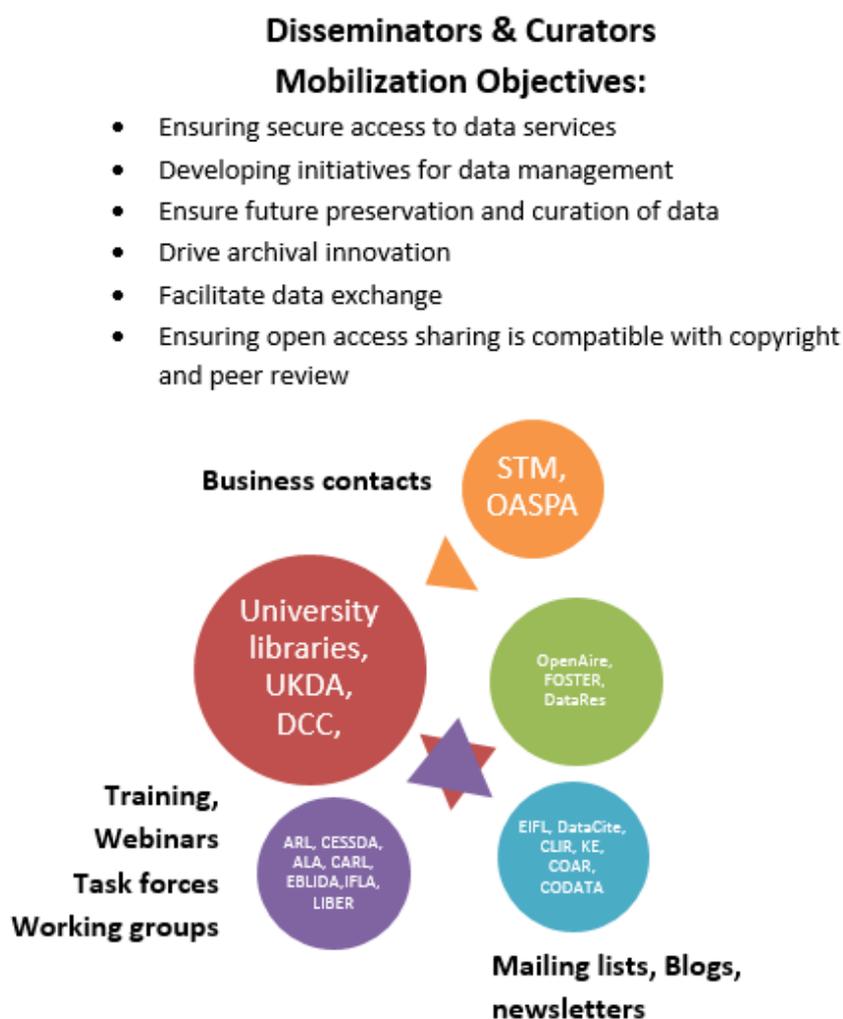

Fig. 5. Mobilization objectives disseminators and curators. Probable relations- centrality/density and channels of cooperation.

3.4.2 Good Examples

The Association of European Research Libraries (LIBER) provides a good example of a network organization that is actively engaged in promoting and facilitating open access to

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[85] University of Leicester. PREPARDE, no date, http://www2.le.ac.uk/projects/preparde

research data. Through its participation in various initiatives and projects, including the RECODE project and the FOSTER project, as well as through workshops, lectures and seminars it aims to create more awareness among research libraries about the value of open research data and the role of libraries in supporting researchers in making their data openly available. LIBER offers its members and other interested parties various resources and guides. One of these resources is a report on 11 case studies of Research Data Management in Libraries. It also published ten recommendations for libraries to get started with research data management.[86]

Another good example is the Digital Curation Center (DCC). It is a national centre of expertise in digital information curation, set up to build capacity, capability and skills in research data management. The centre is intended to address challenges in digital curation that cannot be solved by individual institutions or disciplines. It offers expert and tailored advice and practical help to researchers, data custodians and institutions. They also provide various resources and training programmes on range of topics, including data management, ethical and legal issues, and repository audit and assessment. On their website anyone interested in storing, managing, sharing and protecting data can find various How-to guides, case studies and tools that the DCC has developed as well as resources developed by others. The DCC also participates in projects like FOSTER and the Collaboration to Clarify Costs of Curation (4C) and actively maintains connections with several communities. It regularly organizes conferences, seminars and workshops.

The DCC has played an important role in providing information and training to the research community in the UK and in Europe. It has become a key network organization. The activities of the DCC align with the RECODE recommendations, because they allow room for tailored advice to institutions and disciplines, they help to align policies, contribute to creating incentives for the research community and building capacities and skills.

