IAU Horizons

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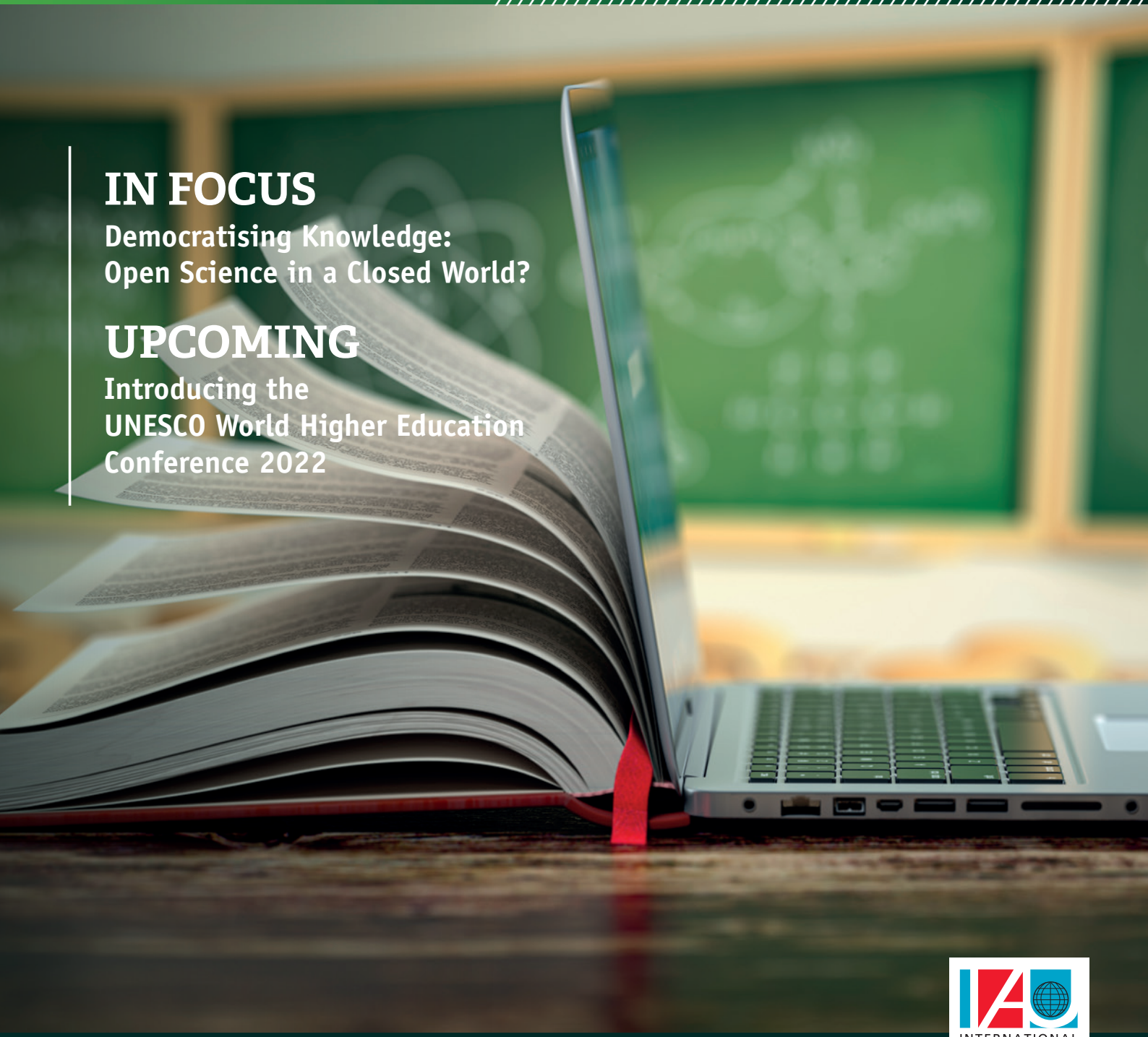
International Association of Universities (IAU), founded in 1950, is the leading global association of higher education institutions and university associations. It has over 600 Member Institutions and 30 organisations in some 130 countries that come together for reflection and action on common concerns.

IAU partners with UNESCO and other international, regional and national bodies active in higher education **and serves as the Global Voice of Higher Education.**



IN FOCUS

Democratising Knowledge: Open Science in a Closed World?

UPCOMING

Introducing the UNESCO World Higher Education Conference 2022

INTERNATIONAL ASSOCIATION OF UNIVERSITIES
INTERNATIONAL UNIVERSITIES BUREAU

MESSAGE FROM THE SECRETARY-GENERAL

Dear Members of the IAU,
Dear Members of the broader higher education community,

More than one year into the pandemic, we start to see some of the long lasting effects of the health, socio economic and cultural crisis on the higher education sector, in particular on the digital transformation, the internationalisation, sustainable development and on HE leadership.

The digital transformation has advanced as never before. Online and blended learning are improving in quality, at least in some parts of the world and is gaining momentum in others. Yet much reform and investment are still required to make online learning a reality, accessible for the many, and of good quality in all parts of the world. Indeed, pivoting online was easier for some than for others and the inequality between countries and regions and even between institutions is too often resulting in time-to-study loss, even months or a year without education or research opportunities and too often no return to university to be envisaged post pandemic due to a complex set of economic and social reasons. Yet universities have been incredibly active and resilient, and multiply efforts in these challenging times.

Unprecedented and numerous opportunities to attend online lectures, webinars, pod casts, workshops, conferences around the world are now available. These opportunities are appreciated and some are probably here to stay in the future as people may hesitate before undertaking long journeys to take part in events. Yet online fatigue is also real and we miss the opportunity to meet face to face, to deepen conversations over coffee and to interact beyond the chat function. Conference attendance offer very valuable opportunities to engage with colleagues and host universities, to develop new cooperation and partnerships and to immerse oneself in host country's culture. The pandemic has also accelerated the call for increased access to research outcomes, especially in the field of health sciences, but not only. This issue of *IAU Horizons* presents a series of thought-provoking papers debating Open Science, including Open Access.

Internationalization, when and where possible, also pivoted online. Students are now often studying abroad… from home. The online version of internationalization has its advantages even if nothing can replace the transformative experience of a true international exposure. Being forced outside one's comfort zone to meet the other and connect realities is a key component of development and real chance to advance and progress. A blended form of internationalization however will probably remain and will continue to allow many more students and staff to benefit from such exposure and opportunities in the future.

IAU has been monitoring and debating the transformations underway. The IAU Surveys on the impact of COVID 19 on higher education (with a second iteration open from March to June 2021) capture the transformative dynamics at play. Similarly the weekly webinars organized as part of the *IAU Webinar Series on the Future of Higher Education* allow to debate issues on HE agendas and to share opportunities and examples of actions undertaken with colleagues from all continents. Personalised meetings online also increased. The IAU Global Meetings of Associations, which did take place once every second year, now bring HE Associations' representatives from around the world together regularly to exchange, learn and debate the future of the sector.

Last but not least, the IAU engages in multilateral projects and events, including the *UNESCO World on Education for Sustainable Development and the UN HLPF 2021*, and we prepare for the upcoming *UNESCO World Higher Education Conference*, where we will present the outcomes of a series of international collaboratives projects on topics shaping the future of higher education. We also contribute to events and debates to advance strong and inclusive HE around the world.

Learn more about the various activities of IAU. I look forward to welcoming you on board.

