Work package 4

Deliverable: D4.5 Report proposing programme- level strategies supporting firm establishment of 'open science'

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The main outcomes

- The report presents the definition of Open Science, a short summary of the background and the most relevant documents for the development of the concept. Furthermore, the status of the development of Plan S and support systems at the time of the finalisation of this report (December 2020), and the status of the implementation of Open Access at funding organisations, as of December 2019, is presented.
- The current incentive and reward structures for academic careers remain obstacles for the transition to Open Science. The future BANOS programme should therefore develop explicit policies on Open Science with a clear description of roles and responsibilities for each stakeholder. Furthermore, the evaluation committee for research proposals should be required to adhere to the DORA principles.
- The BANOS programme should take a proactive role in changing research cultures through support and promotion of good practices and offer training in e.g. research integrity, FAIR data management and sharing, adapted appropriately for all disciplines. To include all types of research outputs and Output Management Plans (OMP) should be required in the project plan for grant applications.
- The BANOS programme should require full and immediate Open Access to peer-reviewed scholarly articles from research funded by the programme, that will be mandatory in the project contract. The Open Access requirements for the programme should align with the requirements of Plan S. The costs for publishing in immediate open access are covered either by the funding agency or by transformative agreements with publishers, i.e. the costs for publications are prepaid by the higher education institutions to which the researcher belong or by other organizations. As not all funding organizations may have signed Plan S at the start of the programme, an initial survey should be conducted on the status of the implementation of Open Access.
- Of 23 national research funding organizations, including funders outside BANOS CSA consortium, only three organisations had no concrete plans to implement Open Access as of December 2019, i.e. one year before the required implementation according to Plan S.
- As the requirement of Open Access is only applicable when a scientific article is being published, it is not a hindrance for innovation in respect to securing intellectual properties, such as patents. The balance between openness of data and the protection of intellectual property rights (IPR) should be in line with the principle 'as open as possible, as closed as necessary'.

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Description of task: (i.e. as in the Description of Work)

The “three O’s” – open innovation, open science and open to the world, set the vision for Europe to make research and innovation more accessible and spread, as well as to encourage collaboration among scientists and innovators across the globe. The task will build on EC’s next generation metrics recommendations (European Commission, 2017), and will formulate strategies for how open science should be addressed in the future joint Baltic Sea and North Sea research and innovation programme. Strategies will go beyond the current EC mandates on open data and open access to publications, and will seek apply FAIR principles (findable, accessible, interoperable, re-usable) to the entire range of research outputs across the research lifecycle.

The task will work closely with task 4.1 (mechanisms for monitoring impact), task 4.6 (open data) and task 4.7 (citizen science), and seek to make synergies and avoid conflicts with open innovation (in synergy with task 4.6 open innovation). Task 4.4 will also provide concrete examples of how access to research outputs can empower citizen science and co-creation in marine research. The work on this task will start in M12, provide input to SOW and the 2nd Project Assembly in M17 and produce the final report on open science in M24.

BANOS
Baltic and North Sea Coordination and Support Action

THE BALTIC AND NORTH SEA COORDINATION AND SUPPORT ACTION (BANOS CSA)

BANOS CSA D4.5

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Contents

Executive summary

The Baltic and North Sea Coordination and Support Action (BANOS CSA) is preparing a framework for the joint Baltic Sea and North Sea Research and Innovation Programme (BANOS), to be ready in 2021.

Task 4.4 *Strategies supporting firm establishment of 'open science'* is part of BANOS CSA work package 4: *Specific measures reinforcing future programme's lasting impact*. Open Science is an umbrella term that describes sharing via internet any kind of output, resources, methods or tools, at any stage of the research process and fundamental parts are usually Open Data and Open Access (OA) to scientific publications. The purpose of task 4.4 is to formulate strategies for how Open Science should be addressed in the future joint BANOS programme in order to promote Open Data and OA to publications and seek to apply FAIR principles (findable, accessible, interoperable, re-usable) to the entire range of research outputs across the research lifecycle.

Other tasks within BANOS CSA WP4 of relevance for Open Science is task 4.5 *Developing strategies and instruments stimulating innovation diffusion and 'open innovation',* task 4.6 *Developing strategies and instruments supporting open data* and task 4.7 *Strategies supporting 'citizen science'*, which in more detail describe the BANOS strategies of these aspects. In this report we present the definition and background to Open Science, the status for Plan S (as in December 2020) and a set of general recommendations regarding the adoption and implementation of Open Science, and OA in particular, in the future BANOS programme.

The future BANOS programme commits to promote and apply Open Science and the FAIR data principles and will require full and immediate OA to peer-reviewed scholarly articles from research funded by the programme. It will develop explicit policies on Open Science with a clear description of roles and responsibilities for each stakeholder as this is a key aspect in fostering the necessary change in research culture. Furthermore, the evaluation committee for research proposals will be required to adhere to the DORA principles, with the aim to support the transfer of scientific knowledge to contribute to policy, practice and innovation.

Introduction

The Baltic and North Sea Coordination and Support Action (BANOS CSA) is preparing a framework for the joint Baltic Sea and North Sea Research and Innovation Programme (BANOS), to be ready in 2021. For research to truly function as a tool for sustainable development, science needs to be openly available. Research outputs must be shared with the society, however balancing the necessary safeguards to protect the interests e.g. within the arena of innovation and scientific discovery.

