

Comments made by France on the First draft of the UNESCO Recommendation on Open Science

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France thanks UNESCO for this first draft Recommendation, which defines in an ambitious and systemic manner the scope and values of open science and the actions needed to promote it.

We wish to make a few preliminary comments on the overall balance of the text:

- The Recommendation could give a more prominent role to issues specific to open access to scientific publications. Publications are not just data like any other. It is through them that the interplay between data in the broadest sense, scientific reasoning and the results obtained is discursively formulated. They are an essential vector for the expression and dissemination of scientific knowledge, and an indispensable channel for the validation, recognition and dissemination of scientific advances in society. The notion of bibliodiversity, understood as the plurality of actors, formats and economic models of scientific publication, should be emphasised much more strongly in this text.
- The Recommendation could allow for greater recognition of the diversity of cultures and practices according to scientific disciplines. The success of open science is highly dependent on the ability to engage disciplinary communities, which are diverse in their expectations and organisations.
- Public research policies are not only driven by national levels. In some cases, they are part of supra-national strategies, such as that of the European Union, which is developing a proactive policy on open science. Advances in open science should also build on the initiatives of higher education and research institutions, which generally operate based on a principle of autonomy. The Recommendation could therefore place more emphasis on the articulation between the international, national and local levels.

Part II – DEFINITION OF OPEN SCIENCE

General remark about open access to scientific publications

France considers that the definition of open science should include a component dedicated to the openness of scientific publications, in the same way as open data and open software and hardware.

Although it started earlier than for data and software, the opening of publications remains an extremely important issue for open science, and the ways and means of doing so are still the subject of multiple and divergent strategies. From a strictly quantitative point of view, French publications are open access at around 50%, so there is still a long way to go. It therefore seems necessary for the UNESCO Recommendation on open science to assert a clear position in this respect.

In fact, the commercial scientific publishing sector has experienced a historical trend of major concentration, which has led to the emergence of an oligopolistic market structure, dominated by a few large international players owning or distributing hundreds or even thousands of journals. These companies have historically based their economic model on subscriptions, a very costly model for public research institutions, even though they do not even pay the authors of the texts they publish. They are currently embarking on a process of transition towards open access that is still largely incomplete and is essentially based on the model of publication fees, which are borne by the researchers or their home institutions.

While the subscription model is based on the negotiation of "big deal"-like contracts concluded with higher education and research institutions or more frequently with national consortia of institutions, the transition to open access is accompanied by the conclusion of so-called "transforming" agreements, involving mixed packages combining subscriptions and publication fees. These agreements remain very costly for public

research actors, their effectiveness in terms of generalising open access remains low, and they maintain, or even strengthen, a trend towards the concentration of commercial actors in the field of scientific publishing.

Further, the publication fee model, while preserving the interests of the traditional actors in scientific publishing, **has many potential downsides for the global research ecosystem**. It can only be supported by the countries of research institutions with significant financial resources, and is a potential source of exclusion for researchers working in less well-endowed countries or institutions, particularly in the countries of the South, but also in many European countries and in poorly funded disciplines and teams. While they would have free access to their colleagues' publications, they would not be able to publish the results of their own research. It is therefore important to **consider carefully the dangers that the generalisation of such a model would represent for research communities around the world, as it would generate severe inequalities**.

To address this risk, **France strongly advocates bibliodiversity**, the principles of which were defined in 2017 in the Jussieu Call for Open Science and Bibliodiversity. Bibliodiversity implies supporting and promoting a diversity of stakeholders in publishing, a plurality of languages of communication, publication formats and funding mechanisms, as well as a variety of levels of intervention (support for local initiatives from communities) and points of view, in a context of highly variable constraints and capacities for action (e.g. countries of the North / countries of the South).