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IAU EVENTS

IAU STRATEGIC PRIORITIES

IAU KNOWLEDGE HUB

IN FOCUS:

IAU EVENTS

CELEBRATING 70 YEARS OF IAU

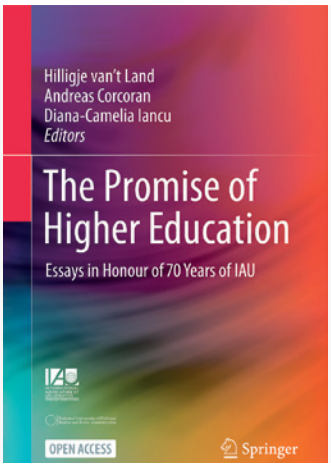
On 9 December 2020 IAU celebrated its 70th anniversary since the signing of its constitution at the founding General Conference in Nice, France, in 1950. The Association was called into life by UNESCO in the post WWII era to recognize the important role and contributions of universities to societal development. Through enhanced international collaboration, higher education responds to the challenges of our time. More than 150 representatives from 52 countries attended the Conference in Nice along with the Director General of UNESCO and a representative of the UN Secretary General. This was the beginning of the Association that you know today. 70 years later, IAU continues to thrive and support the overarching vision and mission set by UNESCO.

The plan was to celebrate this important milestone in the life of the Association during the 16th General Conference in Ireland in 2020, yet as for many other events, the pandemic altered the plans; and instead we launched a year of celebrations until December 2021.

The celebrations were kicked off with a very festive online webinar, with more than 20 speakers from all five continents on the programme. If you missed this important event or if you wish to rediscover it, the recording is available on the dedicated webpage (see below).

IAU has also received many congratulatory messages from Members, partners and friends from around the world; do have a look and get to know your peers around the world. You are also welcome to share a video message with IAU, the wall of messages continues to grow throughout the year.

Passing the milestone of 70 years was also an occasion to look back and remember the achievements of the past. To this end, Vol. 25, no. 2, of the *IAU Horizons* magazine, issued in December 2020, is a special edition presenting the history of the Association. The printed version of the magazine was sent to all IAU Members in January 2021. We hope that it is well received and that you have enjoyed rediscovering your Association and its important achievements over time. The electronic version of the magazine is also available on the dedicated website.



Finally, we are very pleased to announce the publication *The Promise of Higher Education: Essays in Honour of 70 Years of IAU*. The book marks the 70th anniversary of IAU and its role in higher education since 1950. It is a collection of short essays that takes the reader on a tour across the global higher education landscape and addresses pertinent themes and challenges to the sector. Members, partners, colleagues and friends from around the world share their insights into higher education's recent past, present and future. Structured around six broader sections, the essays engage with the role of international collaboration and advocacy, the fundamental values of higher education, the changing landscape as well as the future of higher education. This collection of essays provides a comprehensive overview of issues universities face and suggests scenarios for the future. Published by Springer, and benefiting from generous support from SNSPA in Romania, we are very pleased to inform you that the book will be available online through open access in June 2021.

More on the celebrations of 70 years of IAU here: **https://iau-aiu.net/IAU-turns-70**

IAU 16th GENERAL CONFERENCE

Relevance and Value of Universities to Future Society

In light of continued uncertainties surrounding the pandemic and how the situation will unfold this year, the IAU has taken the difficult decision to postpone the 16th IAU General Conference to 25-28 October 2022. Although the increasing number of vaccines provides hope for the future, it is too premature to provide assurance about the possibility to travel and organise safe gatherings this year, particularly at the global level.

The General Conference is a crucial event for IAU, where elections are held, and the next strategic plan for the Association is presented and adopted. It also offers the opportunity for effective networking among peers from around the world. In order to ensure a smooth functioning of the decision-making processes in line with the Association's governance policies, and to allow constructive dialogue on key issues among participants, an in-person event would be the most suitable format and we hope that this will be possible in 2022.

IAU Webinar series on:

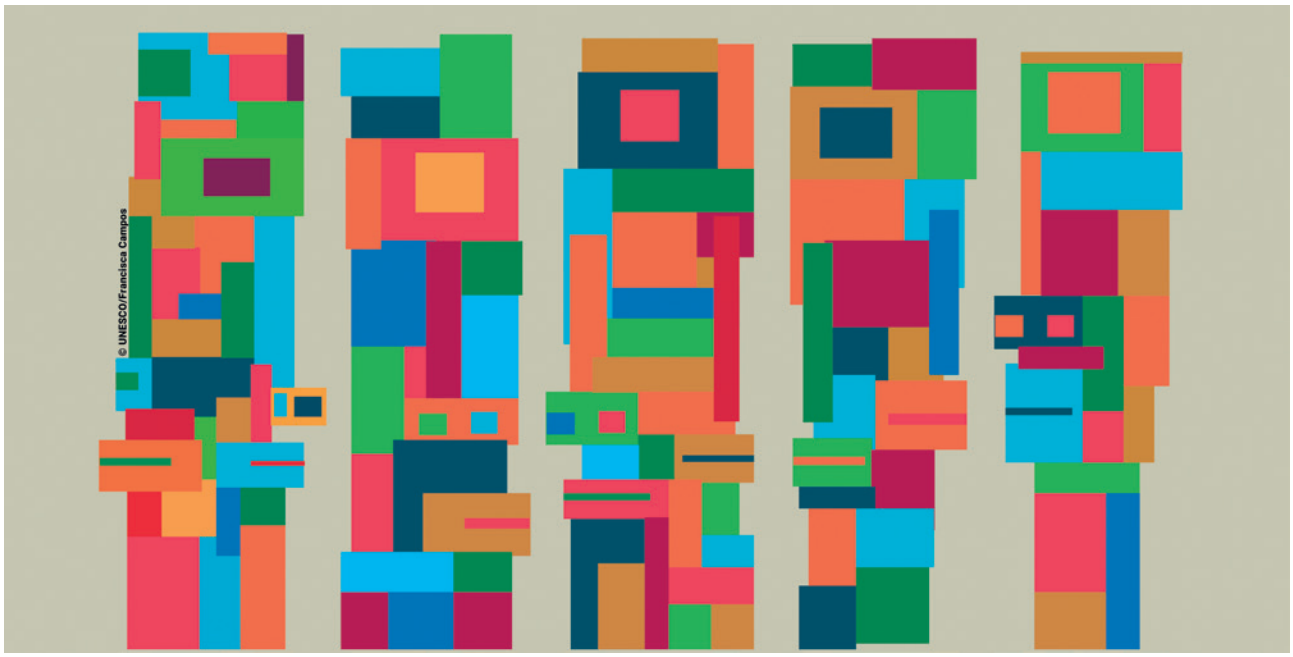
THE FUTURE OF HIGHER EDUCATION

Until we meet again in a physical setting, IAU offers weekly spaces for exchange online. We are pleased to invite you to the IAU webinar series on *The Future of Higher Education*, which first session was launched in May 2020. Nearly every Tuesday, from 14:30-16:00 Paris time (UCT+2), IAU is pleased to bring together leaders and experts on diverse topics of importance to higher education from leadership to sustainable development, from digital transformation to internationalization among other topics. These sessions are often organised with partners from around the world. Make sure to sign up to attend the next sessions or discover the recordings from previous sessions. IAU also invites Members to suggest topics you would like to see covered in the series, or to make recommendations in terms of speakers to bring to the table.

The Future of Higher Education
https://iau-aiu.net/IAU-Webinar-Series-on-the-Future-of-Higher-Education-929

IAU and the UNESCO WORLD HIGHER EDUCATION CONFERENCE (WHEC)

Reinventing the Role & Place of Higher Learning for a Sustainable Future



UNESCO plans for a third **UNESCO World Higher Education Conference (WHEC)**. It was initially planned to take place in October 2021 yet has been postponed to 2022 (date to be announced) due to the pandemic. IAU has been a key partner to the first two World Conferences (1998 & 2009), and will again represent the global voice of higher education during the next edition.