The purpose of BANOS CSA task 4.4 *Strategies supporting firm establishment of 'open science'* is to formulate strategies for how Open Science should be addressed in the future joint Baltic Sea and North Sea research and innovation programme (BANOS) in order to promote Open Data and Open Access (OA) to publications and seek to apply FAIR principles (findable, accessible, interoperable, re-usable) to the entire range of research outputs across the research lifecycle. Three other tasks within BANOS CSA WP4 are of relevance for Open Science:

Task 4.5. *Developing strategies and instruments stimulating innovation diffusion and 'open innovation'* deals with knowledge sharing in the innovation process

Task 4.6 *Developing strategies and instruments supporting open data* with the purpose to formulate a general strategy towards Open Data

Task 4.7 *Strategies supporting 'citizen science'* evaluate the potential of scientific collaboration with citizens

All tasks can support and may enhance Ocean literacy, *i.e. understanding the ocean's influence on you and your influence on the ocean.* Thus, leading to an increased emotional connection to the sea. The descriptions and guidelines for the strategies to implement the aspects of innovation, data and citizen science in the BANOS programme are presented in more detail in the report for each task, respectively.

In this report we specifically summarize the status for the development of Plan S (as in December 2020), which is an initiative for OA publishing launched in September 2018[1]. In the last section, a set of general recommendations, regarding the adoption and implementation of Open Science in the future BANOS programme, are presented.

Open Science – definition and background

Definition

Open Science is an umbrella term that describes sharing via internet any kind of output, resources, methods or tools, at any stage of the research process[2](Figure 1). For instance, access to publications, research data, software/tools, workflows, citizen science, educational resources, and alternative methods for research evaluation including peer review. However, fundamental parts are usually Open Data and OA to scientific publications.

Open Science is often described as having the potential to strengthen quality, importance and the benefit of science, and thereby having a more reliable and more efficient benefit for the whole community. From an economic point of view the main argument for Open Science is that scientific outputs generated by public research are public goods that everyone should be able to use at no cost.

[1] https://www.coalition-s.org/
[2] https://www.fosteropenscience.eu/content/what-open-science-introduction

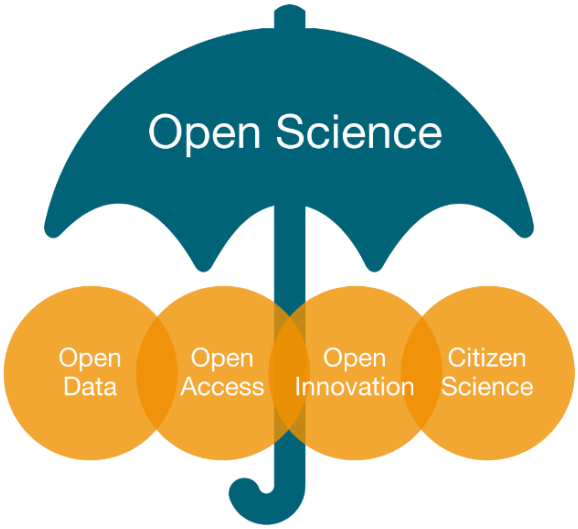

Figure 1. Open Science is an umbrella term that describes sharing via internet any kind of output, resources, methods or tools, at any stage of the research process. Of relevance for the future BANOS programme, is Open data, Open Access to publications, Open Innovation and Citizen Science.

Background

In December 2001, representatives from the research community, publishers and university libraries met in Budapest to discuss free and OA to scientific publications, a first step towards establishment of the open science concept. The meeting resulted in the publication of an OA position in February 2002, called The Budapest Initiative (BOAI), which defined the concept of OA. This initiative has since then been signed by thousands of organizations and individuals in many different countries. This first manifesto was followed by several calls, of which *The Bethesda Statement* (2003) and *Berlin Declaration* (2003) have received the most attention. The purpose of these positions was to strengthen the development to make scientific publications freely and openly available on the internet for anyone. From primarily focusing on the OA of research publications, about ten years later, also Open Data was included.

The term "Open Science" was chosen by stakeholders during the 2014 public consultation[3] to describe the ongoing transitions in the way research is performed, researchers collaborate, knowledge is shared using digital technologies, and science is organised. The concept of Open Science has come to include the entire science system and the dissemination, communication and collaboration aspects of the research process.

In 2016, The Amsterdam Call to Action[4] outlined the changes needed for Member States and actors in the research system to realise the benefits of Open Science. The call centered on four overarching goals:

a. full OA for all scientific publications

b. a new approach towards optimal reuse of research data

c. new assessment, reward and evaluation systems

d. alignment of policies and exchange of best practices.

[3] https://ec.europa.eu/research/openscience/index.cfm?pg=open-science-policy-platform-faqs
[4] https://www.government.nl/documents/reports/2016/04/04/amsterdam-call-for-action-on-open-science

The European Open Science Policy Platform (OSPP, also known as EUOSPP) was established as a high-level advisory group by the directorate-general for research and innovation (RTD) of the European Commission in 2016-2020. The main roles of the OSPP have been to advise the Commission on how to further develop and practically implement Open Science policy, support policy formulation by identifying the issues to be addressed and providing recommendations on the required policy actions. The group consisted of expert representatives of European science stakeholders e.g. universities, research organizations, funding organizations, Citizen science organizations, publishers, Open Science platforms and intermediaries, and libraries.

