



# Future UniLab

## OPEN SCIENCE AS A VALUE

### a concept note

**This Una Europa Future University Lab concept note has been prepared as a part of the Una Europa's Una.Resin project Work Package 3 pilot action on Open Science.**

**The pilot action aims at testing a format for discussing key issues pertaining to the future of universities within the Una Europa University Alliance. The pilot consists in developing a concept note on the understanding and ramifications of Open Science, organizing a panel discussion on the key ideas developed in the note, and providing the framework for a wider community consultation.**

**The concept note has been developed by a writing team appointed by the Una Europa Future University Lab, the Una Europa protected space for innovative thinking about the university of the future. The ideas expressed in the note reflect the position of the writing team members and the Future University Lab Steering Committee who endorse the note. It is not an expression nor a reflection of the position of the Una Europa Alliance.**

**At various stages of its development, the note has undergone consultations with the Una Europa Open Research Cluster members who provided their valuable criticism and insight.**

#### **Executive summary**

Despite the efforts carried out in the last years to clarify the concept of Open Science within the European Research and Innovation Area, there are still many controversial and unclear aspects that are the focus of many ongoing debates. The controversial or unsettled issues pertain not only to the definition of Open Science but are also connected to the fact that Open Science is understood differently in various research cultures. The objective of this concept note is to contribute to these debates by rethinking the nature and scope of Open Science as well as to consider its inherent risks and opportunities connected to it.

We believe that it should be done by putting emphasis on the fact that Open Science constitutes a value, firmly inscribed into rational scientific inquiry as one of its indispensable features. Seen from this perspective, Open

Science may be regarded as including three key dimensions of accessibility, understandability and sharing. The findings of rational, open scientific inquiry must be easily accessible; an effort must be made to explain the advances in science and thus make the results more understandable for the society at large. The value of Open Science also lies in a wider share of research outputs, but also of collected data, methodologies, know-how and skills so that science remains a common undertaking of humanity.

Thus, Open Science is beneficial not only to the scientific community or the society at large, but also to the researchers themselves, who by being more open and transparent in their inquiries may further improve the potential impact and quality of their work. Sharing all kinds of different outputs from all stages of the research life cycle enhances transparency, and thus constitutes an opportunity for better, high-quality research, which is more reproducible and subject to verification.

This concept note also identifies some challenges and opportunities, which lie in the future of Open Science, as well as some potential actions which may be undertaken by universities, researchers, and policymakers to tackle the challenges, take advantage of the opportunities, and improve the understanding and implementation of Open Science in general.

## **Introduction**

The purpose of this concept note is to rethink the idea of Open Science, considering its extent, opportunities, challenges, and risks, and to contribute to the ongoing European discussion pertaining to the importance and function of Open Science in the European Research and Innovation Area. Within Una Europa, focusing on the value of Open Science, we hope to add new dimensions to the ongoing debates as well as to form a future point of reference for the consultations pertaining to, and the development of Open Science related policies within Europe.

This concept note may be useful to different audiences; it may help the researchers to better understand the rationale behind the Open Science policies; it may provide the professional staff with new insights helpful in the implementation of Open Science formats; and it may serve the decision-makers at university-, national and European levels to enrich and further develop Open Science policies and create new ones. It may, in particular, draw the attention

of those audiences to the need to consider and rethink the foundations on which Open Science policies are based.

### **What is open science?**

There is little doubt that Open Science is an important aspect of the existing research policies and the day-to-day research practice. It is similarly true, however, that it is not easy to settle on one particular definition of Open Science. There exist many definitions and approaches, which while sharing a common core, underscore different aspects of the concept as they are related to different scientific processes.<sup>1</sup> This diversity is, however, a strength rather than a weakness. It invites to a debate around the nature and ramifications of Open Science and shows that Open Science is a complex phenomenon which should be approached from different viewpoints to maximize its added value for research.

In the documents of the European Commission, Open Science is defined as a process based on “open and collaborative ways of producing and sharing knowledge and data, as early as possible in the research process, and for communicating and sharing results.”<sup>2</sup> Traditionally, it is mainly associated with open access to research publications and to research data, and it is enabled by digital technologies and collaborative tools. However, this is a very general definition.