Bibliodiversity first of all refers to the plurality of economic models of open scientific publishing, stating that the payment of publishing fees should not be the dominant model and that editorial power should not be concentrated in the hands of a dozen publishers. Among the funding models currently operating in the world, we can particularly highlight:

- Public funding (in Latin America: SciELO and Redalyc platforms; in Europe: public university presses, the European ORE platform, Hrcak in Croatia, etc.).
- Crowdfunding (Knowledge unlatched in Germany)
- Institutional library “advance order” model (Open Library Humanities in UK),
- Freemium, which consists of generating income through services (as implemented by OpenEdition and the OECD as a complement to public funding)
- the “subscribe-to-open” model of transforming subscriptions to protected content into subscriptions to open content, with no processing charges,
- etc.

It is necessary to gain a deeper understanding of these economic models and to strengthen them, by earmarking public funds to them, at least equivalent to financing publication fees.

Beyond the question of economic models, it is the diversity of scientific communication vectors and, more broadly, the diversity of scientific cultures that is at stake. It is a matter of preserving diverse publishing ecosystems on a global scale, but also on the scale of a country or a cultural and/or linguistic area, of promoting the diversity of publishing formats and of encouraging a plurality of infrastructures and services involving scientific communities and public research players in their governance. These requirements are fully in line with the principle of diversity which is outlined in the third part of the preliminary draft Recommendation, devoted to the “Open Science core values and Guiding Principles”.

France is of course not alone in defending the principle of bibliodiversity. In their article “Fostering Bibliodiversity in Scholarly Communication - A call for action” published in April 2020, Kathleen Shearer (Confederation of Open Access Repository), Leslie Chan (University of Toronto Scarborough), Iryna Kuchma (Electronic Information for Libraries) and Pierre Mounier (OPERAS) appeal to urgent action. In Europe, Coalition S has recently strengthened its commitment to a plurality of models for open access to scientific

publications: it has commissioned a study on “collaborative non-commercial publishing models” by a consortium coordinated by OPERAS and including SPARC Europe, Utrecht University, UiT (Norwegian Arctic University), the Association of European Research Libraries (LIBER) and AmeliCA as well as Redalyc. In July 2020, it launched its rights retention strategy for authors of scientific publications, preserving the possibility for researchers publishing in subscription journals to deposit their accepted manuscript in an open archive allowing immediate open access. The European Union has just launched the open access publication platform Open Research Europe, which allows the immediate open access publication of scholarly articles resulting from EU-funded research.

9 (ii) Open Data

The Recommendation could include a broader and more inclusive definition of research data, allowing the full range of disciplinary practices to be taken into account, based for example on the OECD definition (p 13):

“‘research data’ are defined as factual records (numerical scores, textual records, images and sounds) used as primary sources for scientific research, and that are commonly accepted in the scientific community as necessary to validate research findings”.

9 (iii) Open Source/Software and Open Hardware

While the establishment of a community-driven process for contribution, attribution and governance is a valuable objective, a flexible approach should be used to accommodate the wide variety of existing approaches and the speed with which they are evolving in the world of open source software.

9 (v) Open Evaluation

France would like a distinction to be made between principles that constitute an intangible foundation of open science (openness of scientific publications, sharing or opening up of data, software and source codes, methodological transparency) and practices such as open assessment and open notebooks, which must be implemented in a differentiated manner depending on the objects studied and the disciplinary cultures of the diverse scientific communities. In the latter areas, it seems more appropriate to encourage experimentation rather than to impose uniform requirements on all disciplines prematurely.

9 (viii) Openness to Diversity of Knowledge

The text could be based on the principle of “cultural rights” derived from the 2001 Universal Declaration on Cultural Diversity, adopted under the aegis of UNESCO.

10. Scientific outputs should be as open as possible...

France emphasises that the limitations to the principle of free access set out in point 10 relate exclusively to research data, and possibly to sensitive sources and items of study. It is important to emphasise that no reason can justify a restriction on open, full and free access to scientific publications. This clarification is necessary because the current wording indicates on the contrary that the limitations apply to all research results, including “information”, and in fact include scholarly publications.