In the final report from the EUOSPP in April 2020[5] it is concluded that challenges within research performing organisations are lack of funding for OA publishing, mainstreaming of FAIR research data management (i.e. supportive infrastructure, scientific protocols and workflows, improved acceptance, adequate funding etc.), mainstreaming Citizen Science and public engagement in the structure and working process of institutions (including training and education at undergraduate level).

Open Science in the EU partnership programme and UN Ocean Decade

As indicated above, the implementation of Open Science is a priority for the European Commission. In parallel with future BANOS programme the development of the EU partnership programme *A Climate Neutral and Sustainable Blue Economy* and the *UN Decade of Ocean Science for Sustainable Development (2021-2030)* are ongoing. In both these research initiatives access to data, innovation for sustainable development and involvement of citizens, e.g. through citizens science, are of high relevance. For the EU partnership programmes also OA is a priority. As one of the likely implementation mechanisms of BANOS SRIA is the above-mentioned EU Blue Economy Partnerships[6], as the future BANOS programme will closely align its Open Science policy with European Policies and Directives.

The United Nations has proclaimed a *Decade of Ocean Science for Sustainable Development (2021-2030)* to gather ocean stakeholders worldwide behind a common framework that will ensure that ocean science can fully support countries in creating improved conditions for sustainable development of the ocean. Digitization, handling and sharing up-to-date marine data to support information, improved ocean knowledge and Ocean Literacy are described as cornerstones for the success of the UN Ocean Decade[7].

Including Open Science in BANOS

As mentioned in the introduction above, the implementation of data, innovation and citizen science are presented in other tasks within BANOS CSA work package 4. In this report we describe the background and status for development of OA for scientific publications within Horizon Europe at the time of the writing of this report, December 2020.

[5] https://ec.europa.eu/research/openscience/pdf/ec_rtd_ospp-final-report.pdf#view=fit&pagemode=none

[6] The Partnership aims, among others, to align investments in R&I across European regional seas and facilitating collaboration to develop and openly exchange knowledge and innovation in the region. A part of this process is development of a joint SRIA which builds on SRIAs developed for different European regional Sea basin, thus including BANOS SRIA.
https://ec.europa.eu/info/files/climate-neutral-sustainable-and-productive-blue-economy_en

[7] IOC (2020) United Nations Decade of Ocean Science for Sustainable development 2021-2030. Implementation Plan, Draft version 2.0 August 2020.

Open Access - Background

Today many scientific articles are published behind expensive paywalls. This has led to enterprises, schools, authorities, municipalities as well as the general public being cut off from accessing research financed by public funds. Furthermore, as researchers pay for publication and users for subscriptions the costs for publishing compared to other types of publications are low, and, thus, the publishers make big profits from tax-funded research.

OA will make scientific articles immediately accessible upon publication, and thereby allow for the possibility that knowledge and innovation can develop at a greater speed, as more researchers have the opportunity to validate and build upon previous results. Another important incitement for OA is that it creates an opportunity to fully take advantage of the digitalization's potential for efficient communication between researchers and the surrounding society. OA increases the potential that new knowledge can be transferred faster into practice by enterprises, authorities, consultants and organizations.

The requirement for OA, however, means that researchers cannot freely choose where they want to be published, as some prestigious and "high-impact" journals, such as Science or Nature, do not offer immediate OA or access at a very high cost. As long as criteria, such as publications in highly ranked research journals is crucial for grants, positions and careers development, the system will be difficult to change. Thus, incentive and reward structures for academic careers remains an obstacle for the transition to Open Science.

To address the need to improve the ways in which the output of scientific research is evaluated by e.g. funding agencies and within academia, a group of editors and publishers of scholarly journals developed a set of recommendations in 2012 during *the Annual Meeting of The American Society for Cell Biology (ASCB)*[8]. The recommendations are referred to as the San Francisco Declaration on Research Assessment (DORA)[9], and aim to raise the awareness of the necessity for research to be assessed on its own merits rather than on the basis of the venue in which the research is published. Furthermore, in research assessments, to consider a broad range of impact measures e.g. the value and impact of research outputs, such as datasets and software, and qualitative indicators of research impact, such as influence on policy, practice and innovation.

Plan S and cOAlition S

OA has been a core strategy in the European Commission to improve knowledge circulation and, thus, innovation. It is illustrated by the general principle for OA to scientific publications in Horizon 2020 and Open Data[10]. OA has been an important feature of Horizon 2020 and will continue to be so in the next research and innovation framework programme, Horizon Europe[11].