Recently, the EU Open Science Policy Platform (OSPP) has suggested a comprehensive approach to Open Science as ultimately “embedded as part of a larger more systemic effort to foster all practices and processes that enable the creation, contribution, discovery and reuse of research knowledge more reliably, effectively and equitably”<sup>3</sup>.

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<sup>1</sup> Cf. for example the definitions from OECD (<https://www.oecd.org/sti/inno/open-science.htm>) and UNESCO (<https://unesdoc.unesco.org/ark:/48223/pf0000379949.locale=en>).

<sup>2</sup> Factsheet Open Science 2019, [https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/open-science\\_en](https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/open-science_en).

<sup>3</sup> Progress on Open Science: Towards a Shared Research Knowledge System, <https://op.europa.eu/en/publication-detail/-/publication/d36f8071-99bd-11ea-aac4-01aa75ed71a1>.

Thus understood, Open Science embraces not only open access and FAIR data, but is a concept pivotal in a research system based on shared knowledge; a system which is equipped with an academic career structure that fosters outputs, practices and behaviours to maximise contributions to that system; is reliable, transparent and trustworthy; enables innovation; fosters a culture of diversity and equality of opportunity; and is built on evidence-based policy and practice. As such, Open Science is based on eight pillars:

1. Open FAIR (findable, accessible, interoperable and reusable) data,
2. Research integrity & reproducibility of scientific results (the practice of researchers acting honestly, reliably, respectfully and being accountable for their actions; the results of research & innovation activities should be reproducible),
3. New generation metrics (a shift in cultural thinking around the way in which bibliometrics are utilised in research, particularly when evaluating quality, and go beyond simply citation counts and journal impact),
4. Future of scholarly communication (shift in the current academic publishing model towards fully Open Access),
5. Citizen Science (movement towards members of the public having a greater role within research and recognising the invaluable role they play in providing insights a researcher may not typically have),
6. Education and skills (identifying which are the training needs of researchers and sufficiently addressing any gaps in knowledge and skills around engaging with Open Science),
7. Rewards (fostering engagement with the principles of Open Science through reward and recognition; research career evaluation systems should fully acknowledge Open Science activities),
8. The European Open Science Cloud (linking together existing interoperable infrastructures to enable even greater collaboration between researchers across the continent and research domains.)<sup>4</sup>

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<sup>4</sup> [https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/open-science\\_en](https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/open-science_en)

While the shift towards a more comprehensive and holistic understanding of Open Science in the European context is clearly visible, we believe that it may still be enriched with some new perspectives and insights. In the following sections, we consider Open Science as a value and how it benefits science, researchers and the society at large. We also consider the challenges, risks and opportunities to the future of Open Science as well as potential actions which may be taken to increase the understanding and impact of Open Science.

### **The value**

Openness of science should be seen as a key value as it is strictly connected to the rationality of scientific inquiry. Science is one of the most impressive and successful joint undertakings of humanity. As such, it is rational only when it is open to critique, revision, and improvement. Therefore, science – in order to remain science – must not only follow the precepts of methodology, but also operate in a transparent and open way.

By this statement we are not saying anything new, only reemphasizing what has been an inherent feature of science from its beginnings and what many scientists, often unconsciously, have practiced in their work. However, we believe that it is essentially important to address this issue directly, as it helps to understand the full scope of the importance of Open Science, considered as a set of practices and principles that facilitate and support the openness of science. It enables one to see clearly how Open Science policies – such as Open Access or FAIR data – are firmly embedded in a more fundamental understanding of the nature and function of science.

Naturally, there are values other than openness which are crucial for scientific research such as creativity, diversity, inclusivity and economic interest (e.g., of those who sponsor the research). Therefore, openness is not an absolute value. In particular cases, it may be outbalanced by other values, but it must always be taken into account. In considering these trade-offs with competing values, power imbalances and the interests of marginalised actors can be surfaced.