This is all the more necessary because intellectual property rights are mentioned as one of the reasons justifying a limitation to the principle of free access. The wording may therefore imply that scientific publishers benefiting of a transfer of their rights by authors (which is the dominant contractual model) were legitimate in limiting the open access dissemination of scientific texts, in particular by imposing deadlines between the date of publication under subscription and the date of publication in open access (deadlines commonly referred to as “embargoes” for open archives and “moving walls” on publishers’ platforms). Therefore, it seems important to rephrase the wording of this point so as not to enshrine this possibility in the text of the Recommendation.

To the wording “Scientific outputs should be as open as possible and closed only if needed”, France would like to substitute the wording “Research outputs should be as open as possible and as closed as necessary”¹. The notion of need seems too much subject to interpretation, and would be likely to justify abusive practices of closure contrary to the principles of open science previously stated. The principle of necessity appears to be more firmly grounded, as it is based on legal provisions or imperative reasons in terms of personal data protection, security, respect for intellectual property, protection of commercial secrets, protection of endangered species or biodiversity, etc. It should be noted, moreover, that this principle of necessity, rather than need, is used in point 19 (b) of this first draft. We consider that it should be the only one mentioned throughout the text with regard to limiting free access.

Finally, France supports the idea that certain research data which are not freely accessible due to the above-mentioned requirements can nevertheless be made accessible to specific users, according to specific criteria and arrangements. We would like the notion of data sharing, as an alternative to openness, to be used in the text of the Recommendation, as it is a practice used by some research communities and should be encouraged, notably through the implementation of a “data sharing plan”. This is the case, for instance, in the field of medical research, where the disclosure of data from clinical trials is imposed strong and legitimate constraints in terms of personal data protection. It is important to specify that the criteria for making data which are not freely accessible under certain conditions should not only be defined by the relevant national, local or regional authorities, but also that the researchers themselves and the research institutions must be fully involved in the process.

11. The key objectives of adhering to Open Science...

France fully adheres to the objectives mentioned, but would like to see the **objective of reproducibility** explicitly introduced.

Actually, the openness of data, software and source codes, protocols and methods used in a research project enables other scientific groups to reproduce the results, or even challenge them if necessary. The transparency, traceability and reproducibility of the scientific process, which are part of a more general concern about research integrity, strengthen the robustness and accuracy of scientific results and increase trust in science within society as a whole.

12. There are multiple actors in research and innovation systems...

Open science is not just about systems, regulations, tools and technical solutions. France supports the idea that open science is the result of the actions of all research players, including researchers and research support professionals. This is not a minor issue, but a prerequisite for the success of open science, which covers capacity building and the inclusion of a paradigm of openness into the routine of research.

In point (i), the role of the researchers could be further clarified in relation to open science, as initiators of corpora and data collection and production, as implementers of analysis and processing methodologies and formulation of scientific results, as participants in academic dialogue with their peers and in the evaluation of research, as re-users of scientific results and data, and as users of research infrastructures and services.

In point (iv), as information scientists, documentalists and archivists could also be mentioned.

In point (viii), in addition to publishers, editors and managers of professional societies, who are making the transition to open science-friendly publishing models, operators of scientific publication platforms and operators of open archives should also be mentioned.

¹Translator’s note: The whole paragraph makes sense only when referring to the French version of the First Draft, which introduces the notion of “*besoin*” or need, whereas the English version uses only “necessity” or its derivatives.

14. Open Science critiques and transforms the boundaries of intellectual property...

This section should recognise the **legitimacy of exceptions to copyright**, which play an essential role for research and higher education activities. This is specifically the case of the exception for educational uses and the exception for text and data mining for the purpose of scientific research, recently introduced by the European Union in Article 3 of its Copyright Directive passed in April 2019.

Furthermore, in accordance to intellectual property laws, it is necessary to **avoid the transfer of exclusive rights** and to take advantage of all the possibilities available to researchers, as authors of scholarly material, **to waive their exclusive rights** for the exploitation, reproduction and representation of their work (economic rights) **on a voluntary basis**.