The WHEC will take place at a particularly important moment in time – in the context of the Covid-19 pandemic, which abruptly disrupted higher education. Beforehand, the very idea of the university was overwhelmingly based on physical presence for intellectual exchange among students and staff, whether in classrooms, lecture halls or conferences. Libraries and laboratories were shared learning and research spaces with common use and access to books and resources, equipment and materials; social gatherings were a defining feature of campus life, spanning all activities from teaching, learning and research to extra-curricular activities and student life in dormitories. From one day to another, universities had to start operating remotely – where possible –, and many are still continuing operations from a distance.

This sudden shift demonstrated the ability of universities to be agile, to respond to emergent challenges and to innovate. Driven by the shared ambition of minimizing the negative effects of the pandemic on academia and its operations, the higher education community has worked relentlessly to adopt innovative solutions. Many measures in place today are specifically in response to the pandemic, but although it is not clear when we will move beyond this state of play, it is clear that this experience will have an impact on the future of higher education, the question is how?

The ambition of the WHEC is to generate a 10 year roadmap for higher education, with emphasis on 'reinvention': "*If higher education and the university were to be invented today – what would they look like? Who would participate and complete his/her higher education? How would participants learn? Where would they learn? What knowledge, skills, competencies, and values would they need to develop to work, become global citizens, and live with dignity? Who would guide these changes: institutional leaders, policy makers, researchers, students, professors, employers, community leaders, civil society groups?*"[1]

The purpose of the Conference is to break away from traditional models of higher learning and opening the door to new, innovative, creative, and visionary conceptions that not only serve the current global agendas for sustainable development,

1. UNESCO World Higher Education Conference Concept Note (p.4) accessed on 24 February: https://en.unesco.org/sites/default/files/whec2021-concept-note-en.pdf

but also pave the way for a future learning community that speaks to all and that is inclusive of all lifelong learners. IAU welcomes this important opportunity for multi-stakeholder exchange in an intergovernmental setting. Discussing the future of higher education has been on the agenda of the Association since its inception by UNESCO in 1950.

For the first World Conference, UNESCO tasked IAU with an initiative that aimed to protect Academic Freedom and University Autonomy as these are essential prerequisites for universities to meet their responsibilities to society and, at the same time, a means of strengthening the principles of pluralism, tolerance and academic solidarity between institutions of higher learning and between individual scholars and students. IAU developed a statement advocating for the elaboration of a new Social Contract between university and society and calling for a broadly recognised International Charter of mutual rights and obligations, including adequate monitoring mechanisms for its application. The IAU statement "*Towards a Century of Cooperation: Internationalization of Higher Education*" (1997) also informed this conference[2].

The Declaration of the first World Conference: *Higher Education in Twenty-First century: Vision and Action*[3] *stated: "the core missions and values of higher education, in particular the mission to contribute to the sustainable development and improvement of society as a whole, should be reserved, reinforced and further expanded namely to:*

a. *Educate highly qualified graduates and responsible citizens able to meet the needs of all sectors of human activities […] using courses and content continually tailored to the present and future needs of society*

b. *Providing opportunities for higher learning and for learning throughout life […] to educate for citizenship and for active participation in society […]*

c. *Advance, create and disseminate knowledge through research and provide, as part of its service to the community, relevant expertise to assist societies in cultural, social and economic development […]*

The second World Conference (2009) entitled: *New Dynamics of Higher Education and Research for Societal Change and Development* resulted in a joint Communique[4] reaffirming the role and mission as follows:

1. *Higher Education as a public good is the responsibility of all stakeholders, especially governments.*

2. *Faced with the complexity of current and future global challenges, higher education has the social responsibility to advance our understanding of multifaceted issues, which involve social, economic, scientific and cultural dimensions and our ability to respond to them. It should lead society in generating global knowledge to address global challenges […].*

3. *Higher education institutions, through their core functions (research, teaching and service to the community) carried out in the context of institutional autonomy and academic freedom, should increase their interdisciplinary focus and promote critical thinking and active citizenship. This would contribute to sustainable development, peace, wellbeing and the realization of human rights, including gender equity.*

4. *Higher education must not only give solid skills for the present and future world but must also contribute to the education of ethical citizens committed to the construction of peace, the defense of human rights and the values of democracy […].*

THE ROLE OF IAU IN THE WHEC

Higher Education continues to reform and develop and IAU look forward to taking part in the discussions about how to shape the future of higher education, to debate key issues and reaffirm the important role of the state in ensuring a thriving higher education system. Whether the vision will be new or reaffirming many of the important principles already outlined in the past events is one thing, however what is of essence to IAU is that higher education is recognized as a key priority by the UNESCO Member States, and seen as an important investment in the future and in the development of knowledge and of sustainable societies.

The work carried out as part of IAU's strategic priorities, namely *Internationalisation, Sustainable Development* and *Digital Transformation* will inform the WHEC along with a series of UNESCO projects where IAU is a partner for example on Lifelong Learning (with UIL, IIEP and IESALC) and sustainable development (with the International Science Council and the University of Bergen). IAU will also position the World Higher Education Database as a key instrument for the implementation of the UNESCO *Global Conventions on the Recognition of Higher Education Qualifications.*

The Report on the Global Survey on the impact of the pandemic on higher education will also inform the conference and finally, IAU is preparing a position paper outlining essential issues and principles for the future of higher education in consultation with its Members around the world to inform the UNESCO *Roadmap for a new era of higher education systems and institutions* which is the expected outcome of the conference. Members will be informed about the different initiatives and opportunities for engagement.

2. The IAU Policy Statements are available online: https://www.iau-aiu.net/Policy-Statements

3. World Declaration on Higher Education from the 1998 WCHE: https://unesdoc.unesco.org/ark:/48223/pf0000113878

4. Communique of the 2009 UNESCO WCHE: https://unesdoc.unesco.org/ark:/48223/pf0000183277

IAU STRATEGIC PRIORITIES

Internationalization

Internationalization of higher education is an inevitable process in the era of globalization and a deliberate strategy for improving quality and relevance of higher education and research. IAU focuses on the academic rationales, the equitable and collaborative nature of the process and aims to minimize the adverse effects of international interactions when these take place in highly unequal and diverse contexts among HEIs with different resources, needs and interests.

INTERNATIONALIZATION OF RESEARCH IN THE (POST) COVID ERA

There is no doubt that the COVID-19 pandemic had a huge impact on research and on internationalization of research especially at Higher Education Institutions (HEIs) around the world. However, the effects of the pandemic on the internationalization of research are multiple and more complex that one could think.

Immediate negative impact

The first immediate effect was of course negative as travel restrictions, closures of campuses and consequently of laboratories, slowed down – if not completely halted – research at HEIs around the world. In the first *IAU Global Survey on the impact of COVID-19 on higher education*[5], conducted from March to April 2020, the most common impacts reported were the cancelling of scientific research conferences and international travel, followed by scientific research projects being in danger of not being successfully completed.

These results seem to indicate a particularly significant and negative impact of COVID-19 on internationalization of research. At the same time however, the results of the same survey also show that half of the respondents stressed that COVID-19 weakened international partnerships while the other half replied that COVID-19 either strengthened them or opened up new partnership opportunities.

New opportunities

The international research community was quick to react to the pandemic and its consequences. Scientific conferences and meetings moved online and the push for open access to scientific information was reinforced. International and multilateral organisations such as UNESCO published calls for open access to scientific information to facilitate research and information exchange on COVID-19[6]. Indeed, several organisations started sharing their research openly and major scientific journals dropped subscription fees for articles related to COVID-19, making them available to all for free.

Online cooperation opened up new collaboration possibilities; this particularly impacted HEIs in countries that in pre-pandemic times could not attend international scientific conferences and meetings easily, due to financial and visa restrictions. Especially in Africa, the potential of online collaboration gave HEIs and researchers the possibility to increase collaboration at global level.