## The dimensions

Open Science is a comprehensive concept. It is not limited to open access and FAIR data, although they constitute important aspects of Open Science. It also includes, or at least has close ties with, such activities as Citizen Science, science communication, know-how transfer, standards development, global responsibility, etc.

We further believe that in addition to enumerating and describing various kinds of activities connected to Open Science, one should consider – and implement in all their research-related actions – three key dimensions of Open Science: accessibility, understandability and sharing.

- **Accessibility**: research should be easily accessible to other researchers, students, university management, policymakers and the society at large. Accessibility includes not only publishing in open access, but also creating relevant databases, search engines, as well as popularizing the outputs of research activities. Much of this has been done for many decades, but in a digital era, a fresh perspective on accessibility as an aspect of a broader, more comprehensive concept may lead to important improvements and/or innovative ideas.
- **Understandability**: research should be understandable to different audiences, and in particular to the general public. Understandability refers not only to the outputs of scientific inquiry, but also to the reasons for undertaking scientific endeavors and the methodology behind research activities. Given the complexity of science, making it understandable to the public requires simplifications, but not oversimplifications. Finding a right balance in this context is instrumental in addressing pseudoscience and related destructive phenomena.
- **Sharing**: the outputs of scientific inquiry, collected data as well as methods utilized in research, including know-how and relevant skills, should in principle constitute a common pool of knowledge to be further used by anyone interested. Any exceptions to this rule should be well justified, as for example when it affects business competition and innovation. Sharing goes beyond, and is different from,

accessibility as it involves an active engagement in know-how transfer and skills development among scientific community.

### **The benefits**

The understanding of the role and importance of Open Science requires the identification of the benefits it brings for various actors. In fact, openness in scientific inquiry is simultaneously beneficial to the researchers themselves, the scientific community, and the society at large.

Open Science is beneficial to the **researchers**, as it enables them to further improve their work and their findings through responding to constructive critiques and improving data analysis, methodologies and own understanding of what they do. These benefits are therefore not limited to the increased number of citations when a paper is published in open access, or to the easy access to large databases, but are much more profound. In consequence, for the researcher, all their activities connected to Open Science should not be seen as another administrative burden, but rather as an important tool for improving their work and the impact of their results.

Open science is beneficial to **the scientific community**: as history of science clearly illustrates, it is the prerequisite to the progress in science. There is little doubt that through sharing ideas, methods and data, as well as open dialogue and honest critique, we develop a research ecosystem which is capable of generating new insights and innovative solutions to the encountered challenges.

Finally, Open Science is beneficial to **the society at large**, as it enables a better understanding of the scientific endeavor and constitutes an opportunity for the citizens to participate in scientific endeavor, in the spirit of mutual trust and the respect for the autonomy of the researcher. An open dialogue with the society is also instrumental in faster identification of challenges which science should tackle in the service of society, and, consequently, in the accelerated path to socially beneficial solutions to those challenges.

## Challenges and opportunities

The future of Open Science is tied up with both challenges (risks, barriers), and opportunities. Below, we identify some of them, and speculate how putting emphasis on the fact that Open Science is a value may help to take advantage of the opportunities while dealing with the challenges.

Arguably, the greatest challenge to Open Science lies at the **mental level** - due to the inherent features of the human mind, such as cognitive conservatism and the accompanying intellectual inertia, it is difficult to change the researchers' perception of the role and function of Open Science. One may suppose that the Open Science practices are generally followed because there is an obligation to do so or else because researchers see some benefits in doing so (e.g., increased citations). From this perspective, an excessive insistence on implementing Open Science may be counter-effective, as it may lead the researchers to believe that their main role is to engage in Open Science activities, and not to tackle fundamental scientific problems. To put it bluntly: Open Science should not be practiced for the Open Science's sake. To remedy this risk, the communication about Open Science should change the focus to help researchers understand how the values safeguarded by Open Science practices constitute a key ingredient to scientific progress and to the researchers' individual success.