Finally, the Committee on Data for Science and Technology (CODATA) of the interdisciplinary Scientific Committee of the International Council for Science (ICSU) provides a third good example of well-established network organisation that has to potential to mobilize stakeholders in the Disseminator and Curator function. This organisation has a long track record of connecting those working with data worldwide. Since 1996 it has worked to improve the quality, reliability, management and accessibility of data to all fields of science and technology. CODATA is an organisation with different kinds of international members, including ICSU union members, scientific academies, research councils, and data centres. The organisation aims to develop and share knowledge about data through task and working groups, national member activities, conferences, workshops and conferences. Current task groups, for instance, include groups on data risk, linked data, data interoperability and data citation standards and practices. The CODATA Data Science Journal, a peer reviewed open access journal, is one of the instruments through which the organisation aims to develop knowledge about the management of data and databases. As an established international network organisation, CODATA collaborates with numerous other organisations that have a similar interests. For instance, CODATA contributed to the OECD guidelines on research data and is an active member of RDA. One of the collaborative activities with RDA is working group on Legal operability on research data.

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[86] Final Report of the LIBER Working Group on E-Science/Research Data Management, LIBER,2012. http://libereurope.eu/wpcontent/uploads/The%20research%20data%20group%202012%20v7%20final.pdf

3.5   USER NETWORKS

In the functional taxonomy most of the performers in the eco-system are users of data but only two stakeholders are primary users: the media and information aggregators because these stakeholders provide the public in a large degree with information and understanding based on disseminated research- and government data.

The media does not have any special organizations advocating open access to publications or research data but members of the Open Knowledge Foundation (OKF) have, for example, been involved in producing the Data Journalism handbook intended as a resource for data journalists.[87] OKF is a UK based worldwide non-profit network of people passionate about openness. The organization support and international network, campaigning for open release of key information. They provide web-infrastructure and expertise for community projects, they offer training for governments and CSOs and they champion the four Panton principles[88], focusing on implementing sustainable open licenses to data.

MyScienceWork, re3data.org, Sherpa and Google Ngram are all examples of resources produced by stakeholders functioning as information aggregators in that they use mined or collected data to create new information services - data services, news services, search services. MyScienceWork began as a popular science blog. Having built a solid community of researchers and lovers of science and forged partnerships with important institutions, the company launched its site in January 2013. Today, it offers search capability in more than 30 million scientific publications.[89] Re3data.org is set to create a global registry of research data repositories and is funded by the DFG, partnering with Berlin school of library and information science, the German research centre for Geosciences (GFZ) and the Karlsruhe institute of technology library. Together they are also involved in the DINI initiative. SHERPA comes out of the University of Nottingham providing a set of very useful resources for disseminators and curators about publishers' copyright policies, funders archiving mandates, directory of open access repositories and full-text search of UK repositories. Funding is made available by, among others, the Wellcome trust, JISC, Open Society Institute (OSI), Research Libraries UK (RLUK) and SPARC. Google Ngram is a quite new resources provided by the multinational Google company for finding occurrences of words or phrases in parts of the corpus of books scanned by Google in last couple of years.[90]

3.5.1 Relations and Interactions

It seems that the majority of networking and cooperation among stakeholders in the user function is concentrated around initiatives originating in direct needs from creators, disseminators and curators for administrating open access publications. These organizations are very similar with origin and members from the university circuit and they do know each other and cooperate when their aims are parallel. The reuse of research data for the public mostly has surfaced as resources based on government data. The media is a big potential user of government and research data but is yet just in the beginning of the beginning of using open data as a source for a wider dispersion of awareness of scientific contexts to the public.

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[87] Data Journalism Handbook, no date, http://datajournalismhandbook.org/1.0/en/front_matter_1.html

[88] Open Knowledge Foundation, Panton prinicples, no date, http://pantonprinciples.org/

[89] MyScienceWork, About us, no date, https://www.mysciencework.com/aboutus

[90] Google books Ngram Viewer, no date, https://books.google.com/ngrams

Information aggregators set up services based on stakeholder demand. Communication with their customers, who very often belong to the same circles, is often done along established channels. The SHERPA services were, for example, created by librarians and information professionals at universities for librarians and information professionals at universities.

