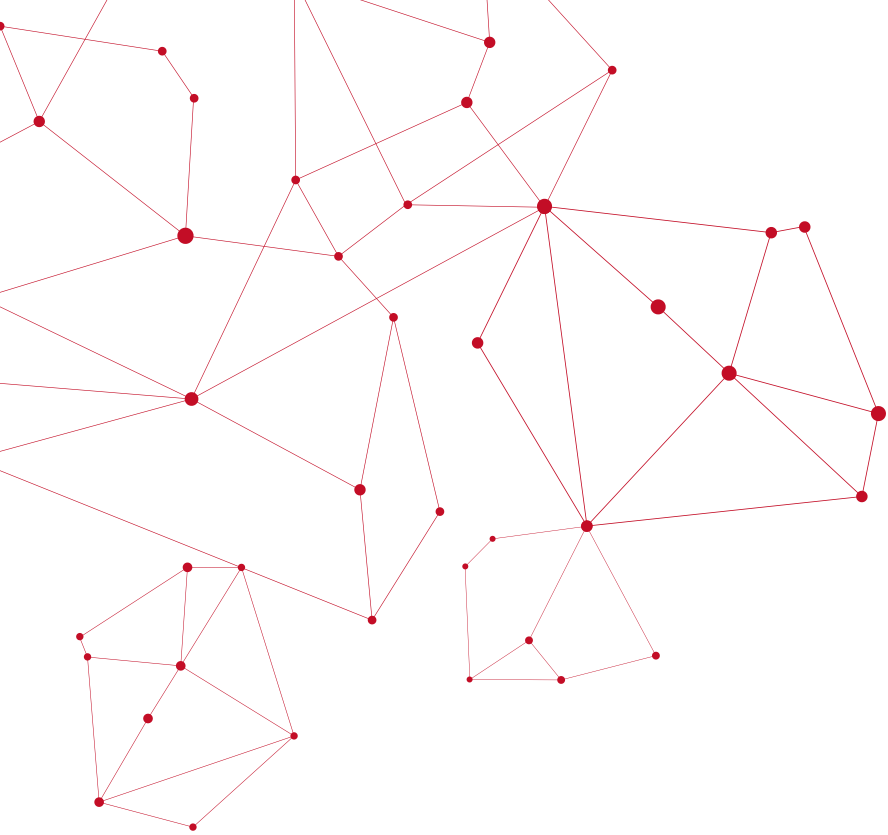
SUMMARY

Open Science

The Challenge for Universities

INTERNATIONAL ASSOCIATION OF UNIVERSITIES
INTERNATIONAL UNIVERSITIES BUREAU



The **IAU Open Science Expert Group** brings together representatives from all regions of the world (***see members p. vii***). The report ***Open Science: The Challenge for Universities*** is the first deliverable of the Expert Group, providing an introduction to *Open Science* and outlining the associated challenges and opportunities for universities. It urges the higher education community to collaborate in shaping the adoption of Open Science principles, recognizing universities as essential contributors to the scientific ecosystem. The *report* aims to raise awareness among higher education leaders about *Open Science* and the institutional transformation it requires. Additionally, it informs policymakers and other stakeholders of the critical issues universities encounter in this transition.

Table of Contents

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This brochure only contains the summary of the report. All sections of the Table of contents are available in the full report which is openly available online.

Summary

Universities have endured over time as centres of knowledge, adapting to significant changes in their environments. They often share the ambition of being both flexible and reflective, and at the same time remaining committed to the fundamental values of higher education and to a core mission, namely fostering critical thinking, creativity, social progress, social responsibility, inclusivity, diversity and upholding the role of arbitrators of truth through academic integrity in knowledge production respectful of various epistemological traditions.

In line with the mission of the IAU, the notion of a university encompasses the diversity of the higher education institutions globally. Some are focusing mainly on research and global academic exchange, while others are more dedicated to education and higher vocational training and serving their local communities. They span the classical medieval disciplines, social sciences, natural sciences, technology, art and humanities and some incorporate learning in close collaboration with practice-oriented knowledge systems – but they are all part of that community of universities, if they endorse the fundamental values of the academy.