COVID-19 also demonstrated the importance of science and facts to society. In December 2020, the scientific journal Nature even called 2020 An extraordinary year for science.[7]

5. https://www.iau-aiu.net/IMG/pdf/iau_covid19_and_he_survey_report_final_may_2020.pdf

6. https://en.unesco.org/covid19/communicationinformationresponse/opensolutions

7. https://www.nature.com/immersive/d41586-020-03437-4/index.html

Vaccines for COVID-19 were found and produced at a record time, scientists were called upon by governments to advise on the most appropriate health measures to be adopted, and their presence in the public sphere grew through participation in debates on television, interview in the press and fighting disinformation, especially on social media. The world was reminded of the universal nature of scientific research and the importance of collaboration including with universities. The fundamental value of internationalization of research became clear.

Old and new threats

However, despite these undeniable positive consequences, the pandemic also showed that the phantoms of the past are far from having disappeared and new ones might appear on the horizon. International research in pre-COVID-19 times was based on a highly competitive model in which HEIs and research groups were fighting for resources and recognition. Research is expensive and both access to it and the capacity of producing and disseminating results were and still are unequally distributed in the world. There is a strong correlation between the number of HEIs per capita in the top position of international rankings, or the number of publications in top scientific journals, and GDP per capita of a country.

The race to develop a vaccine for COVID-19 was clearly an expression of this competitive model, as is the subsequent distribution around the world. Although cooperative initiatives such as COVAX[8], which aims at providing a global equitable access to COVID-19 vaccines, exist, the production and distribution of vaccines is in the hands of few developed countries or organisations: China, Russia, United Kingdom, United States and the European Union. Moreover, these countries are competing among themselves and using the vaccines as a tool in their diplomatic relations with third countries. Geopolitical considerations and rivalry are playing a bigger role than scientific considerations on judgements on the efficacy and adoption of a vaccine.

For what concerns open science, many open access models requires authors to pay a fee in order to publish their articles; this is a barrier to researchers with less resources to publish their research through this model, especially in least developed countries. Even access to online technology is unequal and again least developed countries are those at risk of being in an unfavourable position.

Conclusion: the risk of growing inequality

The COVID-19 pandemic has shown that global problems need global solutions and that internationalization of research and cooperation are essential, but at the same time, it has not resulted in completely disrupting the competitive model of international research. With the economic crisis deriving from the pandemic there is the risk that inequality in research in the world will even increase. It is up to the higher education and research community to act to avoid it.

8. https://www.who.int/initiatives/act-accelerator/covax

GET INVOLVED

ISAS impact evaluation study – Learn about what HEIs that undertook an ISAS/ISAS (2.0) think about it

At the end of 2020, in cooperation with the Centre for International Higher Education of Boston College, IAU conducted the *ISAS impact evaluation study*. Its objective was to investigate the efficacy of the IAU *Internationalization Strategy Advisory Services* (ISAS) and its subsequent version "ISAS (2.0)" on internationalization initiatives at the higher education institutions that undertook one of the services proposed by ISAS/ISAS (2.0).

The *ISAS impact evaluation study* employed a mixed-methods research approach combining survey results and semi-structured interviews. Out of the 17 HEIs that ever undertook an ISAS/ISAS (2.0) service, 12 completed the survey and representatives from 5 countries were interviewed: Bangladesh, Ghana, India, Italy, and Japan.

8 out of the 12 institutions expressed that "ISAS/ISAS (2.0) was really helpful to advance internationalization at [their] institution" while the other 4 indicated that "It was somewhat helpful to advance internationalization", while interviewees confidently, and unanimously, recommended the service to other institutions. This is clearly an endorsement of ISAS/ISAS (2.0) by the institutions.

Moreover, 11/12 HEIs noted progress in internationalization since completion of their time with ISAS/ISAS (2.0). 'Significant progress' was made at 3/12 of institutions and 8/12 progressed 'moderately.'

The *ISAS impact evaluation study* is freely available to download on the IAU website https://iau-aiu.net/Publications

Learn from the experience of the universities that undertook an ISAS/ISAS (2.0) and consider benefiting from the ISAS (2.0) service to advance internationalization at your institution.

For more information, please contact: Giorgio Marinoni at g.marinoni@iau-aiu.net

Higher Education and Research for Sustainable Development

Future well-being of humanity and the planet depends on successful resolution of the interconnected challenges of economic, social, cultural, and environmental sustainability. IAU's actions in support of *Transforming our world: the 2030 Agenda for Sustainable Development* and the related Sustainable Development Goals.

SUSTAINABLE DEVELOPMENT: THE ROLE OF HIGHER EDUCATION AND RESEARCH

"Science builds on Science" accelerating solutions for a more sustainable future

Higher education is uniquely positioned to build bridges between the different actors in society and to help develop the solutions needed to address the challenges faced. Universities are key to healthier, greener, fairer and more inclusive societies – in short to ensuring a better and more sustainable future for the many. Already before the disruption caused by the Covid-19 pandemic, the world was facing a global crisis, a climate emergency, with scientific data providing evidence that human activity is testing our planet's boundaries and that natural resources are limited. The disruptions of the pandemic provide an opportunity to propose new and sustainable solutions for a more planet-friendly and just economy and society. Solutions come from science through research, exchange, and teaching the next generation – hence universities should be and already are at the vanguard. The question is whether the process of discovery and development of solutions around the world could be accelerated if scientific results and data were shared more openly?

The *UN Decade of Action for Agenda 2030 and the Sustainable Development Goals (SDGs)*[9] calls of higher education and research to engage with the Agenda and the set SDGs and overall for knowledge and research to be more accessible for actions to become more effective. This is also reflected in the first draft of the *UNESCO Recommendation on Open Science*, which acknowledges the "transformative potential of Open Science for reducing the existing inequalities in science, technology and innovation and accelerating progress towards the implementation of the Agenda 2030 and the achievement of the Sustainable Development Goals and beyond."[10]

Despite the shortfalls on climate goals set by the 2015 Paris Agreement for national governments and private actors, many solutions have been developed already, but need to be made accessible and transferable to society in order to become actionable. Time is ticking for convincing all actors to make more sustainable choices, in policies, corporate practices and individual lives. Hence sharing information, fostering better cooperation and facilitating access are crucial to ensure progress; academic institutions are in the position of facilitating these transformative processes. This is however not always the case, especially when taking into account regional and systemic differences in higher education globally. The 2nd *IAU Global Survey Report on HESD*[11] for example analysed how universities engage with the SDGs and if and how they adopt a whole institution approach to sustainability. When asked about the difficulties encountered to implement Sustainable Development, on average every fourth respondent indicated that "lack of knowledge" was the factor most negatively impacting progress on sustainability at their institution; in some world regions almost half of the respondents found this to be an issue. While lack of funding and staff are more complex issues slowing down the engagement with sustainability, providing for access to information and research results from

9. https://www.un.org/sustainabledevelopment/decade-of-action/
10. https://unesdoc.unesco.org/ark:/48223/pf0000374837
11. IAU 2nd Global Survey Report: Higher Education and the 2030 Agenda: Moving into the 'Decade of Action and Delivery for the SDGs. p.48.: https://www.iau-hesd.net/sites/default/files/documents/iau_hesd_survey_report_final_jan2020.pdf

the other parts of the world should be fairly easy, especially thanks to technologic possibilities available today.

It is clear that to advance in science, a knowledge network, access to information and accurate data are crucial. Science builds upon science, yet researchers too often encounter barriers which prevent them to perform; these barriers include: restricted access to scientific data, competition between institutions, lack of resources to commit the time required to undertake research and to find the information needed to pursue research, just to mention a few. Publication mechanisms could be simplified and open science principles implemented at a larger scale. Transformation is underway as open science publishing and availability of peer reviewed journals without paywalls increase, or free online databases and platforms develop such as the "2030 connect"[12] launched by the UN, last summer. None of the 17 SDGs can be achieved without knowledge and research cooperation – two dynamics that higher education can and should foster.