The relationship and communicative mechanisms between researchers, the media and the public is much more complicated and actually lacking in many ways. Therefore new channels for communication and training need to be established.
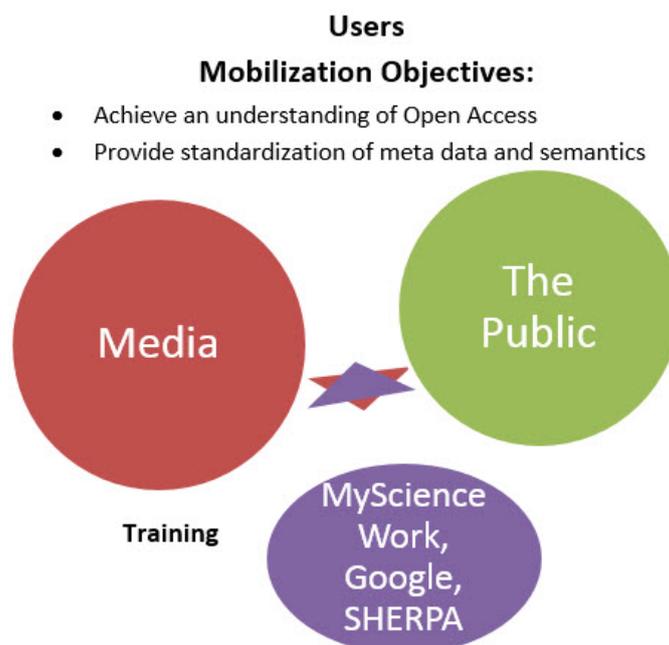

Fig. 6. Mobilization objectives users and channels of cooperation. Probable relations- centrality/density and channels of cooperation.

3.5.2 Good Examples

Open Knowledge Foundation (OKF) is an example of a bottom-up driven network organization with promoting and enabling open access to research data as one of its central aims. OKF is a UK based worldwide non-profit network of people concerned with making information openly accessible to everyone and enable them to use it. The aim is to empower citizens, make powerful institutions comprehensible and accountable and use research information to solve global challenges. The organization supports an international network, campaigning for the open release of key information. They provide web-infrastructure and expertise for community projects, they offer training for governments and CSOs and they champion the four Panton principles[91], focusing on implementing sustainable open licenses to data. The four Panton Principles for open data in science have been drafted and refined within the OKF. This network organization contributes to the mobilization of users by offering information and training to a wide range of audiences, including CSO's, data journalists, or other data users.

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[91] Open Knowledge Foundation, Panton prinicples, no date, http://pantonprinciples.org/

The volunteer led Open Science Working Group at the OKF[92] has been working with key stakeholders to promote open scientific data. They have been active in various areas, ranging from policy initiatives like the Panton Principles and the Panton Fellowships[93], to the more recent open source PyBossa[94] crowdsourcing platform.[95] The working group is involved in advocacy activities as well as developing and providing training programmes. It organizes online and offline meetings that provide a platform for a wide range of individuals from the research community to discuss open science and develop various initiatives.

As the OKF and the Open Science Working groups are both open organisations with an extensive global network their ambitions align well with the RECODE recommendations. They allow for heterogeneous and discipline specific approaches and are actively involved in creating awareness about open research data among a broader public of users.

3.6   SUMMARY

The stakeholder function networks do differ in density of connections and the centrality of positions and number of central players. For example, the funder and initiator network has quite homogenous mobilization objectives dominated by two central players: Research councils and policy makers with dense relations between officials of both groups. This is different compared to creator, disseminator/curator networks where central players, and many specialized satellite stakeholder organizations, have a more scattered interaction with the center. This fragmented picture suggests an open access ecosystem with a diverse set of stakeholders and objectives. The good practice examples, however, show that a range of network organisations exist that have open access to research data on their agenda. These network organisations play an important role in mobilizing stakeholders to actively engage with open research data. They bring together various institutions and researchers to exchange knowledge and good practices, harmonise policies and broker collaborations. Many of these network organisations organise conferences, workshops and seminars or support various working groups to further develop emerging data practices. They engage in advocacy activities and offer various services. Some of these organisations, like the RDA and the OKF, operate on global scale and are open to a diverse range of stakeholders. Other organisations, in particular umbrella organisation, have a more narrow focus, such as Science Europe (funders) and LERU (research universities). Both these kinds of network organisation should be engaged in a network of mobilization actors to implement the RECODE recommendation. Whereas overarching organisations can contribute to creating awareness and can enable learning and negotiations about strategies, policies and standards, more specifically dedicated umbrella organisations have the potential to implement change and facilitate collaborations. In this Chapter we have highlighted several of these organisations as good examples. These should be regarded as a starting point for establishing a network of mobilising actors, rather than an exhaustive list.

