**Resilience in Times of Crisis: Strengthening Open Science Against Geopolitical Pressures**

*Recommendations to the Netherlands National Commission for UNESCO*

**Objective of Recommendation**

This Recommendation summarises the findings from the recent [workshop](#:~:text=Show%20less-,Resilience%20in%20times%20of%20crisis%3A%20Strengthening%20Open%20Science%20against%20geopolitical%20pressures%20%2D%20Leiden%20University,-Resilience%20in%20times) “​​Resilience in Times of Crisis: Strengthening Open Science Against Geopolitical Pressures”. These findings broadly outline areas of action to strengthen the UNESCO Recommendation on Open Science. As representatives from the Dutch and international research community, we request that the Netherlands National Commission for UNESCO support the findings and amplify the call for action within the broader UNESCO community.

**Preamble**

The release of the UNESCO Recommendation on Open Science in 2021 was a landmark moment for the Open Science movement. Adopted by 194 member states, it outlines a global commitment to opening up knowledge creation through open scientific knowledge, open scientific infrastructures, open engagement with societal actors and open dialogue with other knowledge systems. The transformation of the global research agenda is envisioned to be guided by the values of quality and integrity, collective benefit, equity and fairness, and diversity and inclusiveness.

Global support for the implementation of the Recommendation has been significant, and many countries are already examining how best to advance openness within their research ecosystems. Moreover, as of June 2025, a total of 77 countries had submitted reports detailing their progress in implementing elements of the Recommendation, such as Open Access publishing, FAIR data sharing and public engagement. This growing national adoption of Open Science practices continues to be supported by grassroots and volunteer communities who have pioneered the advancement of open research practices and open infrastructures.

Notwithstanding the growing support, the uptake of Open Science is not assured, and may even be under threat. Recent global events have illustrated the vulnerability of global science to geopolitical influences. In the USA, research, infrastructure and data are all under threat from changing political ideologies. In Sudan, Ukraine and Gaza, for example, knowledge collections are threatened by armed conflict and war. Recognising that these geopolitical pressures are unlikely to disappear, Open Science needs to develop strategies of resilience and sustainability to safeguard open knowledge, infrastructures, and dialogues with societal actors.

**Threats to the UNESCO Recommendation on Open Science**

A recent workshop funded by Open Science Netherlands was held in Leiden on the 6th of November 2025. This workshop discussed the influence of geopolitics on the adoption, sustainability and resilience of Open Science. In particular, the workshop focused on how Open Science – and the UNESCO Recommendation – could be made more resilient by clearly identifying and addressing a set of often-overlooked issues concerning critical aspects of open research. These issues were grouped into four broad themes:

*1. The (over)reliance on volunteer labour for the advancement of Open Science*

As a “bottom up” movement, Open Science has long relied on the voluntary efforts of individuals to develop, teach and adopt open research practices. Nonetheless, the extent of voluntary contributions to Open Science extends far beyond these activities. Volunteers play vital roles in maintaining infrastructures and (social) networks, as well as contributing to working groups to advance Open Science policy. Nonetheless, volunteer activities are rarely rewarded, supported, or even visible to institutions or governments. This unfairly burdens willing contributors to advancing the Open Science agenda.

As can be seen from recent mobilization activities, such as the Data Rescue Project[[1]](#footnote-1) in the United States and SUCHO in Ukraine,[[2]](#footnote-2) volunteer work is vital for safeguarding the resilience of the Open Science ecosystem. Volunteers not only provide key expertise, but the relationships of trust established through long-term engagement in voluntary activities enable robust and responsible mobilisation and action. Furthermore, networks of volunteers and academic associations provide important international connectivity and best practice sharing between - as well as during - times of crisis. However, reliance on volunteer work should not be the primary approach to sustainability in the long term, as it depends on goodwill rather than guaranteed resources. This means that it cannot reliably provide the stable capacity required for long-term operation and advancement of Open Science infrastructures.

*2. The absence of support for anticipatory resilience and maintenance planning for human, physical and digital infrastructures*

The loss of datasets, access, supporting analytic tools, and data experts in the US both in 2017 and 2025 are important cautionary lessons for the Open Science movement more broadly. The rescue and mitigation efforts in both instances originated from within the library community and relied on voluntary effort. To this end, these efforts were under-resourced and faced challenges of coordination. Furthermore, lack of long-term support means that the social networks, critical insights and lessons learned are at risk of dissipating after the crisis has passed. The challenges associated with crisis response to loss of datasets also impacts technical infrastructure and earth observing infrastructure as reductions in government funding are mandated and implemented. For example, exploration of Antarctica has been severely curtained with the termination of the Nathaniel B. Palmer research ship.[[3]](#footnote-3)

Numerous geopolitical tensions over the past decades draw attention to the lack of resilience and strategic sustainability planning within the human, physical and digital infrastructures that are essential to Open Science. Furthermore, the under-funding for activities relating to inter-crisis planning and planning in times of stability presents additional challenges. While activities such as the Center for Open Science’s committee on “Ensuring the Preservation, Accessibility, and Usability of Public Data” represent important steps towards addressing these issues, far more coordination, funding and support are urgently needed.[[4]](#footnote-4) Indeed, without mitigation and action plans for these significant risks and realities the fragile Open Science ecosystem is undermined.