In conclusion, many HEIs are already engaging with sustainability and with the SDGs, yet more can be done to support this "Decade of Action". Universities have key stakeholders in society, in local and global contexts, and through teaching, research and community engagement they are ideally positioned to make the difference. By adopting Open Science as a principle more broadly HE research will help accelerate the action we need, to reach the future we want.

IAU Advocacy role

IAU strongly advocates for the role of universities and recognition of this role in reaching the goals within its membership and within the higher education community at large, with key partner networks around the world, including ACU, AUF or by supporting international initiatives like the UNESCO Education for 2030 initiatives and the work of the UNESCO ESD section, UNU-IAS and the RCE initiative, UN-SDSN, HESI, etc.

IAU contributed to Decade on Education for Sustainable Development which was marked by a Global Conference on ESD in Berlin in 2009 and ended with the first *UNESCO World Conference on Education for Sustainable Development* (WC-ESD) which took place in Aïchi Nagoya, in Japan, in 2014[13]. In preparation of the Conference, IAU developed the Iquitos Statement on SD which informed the WC-ESD outcomes document. This year and with UNESCO, IAU co-organises the debates on the contribution of HE to SD at the second WC-ESD (Berlin, May).

As well IAU strongly advocates for the role of HE for SD at the UN High Level Political Forums, taking place each year at the UN headquarters, in New York. IAU contributed in substance to the 2019 & 2020 editions and will again contribute to the HLPF this year in July, each time with lead universities in the IAU Global Cluster on HESD, with ACU & AUF, and with partners like UNESCO, UNODC or the Council of Europe, HESI, etc.

IAU mechanisms to foster the priority area of work on HESD:

- IAU Working Group on HESD under the leadership of Prof Pornchai Mongkhonvanit, Siam University, Thailand, IAU Board Member
- IAU Global Cluster on HESD (see: https://www.iau-hesd.net/contenu/4648-iau-global-cluster-hesd.html)
- IAU Policy statements on HESD, see: https://www.iau-hesd.net/contenu/4648-iau-global-cluster-hesd.html

12. https://tfm2030connect.un.org/

13. https://en.unesco.org/news/world-conference-education-sustainable-development-opens-aichi-nagoya-japan

GET INVOLVED

Contribute to the IAU Global Portal on HESD and share your initiatives with the global higher education community!
www.iau-hesd.net

Read the latest IAU HESD Cluster Report 2019-2020
https://www.iau-aiu.net/IMG/pdf/clusterhesd_iau_report_2020.pdf

Learn more about IAU at the UNESCO World Conference on Education for Sustainable Development (WC-ESD) 2021:
https://en.unesco.org/events/ESDfor2030

Learn more about the Global Independent Expert Group on the Universities and the 2030 Agenda (EGU2030):
https://www.uib.no/en/sdgbergen/141190/unesco-global-independent-expert-group – the outcomes report will inform the UNESCO WHEC.

Follow us on twitter
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For more information, please contact: Isabel Toman at contact@iau-hesd.net

Digital Transformation of higher education

ICTs and their impact are ubiquitous in all aspects of higher education worldwide. Yet, for various reasons the inclusion of and the reflection on how best to use ICTs in all functions of higher education is uneven from region to region, from country to country, and among institutions. The aim of IAU's action in this area is to promote the opportunities and discuss the challenges and, through collaboration and exchange, to pursue that the potential is unlocked for all.

Pixabay

QUESTIONS THAT ARISE WITH THE ACCELERATED PACE OF THE DIGITAL TRANSFORMATION OF HE

The first IAU Global Report on *Higher Education in the Digital Era: The Current state of transformation around the world*[14] was released in January 2020. Looking back at the conclusions of this report one year later, it is amazing to see the transformation that has taken place in higher education within such a short timeframe. To take one example, the Report showed that prior to the pandemic nearly a third (32%) of all responding institutions did not offer any online course. We can easily imagine that this figure looks very different today.

As a consequence of the pandemic and the need for physical distancing, universities and higher education institutions have found themselves (involuntarily) being part of an international laboratory tasked to avoid disruption by relying on digital tools. Many universities already were equipped with hubs or centres experimenting how to leverage technologies in higher education. These suddenly became essential to scale up the initiatives. Yet, it is one thing to have the measures in place to fight the pandemic, another thing is to seize how this experience will impact the future of higher education. This article looks at essential questions to consider when transitioning from a situation where the pandemic forces the use of digital technologies, to a world where this becomes an option:

Data and ethics: Shifting from presential to online operations generates new data, from information about students and learning trajectories to recorded lectures and teaching material. This generates the need for transparent policies and regulations on their use including questions of data privacy in relation to the different EdTech providers. A university in Canada was recently faced with a new dilemma when a student tried to reach out to the professor of an online lecture, only to discover that he had passed away. We are accustomed to reading books or watching a movie regardless of whether the respective authors and actors are still alive or not, yet unexpectedly attending lectures of late professors is a rather new situation. This is primarily a problem of communication and context, as the lecture should not generate the expectation that you are able to exchange with the professor when it is not the case. Yet, it is also illustrating one out of many new examples of situations where data created through online presence can serve different purposes, be disseminated widely or used across time. Such cases existed before the pandemic, yet, they have intensified with the accelerated use of digital technologies. Data can be used for good or be misused, thus it is important to develop and adopt privacy policies and ethical guidelines that find a balance between learning from and making use of the data gathered and respecting privacy and intellectual property.

Teaching and learning: The forced shift to distance learning has generated a dichotomy between face-to-face and online learning – a simplification that distorts the real question which is rather one of quality, regardless of the mode of delivery. Instead of opposing different modes of learning, deciding which one is better than the other, it would be more interesting to consider the opportunities that diverse modes of delivery offer in different contexts, in different disciplines and especially to different types of learners. The overall

14. IAU Global Report: Higher Education in the Digital Era: The current state of transformation around the world: https://www.iau-aiu.net/IMG/pdf/technology_report_2019.pdf

curriculum can be composed of a variety of different modes of delivery, and thus it is better to avoid creating a narrative that only allows binary and opposing options and be open to the nuances and opportunities as long as quality is at the centre of any innovation.

The mental health issues that come with isolation and physical distancing demonstrate what we already know – humans are social beings. The universities play an essential role in providing spaces to gather, to exchange, to be part of a community and to create social bonds. These functions and their outcomes may not be reflected in the credentials that the students take away when they leave the campus; it may not be part of the reporting that is required to justify state funding, yet, this dimension must not be forgotten when discussing the effectiveness and value of higher education in the aftermaths of the pandemic. Universities are social institutions that contribute to making its community thrive, grow, and prepare students to transition from a world of education and learning to a world of work and learning. At the same time, in an era of lifelong learning, it is also to be stressed that adult learners may not have the same needs in terms of a campus-based social life.

Research: The impact of the pandemic on research depends very much on the discipline and the needs for laboratory access, for travel to undertake field research or need to access archives, materials or other facilities that are temporarily closed. Yet, regardless of the discipline, scientific conferences have been cancelled or have shifted to online formats which do not allow for the same type of interpersonal relationships or networking as can be experienced by physical presence at a conference. While there will be a continued need for such events, the pandemic is an opportunity to question pre-pandemic ways of operating and to complement them with new types of online collaboration, which has become mainstream during the pandemic; this can increase participation for those who have previously had limited access due to financial issues, visa issues – as long as they have online access.

The *In Focus* section (page 16) discusses the topic "*Democratizing Knowledge: Open Science in a Closed World?*" and authors from around the world have provided their views on Open Science – a movement facilitated by digital technologies and that allows for data- and knowledge-sharing in new ways. Yet, it is a complex process that is intertwined with traditional ways of operating, with research financing and governance. Digital technologies are merely a means to an end – a tool that provides new opportunities. The most difficult aspect remains the systemic changes required to take the next step, from principles to action, and to create a world of Open Knowledge serving humanity.