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[92] Open Knowledge Foundation, "Open Knowledge", no date. https://okfn.org/

[93] Newman, Laura, "Introducing our Panton Fellows", Open Knowledge Foundation Science working group, 3 April 2012. http://science.okfn.org/2012/04/03/introducing-our-panton-fellows/

[94] Pybossa, "Build with Pybossa", 2014. http://pybossa.com/

[95] Citizen Cyberscience Centre, "Citizen Cyberscience Centre", 2015. http://www.citizencyberscience.net/

4   DISCUSSION

This report has identified and assessed different options for bringing together and mobilizing stakeholders in the field of open access. In order to do so, we identified a sample of existing networks and organizations. We scrutinized stakeholder needs and motives as well as examined how stakeholder organizations mobilize members and define their objectives. We have presented the most important mobilizing themes and have found that strategies aimed at cooperative and coordinating activities that combine both change in attitude and practice are likely to be most successful in advancing open access, data preservation, dissemination and use of research data. Mobilization objectives of this type have the greatest impact on and bring the most benefit to stakeholders.

Within the funder and initiator function, examples of mobilization objectives are to provide career-boosting activities across disciplines for young researchers related to open research data and to initiate and harmonize funders' data policies. In our inventory of different stakeholder function needs it is clear that funders generally do have a need for advice on how to formulate clear policies that consider differences between disciplines and build on consensus definitions of what research data is. In the case of funders, there are some good examples of organizations that meet some of the funders expressed needs in stimulating policy development such as the RCUK, working within the British framework and Science Europe working within the EU framework. Two mobilization objectives among funders that also apply to other function categories are to support education and advancement of young scientists and to increase and improve scientific collaboration using open data. Examples like this could well be used to seed the RECODE recommendations.

Disseminator and Curator stakeholders take a more practical or technical approach to mobilizing objectives. They have concerns about usability both for creators as well as users; an attitude that reflects the service aspect of these stakeholder functions. Their objectives are more focused on infrastructure on an organizational and technical level. Such objectives include: ensuring access to, and security and preservation of data on a collective level; providing training and education for all stakeholders; driving archival innovation and ensuring sharing is compatible with copyright and peer review.

In the user function, the media and information aggregators are primary performers. According to the Commission's instructions[96], open access to research data is not just about storing and sharing data among a select group of scientists, but also about making data available for re-use and examination by a broader group of societal stakeholders. This requires vastly more local resources and expertise. Therefore the main mobilizing objective in this stakeholder function is to achieve an understanding for open access and for the usability of the data in order to broaden the base for services. Research data are in this context of minor importance compared to government data that are likely to be more easily reused and developed by media and information aggregators.

In chapter three, we identified key groups and networks and their relations in each of the five stakeholder functions that could play a key role in implementing the RECODE recommendations. We described the mechanisms used to influence decisions, cooperate

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[96] Guidelines on Open Access to Scientific Publications and Research Data in Horizon 2020, European Commission, Version 1, 11 December 2013.
http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/oa_pilot/h2020-hi-oa-pilot-guide_en.pdf

towards common goals and to disseminate and receive information. Funder stakeholders use direct means like newsletters and lobbying activities to exert their influence. They sponsor or organize conferences to provide forums for discussions and cooperation. Creator organizations tend to leverage influence by having members on important boards, working groups, expert committees, etc. Cooperation within and across disciplines is mainly done via conferences, projects and by creating network organizations. Moving and propagating issues within and across the sciences is often done by creating working groups within established organizations like LERU, CERN, ALLEA or engaging public sector knowledge networks like RDA, DataCite and the Open Knowledge Foundation. Curation and dissemination organizations are to a large degree focused on issues of a technical and organizational nature, such as creating sustainable repositories by initiating standards and protocols for exchange, preservation, metadata, etc. University libraries and data centers come together in organizations like CSOs like COAR, KE, DataCite, professional associations like LIBER, IFLA, CESSDA, international projects like OpenAire, FOSTER and publisher contacts like OASPA and STM. In these settings they collaborate with project partners, exchange knowledge and ideas and receive feedback on their effort to make more research data openly accessible. The joint projects these stakeholders engage in are very much oriented towards training for professional competence and for finding practical solutions to technical or organizational barriers.

A number of well-tried channels and mechanisms are available for cooperative initiatives. For RECODE, umbrella organizations like ALLEA or RCUK, professional associations like CESSDA and LIBER, and public sector knowledge networks (PSKN) like RDA and COAR, are especially suited for information and knowledge sharing across organizations and functions as they have many members and are used to participating in international projects and issues. Using and supporting these kind of networks is one way of harmonizing the open access eco-system and to disseminate the RECODE recommendations. Two possible strategies for attracting the attention of these organizations are:

1. Target key officials in these organizations with information about the RECODE findings.
2. Invite key persons from the different organizations representing functions where we have observed that there is a need but as yet no mobilization activity, in order to start discussions of possible cooperative actions.