*3. The uneven geographical distribution of essential infrastructures and the growing role of big tech*

It is recognised that a considerable proportion of the digital infrastructures essential for Open Science, For example, the providers of digital object identifiers (DOIs - an important form of digital persistent identifiers) and many preprint servers are located within the US. The concentration of these infrastructures within one legal jurisdiction introduces vulnerabilities into the Open Science ecosystem. Changes in national legislation and funding can impact the activities of these infrastructures. Moreover, as cloud computing has come to the fore, there is a dependence on commercial providers of those resources. For example, a considerable amount of the infrastructure for preprint services is provided by three commercial providers - Cloudflare, Amazon and Google all of which may be subject to changing market strategies and geopolitical influence.

The geographic location of key infrastructures, as well as the pervasive role of commercial actors in data storage, are often overlooked in discussions on Open Science. Nonetheless, they introduce hidden interdependencies and vulnerabilities that will continue to be entrenched unless the potential for resiliency through redundancy, e.g. through mirrored or distributed systems, is systematically funded and supported.

*4. Internationalisation versus national priorities*

Rising concerns about knowledge security and data sovereignty are increasingly focusing attention on actions to secure national knowledge assets and can introduce tension into the implementation of Open Science. National investment in research infrastructures, and national funding of research activities are often bounded by scope, namely, to support national research communities. This means that it is often difficult to mobilise resources to respond to crises beyond national borders, something that is antithetical to Open Science and the global, open flow of scientific knowledge. This has been a challenge not only for recent events in the US, but also for Open Science responses to geopolitical concerns around the world.

Of further concern is the tension between the focus of the UNESCO Recommendation on national monitoring and the promotion of international cooperation and funding. Focusing the level of monitoring of the adoption of the Recommendation at a national level has the potential to create a “streetlight” effect where national activities are made visible, and cross-border activities or global infrastructures that support international collaborative resilience and sustainability remain unseen.

**Call for concrete actions**

As an international organisation, UNESCO is ideally placed to be able to advance the *international connectivity* necessary to make Open Science resilient. UNESCO should champion support and resourcing to address the above tensions:

*The (over)reliance on volunteer labour for the advancement of Open Science*

* Support (and where possible fund), cultivate and recognise the network of expertise and free labour provided by volunteers in the Open Science movement
* Strategically recognised and supported the social networks and relationships of trust that enable resiliency in the long-term. For example, university/HEI partnerships could include resilience strategies in their agreements, so some of the partners would support others enduring challenging times

*Support for anticipatory resilience and maintenance planning and addressing the role of big tech*

* Identify and systematically monitor threats to Open Science to enable efficient mobilisation at different stages, including anticipatory action, defense and rebuilding
* Systematically document case studies of response activities and strategies for reference and refinement for future use
* Better articulate the vital role that maintenance and sustainability activities play in responsible and open research, to motivate for funding from governments, funders and the general public
* Improve strategies to explain the value of long-term data preservation to the public

*Internationalisation versus national priorities*

* Promote and support, legally and financially, infrastructures that distribute global knowledge resources across the globe
* Support the elaboration of guidelines (for researchers/ states / institutions) on how to approach tensions between national implementation of research security measures and the values of the Recommendation
* Coordinate dialogue with related areas of action such as academic freedom, researcher mobility, academic integrity and science diplomacy

**Without these actions, Open Science values are at risk**

In the current global and geopolitical context, a continued focus on national activities, an undervaluing of voluntary work, and a lack of support for resilience planning and preparation weaken the power of the UNESCO Recommendation on Open Science. In particular, the values of **equity and justice** are threatened by the uneven impact of geopolitical pressures across regions and communities. Sanctions, infrastructure location, and funding cuts disproportionately affect scholars in already marginalized contexts. Giving equity and justice more direct attention here will help anchor resilience not only in technical or governance terms but also in questions of inclusion and epistemic fairness.

Furthermore, there is a need for more focus to be placed on the principle of **sustainability**within the activities surrounding the advancement of Open Science. Sustainability discussions cannot solely focus on environmental sustainability, but must encompass the entire gambit of vulnerabilities including those arising from geopolitics.

**Contributors**

Flavio Azevedo <https://orcid.org/0000-0001-9000-8513>

Louise Bezuidenhout <https://orcid.org/0000-0003-4328-3963>

Jeroen Bosman <https://orcid.org/0000-0001-5796-2727>

Olga Ceran <https://orcid.org/0000-0003-1394-2550>

Rodrigo Costas <https://orcid.org/0000-0002-7465-6462>

Anna D’Agostino <https://orcid.org/0009-0001-3452-8474>

Daniela Gawehns [https://orcid.org/0000−0002−9678−9012](https://orcid.org/0000%E2%88%920002%E2%88%929678%E2%88%929012)

Kathleen Gregory <https://orcid.org/0000-0001-5475-8632>

Joseph Gum <https://orcid.org/0000-0002-3045-0593>

Hilary Hanahoe <https://orcid.org/0000-0002-0328-3419>

Johanna Havemann <https://orcid.org/0000-0002-6157-1494>

Lynda Kellam <https://orcid.org/0000-0002-3263-859X>

Tanya Lee <https://orcid.org/0009-0004-6381-7672>

Laurents Sesink <https://orcid.org/0000-0001-7880-5413>

Nathanael Sheehan <https://orcid.org/0000-0002-2779-0976>

Shelley Stall <https://orcid.org/0000-0003-2926-8353>

1. <https://www.datarescueproject.org/> [↑](#footnote-ref-1)
2. <https://www.sucho.org/about> [↑](#footnote-ref-2)
3. <https://www.nytimes.com/2025/08/22/climate/nathaniel-b-palmer-ship-budget-cuts-polar-science.html> [↑](#footnote-ref-3)
4. <https://www.cos.io/ensuring-preservation-accessibility-usability-of-public-data> [↑](#footnote-ref-4)