Inequalities: The question of inequalities is the most difficult one of them all, because despite recent progress, it is a long-term issue. In the IAU *Global Report on Higher Education in the Digital Era* 58% of institutions in Africa reported that unreliable internet is the main obstacle to pursuing digital transformation of higher education against 5% of respondents in Europe. The pandemic has served as a magnifying glass, highlighting the inequalities even in terms of continuing higher education during this pandemic.

The first IAU *Global Report on the Impact of Covid-19 on Higher Education around the World*[15] showed that 24% of responding institutions in Africa cancelled teaching and learning where for other world regions this only concerned 3%. We see the disparities across regions, within countries and within institutions. Distance learning requires access to internet, to data and to devices. This has become the main road for accessing information, yet a very unequal road which entails profound differences in terms of the opportunities to take part in and contribute to the knowledge society. It is a problem that cannot be solved by the higher education sector alone, yet we must reflect on the impact of these knowledge divides and address them in our international collaboration. This is a global responsibility.

The dimensions raised here are among the principles developed in the new *IAU Policy Statement: Transforming Higher Education in the Digital Era for the Common Global Good* created through an extensive consultative process. It will inform the work of IAU in this field and will also form part of the IAU's contribution to the third **UNESCO World Higher Education Conference**.

15. IAU Global Report on the Impact of Covid-19 on Higher education around the world (p. 24): https://www.iau-aiu.net/IMG/pdf/iau_covid19_and_he_survey_report_final_may_2020.pdf

GET INVOLVED

Register for the joint IAU-UOC (Universitat Oberta de Catalunya) online series: **Innovative Education for Unshaped Futures (IE4UF)**. The series will discuss the blended modes after the return to campus, innovations in assessments and exams, data governance, designing quality (online) education amongst others. It will be launched on 10 June and will be accompanied by Policy Dialogues that will inform the UNESCO World Higher Education Conference (WHEC).
Visit www.iau-aiu.net for more information and to register to take part in the conversations.

For more information, please contact: Trine Jensen at t.jensen@iau-aiu.net

IAU KNOWLEDGE HUB

New IAU publications

IAU Global Survey on the Impact of COVID-19 on Higher Education around the World

The COVID-19 pandemic has led to an unprecedented health and socio-economic crisis which will mark our times for long. It has also severely impacted the entire higher education sector around the world. To deliver an overview of the state of play worldwide, the *IAU Global Survey on the Impact of COVID-19 on Higher Education around the World*, conducted in April 2020 aimed to better understand the disruption caused by COVID-19 across the globe and to investigate the first measures undertaken by HEIs in teaching & learning, research, and community engagement. Results of the survey were analysed both at the global level and at the regional level in four regions of the world – Africa, the Americas, Asia Pacific and Europe**.** The second edition of the global survey is currently being developed to inform the UNESCO WHEC and the future of higher education. https://iau-aiu.net/Publications

Regional & National Perspectives on the Impact of COVID-19 on Higher Education

In August 2020, IAU released this complement complementary report to the IAU Global Survey Report. IAU called its member organizations to contribute i regional and national perspectives contextualizing the results of the IAU global survey in their local realities and providing additional information. The report presents success stories at regional and national level in Asia, Europe and North America. https://iau-aiu.net/Publications

Higher Education Policy (HEP)

HEP 33/3 September 2020

In September a special edition was released entitled "Globalization and Resurgent Nationalism in Higher Education", edited by Ka Ho Mok, a member of the HEP Editorial Board. Articles deal with experiences of students from Mainland China and Taiwan who return home after studying in the UK; Mobility and research performance in city-based education systems; Ugandan graduates from Chinese universities; Chinese government scholarships and natural resources in Africa The drivers behind the sharp rise of overseas students in China; and international learning and academic career development. See: https://link.springer.com/journal/41307/volumes-and-issues/33-3

HEP 33/4 – December 2020

HEP finished off the year with another special edition on Master's Education in Massified, Internationalized, and Marketized East Asian Higher Education Systems. Papers look at master's education in Taiwan; Master's degrees and how they impact on job satisfaction in South Korea The effects of gender in STEM fields in China; How internationalization policies impact master's programmes in Japan; and The profile of master's students in Hong Kong. More information on https://link.springer.com/journal/41307/volumes-and-issues/33-4

Higher Education and SDG-5: Achieve Gender Equality and Empower All Women and Girls

Gender Equality is a crucial issue for society in the 21st century. Around the globe, universities and other higher education institutions, their leadership, academic and administrative staff, and students, are increasingly mobilized for the United Nations Agenda 2030 and the related Sustainable Development Goals (SDGs). SDG-5, in particular, is receiving increased attention, due to its crucial role for the advancement of all of the SDGs and society. IAU and the University of Bologna, Italy -the SDG-5 Lead Institution in the IAU Global HESD Cluster, have jointly collected examples of best practice undertake by universities around the world on this topic. The publication is part of a series of publications on university actions for the SDGs, with the overall aim of building new synergies and increasing capacity to act while informing higher education more broadly. A first publication focused on *SDG-13: Climate Action*. Upcoming publications in the series will be on *SDG-14: Life below Water*, with the University of Bergen in Norway, and on *SDG-16: Peace and Strong Institutions*, with UNODC. https://iau-aiu.net/Publications

IAU WORLD HIGHER EDUCATION DATABASE (WHED)

United Nations Educational, Scientific and Cultural Organization

World Higher Education Database

The UNESCO **Global Convention on the Recognition of Qualifications concerning Higher Education** was adopted in November 2019, making it the first UN treaty on higher education credentials with a global scope. The IAU has accompanied the long process towards this Global Convention and supports this multilateral and collective move towards democratizing knowledge, enabling a more fluid circulation of talent while fostering global trust in higher education systems.

The WHED is a key resource for the practical implementation of the Global Convention. The Convention calls upon the State Parties to "*Facilitate the dissemination of and access to accurate information on the other States Parties' higher education systems, qualifications, and qualifications giving access to higher education.*" The WHED provides exactly that: authoritative higher education information on a global scale.

ABOUT THE WHED

The WHED is the reference portal for authoritative and validated information on higher education institutions and national systems. It contains verified information and lists only those institutions that are officially recognized by their own countries' national bodies.

Operated by IAU in collaboration with UNESCO, the WHED provides information on:

- **higher education systems and credentials** (196 countries and territories)
- **accredited higher education institutions (HEIs)** that passes WHED criteria (around 20,000 HEIs)

www.whed.net

The IAU fully supports the Convention's aim to

- strengthen global **academic mobility;**
- provide a **framework of quality assurance** for the fast-growing diversity of higher education providers;
- develop agreed **principles for recognition** of higher education qualifications common to all regions;
- to cover **good practices** for the recognition of qualifications in higher education awarded by a diverse range of providers;
- share a **common understanding** of recognition for enhancing inter-regional mobility.

The most important change foreseen by the Global Convention is that individual applicants moving from one country to another will have legal recourse to have their higher education qualifications assessed by the receiving competent national authority in a fair, transparent, and non-discriminatory manner. For this, the WHED is the crucial go-to reference portal for assessing the validity of qualifications.

The WHED is a key resource for the implementation of the Global Convention in that it

- is a key facilitator of recognition as it provides authoritative information on HEIs and national education systems;
- enhances global academic mobility and international cooperation in higher education;
- gives easy access to and ensures reliability of information in a fair and transparent manner;
- supports academic integrity, recognition and quality assurance globally;
- is fully compliant with the Convention's call for transparency by adhering to strict selection criteria and relying on officially released lists;
- facilitates clear identification and communication within the global HE sector and among government institutions;
- provides greater administrative certainty while combating fraud.