5   CONCLUSION AND RECOMMENDATIONS

In order to achieve a researcher-centred, ethical, coherent and flexible approach to open access, RECODE suggests that the key stakeholders need to be mobilized to form collaborative partnerships to ensure that open access principles govern the open data ecosystem. The aim of the mobilizing recommendations is to support key stakeholders in engaging in collaborative partnerships to further define and improve their particular functions in the ecosystem with the help of the RECODE policy recommendations.

1   Develop a high-level strategy for mobilization that takes into account the varied motivations and needs of stakeholders.

Despite the fragmentation of the science system there are basic requirements that need to be met to ensure successful collaboration. The key to bringing together the efforts and actions of people within communities is to "create policies that all of the people within a community are motivated to accept – that is, to be able to gain widespread rule adherence".[97] In the different stakeholder communities we have already identified basic stakeholder mobilizing objectives that can justify cooperation both within and across functions. The open access ecosystem already contains a wealth of know-how, sustainable initiatives and common motivations bridging inherent conflicts of interests and the heterogeneity of research cultures. A number of organizations and institutions are already working together, achieving good results and providing good examples. But despite all the good work being done there is a need to implement aligned policies at national and institutional levels that can motivate and guide stakeholders. Such policies need to make responsibilities transparent and their execution needs to be economically sound.

2   Establish a sustainable network of mobilization actors to coordinate and deliver the high-level strategy.

Public sector knowledge networks (PSKN) are especially suited to information and knowledge sharing across organizations as they address public needs that no single organization can handle alone. Using and supporting these kind of networks is one way to harmonize the open access eco-system. Examples within the system of such networks are RDA, COAR and DataCite.

3 Develop a platform/project to integrate and oversee the mobilization of OA, in order to reduce duplications of effort, reduce fragmentation, and share best practice among stakeholders.

Policy and legal barriers, especially in the absence of formal support mechanisms are the greatest obstacles to building and sustaining such networks. As Dawes et al. note: "These barriers are not so much restrictions on sharing as they are failures to support collaborations with appropriate resource allocations and policy mechanisms".[98]

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[97] Tyler, Tom R., *Why people cooperate; The role of social motivations*, p, 12, Princeton University Press, 2013. eBook.

[98] Dawes, Sharon S., Anthony M. Cresswell and Theresa A. Pardo. "From "Need to Know" to "Need to Share": Tangled problems, information boundaries, and the building of public sector knowledge networks". *Public Administration Review*, May/June 2009, pp. 392-402.

The RECODE recommendations are targeted to inspire policy making on all levels. For the task of harmonizing and supporting European policies on open access and data dissemination and preservation the target group for moving these policies should be a set of stakeholder specific umbrella organizations, professional associations and PSKNs. Their goals are to support and serve members and member organizations; to lobby for policies, and to share information about best practices. Umbrella organizations are major organizers of conferences, workshops and training seminars where the RECODE recommendations could be discussed and advanced. The project/platform would use the recommendations via these organizations representing each of the five stakeholder functions advancing policy making and policy change on all levels. Within such a platform/project three actions are imperative:

- Develop a set of best practices which can be adopted by stakeholders
- Create accessible and consistent user guides for OA to data
- Create institutional alliances of repositories on different levels – national and international in the mode of projects like OpenAire.

