Policy Paper for the Science Summit at UNGA 79

September 2024

Advancing Open Science for Sustainable Development

MDPI Policy Paper – How Open Access can support the SDG's

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MDPI

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Executive Summary

Open Science (OS) is intrinsic to the objective to 'Leave no one behind (LNOB)' the central, transformative promise of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs). The Open Access (OA) publishing model is a critical enabler of Open Science.

This Policy Paper makes a powerful plea for wider support of Open Science as a prerequisite to achieving the SDGs by 2030. It provides four actionable recommendations to unleash the full potential of Open Science in the service of Sustainable Development:

1. **Encouraging Open Access by formulating targeted policies at global, regional, national, and institutional levels.**

2. **Promoting data sharing with the support of robust and enforceable guidelines on ethics and security.**

3. **Fostering cross-cutting international collaboration involving governments and NGOs, academia and industry, public and private sector, and civil society.**

4. **Capacity building through targeted investments in infrastructure, communication, education, and training.**

With the world, at present, "severely off track to achieve the [SDG] agenda", this Policy Paper argues that a full adoption of the philosophy and practices of Open Science is vital to recover the ground lost and facilitate the achievement of the SDGs by the 2030 deadline.

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1.

Introduction

The 2024 report of the United Nations Secretary-General on Progress towards the Sustainable Development Goals raised a red flag: while observing that "many countries are pursuing SDG transformation with real determination and they are making tangible progress," and that "governments remain united behind the 2030 Agenda", it concluded that "(t)he 2024 progress assessment reveals the world is severely off track to achieve the 2030 agenda."

In proposing three critical priorities for addressing this situation, the report states that "we must double down on those areas that can unlock transformative progress across the goals. Key transitions around energy, food and digital connectivity, underpinned by expanded access to social protection and decent jobs, and education and skills for the future, are essential for rewiring economies to combat the triple planetary crisis and to reduce inequalities within and between countries."

Science alone, and still less scientific publishing, is not capable of solving all the manifest problems requiring our urgent attention. However, both science and scientific publishing are critical enablers of all our activities through every dimension of this endeavour. Indeed, one could argue without exaggeration that the problems identified in the 2024 report on Progress towards the Sustainable Development Goals cannot be solved without the support of science and scientific publishing in the widest sense.

Within this context, Open Access publishing is key to unleashing the full potential of Open Science. This Policy Paper outlines the role of Open Access and makes a powerful plea for wider support of Open Access publishing as a prerequisite to achieve the SDGs by 2030.

UN Secretary-General, Antonio Guterres, warned at Davos 2024, "We can't build a future for our grandchildren with a system built for our grandparents." This statement applies to global governance at its highest level, but it applies equally to the constituent elements of a united global effort. As the UN International Decade of Sciences gets underway, a powerful groundswell of support is growing for a new and more collaborative approach to science. In its 2023 report *Flipping the Science Model: A Roadmap to Science Missions for Sustainability*, for example, the International Science Council makes a crucial set of observations that merit being quoted in full: "We need to fund and undertake science for the SDGs differently if we are to put humanity and the planet back on the path towards long-term global sustainability. This requires an additional mechanism beyond the traditional science model, which is predominantly characterised by intense competition, an absence of trustful relationships with stakeholders, and siloed science funding. We propose a model that encourages science to cater directly to societal needs. This can be achieved by co-creating actionable knowledge and finding solutions tailored to the intricate sustainability issues identified by both local and global stakeholders. The commission advocates for the co-design of research and action to be the standard practice in sustainability science. This approach requires an inclusive collaboration among a wide array of stakeholders, making it the new norm."

As a globally recognised pioneer of Open Access publishing, MDPI has always been profoundly committed to the open and collaborative approach advocated by the International Science Council. In the following, we not only argue in favour of Open Access publishing but also provide a range of actionable recommendations for its use to realise the full power of Open Science in the service of Sustainable Development.