III. OPEN SCIENCE CORE VALUES AND GUIDING PRINCIPLES

France endorses the stated values and guiding principles. In point 15 (iv) on diversity, regarding the diversity of research communities, it proposes to introduce the notions of **scientific disciplines** and **disciplinary communities more explicitly**, as research cultures and practices vary greatly from one disciplinary field to another, and it is important to take these variations into account in the implementation of open science policies to foster their acceptance and adoption.

Furthermore, in this same point 15 (iv), France strongly supports the notion of **linguistic diversity** and proposes to introduce the notions of **plurality of dissemination vectors and forms of scientific publications**, in accordance with the principle of **bibliodiversity** set out above.

In point 16. (a), we propose to introduce the concept of “**reproducibility**”, on which there is a consensus among higher education and research stakeholders when it comes to ensuring that all stages of a research process are made available in a transparent manner, so that the results and conclusions can be reproduced, validated or criticised. Verifiability can also be exposed and defended, but it should not replace reproducibility.

IV. AREAS OF ACTION

(i) Promoting a common understanding of Open Science and diverse paths to Open Science

(ii) Developing an enabling policy environment for Open Science

While supporting these actions, particularly with regard to the adoption of national strategies for open science, France believes that the Recommendation could place greater emphasis on the necessary link between the national level of action, which is the responsibility of the Member States, and local initiatives within higher education and research institutions. While Member States are the primary architects of the main directions and coherence of national strategies, higher education and research institutions generally operate according to a principle of autonomy which enables them to develop and implement their own research policies. An effective public policy on open science should not rely solely on the leadership of States, but also on a fair combination between the national level and the local initiatives of research institutions.

(iii) Investing in Open Science infrastructures and services

France welcomes the fact that the issues specific to open science infrastructures and services are fully taken into account in the first draft Recommendation. We support the principles set out on the sustainability of investments, community governance and collective funding by States, funders and non-profit organisations that reflect the diverse interests and needs of the research community and society.

In addition, France would like to emphasise the following points:

- Operating research infrastructures is not only based on the deployment of technical resources, but also on the mobilisation of sustainable skills and human resources.
- Open science infrastructures are intended for human users, whether they are members of the academic community or beyond. They should therefore be primarily directed towards meeting the

needs of users, by focusing on developing functionalities adapted to their practices and presenting user-friendly interfaces. In order to support this focus of infrastructures on meeting the needs of end users, users should always be involved in their governance, with usage being measured on a regular basis and the steady analysis of user feedback becoming the norm.

- The scientific outcome of data is not proportionate to its size expressed in bytes. Therefore, the resources of data infrastructures should not be dedicated exclusively to the needs of disciplines that make use of high performance computing on big data, but should also be devoted to so-called "long tail" data, typical in many disciplines. These data are scattered and heterogeneous, but their scientific significance can be decisive in fields such as the study of rare diseases or palaeoanthropology, for instance.
- Permanent identifiers should be designated as an essential component for the effective implementation and integration of Open Science infrastructures. They allow the unambiguous and permanent identification of objects (publications, data, source codes) or contributors (researchers, institutions), the linking of objects (e.g. between a publication and a dataset), and are essential for the discovery, sharing, reuse and citation of research results and scientific production.
- Digital infrastructures should be based on free software and open protocols. It is important to invest sustainable financial and human resources in software stacks supporting open science, including in securing their maintenance.
- It is essential to address the specificity of the infrastructure for software and source code. Research software is a thin layer on top of a vast body of components developed outside the academic world. The right approach to managing source codes over the long term is the development of a universal archive, which collects all source codes, as a research output or other, and not a federation of institutional archives with a purely academic purpose. Software Heritage, an initiative led by UNESCO and supported by France, fulfils this requirement.

(iv) Investing in capacity building for Open Science

Training and capacity building are key areas of action to promote open science. However, France thinks that the present wording could be revised so as not to immediately and exclusively limit the target to technical skills in science and data management, archiving, software and computing.