Plan S is an initiative for OA publishing that was launched in September 2018[12] (Appendix 1). The plan is supported by cOAlition S, an international consortium of research funders, including for instance, Academy of Finland, Dutch Research Council (NWO), French National Research Agency (ANR), Research Council of Norway (RCN), Swedish Research Council for Environment, Agricultural Sciences and Spatial

[8] https://sfdora.org/
[9] https://sfdora.org/read/
[10] https://www.openaire.eu/what-is-the-open-research-data-pilot
[11] Glinos K. 2020. Making Open Science the new normal. In: Keynote presentation slides from the 15th International Digital Curation Conference. Dublin, Ireland: Zenodo. p. 35. https://zenodo.org/record/3688670#.X2SH8GgzY2y
[12] https://www.coalition-s.org/

Planning (FORMAS), Sweden's Innovation Agency (Vinnova), National Science Center (NCN Poland) and UK Research and Innovation.

The timeline for implementation of Plan S will vary among member organisations. As a minimum requirement, cOAlition S members must apply the Plan S principles at the latest in calls published, or application deadlines, after 1 January 2021. Furthermore, cOAlition S supports the principles of DORA and members will implement the principles in their policies by January 2021.

Mandates for Open Access

Plan S requires that peer-reviewed scholarly articles that result from research funded by public grants must be published in compliant OA journals or platforms. This means no embargos will be accepted, all articles must be made available with OA directly upon publications. Research articles must be published in OA venues (journals or platforms) or made openly and immediately available upon publication in an OA repository.

cOAlition S endorses several strategies to encourage subscription publishers to transition to full and immediate OA.

- *OA publishing venues (journals or platforms)*

  Authors publish in an OA journal or on an OA platform and cOAlition S funders will financially support publication fees.

- *Subscription venues (repository route)*

  Authors publish in a subscription journal and make either the final published version (Version of Record, VoR) or the Author's Accepted Manuscript (AAM) openly available in a repository. However, cOAlition S funders will not financially support 'hybrid' OA publications fees in subscription venues.

- *Transition of subscription venues (transformative arrangements)*

  Authors publish OA in a subscription journal under a transformative arrangement. cOAlition S funders can contribute financially to OA publishing under transformative arrangements.

- *Transformative Journal*

  Transformative journal is a subscription/hybrid journal that is committed to transitioning to a fully OA journal, and must gradually increase the share of OA content and offset subscription income from payments for publishing services (to avoid double payments).

Authors or their institutions are required to retain copyright to their publications. All publications must be published under an open license, preferably the Creative Commons Attribution license (CC BY).

The costs for publishing will be covered either by the funding agency or by transformative agreements with publishers. Researchers can apply for funding for publication costs, such as article processing costs (APC), with the exception for APC: s in "hybrid journals", i.e. journals that make content available via a mixture of traditional subscription-based publishing and OA. In the case of transformative agreements, the costs for publications are prepaid by the higher education institutions to which the researcher belong, or by other organizations and, thus, free of charge for the individual researcher.

In November 2020, cOAlition S opened a trial version of a tool for finding channels and journals to publish consistent with forthcoming stricter requirements for immediate OA[13]. The tool is called the Journal Checker Tool (JCT)[14] and formal launch will take place January 2021.

Specifically, for Horizon 2020 and Horizon Europe beneficiaries the European Commission scientific publishing service will provide a peer-reviewed venue, Open Research Europe[15], to publish results in open access, at no cost and in full compliance with OA. The formal launch of the platform will take place in early 2021 The platform will use a model of immediate publication of submissions followed by transparent and open peer review with inclusion of all supporting data. The names of the reviewers will be open, as well as their reviews.

Present status for Plan S and Open Access within the consortium for BANOS CSA

Among the national funding organizations in the consortium for the future BANOS programme, 50 % have signed Plan S as of October 2020 (Appendix 2). In order to further evaluate the status, a question regarding the status of implementation of OA was included in a questionnaire to all currently involved organisations in BANOS CSA, to potentially interested future funders and to strategic partners (Appendix 3). The questionnaire was distributed in December 2019 in collaboration with task 4.6 on Open Data. The outcome of the questionnaire was that all but one of the BANOS CSA partners that are funding organizations (Research Council of Lithuania) have the requirement for OA already in place or will have from 2021.

Of the in total 23 national research funding organizations (thus, including funders outside BANOS CSA consortium) that responded to the questionnaire, three responded that they will implement OA but that the timing is uncertain, i.e. Estonian Research Council, Ministry of Education and Science of Latvia, and The National Centre for Research and Development (Poland). Three organisations answered that they had no concrete plans to implement requirements stipulating immediate OA for scientific articles; i.e. the Swedish Research Council, Research Council of Lithuania and Ministry of Rural Affairs (Estonia).

The difference in progress towards OA may be larger between national funding agencies than between countries. For example, in Sweden three funding agencies (Formas, Forte and Vinnova) require immediate access while the Swedish Research Council answer that they have no concrete plans to implement requirements stipulating immediate OA, accepting an embargo of 6-12 months.

Open Science in relation to other tasks within WP4

Several other tasks within BANOS CSA WP4 are of relevance for Open Science. A short summary of some key messages from each task is presented below.

Task 4.1 Mechanisms for monitoring impact

The impact monitoring will focus on assessing both a project and Programme level impact. For projects, the assessment contains predefined performance indicators of which some are narrative in style. In respect to Open Science, indicators include both numbers of OA publications as well as datasets to

[13] https://www.coalition-s.org/coalition-s-releases-the-journal-checker-tool/
[14] https://journalcheckertool.org/
[15] https://open-research-europe.ec.europa.eu/

openly accessible common databases arising from BANOS projects. Societal impact, engagement of citizens and outreach activities, including enhancement of ocean literacy in general, will also be assessed in relevant projects.