Today, universities are facing numerous pressures spanning from political interferences, digital transformation, environmental challenges, funding cuts, decolonization processes, to repercussions of the increasing commodification of higher education. The latter often prioritizes financial gains while exacerbating social inequalities, ultimately eroding the core mission of higher education.

Openness has long been in the DNA of science and scholarship, but a new era of digital technologies has removed all remaining physical barriers to communication and created new challenges and opportunities. The challenge is to retain and improve the integrity of science in the face of unprecedented data volumes and social pressures for scientists to cut corners. The opportunity is to reach out more widely to society and address global inequities at a time when the cacophony of misinformation and disinformation is rising to a crescendo. Are the universities globally willing to promote a new era of open science as a transformative opportunity for them to collectively address these challenges and opportunities and collaborate with a shared set of principles in service of the global common good?

This document does not pretend that this road will be simple or straightforward—particularly in a context in which international research collaboration and openness is hampered by current geopolitical tensions generating new forms of barriers under the veil of national security. Yet, universities play a critical role in building citizens' capacity for critical and innovative thinking, fostering participatory democracies, and contributing to solutions to global challenges, as outlined in the UN Sustainable Development Goals (SDGs). For this, unrestricted knowledge circulation and access to data are essential.

The digital developments of recent decades have created opportunities for a new era of open science, influencing the way that science is done, used and embedded in society (with the word science being inclusive of all disciplines). *The UNESCO Recommendation for Open Science (2021*) provided a general

framework of definitions and shared values at a global scale, along with complementary reports and toolkits to foster a change in scientific practices. However, there is scarce literature and experience on the role of universities, at an institutional scale, even though they are critical actors in this process. Universities create a social resource by generating new knowledge, re-assessing knowledge from the past, and seeking ways of applying knowledge to human concerns, critically coupled with the education of the rising generations.

If a new era of open science is to become an effective reality and to open new doors of possibility, universities must rise to the challenge and embed new approaches to open science within their structures and priorities. But it is also important to be clear about the contemporary pressures and constraints that influence the universities and how these intertwine with open science.

This report informs universities about the key issues and opportunities at stake for universities to embark and navigate in this transformation and proposes recommendations as for why and how universities can play a leadership role in supporting and shaping a new era of open science.

The social role of universities

Universities create social potential through the coupling of knowledge creation with their educational role of helping to form citizens, through community involvement and innovation. Each one influences the other. However, a vital input into this coupling is access to the global knowledge stream, which is the collective creation of the global scientific community. Though acknowledging that, in today's world, knowledge is primarily represented by publications, it is important to emphasize that this document refers to scientific outputs in a broader sense encompassing not only publications, but also data, software, educational resources, hardware and collaborative practices.

Science fundamentals

It is important that enthusiasm for a new era of open science maintains the rigour that is the strength of science, and that novel knowledge claims and the evidence on which they are based are made widely available and formally tested against reality and logic through processes of sustained and organised scrutiny by peers. It is also important to recognise that this is not, in essence, different from normal patterns of empirical human reasoning, apart from the formal dissemination of truth claims and their open scrutiny, which makes science a special form of knowledge.

Challenges to universities

There are a number of crucial challenges to which universities today and a new era of open science must respond:

- Universities are increasingly confronted with rising mistrust in science and tendencies of anti-intellectualism which undermines the purpose of science and the pursuit of truth and new knowledge.
- The trustworthiness of science is furthermore being undermined by the explosion of scientific publications, without necessarily adding significant scientific value. This is all the more serious in the face of increasing attacks on the integrity of science and of universities.
- Open science risks being seen as an extension of a western dominated system that

undervalues outputs, priorities and epistemologies from other practices and regions, particularly those of the global south.

- Securitisation of university research and exchange are creating politically-driven detachments that are an increasing feature of international relations.
- The circulation of publications in the core of the "global knowledge stream" currently benefits high income countries and disadvantages low-and-middle income countries. The present pricing structure of the dominant commercial publishing model hinders access to large parts of this knowledge stream by countries and universities in the global south, thereby fracturing the global scientific community.
- The *"liberal"* university is threatened in many countries, and potentially at risk from technological companies that could absorb some utilitarian educational functions at lower cost and privatise aspects of knowledge creation, thereby diminishing its social potential.