6   APPENDIX

6.1   LIST OF ACRONYMS

ABI – Auckland Bioengineering Institute
AHRC - Arts and Humanities Research Council
ALA – American Library Association
ALLEA - federation of All European Academies
APA/APARSEN – Alliance for Permanent Access
API – Application Programming Interface
ARK – Archival Resource Key
ARL – Association of Research Libraries
AUP – Amsterdam University Press
BA – Business Architecture
BBSRC – Biotechnology and Biological Sciences Research Council
CARL – Canadian Association of Research Libraries
CAS – Chemical Abstracts Registry Service
CC0 – Creative Commons license "No Rights Reserved"
CC-BY – Creative Commons license "Attribution"
CC-BY-SA – Creative Commons license "Attribution-ShareAlike"
CDL – California Digital Library
CEA – Commissariat à l'energie atomique et aux energies alternatives
CERN - European Organization for Nuclear Research
CESSDA – Council of European Social Science Data Archives
CICG – Centre International de Conferences de Genève
CIDOC – International Committee on Documentation
CLIR – Council on Library and Information Resources
CLOCKSS – Controlled LOCKSS
CMS – Compact Muon Solenoid
CNG – Centre National de Genotypage
COPD – Chronic Obstructive Pulmonary Disease
COAR – Confederation of Open Access Repositories
CPU – Central Processing Unit
CRM – Conceptual Reference Model
CRUI – Conference of Italian University Rectors
CSOs – Civil Society Organisations
DANS – The Data Archiving and Networking Services institute in the Netherlands
DARIAH – DigitAl Research Infrastructure for the Arts and Humanities
DAS – Standards for Digital Archives
DCC – Digital Curation Center
DFG – German Research Foundation
DG CONNECT – Directorate General for Communications Networks, Content and Technology
DINI – Deutsche Initiative fűr Netwerkinformation
DOAJ – Directory of Open Access Journals
DMP – Data Management Plan
DNFR – The Danish National Research Foundation
DOI – Digital Object Identifiers
DOI – Digital Objet Identifier
DoW – Description of Work

DPE – Digital Preservation Europe
DRAMBORA – Digital Repository Audit Method Based on Risk Assessment
DRIVER – Digital Repository Infrastructure Vision for European Research
DRIVER-II – Digital Repository Infrastructure Vision for European Research II
DSA – Data Seal of Approval
DVCS – Distributed Version Control System
EBLIDA – European Bureau of Library Information and Documentation Associations
EC – European Commission
EC – European Community
EDINA – is the Jisc-designated national data centre at the University of *Edinburgh*
EDNA – e-Depot Netherlands Archaeology
EEN – Enterprise Europe Network
EGIDA – Coordinating Earth and Environmental Cross-Disciplinary Projects to Promote GEOSS
EGU – European Geosciences Union
EHR – Electronic Health Record
EIFL – Electronic Information for Libraries (low-cost access to developing countries
ELIXIR – A distributed infrastructure for life-science information
EOS – Earth Observing System
EPSRC – Engineering and Physical Sciences Research Council
ERA – European Research Area
ERC – European Research Council
ESA – European Space Agency
ESF – European Science Foundation
ESO – European Southern Observatory
ESRC – Economic and Social Research Council, UK
EU – European Union
EU – European Union
EU JRC – European Union Joint Research Centre
EUDAT – European Data Infrastructure
EuroCRIS – The European Organisation for International Research Information
EuroGEOSS – the European approach to GEOSS
EUROHORC – European Heads of Research Councils
EvA – Emphysema versus Airways disease
EVA – Emphysema versus Airways disease
FNRS – Fonds de la Recherche Scientifique, Belgium
FOIA – Freedom of Information Act
FOSTER – Facilitate Open Science Training for European Research
FP7 – EU Seventh Framework Programme for Research and Technological Development
FWF – Austrian Science Fund
GCI GEOSS – Common Infrastructure
GEO – Group on Earth Observations
GEOSS – Global Earth Observation System of Systems
GEO-X – Tenth Plenary Session of the Group on Earth Observations
GESIS – Leibniz Institute for the Social Sciences
GFZ – German Research Centre for Geosciences
GIS – Geographic Information Systems
GIT DVCS – Free software Distributed Version Control
GPR – Ground Penetrating Radar
H2020 – Horizon 2020

HE – Higher Education
HEI – Higher Education Institutes
HHS – Health & Human Services
IA – Information Architecture
ICORDI – International Collaboration on Research Data Infrastructure
ICT – Information and Communication Technology
ICT – Information and Communication Technology
IFLA – International Federation of Library Associations
IGO – Intergovernmental Organisations
INET – CERNS interdepartmental knowledge transfer network
INSPIRE – Infrastructure for Spatial Information in the European Community
INSPIRE – Infrastructure for Spatial Information in the European Community
IPR - Intellectual Property Rights
IPR – Intellectual Property Rights
iRODS – integrated Rule Oriented Data Systems
ISO – International Standards Organization
IT - Information Technology
IUPS – International Union of Physiological Sciences
JISC – Joint Information Systems Committee
JOAD – Journal of Open Archaeological Data
JRC – European Union Joint Research Centre
JSON – JavaScript Object Notation
JSON-LD – JavaScript Object Notation - Linked Data
KE – Knowledge Exchange
KNAW – Royal Netherlands Academy of Arts and Sciences
LEP – Large Electron Positron
LERU – The League of European Research Universities
LHC – Large Hadron Collider
LHC – Large Hadron Collider
LIBER – Ligue des Bibliothèques Europeennes de Recherche - Association of European Research Libraries
LOCKSS – Lots of Copies Keep Stuff Safe
LSID – Large Structure Identifier
MedOANet – Mediterranean Open Access Network
MI – Marine Institute
MITA – Medicaid Information Technology Architecture
MPS – Max Planck Society
MPDL – Max Planck Digital Library
NASA – National Aeronautics and Space Administration
NEH – National Endowment for the Humanities
NERC – Natural and Environmental Research Council
NESTOR – Network of Expertise in Long-Term Storage of Digital Resources
NIST – National Institute of Standards and Technology
NSF – National Service Frameworks
NSF – US National Science Foundation
NZ – New Zealand
OAI – Open Archives Initiative
OAIS – Open Archival Information System
OAPEN – Open Access Publishing in European Networks
OAR – Open Access Repositories