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The Role of Open Science in Achieving the SDGs

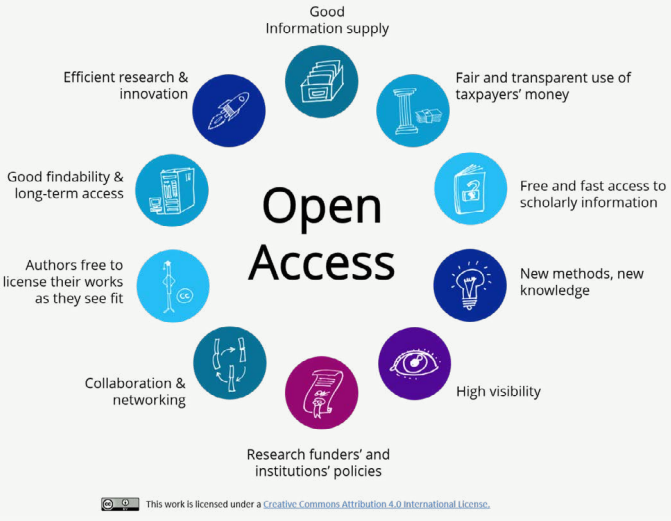
In the words of UNESCO, "Open Science is a set of principles and practices that aim to make scientific research from all fields accessible to everyone for the benefits of scientists and society as a whole. Open Science is about making sure not only that scientific knowledge is accessible but also that the production of that knowledge itself is inclusive, equitable and sustainable."

MDPI shares UNESCO's belief that, "Open Science has the potential of making the scientific process more transparent, inclusive and democratic." Open Science achieves this by stimulating scientific collaboration and information sharing to the benefit of society at large, making scientific knowledge available, accessible, and reusable for everyone, and opening the processes of scientific knowledge creation, evaluation and communication to societal actors beyond the traditional scientific community. By these means, it "furthers the right of everyone to share in scientific advancement and its benefits as stated in Article 27.1 of the Universal Declaration of Human Rights." The use of Open Science, facilitated by Open Access publication, is, therefore, intrinsic to the objective to 'Leave no one behind (LNOB)' — the central, transformative promise of the 2030 Agenda for Sustainable Development and its Sustainable Development Goals (SDGs).

Open Science's potential to contribute to the achievement of the SDGs is particularly evident in the context of certain goals, such as Quality Education (SDG 4), Industry, Innovation, and Infrastructure (SDG 9), and Partnerships for the Goals (SDG 17). As a philosophy founded on the value of sharing scientific insights for the general benefit of humanity, however, there are no limits to the application of Open Science to the pursuit of the SDGs. The eight pillars of Open Science identified by the European Commission make this clear. They are FAIR (Findable, Accessible, Interoperable, and Reusable) Data, Research Integrity, Next-Generation Metrics, Future of Scholarly Communication, Citizen Science, Education and Skills, Rewards and Incentives, and the European Open Science Cloud (EOSC).

The ability of Open Science to generate a massive and co-ordinated response to a global crisis was amply demonstrated during the COVID-19 pandemic, which prompted many researchers and publishers to accelerate their adoption of Open Science practices in the urgent search for an effective vaccine. At the time, the real-time sharing of research publications, software, and data to combat COVID-19 was described as "unprecedented" by SPARC Europe, a Dutch foundation committed to delivering on the promise of open access, open science, open scholarship, and open education. It is hard to imagine a process whereby the global scientific community would take a collective step backwards following that experience. The Barcelona Declaration on Open Research Information, a multi-institution, multi-country initiative published on 16 April 2024, shows just how far the global scientific community has come in the past four years, with its commitment to "(1) making openness of research information the default, (2) working with services and systems that support and enable open research information, (3) supporting the sustainability of infrastructures for open research information, and (4) working together to realize the transition from closed to open research information." Seen in this light, the question is not whether Open Science will become the globally accepted standard but rather how quickly this will happen and how its potential (Figure 1) can be most effectively leveraged.

Figure 1: Ten Reasons for Open Access



Source: based on Brinken, H. (2021). 10 Gründe für Open Access. Zenodo. https://doi.org/10.5281/zenodo.4643859 (CC BY 4.0 International)

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3.

MDPI's Contributions to Open Science

A pioneer in scholarly, Open Access publishing, MDPI has supported academic communities since 1996. MDPI is leading the transition to Open Science by making a greater proportion of the research conducted worldwide free and accessible to everyone. To date, over 3.5 million researchers have entrusted MDPI with publishing their scientific discoveries. Our editorial process is bolstered by a network of dedicated reviewers, a team of 6,000 professional, well-trained staff members, and an in-house article submission platform designed to ensure efficient processes within its 440 fully Open Access journals.

We support more than 800 academic institutions worldwide, helping them adhere to national mandates while facilitating the publication of authors' papers in fully compliant (CC BY) Open Access journals.