In order to engage researchers in all disciplines, developing a comprehensive understanding of open science is important. To this end, the common sought-for knowledge base should be based on a generic approach, which highlights the epistemological values and the social and economic benefits of open science, which makes the systemic aspect of open science understandable, and which presents its various practical applications at all stages of a research effort. Concepts such as research ethics, integrity, reproducibility, should be included within this common understanding.

This open science competence base for researchers should not only focus on data management and data science, but also include skills in the processes of open scientific publication, the role and use of infrastructures such as open archives, pre-publication platforms, data warehouses, basic software elements, basic skills in intellectual property and data legislation, awareness of new approaches of research evaluation and new metrics that can be used in this context.

A generalist approach of this open science training is all the more relevant for undergraduate students.

Moreover, setting out a standardised skill set in open science at different academic career stages is desirable not only for researchers, but also for research support professionals.

(v) Transforming scientific culture and aligning incentives for Open Science

France fully supports the recognition of open science practices in research assessment, in the hiring and promotion of researchers. In this respect, the Recommendation should refer to the San Francisco declaration

on research assessment. It recommends the inclusion of pre-publications and data papers in the lists of scientific productions that can be considered in academic assessment submissions.

Beyond taking into account the diversity of scientific productions, and the use of new metrics other than the impact factor of journals, these new evaluation methods should also rely on qualitative aspects and take them into account by reviewing the scientific value of the results obtained, and the role of the researcher in the production of these results.

The transformation of scientific culture should also involve the publication and valuation of research that leads to negative results. Indeed, these results are currently little recognised in publication systems and therefore not very visible, even though they have a real scientific value, by making it possible to invalidate hypotheses and guide future studies. It is therefore important to provide incentives and create the appropriate instruments for the publication of negative results.

(vi) Promoting innovative approaches for Open Science at different stages of the scientific process

France supports the innovative approaches mentioned in the first draft Recommendation. However, the acceptance of practices like openness at each stages of the research process or the use of preprints differs significantly across disciplines and research contexts. Thus, incentives should not be applied uniformly across all scientific fields but should take into account the distinctive cultures of different disciplinary communities and research contexts.

The publication of data papers as well as the production of notebooks, articles and executable books using tools like Jupyter notebook, including mixed material like code, equations, data visualisation and narratives, should be mentioned as innovative approaches to be fostered for the scientific disciplines that use them.

(vii) Promoting international cooperation on Open Science

With regard to the potential risks associated with the exploitation and misuse of data across borders and the appropriation of data by the most technologically advanced countries, France is concerned that the wording used suggests that the opening up of data is a source of increased risk.

When combined with good data management, supported by sound infrastructures, with shared and balanced governance, open data helps to mitigate the risks of appropriation by allowing better identification of data, greater transparency on reuse practices and better capacities to detect inappropriate practices. However, it is necessary to ensure that the countries of the South have sufficient capacity to process, curate and transform the raw data they produce, in order to control a potential of scientific, social and economic valorisation of their own.

V. MONITORING

France is of the opinion that the monitoring of Member States' open science policies should be based on the adoption of common indicators to be developed at the UNESCO level, thus making it possible to build a global "barometer" or "observatory" of open science. For example, these indicators would cover, the rate of open access publications, the rate of openness of research data, the consideration of open science in the evaluation of research, etc. Such a "barometer" would make it possible not only to monitor this Recommendation, but also to obtain a concise, reliable and standardised view on the progress of open science in the world, to evaluate and guide public policies and to foster a spirit of mutual stimulation.

Since 2018, France has been working on the development of such an open science "barometer", currently focused on the level of openness of publications but which will gradually be extended to the opening of research data, clinical trials and other research objects. This approach is entirely open source and is based on open data. Its reuse is therefore possible². France is available to UNESCO and its Member States and is willing to engage in the development of common indicators and the construction of a world barometer of open science.

²Code and data available there: <https://ministeresuprecherche.github.io/bs/>