Open science and the universities

In a world where data and information have become the driving forces of an immensely powerful general-purpose technology, and where private interests could come to control key parts of the scientific enterprise, universities are vital in ensuring open science and public ownership of and access to knowledge. It is important that the university voice is heard, and that universities commit themselves to action in this new era of open science. Issues that must be at the heart of its open science commitment are: open evidence/data, open to society, and open access publishing.

Open science priorities for universities

There are four practical and crucial priorities, for universities, all of them being relevant to the contemporary challenges set out above. They are:

- Opening the workings of science to scrutiny, both to peers and to the public, as powerful means of ensuring rigour and honesty and therefore the integrity of science, its capacity for self-correction and its efficiency for users.
- Open collaboration across the scientific community including the sharing of outputs in interoperable formats to enhance value through collaboration and efficient use of resources.
- Openness to society in which universities extend their public engagement in the joint creation of actionable knowledge including transdisciplinary approaches.
- Building bridges to international societies as parts of an international scientific and scholarly community that is aware of regionally and culturally varied contributions to the global tapestry of human knowledge.

Open Science publishing: The need for reform

Publishing is fundamental to the scientific endeavour and to open science. It makes up the core of the "global knowledge stream" but currently operates in a sub-optimal fashion. There are a number of serious problems:

- Rather than digitisation lowering prices, prices have risen at rates greater than inflation, severely disabling access to the global knowledge stream, particularly in low-and-middle income countries.

- Publishers have increasingly turned scholarly dissemination into a commercial enterprise. This shift has prioritised profit over access, creating barriers for researchers, particularly those from under-resourced institutions or regions, to fully engage with the global scientific output. In doing so, publishers have exploited academic labour—much financed through the public purse—to perpetuate a system that undervalues their contributions but relies on them to maintain its commercialised structure.
- The system has shown itself to be open to financial exploitation and fraud, which has created an extraordinary explosion of papers without significant scientific value. This diminishes other university priorities, reduces the productivity of science and threatens its credibility.
- Relatively few publishers fulfil the most basic of scientific requirements, that the evidence for a truth claim should be made available in such a way to permit reproduction.
- Processes designed to maximise the integrity of science are rarely required by publishers as a condition of publication, a particularly damaging stance at a time when established scientific conclusions are under attack.
- Bibliometrics derived from the publishing process are core components in university ranking procedures. Both bibliometrics and ranking systems are statistically flawed and play perverse roles in conditioning university strategies.
- A source-agnostic indexing system (perhaps AI-based) that would aid discovery of all journals and papers that meet a prescribed quality level is required, which would avoid current biases and outlaw predatory journals.

The limitations of current systems of scientific publishing create severe barriers to a new era of open science. There is an urgent need for an independent governance structure that defines minimum standards and oversees key procedures.

The challenge of artificial intelligence

Artificial intelligence technologies are becoming pervasive across the whole range of university work. They offer four major opportunities to the university:

- They can support many of the routine tasks that are essential to scientific integrity.
- Generative AI models can be used to deduce complex relationships in many areas of scientific concern. Publishers have begun to exploit the copyrights gifted to them by researchers by selling access to them as training sets to deduce the broader scientific patterns that they can reveal. Publishers, who contribute relatively little to the enterprise of science, are benefitting grossly, rather than the public sector which funds the work, the scientists who undertake the work, the universities in which it is done and the broader interests of open science. A major part of the record of science is thus held as a private resource by commercial publishers, and therefore inaccessible to those who are best placed to advance knowledge as a public good. It represents a profoundly damaging privatisation of knowledge.
- Such models can also be used to summarise broad fields of

scientific understanding in ways that support openness to society.

- The possibility that Artificial General Intelligence might become a reality would pose considerable problems for universities and to open science.

Conclusions & Recommendations

As universities are the principal locations of publicly funded science, and as they have been and are places where knowledge from the past is reassessed and new knowledge created and extended, and as the infrastructures and systems that open science needs are dependent upon university investments and management, universities should place themselves in the vanguard of the open science movement. This is consistent with recent **IAU Policy Statement'Transforming Higher Education in a Digital World for the Global Common Good' (2022)**, which confirms the commitment of the IAU to open science.