As at September 2024, 44 Nobel laureates had contributed to more than 115 articles across 35 MDPI journals. We are proud to list the names of Pierre Agostini, Hiroshi Amano, Werner Arber, Aaron Ciechanover, Robert H. Grubbs, Oliver Hart, Gerard 't Hooft, Michael Houghton, Harald zur Hausen, Katalin Karikó, Jean-Marie Lehn, Gérard Mourou, Ferid Murad, Shuji Nakamura, William Nordhaus, Kostya S. Novoselov, Giorgio Parisi, Charles M. Rice, Alvin E. Roth, Donna Strickland, K. Barry Sharpless, George F. Smoot, Anne L'Huillier, Drew Weissman, Kurt Wüthrich, Ada Yonath, Tomas Lindahl, Thomas C. Südhof, Stanley B. Prusiner, Roger Kornberg, Robert F. Engle, Richard J. Roberts, Ōmura Satoshi, Kenneth J. Arrow, John B. Goodenough, Jennifer Doudna, Hamilton Othanel Smith, Eric R. Kandel, Carlo Rubbia, Bernard Feringa, Barry J. Marshall, Anthony J. Leggett, and Andrew Victor Schally. The privilege of hosting such contributors, who significantly influence the open access movement, resonates deeply with our editorial teams.

Authors publishing in an OA journal can expect more citations of their work, increasing its potential impact. Research findings that are freely available are more likely to be cited than those hidden behind a paywall. Freedom of access greatly increases the potential audience for each paper, fostering a sense of community among researchers worldwide. Heightened visibility can attract prospective collaborators and employers for young scientists. We believe that all these factors can only accelerate the advance of science. Additionally, authors retain copyright ownership of their work instead of signing it away, permitting broader dissemination under Creative Commons licenses and increasing its capacity for impact.

Acting on our objective to promote inclusivity in global science, we offer especial support for researchers who are at the outset of their careers. This group includes young scientists and researchers from developing countries. We offer a range of opportunities for early career researchers, including a number of awards such as the Early Career Investigator Award or Travel Awards to encourage junior scientists to present their latest research at academic conferences.

At MDPI, we have a long tradition of fostering partnerships, including our Institutional Open Access Program (IOAP). A recent example is the renewal of our partnership with Delft University of Technology (TU Delft) in the Netherlands. This collaboration introduces a fixed lump-sum fee, covering publishing costs from 2024 to 2026. This removes Article Processing Charges for TU-Delft-affiliated authors and simplifies costs associated with publishing, whilst aligning with MDPI's commitment to removing barriers to Open Access. The agreement supports Plan S compliance and facilitates a seamless publishing process for TU-Delft-associated authors. This initiative reflects our dedication to transparent and inclusive publishing, providing stability and predictability for authors and institutions.

Articles published in MDPI journals achieve worldwide impact and reach, with over 21,000 mentions in policy documents from over 200 organizations, such as United Nations, WHO, CDC, and governments to shape and develop national and international policy.

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MDPI and the Sustainable Development Goals (SDGs)

In 2020, the SDG Publishers Compact was launched to accelerate implementation of the SDGs by promoting content that informs, develops, and inspires action. MDPI joined this initiative in 2021 and subsequently launched the MDPI SDG Hub in 2022, offering free access to recent research within the scope of each of the 17 SDGs. We also support authors from underrepresented communities by waiving publication charges for selected SDG-related papers. Detailed sustainability practices and supported publications are available in the report under each Goal page.

“More than 80% of MDPI articles and reviews published in 2022 relate to the Sustainable Development Goals.”
[source: InCites, Accessed on 21.08.2023]

MDPI Sustainability Foundation: Recognizing Excellence in Sustainability Research

At MDPI, we fund research to make the world a better place. Through the MDPI Sustainability Foundation we support researchers through two sustainability-focused awards: the World Sustainability Award, amounting to USD 100,000, is given to senior researchers, and the Emerging Sustainability Leader Award, valued at USD 20,000, sponsored by the MDPI journal Sustainability, is presented to early-career researchers.

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Challenges and Opportunities

Although support for Open Science is growing rapidly in many regions, various obstacles remain to be overcome before it has a realistic chance of becoming the globally accepted norm.

Anneke Zuiderwijk, associate professor of Open Data at the Faculty of Engineering, Governance and Management at TU Delft, summarises some of the main challenges: "One factor that plays a role is time. Structuring data properly and making it available requires quite a lot of work, while the workload for researchers is already high. In addition, researchers – unlike for publications – are hardly rewarded for sharing datasets, so there is a lack of incentive. Furthermore, there is a fear among some researchers that data will be misinterpreted or others will run with it before the research or article is completed." Natasha J. Gownaris et al., writing in *Data Science Journal*, expanded the list to include lack of awareness, lack of training, and the fragmented state of current Open Science practices.