IAU has rolled out a new system of **unique identifiers** for each HEI listed in the WHED to help facilitate identification and thus recognition in support of the implementation of the Global Convention. The **Global WHED ID** can be easily integrated and used in new technologies for recognition and quality assurance purposes as well as **digital services world-wide**. The WHED and the Global Convention, in their own way, both function as a gate-opener and a gate-keeper: the aim is to facilitate mobility, while ensuring and safeguarding shared standards of recognition.

The WHED's *raison d'être* is to serve the public common good. The IAU has done so ever since its foundation under the auspices of UNESCO in 1950. In the past through the publication of the *International Handbook of Universities*, now online through the WHED.

Support the WHED financially by making a donation on whed.net and by updating the information about your institution.

Contact: **centre@iau-aiu.net**

IAU Membership News

Since March 2020, IAU is pleased to welcome 38 new members from 25 different countries into its global community. We are grateful to all our Members for their incredible support even in these challenging times and look forward to further strengthening our collaboration. New programmes and further opportunities to engage are under development.

Please follow us on www.iau-aiu.net, and make sure you have subscribed to our montly e-newsletter to keep up to date on our activities. Make sure to share with us any news or updates that you would wish to disseminate to the rest of the IAU community as well as the broader global higher education community. We are also always open to questions and suggestions – for membership-related queries, please contact Disha Kohli at d.kohli@iau-aiu.net

NEW MEMBER INSTITUTIONS

AZERBAIJAN
Western Caspian University
https://wcu.edu.az/en

BANGLADESH
European University of Bangladesh
https://eub.edu.bd/

CAMBODIA
University of Cambodia
https://uc.edu.kh/

CANADA
Queen's University
https://www.queensu.ca/

CONGO
Institut Supérieur de Commerce de Goma
https://www.unipage.net/en/24665/institute_of_commerce_of_goma

EGYPT
Future University in Egypt
https://www.fue.edu.eg

GEORGIA
New Vision University
www.newvision.ge

GREECE
University of West Attica
www.uniwa.gr

HUNGARY
Budapest University of Technology and Economics
https://www.bme.hu/?language=en

INDIA
Chettinad Academy of Research and Education
https://www.chettinadhealthcity.com/care/index.htm

INDIA
Siksha 'O' Anusandhan
https://www.soa.ac.in/

University of Hyderabad
https://www.uohyd.ac.in/

KENYA
The Management University of Africa
https://www.mua.ac.ke/

KYRGYZSTAN
Adam University
https://bafe.edu.kg/

S. Tentishev Asian Medical Institute
www.asmi.edu.kg

MEXICO
Tecnologico de Monterrey
https://tec.mx/en

NEW ZEALAND
Universal College of Learning
http://www.ucol.ac.nz/

NORWAY
Western Norway University of Applied Sciences
https://www.hvl.no/en/

PORTUGAL
ISEC Lisboa
https://www.iseclisboa.pt/

RWANDA
University of Rwanda
https://ur.ac.rw/

SWEDEN
University West
https://www.hv.se/en/

TURKEY
University of Kyrenia
https://kyrenia.edu.tr/?lang=en

TURKMENISTAN
Institute of Telecommunications and Informatics of Turkmenistan
https://itit.edu.tm

Oguz Han Engineering and Technology University (Observer)

Turkmen Agricultural Institute

Turkmen Agricultural University

Turkmen State Architecture and Construction Institute
https://tdbgi.edu.tm/En-project/index_en.html

Turkmen State Institute of Economics and Management

International University for the Humanities and Development
https://iuhd.edu.tm/

Turkmen State University Named After Magtymguly

UAE
New York University Abu Dhabi
https://nyuad.nyu.edu/en/

UNITED KINGDOM
Leeds Trinity University
https://www.leedstrinity.ac.uk/

USA
Georgia College
https://www.gcsu.edu

Lehigh University
https://www1.lehigh.edu/

UZBEKISTAN
Tashkent State University of Economics
http://tsue.uz/?lang=en

Tashkent State University of Law
https://tsul.uz/en

Westminster International University in Tashkent
http://www.wiut.uz/

NEW MEMBER ORGANIZATIONS

ITALY
Mediterranean Universities Union – UNIMED
https://www.uni-med.net/en/

NOT A MEMBER YET?

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Learn more about membership categories, eligibility criteria, and fees.
https://iau-aiu.net/Join-IAU

Contact: Disha Kohli d.kohli@iau-aiu.net

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IN FOCUS

Democratising knowledge: Open Science in a Closed World?

By **Trine Jensen**, Manager, HE & Digital Transformation, Publication and Events

This year UNESCO is preparing a *Recommendation on Open Science* tabled for adoption by its 193 Member States at its General Conference in November 2021. This normative instrument represents a global commitment towards Open Science and contributes to creating a common understanding of what it implies. It is the result of an extensive multistakeholder consultation across the different world regions and it is crafted in the context of a pandemic that has certainly underlined the need for science and international collaboration to develop solutions to the challenges of our time – whether the current health crisis or redressing the unsustainable dimensions and modes of living of contemporary society – to mention but a few.

Within this context, this In Focus section explores the current state of Open Science from the perspective of the universities. Are we at an opportune moment of time to unlock access to science, data and knowledge? What are the current practices around the world and the opportunities to be leveraged? At the same time what are the major barriers, pitfalls and tensions that prevent progress and perpetuate closed structures? These questions are addressed in the 27 articles covering various perspectives and dimensions of Open Science framed under the broader question: ***Democratising knowledge: Open Science in a Closed World?***

As several of the authors state, Open Science is not new, but rather an inherent principle of the foundation of science, a wish to share and discuss discoveries, further build on and develop solutions in a continuous quest for inquiry, discovery and knowledge.

What makes a great difference in the current context is the development of digital technologies that provides new opportunities and tools in terms of how we generate, store, share and disseminate research data and findings. Yet, rethinking the entire ecosystem of science is a complex process as underlined by many of the authors. It is a process that takes time as it requires a culture change in operations and bringing multiple actors together, often with different perspectives and interests within the ecosystem. Several authors point to the current dysfunctional commercial publishing system and research rewards systems that are perpetuating a closed circle of scholarly research accessible to those who can afford it and structured around exclusive rather than inclusive practices.

Despite the challenges, the articles also demonstrates that this movement is finding breeding ground around the world. However, a world already composed of complex asymmetries among and within countries that must be addressed to ensure that the Open Science movement meets its ideals rather than perpetuating inequalities.

Although the road ahead is far from simple to build, and it will be subject to various transformations along the way, the authors propose different solutions, share their experiences and display a common ambition of making access to knowledge a human right as well as recognising knowledge as a common good - underpinned by a shared set of principles for collaboration. This requires at the same time top-down support at the policy level - nationally, regionally and internationally - as well as bottom-up solutions proposed by the researchers, universities and other stakeholders - respecting diversity in knowledge systems, multilingualism and multicultural contexts. Many authors also question latent practices, such as *Publish or Perish* that shape science by adapting to the structures of commercial journals rather than to the actual interest of research and its potential contribution to societal development and human capital.

A warm thank you goes out to all the authors who have contributed to this important discussion. The collection of articles will take you on a tour around the world, and you will notice that many of the opportunities as well as obstacles are quite similar in the different contexts. The pandemic has forced us to rethink many practices and processes. Maybe now is an opportune time to reflect on the power that universities hold to contribute to democratising knowledge and hopefully opening doors in a world that remains too closed.