A different set of challenges is connected to the **organization and work culture** in the higher education system. Driven largely by quantitative indicators, procedures and practically oriented agendas, universities tend to treat Open Science practices as another set of procedural obligations to be imposed on the professional staff and the researchers. This constitutes an obvious risk. Again, a remedy may be provided by reorienting the organizational culture towards a more value-driven understanding of Open Science, not only at the level of declarations, but also in the day-to-day functioning of the universities.

At a different plane, there exist challenges connected to the **societal pressures**. The society, equipped with social media and other communication channels, have begun to question the usefulness of (a large part) of science, even if the COVID-19 pandemic and the role science



played in dealing with it, has (temporarily?) changed these tendencies. It remains a fact that in the contemporary world science is often mixed up with pseudoscience, and the role of the scientist is perceived in a different light than it used to be – and often put into question. Moreover, the ongoing debates go beyond the science-pseudoscience controversy, touching upon the issue of the interpretation of the research results, and often subtle differences between well-established scientific results and more speculative forms of research. All this constitutes a very complex phenomenon, which may easily lead to confusion and misunderstanding. Emphasizing the comprehensive understanding of Open Science seen as a value, which embraces also a new and efficient ways of communicating and cooperating with the public, may alleviate those risks.

In connection to this, **technological progress**, and in particular the spectacular developments of AI, may with time lead to the border between science and pseudoscience becoming even more blurred. At the same time, it is the digital revolution that has enabled the Open Science we know. Moreover, the new digital tools already offer innumerable new ways to share scientific findings, data, as well as offer innovative formats of science communication. However, to take full advantage of these opportunities, a value-driven approach is needed for the digital tools to be not only effective, but also ethical.

The challenges and risks to Open Science at the **economic level** are also substantial.<sup>5</sup> In its current form, the Open Science practices (Open Access, FAIR data) are expensive, and they are becoming significantly more expensive every year. This generates a form of discrimination, when researchers from poorer countries (e.g., from the Global South) do not have the financial resources to share their research outputs in the same way researchers from richer parts of the world do. Moreover, the prevalent business models of the publishers include not only the Open Access format which generates substantial revenue but also the ownership of vast databases as well as comparably vast portfolios of copyrights. The economic interests of such big companies, together with a ‘blind’ insistence on following Open Science practices, may lead to an even more imbalanced knowledge sharing system. On

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<sup>5</sup> For a comprehensive overview see International Science Council. 2021. *Opening the record of science: making scholarly publishing work for science in the digital era*. Paris, France. International Science Council. <http://doi.org/10.24948/2021.01>.

the other hand, too much emphasis on some forms of Open Science practices may inhibit innovation as businesses will see no economic interest in investing in research and development. Arguably, a reorientation on the value dimension of Open Science, and a more ethical approach to knowledge dissemination, may contribute to developing a more acceptable and balanced model.

### **Potential actions**

In order to illustrate the points made above, we provide a list of some ideas for potential actions related to Open Science which may be included in the future strategies and policies or implemented in pilot projects of Una Europa (and beyond). The list is by no means exhaustive but may serve as a starting point for further discussions and developments.

We suggest considering the following actions:

- ⇒ include discussion of Open Science understood as a value in the curricula of BA, MA and PhD programs organized jointly by Una Europa;
- ⇒ develop Una Europa MOOC on Open Science, which emphasizes the value aspect of Open Science (e.g., with elements of philosophy of science, ethics);
- ⇒ develop skills development programs emphasizing the value aspect of Open Science (e.g., with elements of philosophy of science, ethics);
- ⇒ appoint a task force to provide recommendations for research assessment where openness of research (reaching beyond Open Access and FAIR data) constitutes an important evaluation criterion;
- ⇒ develop Una Europa awards for implementing the principles of Open Science in an innovative way;
- ⇒ appoint a task force to consider the ways Open Science is communicated and develop recommendations;
- ⇒ develop innovative communication formats which underline the importance and show the benefits of Open Science and help researchers understand why it is important, as well as discuss the nature and limits of openness in science;

- ⇒ organize a series of workshops devoted to analysing various aspects of Open Science practices from the value-driven perspective;
- ⇒ develop decision-aiding tools (e.g., checklists) to reflect the importance of Open Science.

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