Clearly, the wider and more rapid adoption of Open Science by the global scientific community requires an enabling environment, which does not currently exist. Far from regarding this as an insuperable barrier, it is our view that policymakers at the highest level should see the current moment — precisely at the beginning of the International Decade of Sciences for Sustainable Development — as an opportunity that will not return.

The benefits of Open Science have been widely attested: more efficient research activity as a result of faster and wider dissemination of results; greater ease in replicating results, thus helping reduce the potential for data manipulation; more innovation potential through wider access to new insights and ideas; and enhanced potential for collaboration, which boosts society's capacity to respond to such major global challenges as climate change, biodiversity loss, food insecurity, obesity, and antimicrobial resistance — to make no mention of the all-too-likely prospect of a new pandemic at some point in the not-too-distant future. The eight pillars of Open Science have already been defined and acknowledged, creating a framework for research integrity and citizen science. What is needed now, crucially, is more detailed elaboration of the policy landscape, supported by judicious funding mechanisms and other incentives.

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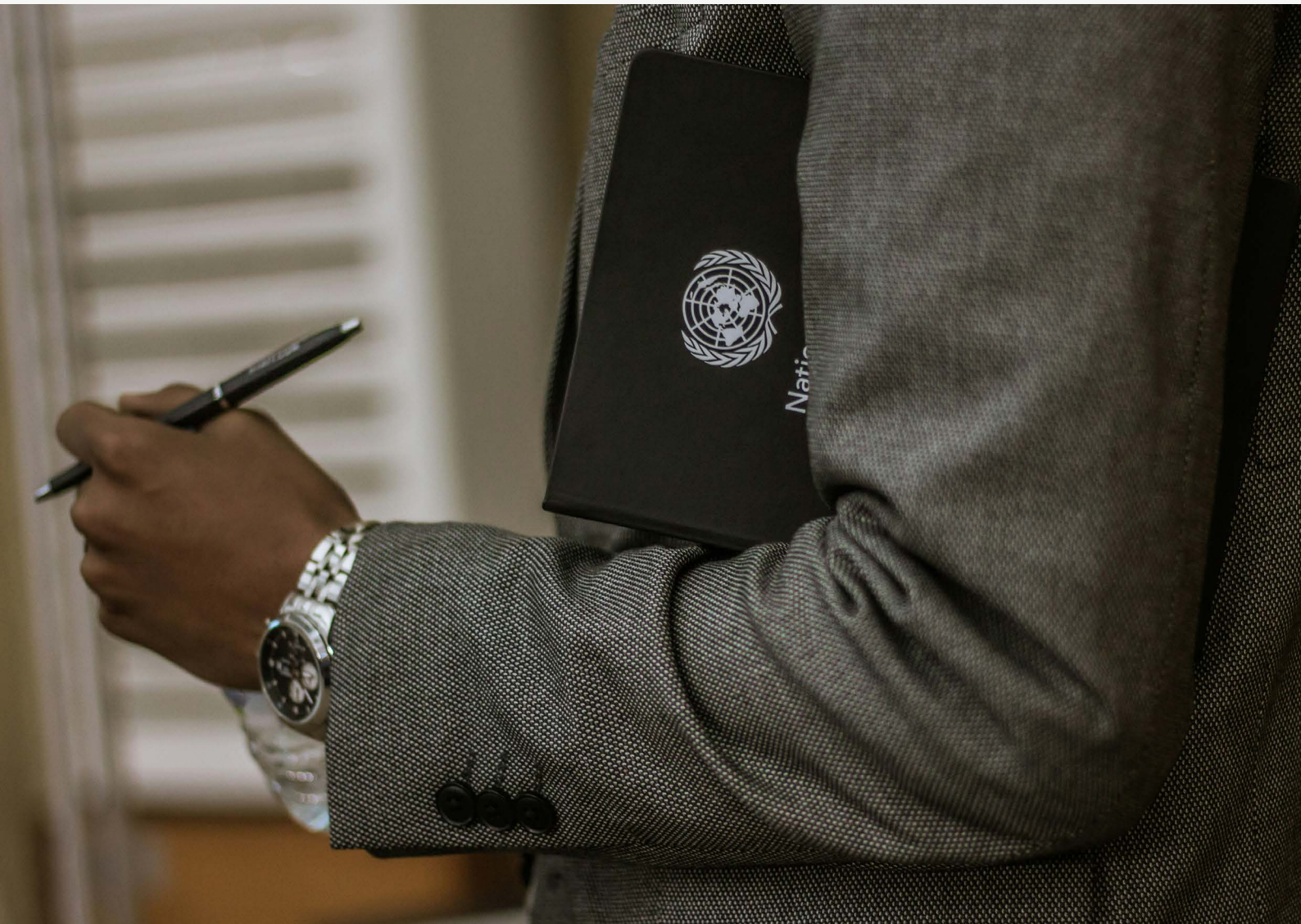
Policy Recommendations