Task 4.5 Developing strategies and instruments stimulating innovation diffusion and 'open innovation'

Knowledge is a prerequisite for innovative power and the excellence of Europe's scientific research is widely acknowledged but it is not efficiently transferred into marketable innovations. This recognised deficiency has coined the term 'European paradox'. Open Science will move science forward by allowing faster and broader dissemination of research results. Requiring OA and Open Data of research outputs created by projects funded by the programme will enable quicker dissemination and use new information for startups, small- medium size enterprises and the general public. Also, if the DORA principles are considered in research assessments, and qualitative indicators of research impact are included, will be an important support to transfer knowledge to innovation.

OA of scholarly publications is not a hindrance for innovation in respect to securing intellectual properties, such as patents etc. The OA requirement is only applicable when a scientific article is being published. Any information considered confidential due to patent processes etc. will not be subject to the requirements of OA. Thus, the balance between openness of data and the protection of intellectual property rights (IPR) should be in line with the principle 'as open as possible, as closed as necessary'.

Task 4.6 Developing strategies and instruments supporting open data

The European Open Science Cloud (EOSC) will be moving into the implementation phase in 2021 and this and key to the success of the EOSC is that the research community is making their data FAIR, and a common practice. As mentioned above, a questionnaire was distributed amongst the consortium members and other national funding agencies to map the strategies for Open Data in the countries that are represented in the BANOS CSA consortium. The outcome was that most of the organizations are compliant with the Open Data Directive or are taking steps in that direction. The consortium members are largely in favour of implementing the Directive's requirements for open and FAIR data in the BANOS programme. Furthermore, a good majority of organisations surveyed declares to have a research data policy in place or in the works, and explicitly supports the use of a Data Management Plans (DMP).

Task 4.7 Strategies supporting 'citizen science'

The development in the method application and the awareness of the potential benefits of involving citizens in research projects over the past decade has been impressive. The environmental engagement of citizens in the countries around the Baltic Sea and North Sea offers a great potential for a broad co-operation between scientists and citizens. T*o increase Ocean Literacy in the EU and beyond* is one of the identified destinations of the Blue Economy Partnership. Citizen Science is one important tool for Ocean Literacy as involvement of citizens will increase the understanding of the marine ecosystem and demonstrates how the marine environment is influenced by humans while stimulating the awareness for the protection of the sea.

Recommendations

The following overview of recommendations will form the bases for the Open Science strategy for the future BANOS programme. The list of recommendations is non-exhaustive and is largely based on recommendations that were proposed in reports from EUOSPP [16] [17] [18]. Specifically, recommendations to promote OA to publications aligned with Plan S (see Appendix 1). Recommendations concerning strategies specifically for Open Data, Open innovation and Citizen Science are presented in the BANOS CSA deliverables for Task 4.5, Task 4.6 and Task 4.7, respectively.

Outline clear roles and responsibilities for each stakeholder

The current incentive structures of academic research often fail to recognize value and reward efforts to open up scientific research. The future BANOS programme will therefore strive to develop explicit policies on Open Science with a clear description of roles and responsibilities for each stakeholder as this is a key aspect in fostering the necessary change in research culture. Furthermore, the evaluation committee for research proposals will be required to adhere to the DORA principles, with the aim to support the transfer of scientific knowledge to policy, practice and innovation.

Promotion and training for Open Science

The future BANOS programme will take a proactive role in changing research cultures through promoting good practices and offer training for, e.g. PhD students. Training for Open Science could include research integrity, FAIR data management and sharing, adapted appropriately for all disciplines. Furthermore, support could include access to technologies, skills and infrastructure related to data storage and management. To include all types of research outputs, and not only restricted to data in DMP, Output Management Plans will be required in the project plan for grant applications.

Full and immediate Open Access to peer-reviewed scholarly articles

The future BANOS programme will require full and immediate OA to peer-reviewed scholarly articles from research funded by the programme, that will be mandatory in the project contract. The OA requirements for the programme will be aligned with the requirements of Plan S.

As not all funding organizations may have signed Plan S at the start of the future BANOS programme, an initial survey will be conducted on the status in the different countries for researchers to get financing for publishing in OA.

[16] EUOSPP (2018a) Combined Recommendations for the embedding of Open Science
[17] EUOSPP (2018b) OSPP-REC Open Science Policy Platform Recommendations
[18] EUSPP (2020) https://ec.europa.eu/research/openscience/pdf/ec_rtd_ospp-final-report.pdf#view=fit&pagemode=none

Conclusion

Open Science make science more efficient, reliable and responsive to societal challenges. For instance, the current experience of the Covid-19 situation has demonstrated the significance of opening up science, sharing knowledge and collaborating to combat the spread and enable mitigation the effects of the virus. Similarly, given the present critical status of the marine environment, a more efficient sharing of scientific knowledge of the sea's responses to pressures and management action is fundamental for healthier seas. The implementation plan for the UN Decade of Ocean Science for Sustainable Development (2021–2030) highlights access to scientific knowledge and information as a prerequisite for the transformation of the scientific and technical capacity of ocean stakeholders globally, so that all can participate in, and benefit from, developments in ocean science and technology. To achieve the structural changes needed in the research system to ensure that science can advance more rapidly and effectively to reach our common goal of sustainable management of our seas and oceans we need to actively contribute to implement the tools and structures for Open Science.