OASPA – Open Access Scholarly Publishers Association
OBO – Open Biological and Biomedical Ontologies
ODE project – Opportunities for Data Exchange
ODI – Open Data Institute
OECD – Organisation for Economic Co-operation and Development
OID – Object Identifier
OKF – Open Knowledge Foundation
OpenAIRE – 1st Generation of Open Access Infrastructure for Research in Europe
OpenAIREplus – 2nd Generation of Open Access Infrastructure for Research in Europe
OpenAIREplus – 2nd Generation of Open Access Infrastructure for Research in Europe
OpenDOAR – The Directory of Open Access Repositories
ORCID – Open Researcher & Contributor ID
OSEPI – Open Society European Policy Institute
OSI – Open Society Institute
OWL – Web Ontology Language
PANGAEA – Data Publisher for Earth & Environmental Science
PARSE – Permanent Access to the Records of Science in Europe
PARSE.Insight – Permanent Access to the Records of Science in Europe
PDB – Protein Data Bank
PEER – Publishing and the Ecology of European Research
PID – Positive Identification
PlosOne – Public Library of Science journal
PMR – Physiome Model Repository
PPPA – Particle Physics and Particle Astrophysics
PPPA – Particle Physics and Particle Astrophysics
PREPARDE – Peer Review for Publication & Accreditation of Research Data in the Earth Sciences
PREPARDE – Peer Review for Publication & Accreditation of Research Data in the Earth Sciences
PRIME – Power-efficient, Reliable, Many-core Embeded systems
PSI – Public Sector Information
PURL – Permanent Universal Resource Locator
RCUK – Research Councils United Kingdom
RDA – Research Data Alliance
RDNL– Research Data Netherlands
RDF – Resource Description Framework
RECODE – Policy RECommendations for Open access to research Data in Europe
RFO – European Research Funding Organisations
RI – Research Institutes
RIN – Research Information Network
RLG – Research Library Group
RLUK – Research Libraries UK
RP0 – Research Performing Organisations
SAFE – Standard Archive Format for Europe
SCIDIP-ES – SCIence Data Infrastructure for Preservation with focus on Earth Science
SFTP – Secured File Transfer Protocol
SHERPA – Securing a Hybrid Environment for Research Preservation and Access
SHERPA/JULIET – Securing a Hybrid Environment for Research Preservation and Access (Research funders' open access policies)

SHERPA/ROMEO – Securing a Hybrid Environment for Research Preservation and Access (Publisher copyright policies & self-archiving)
SiS – Science in Society
SOAP – Study of Open Access Publishing
SOS – System of Systems
SOSE – System-of-Systems Engineering
SPARC – Scholarly Publishing and Academic Resources Coalition
SSH – Socioeconomic Sciences and Humanities
SSHRC – Social Sciences and Humanities Research Council of Canada
STM – International Association of Scientific, Technical & Medical Publishers
SURF – collaborative organisation for ICT in Dutch higher education and research
TRAC – Trustworthy Repositories Audit and Certification
UCL – University College London
UK – United Kingdom
UK NERC – United Kingdom Natural Environment Research Council
UKOLN – United Kingdom Office for Library and Information Networking
UKDA – UK Data Archive
UNESCO – the United Nations Educational, Scientific and Cultural Organization
URI – Uniform Resource Identifier
URL – Uniform Resource Locator
URN – Uniform Resource Name
USFD – University of Sheffield
UUID – Unique User Identifier
VPH - Virtual Physiological Human
VPH – Virtual Physiological Human
W3C – World Wide Web Consortium
WCS – Web Coverage Service
WebDAV – Web-based Distributed Authoring and Versioning
WHO – World Health Organization
WP1 – RECODE Work Package 1, Stakeholder Values and Ecosystems
WP2 – RECODE Work Package 2, Infrastructure and technology
WP6 – RECODE Work Package 6, Stakeholder Engagement and Mobilisation
WPS – Websphere Portal Server
XML – Extensible Markup Language
XRI – Extensible Resource Identifier
Zenodo – An open digital repository for research data