By embracing a proactive, informed, and solution-oriented approach to policy development, the global community enhances its capacity to address pressing societal issues and safeguard the future. Actionable policy recommendations provide a springboard for this positive change.

Encouraging Open Access

Open Access publishing, the key enabler of Open Science, can be encouraged by the formulation of targeted policies at global, regional, national, and institutional levels. One such example is Plan S, an initiative that was launched in September 2018. The plan is supported by cOAlition S, a group of national research funding organisations supported by the European Commission and the European Research Council (ERC). Plan S requires that, from 2021, scientific publications that result from research funded by public grants must be published in compliant Open Access journals or platforms.

Promoting Data Sharing

In the words of Wellcome Open Research, an Open Research publishing platform for Wellcome researchers, "Open data can help to improve reproducibility, transparency, and trust in research, playing a key role in Open Science. However, while it has lots of benefits, researchers working with sensitive or commercial information can face challenges with data sharing practices." These challenges include the need to anonymise sensitive human data and the requirements to protect national security, intellectual property, and proprietary commercial information. Robust and enforceable guidelines, such as those formulated by Wellcome Open Research, are essential from an ethical as well as a security standpoint.

Fostering International Collaboration

The UN Sustainable Development Goals belong not to any single country but to the world as a whole. Fostering Open Science in support of the achievement of the SDGs is, therefore, by definition an international concept. At every level — supranational, regional, national, and institutional — cross-border scientific collaborations and partnerships that align with the SDGs should be encouraged. These should bring together governments and NGOs, academia and industry, the public and private sectors and should be devised, wherever possible, and in a manner that actively involves civil society.

Capacity Building

If Open Science is to rapidly deliver solutions to some of the world's most urgent problems, targeted investments need to be made in infrastructure, communication, education, and training. This applies specially to countries of the Global South, which lag significantly behind the Global North in this regard.

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The Way Forward: MDPI's Vision for the Future

The impulse to democratize scientific communication is nothing new. To quote the Open and Universal Science Project (OPUS), "The origins of the Open Science movement can be traced back to the 17th century with the advent of scientific journals. The establishment of journals like the Philosophical Transactions of the Royal Society in 1665 marked the beginning of a formalized system for disseminating scientific knowledge. These publications were crucial in promoting the sharing of experimental results and ideas, fostering a collaborative scientific community."

The ideals of openness and transparency in scientific communication were fruitfully nurtured during the Age of Enlightenment and much of the 19th century, only to be systematically undermined through the growing commercialisation, politicisation, and consequent institutionalisation of scientific research in the 20th century. With almost a quarter of the 21st century now behind us, it is only too obvious that the restrictive and protectionist spirit that informed the corporate scientific endeavours of recent generations will not find answers to the problems that are pervading society.

At MDPI, we believe that Open Science is not just a matter of ethical idealism, or even scientific pragmatism; it is a fundamental right for all citizens and a necessity for a brighter, more informed future. With the world "severely off track to achieve the [SDG] agenda", our capacity to generate transformative scientific insights must be radically democratized and maximised at one and the same time.

Only thus can humankind's full creativity be deployed to solve the apparently intractable problems surrounding us on all sides and build a sustainable and equitable future for the whole world. "Leaving no one behind: acting together for the advancement of peace, sustainable development and human dignity for present and future generations" — the theme during the General Debate of the UN General Assembly High-level Week 2024 — will only be possible if we open our hearts and minds to the potential of Open Science. Action must follow on the heels of insight.

In the face of unprecedented global challenges, this is not the time for incremental steps or cautious approaches. The pressing issues we face demand open, accessible, and transparent scientific practices at scale. Open Science is not merely a choice; it is a necessity for creating collaboration, innovation, and equity across borders. We must act now, boldly and decisively, to ensure that no one is left behind in the race to meet the Sustainable Development Goals. The time for small measures is over; the future depends on our collective willingness to scale up efforts for a more open and sustainable world.

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