It is recommended that the universities endorse the four major university-specific open science priorities set out in this report, of scientific integrity, open collaboration within national science systems, openness to society, and the creation of an international open science community. To promote these priorities, the universities convened through IAU should:

1. **Press** for implementation of open processes designed to re-enforce and enhance the integrity of science. In particular, it should advocate the importance of processes of scrutiny, reproduction and replication as essential to scientific self-correction and to combat fraud.
2. **Advocate** greater collaboration within and between national science systems through national and regional sharing of data resources, equipment and archival infrastructures. Embedding open science concepts and practices in education and training, particularly that of young researchers should be strongly promoted. Within the frame of the UNESCO Recommendation, the IAU could contribute to monitoring the take-up of open science and its infrastructures within universities through its global surveys.
3. **Advocate** enhanced openness to society as a prime objective for universities in engaging with their local and regional communities to broaden the take-up of scientific knowledge and to combat populist attacks on science. This includes supporting transdisciplinary modes of engagement, whereby scientific disciplines work together with external stakeholders in the joint creation of actionable knowledge.
4. **Encourage** the international community of universities to work together to articulate a university voice. This should not venture into an expression of political views, but to articulate scientific understanding of contemporary issues. In distinguishing between reality and illusion, universities must be on the side of reality. A new era of Open Science must be truly internationality, a vital antidote to a current withdrawal into antagonistic cultural blocs that inhibit attempts to address global problems. University leaders should actively seek ways of stimulating deep collaborations in order to address matters of global concern, and lobby for research funding that will support such activity.

Bringing together the universities and their leadership under the umbrella of the IAU would make it possible to collectively address problematic issues which often cannot be addressed at the institutional level alone:

- **Collaborating** with key stakeholders, including funders and international representative bodies of science on the reform of scientific publishing.
- **Reviewing** and reforming the means whereby academics are assessed, and universities ranked.
- **Assessing** the processes whereby knowledge created within universities is assessed and avoiding the inappropriate privatisation of knowledge through AI processes to the detriment of the public good.
- **Supporting** the launch of more diverse evaluations of merit to enable scholars in making their contribution to open science and driving a career that benefits both the individual, universities and the common good.
- **Preventing** the use of published works in training sets for AI technologies without referencing the original authors and institutions. Universities should avoid that their researchers hand over copyright to publishers. Ideally a "horizon scanning group" should be established with the remit to identify best practice on AI issues and scan for developments which could undermine the public good of universities.

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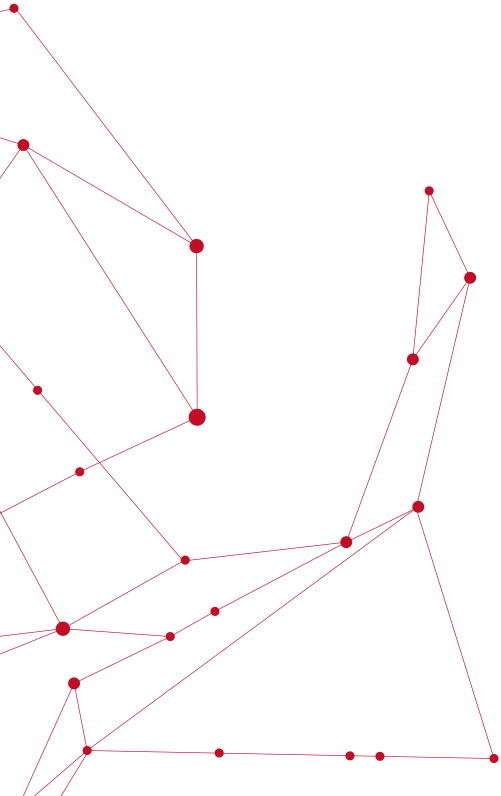
International Association of Universities

The International Association of Universities (IAU), created under the auspices of UNESCO in 1950, is a membership-based organization serving the global higher education community through advocacy, expertise, and exchange.

IAU brings together Members from over 130 countries for reflection and collaborative action on common priorities. It is an independent, non-governmental organization in an official partnership with UNESCO (Associate status), UN ECOSOC (Consultative status), and the Council of Europe (Participatory status).

The IAU provides a forum for building a worldwide higher education community, promotes collaboration and the exchange of information, experience and ideas.



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