The future BANOS programme commits to Open Science and the FAIR data principles. It will develop explicit policies on Open Science with a clear description of roles and responsibilities for each stakeholder as this is a key aspect in fostering the necessary change in research culture. Furthermore, the evaluation committee for research proposals will be required to adhere to the DORA principles, with the aim to support the transfer of scientific knowledge to contribute to policy, practice and innovation.

Appendix 1

The Plan S Principles

"With effect from 2021, all scholarly publications on the results from research funded by public or private grants provided by national, regional and international research councils and funding bodies, must be published in Open Access Journals, on Open Access Platforms, or made immediately available through Open Access Repositories without embargo."

In addition:

1. Authors or their institutions retain copyright to their publications. All publications must be published under an open license, preferably the Creative Commons Attribution license (CC BY), in order to fulfil the requirements defined by the Berlin Declaration[19];

2. The Funders will develop robust criteria and requirements for the services that high-quality Open Access journals, Open Access platforms, and Open Access repositories must provide;

3. In cases where high-quality Open Access journals or platforms do not yet exist, the Funders will, in a coordinated way, provide incentives to establish and support them when appropriate; support will also be provided for Open Access infrastructures where necessary;

4. Where applicable, Open Access publication fees are covered by the Funders or research institutions, not by individual researchers; it is acknowledged that all researchers should be able to publish their work Open Access;

5. The Funders support the diversity of business models for Open Access journals and platforms. When Open Access publication fees are applied, they must be commensurate with the publication services delivered and the structure of such fees must be transparent to inform the market and funders potential standardisation and capping of payments of fees;

6. The Funders encourage governments, universities, research organisations, libraries, academies, and learned societies to align their strategies, policies, and practices, notably to ensure transparency.

7. The above principles shall apply to all types of scholarly publications, but it is understood that the timeline to achieve Open Access for monographs and book chapters will be longer and requires a separate and due process;

8. The Funders do not support the 'hybrid' model of publishing. However, as a transitional pathway towards full Open Access within a clearly defined timeframe, and only as part of transformative arrangements, Funders may contribute to financially supporting such arrangements;

9. The Funders will monitor compliance and sanction non-compliant beneficiaries/grantees;

10. The Funders commit that when assessing research outputs during funding decisions they will value the intrinsic merit of the work and not consider the publication channel, its impact factor (or other journal metrics), or the publisher.

[19] Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities: https://openaccess.mpg.de/BerlinDeclaration

Appendix 2

Table 1. The answer in a questionnaire regarding status of OA in December 2019 by organizations in the consortium for BANOS that have signed Plan S in October 2020, or, in collaboration with task 4.6 Open data

Country	Institution	Relation to BANOS CSA	Signed Plan-S	Reply in questionnaire 2019 regarding OA
Denmark	Innovation Fund Denmark (IFD)	Consortium member		Requirements for Open access are in place
Estonia	Estonian Research Council (ETAG)	Consortium member		Yes, but timing is uncertain or projected to be later than 2021
Finland	Academy of Finland (AKA)	Observer	Yes	
France	National Research Agency (ANR)	Consortium member	Yes	
Latvia	State Education Development Agency (SEDA)	Consortium member		Such requirements are already in place
Lithuania	Research Council of Lithuania (LMT)	Consortium member		No, topics are under discussion
Netherlands	Netherlands Organisation for Scientific Research (NOW)	Consortium member	Yes	
Norway	Research Council of Norway (RCN)	Consortium member	Yes	
Poland	National Centre for Research and Development (NCBR)	Consortium member		Yes, requirements in place from 2021 onwards
Sweden	Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas)	Consortium member	Yes	

Appendix 3

Questionnaire in collaboration with task 4.6 Open Data

In December 2019 a questionnaire was distributed, as a part of task 4.6 *Developing strategies and instruments supporting open data,* to all currently involved organisations in BANOS CSA, to potentially interested future funders and to strategic partners. In this questionnaire one question related to OA was included;

Does your institution have concrete plans to implement requirements stipulating immediate Open access for scientific articles?

- *Such requirements are already in place*
- *Yes, requirements in place from 2021 onwards (congruent with Plan S)*
- *Yes, but timing is uncertain or projected to be later than 2021*
- *No*

For all alternative answers given, the respondent had the possibility to elaborate in free text (see table 2). Of the 55 institutions that were approached for this survey, all twenty consortium members and associates submitted a complete response, along with fourteen other national funding agencies (total response rate of 62%). For more details, please see the report for task 4.6.

Table 1. Institutions that responded to the questionnaire are displayed in bold. For short descriptions of the national funding agencies, see Annex 3 of the BANOS CSA report D2.2 (ANR and BONUS EEIG 2019).