6.2   LIST OF ORGANIZATIONS

Major organizations involved in the open access project that we encountered during the RECODE study

Acronym	Org. Title
ALA	American Library Association
ALLEA	the federation of All European Academies
APA	Alliance for Permanent Access
ARL	Association of Research Libraries
BBSRC	Biotechnology and Biological Sciences Research Council
CC	Creative Commons
CCSDS	Consultative Committee for Space Data Systems
CERN	European Organization for Nuclear Research
CESSDA	Consortium of European Social Science Data Archives
CLIR	Council on Library and Information Resources
CNR	Italian National Research Council
COAR	Confederation of Open Access Repositories
CODATA	Committee on data for science and technology (ISCU)
CRC	Centre for Research Communications
DANS	Data Archiving and Networked Services
DARIAH	the Digital Research Infrastructure for the Arts and Humanities
DataCite	DataCite
DataRes	DataRes Project
DCC	Digital Curation Center
DDG	Development Data Group, World Bank
DFG	German Research Foundation
DigitalScience	Software developers promoting scientifc research
DIN	Deutsches Institut für Normung
DINI	Deutsche Initiative fűr Netwerkinformation
DPC	Digital Preservation Coalition
DPE	Digital Preservation Europe
DRYAD	a general-purpose home for a wide diversity of datatypes
DSA	Data Seal of Approval
EarthCube	A Data and Knowledge Environment for the Geosciences
EBLIDA	The European Bureau of Library, Information and Doc. Assoc.
EGU-ESSI	European Geoscience Union-Division on Earth and Space Science Informatics
EIFL	Electronic Information for Libraries
ELIXIR	Open access to biological data
ERA	European Research Area
ERAC	European Research Area Committee
ERC	European Research Council
ESF	European Science Foundation
EUDAT	European Data Infrastructure
euroCRIS	The European Organization for International Research Information
EUROHORC	European Heads of Research Councils
FOSTER	Facilitate Open Science Training for European Research
GBIF	Global Biodiversity Information Facility
GEO-BON	The Group on Earth Observations Biodiversity Observation Network
GEOSS	Global Earth Observation System of Systems
GESIS	Leibniz Institute for the Social Sciences
ICSU	International Council for Science
IFLA	International Federation of Library Associations and Institutions
IUGG-UCDI	Int. Union of Geodesy and Geophysics - Union Comm. for Data and Information

JISC	Joint Information Systems Committee
KE	Knowledge Exchange
KNAW	Royal Netherlands Academy of Arts and Sciences
LERU	League of European Research Universities
LIBER	Association or European Research Libraries
LISC	linked Science
MedOANet	Mediterranean Open Access Network Project
MyscienceWork	MyScienceWork
OAPEN	Open Access Publishing in European Networks
OASPA	Open Access Scholarly Publishers Association
OCLC	Online Computer Library Center
ODaF	The Open Data Foundation
ODI	Open Data Institute
OECD	Directorate for Science, Tech. and Industry Science and tech. policy
OKF	Open Knowledge Foundation
OpenAIRE	Open Access Infrastructure for Research in Europe
OpenAIREplus	Open Access Infrastructure for Research in Europe
OSDA	Open Semantic Data Association
OSEPI	Open Society European Policy Institute
PLOS	Public Library of Science
RAC	ISO Repository Audit and Certification work
RCUK	Research Councils UK
RDA	Research Data Alliance
re3data.org	Registry of Research Data Repositories
RIN	Research Information Network
Science Europe	Asssoc. of European Research Funding and Research performing Org.
SF	Sunlight Foundation
SHERPA	is investigating issues in the future of scholarly communication. See CRC
SPARC	The Scholarly Publishing and Academic Resources Coalition
SPARC-EUROPE	The Scholarly Publishing and Academic Resources Coalition
SSP	Society for Scholarly Publishing
STM	International Association of Scientific, Technical & Medical Publishers
SURF	collaborative org. for higher education inst. and research institutes
UKDA	UK Data Archive
UKOLN	United Kingdom Office for Library and Information Networking
UNESCO	United Nations Educational, Scientific and Cultural Organization
Unidata	providing innovative data services to transform the conduct of geoscience
WC3	World Wide Web Consortium
WIPO	World Intellectual Property Organization
WWWF	World Wide Web Foundation
Zenodo	Repository service for sharing multidisciplinary research results