Country	Acronym	Institution	Relation to BANOS CSA
Belgium	**BELSPO**	**Belgian Science Policy Office**	**National funding agency**
Belgium	**VLAIO**	**Flanders Innovation & Entrepreneurship**	**National funding agency**
Belgium	**VLIZ**	**Flanders Marine Institute**	**Consortium member**
Belgium	**F.R.S.–FNRS**	**National Fund for Scientific Research**	**National funding agency**
Belgium	**FWO**	**Research Foundation - Flanders**	**National funding agency**
Denmark	**IFD**	**Innovation Fund Denmark**	**Consortium member**
Estonia	**EAS**	**Enterprise Estonia**	**National funding agency**
Estonia	KIK	Environment Investment Centre	National funding agency
Estonia	**ETAG**	**Estonian Research Council**	**Consortium member**
Estonia		**Ministry of Rural Affairs**	**National funding agency**
European	**JPI Oceans**	**Joint Programming Initiative Healthy and Productive Seas and Oceans**	**Strategic partner**
Finland	**AKA**	**Academy of Finland**	**Observer**
Finland	**MMM**	**Ministry of Agriculture and Forestry**	**National funding agency**
France	ADEME	Agency for Environment and Energy Management	National funding agency
France	AFD	French Development Agency	National funding agency
France	**Ifremer**	**French Research Institute for Exploitation of the Sea**	**Consortium member**
France	**ANR**	**National Research Agency**	**Consortium member**
Germany	BMWi	Federal Ministry for Economic Affairs and Energy	National funding agency
Germany	BMBF	Federal Ministry of Education and Research	National funding agency
Germany	BMEL	Federal Ministry of Food and Agriculture	National funding agency
Germany	**Jülich**	**Research Centre Jülich**	**Consortium member**

Latvia	LIAA	Investment and Development Agency of Latvia	National funding agency
Latvia		**Ministry of Education and Science**	**National funding agency**
Latvia	**SEDA**	**State Education Development Agency**	**Consortium member**
Lithuania	MITA	Agency for Science, Innovation and Technology	National funding agency
Lithuania	**ŽŪM**	**Ministry of Agriculture**	**National funding agency**
Lithuania	**LMT**	**Research Council of Lithuania**	**Consortium member**
Macroregional	**HELCOM**	**Baltic Marine Environment Protection Commission - Helsinki Commission**	**Strategic partner**
Macroregional	**BONUS EEIG**	**Baltic Organisations Network for Funding Science**	**Consortium member**
Macroregional	**OSPAR**	**Convention for the Protection of the Marine Environment of the North-East Atlantic**	**Strategic partner**
Macroregional	**ICES**	**International Council for the Exploration of the Sea**	**Strategic partner**
Netherlands	RVO	Netherlands Enterprise Agency	National funding agency
Netherlands	**NWO**	**Netherlands Organisation for Scientific Research**	**Consortium member**
Norway	**RCN**	**Research Council of Norway**	**Consortium member**
Poland	**NCBR**	**National Centre for Research and Development**	**Consortium member**
Poland	**NCN**	**National Science Centre**	**National funding agency**
Sweden	VINNOVA	Sweden's Innovation Agency	National funding agency
Sweden	**SwAM**	**Swedish Agency for Marine and Water Management**	**Consortium member**
Sweden	**SEPA**	**Swedish Environmental Protection Agency**	**National funding agency**
Sweden	**Mistra**	**Swedish Foundation for Strategic Environmental Research**	**National funding agency**
Sweden	**VR**	**Swedish Research Council**	**National funding agency**
Sweden	**Formas**	**Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning**	**Consortium member**
UK	BBSRC	Biotechnology and Biological Sciences Research Council	National funding agency
UK		British Academy	National funding agency
UK	**Cefas**	**Centre for Environment, Fisheries and Aquaculture Science**	**Consortium member**
UK	BEIS	Department for Business, Energy & Industrial Strategy	National funding agency
UK	DEFRA	Department for Environment, Food & Rural Affairs	National funding agency
UK	DFID	Department for International Development	National funding agency
UK	EPSRC	Engineering and Physical Sciences Research Council	National funding agency
UK		Innovate UK	National funding agency
UK	Invest NI	Invest Northern Ireland	National funding agency
UK	NERC	Natural Environment Research Council	National funding agency
UK	STFC	Science and Technology Facilities Council	National funding agency
UK	**Marine Scotland**	**Scottish Government, Marine Scotland Directorate**	**National funding agency**
UK	UKRI	UK Research and Innovation	National funding agency

Table 2. Responses from the national research funding agencies that responded in the questionnaire regarding the status of implementation of OA

Funding organization	Answer	Free text
Academy of Finland	Such requirements are already in place	See Academy's webpage Open Science – Open Access Publishing and Open Data" https://www.aka.fi/en/funding/apply-for-funding/az-index-of-application-guidelines/open-science/ We require that Academy-funded projects see to that the scientific publications in which the project's results are published are open-access, and that the projects' data are made widely available. The degrees of data openness may justifiably vary, ranging from fully open to strictly confidential.
Agence Nationale de la Recherche (ANR)	Such requirements are already in place	As part of the ANR's contribution to the promotion and implementation of open science, and in line with the National Plan for Open Science, the funded project coordinator and partners must undertake to submit the scientific publications (full text) resulting from the research project to an open archive, either directly in HAL or via a local institutional archive, in accordance with the conditions in article 30 of the French "For a digital republic" act. In addition, the ANR recommends giving preference to publication in open access journals or books.
BELSPO (Belgium)	Such requirements are already in place	
Estonian Research Council	Yes, but timing is uncertain or projected to be later than 2021	Will be part of Estonian R&D&I strategy, currently under development
Flanders Innovation & Enterpreneurship	Such requirements are already in place	In the framework of programmes with support for public funded research organisations our Agency as programme owner provides following open access obligations for the beneficiary in the grant agreement: - Obligation to provide information about the project on the Flanders Research Information Space, the regional portal on researchers and their research in Flanders (see: https://researchportal.be/en). - Obligation to disseminate broadly the project results generated during the execution of the project.
Flanders Marine Institute	Such requirements are already in place	Publishing with immediate open access is strongly encouraged, although exceptions are still possible. From 2020 onward, a budget is available on the institutional level specifically for covering costs of open access publishing. From 2023 onward, at least 90% of publications should be OA (gold, or green with 6-12 month embargo, no hybrid). Belgium also has a national law for secondary

		publication right (SEPT 2018). This law gives authors of scientific articles the right to make a postprint available in Open Access if the publication is a result of research funded by public funds for at least 50%, with a maximum embargo period of 6 months for STM (Science, Technology and Medicine) and 12 months for SSH (Social Science and Humanities), no matter the contract with publisher. Postprint = Author Accepted Manuscript (AAM) = approved version of the article after peer review and before the final layout.
Fund for Scientific Research (Belgium)	Such requirements are already in place	Since 2013, the Fund for Scientific Research(F.R.S.-FNRS) requires that all recipients shall submit all the published research outputs to their institution's repository, whether they are funded authors or co-authors. They are required to store PDF duplicates of their post-printed author's version before its publication. The F.R.S.-FNRS will contribute to researcher APC requirements for publication in OA journals at the maximum amount of 750 €.
Research Foundation - Flanders	Such requirements are already in place	Following the Berlin Declaration of 2003 for the promotion of free access to scientific knowledge and cultural heritage, beneficiaries of FWO fellowships, grants and projects must deposit the publications resulting from the FWO subsidies, in a public "Open Access" database, within one year from the date of publication, in order to effect greater impact and valorisation of their work. Researchers are also advised to publish their other publications in such an "Open Access" database, the so-called "Open Archives", together with the research data that resulted in these publications.
Innovation Fund Denmark	Such requirements are already in place	
Ministry of Agriculture and Forestry Finland	Such requirements are already in place	
Ministry of Agriculture of the Republic of Lithuan	Such requirements are already in place	Every research financed by the Ministry of Agriculture is uploaded online at the website of the Ministry.
Ministry of Education and Science of Latvia	Yes, but timing is uncertain or projected to be later than 2021	We have recently commissioned a study to develop our Open Science policy, which will include concrete Open Access requirement scenarios which will be selected pending a political decision.
Ministry of Rural Affairs (Estonia)	No	These requirements under the discussion at the moment.
Mistra (Sweden)	Such requirements are already in place	Slightly different wording not requiring immediate accessibility but asap: "Research results obtained within the Programme shall, as soon as possible, be published in international peer-reviewed academic journals or made public in some other similar way, unless an

		agreement on confidentiality for a certain period of time has been entered into in order to protect commercial interests. If publication takes place in an academic journal that does not offer open access, the academic article shall be archived in a freely accessible database as soon as possible after publication."
NWO (Dutch research Council)	Yes, requirements in place from 2021 onwards (congruent with Plan S)	NWO has joined the Plan S consortium and will implement the proposed measures as laid out in the final version of Plan S.
Formas (Sweden)	Yes, requirements in place from 2021 onwards (congruent with Plan S)	
Research Council of Lithuania	No	Topic is under discussion with the scientific community, there is no answer yes/no for the moment, timing for the answer given is uncertain
Swedish Environmental Protection Agency	Such requirements are already in place	We have an datapolicy with open licenses (CC) https://www.naturvardsverket.se/upload/miljoarbete-i-samhallet/uppdelat-efter-omrade/oppna-data/policy-naturvardsverkets-datainformation-2017-06-08.pdf and an open access policy implemented in the instructions https://www.naturvardsverket.se/upload/stod-i-miljoarbetet/forskare-och-granskare/granska-ansokningar/instruktioner-for-sokande%202019.pdf
Swedish Research Council	No	The Swedish Research Council has a mandate for open access to publications, but we do accept an embargo of 6/12 months.
The National Centre for Research and Development (Poland)	Yes, but timing is uncertain or projected to be later than 2021	Timing is uncertain and the implementation as well as the final regulations depend on the national policy and the plans and the actions to be taken by Ministry of Science and Higher Education or/and the Polish government.
The National Science Centre (Poland)	Yes, requirements in place from 2021 onwards (congruent wit Plan S)	We are currently working on the policy requirements.
The Norwegian Research Council	Such requirements are already in place	We have developed a policy on this. We are members of coalition S
State Education Development Agency (Latvia)	Such requirements are already in place	This is mandate of Ministry of Science and Education.