GLOBAL PERSPECTIVES

AFRICA

ASIA & THE PACIFIC

EUROPE

LATIN AMERICA AND THE CARRIBEAN

NORTH AMERICA

GLOBAL PERSPECTIVES

01 Setting Global Standards for Open Science: the Role of UNESCO and its future Open Science Recommendation

by **Ana Persic**, *Chief of Section a.i., Science Policy and Partnerships, Natural Sciences, UNESCO*

The COVID-19 pandemic has been a stark reminder of the universal need for timely, accessible, verifiable, shared scientific knowledge across disciplines and across borders. This global threat has also sounded alarm bells on the critical need to fulfill the human right to "share in scientific advancement and its benefits".

As the United Nations specialised agency dedicated to Science, UNESCO holds a particular responsibility to ensure that science truly benefits the people and the planet and leaves no one behind. In this context, the Organization recognizes Open Science as an important movement to make science more inclusive, accessible, efficient and transparent.

For UNESCO, Open Science is not only an issue of science being open to the research community, as in "open access" and "open data", but refers to a science open to society. Open Science can contribute to democratising science by increasing scientific collaboration and access to networks, strengthening scientific culture, enhancing the involvement of citizens in research activities and increasing the access to scientific data and information for communities, policy and decision makers. Moreover, with the potential to increase scientific discovery and facilitate adoption of well-adapted technologies for enhancing economic competitiveness, supporting sustainable development and alleviating poverty, Open Science is also increasingly seen as a game changer for achieving the United Nations' Sustainable Development Goals.

Moving forward, it will be imperative for the global community to ensure that Open Science lives up to its potential to fulfill the human right to science and to guarantee that it truly makes a difference for scientists and for society as a whole, particularly in developing countries and for marginalised communities.

As noted by the UNESCO Director General, Ms Audrey Azoulay, the key priority today is "*to ensure that Open Science does not replicate the failures of traditional closed science systems. It is these failures that have led to high levels of mistrust in science, the disconnect between science and society, and the widening of science, technology and innovation gaps between and within countries.*"

> The key priority today is *"to ensure that Open Science does not replicate the failures of traditional closed science systems. It is these failures that have led to high levels of mistrust in science, the disconnect between science and society, and the widening of science, technology and innovation gaps between and within countries."*

Open Science in practice will require adequate resources and capacity and the participation of all scientists and all nations in the global enterprise of science. A global policy framework for Open Science is needed to harmonise Open Science practices and to foster common ethical, legal and technical frameworks for sharing information and data.

In the fragmented scientific and policy environment, a global understanding of the meaning, opportunities and challenges of Open Science is still missing. International norms and standards are urgently needed. Responding to this need, UNESCO has embarked in the process of development of an international standard-setting instrument on Open Science in the form of the UNESCO Recommendation on Open Science [1]. Emanating from the Organization's supreme governing body, recommendations are intended to formulate global principles and norms for the international regulation of any particular question and to influence the development of national laws and practices in accordance with these norms.

The UNESCO Recommendation on Open Science, to be adopted at the UNESCO 41st General Conference, in November 2021 by its 193 Member States, is intended to define shared values and principles for Open Science, as well as a common policy and action framework for Open Science practices.

While capitalising on the opportunities provided by Open Science, it is critical for this first international legal instrument on Open Science to clearly acknowledge and address the possible unintended consequences of Open Science in different scientific and regional settings. That is why a series of global, regional and thematic multistakeholder consultations were conducted allowing the crystallisation of a common definition of Open Science and the identification of key benefits and barriers to Open Science, mindful of regional priorities and specific challenges of scientists and other Open Science actors across the world and in particular in developing countries.

At this stage, the draft text includes a coherent definition of Open Science and a shared set of overarching principles and

values. It also includes key actions, not only for governments, but for all Open Science actors in view of providing the necessary framework for actors across the world to transform and democratise science.

The development of the UNESCO Recommendation has now entered a final stage with UNESCO Member States starting the negotiations on the draft text in May 2021, so that the final text can be submitted for adoption by the UNESCO General Conference in November 2021. The inputs and the voices from the scientific community will be critical during the process to ensure that Open Science fulfills its potential by furthering the fundamental right to science and leaving no one behind.

02 Open science: the moment for universities?

by **Geoffrey Boulton**, *Regius Professor of Geology Emeritus, University of Edinburgh, Scotland and Governing Board member, International Science Council &* **Megha Sud**, *Science Officer, International Science Council*

Open science is not new. It arose when the first scientific journals in the late 17th century openly published truth claims, thereby permitting others to scrutinise and test the logic of arguments and the validity of evidence. It created the bedrock on which the rigour of science rests. Its modern reincarnation was heralded by a ringing declaration from a small gathering of scholars in Budapest in 2002:

> *An old tradition and a new technology have converged to make possible an unprecedented public good. The old tradition is the willingness of scientists and scholars to publish the fruits of their research in scholarly journals without payment, for the sake of inquiry and knowledge. The new technology is the internet. The public good they make possible is the world-wide electronic distribution of the peer-reviewed journal literature and completely free and unrestricted access to it by all scientists, scholars, teachers, students, and other curious minds.*

This principle of open access to publications was subsequently enlarged in reports from major science academies [1] to include access to scientific data, and extended further by three representative bodies of global science (the International Science Council – ISC, the Inter-Academy Partnership – IAP, and The World Academy of Sciences – TWAS) to include broader engagement with society [2]. Together, they form three pillars of the modern open science movement.

There are diverse perspectives of the benefits of open science. Some advocate it as a means of increasing the efficiency and rigour of scientific inquiry; some see access to and integration of diverse, multi-dimensional data streams as means of analysing inherently complex problems; and some see open science as a democratising process. The ISC takes a broad view [3], encompassing all these motivations in its definition of open science as:

> *Science that is open to scrutiny and challenge, and to the knowledge needs and interests of wider publics. Open science makes the record of science, its evolving stock of knowledge, ideas and possibilities accessible to all, irrespective of geography, gender, ethnicity or socio-economic circumstance. It makes the data and evidence of science accessible and re-usable by all, subject to constraints of safety, security and privacy. It is open to engagement with other societal actors in the common pursuit of new knowledge, and to support humanity in achieving sustainable and equitable life on planet Earth.*

The global scientific response to the Covid-19 pandemic has powerfully exemplified the potential of open science, with unprecedented sharing of ideas and data within and beyond the scientific community and across the public-private interface. This agility and openness have been essential in enabling progress from initial genomic sequencing to the development and deployment of effective vaccines in less than a year and guiding national strategies. There has been a spontaneous response from the networks of science in developing websites for sharing information, by specialist groups that contribute evidence and ideas (modelling, behavioural science, economics etc), in rapid peer-review procedures, by accessible communication in the public domain, and in research projects that report at pace on issues such as social impacts, misinformation and vaccine hesitancy. Scientists ignored, if only temporarily, the bibliometric incentives to which they are subject and that work against efficient data sharing, and even commercial publishers temporarily opened their holdings of publicly-funded research results (that they normally privatise as a condition of publication) to permit mining of text and data relevant to the pandemic. In the words of the Director of the US National Institutes of Health: "I have never seen anything like this" …. "the phenomenal effort will change science – and scientists – for ever" [5].

A question arises from the pandemic experience: can the international science community, including the universities, learn from it by making such openness the 'new normal' in addressing the many major challenges that confront global society? The essential power of open science lies in the speed and efficiency by which new ideas are able to permeate through the scientific community and the public realm, enabling them

to be tested, rejected, reformulated and deployed to a wide variety of potential applications. It is important that this perspective is embedded in the Recommendation on Open Science that UNESCO is currently preparing for sign-off by its 193 member states.

> **“The universities themselves, as corporate entities, have, through their various networks, the potential for great influence, both in the scientific contribution to the grand challenges of global policy and as powerful agents in developing robust open science systems. It is our judgement however that their role has been more muted than it should have been, and that the time is ripe for change.”**

But what of the universities? Their academics, research groups and graduates make massive contributions to understanding many of the challenges that confront humanity and to many of the global initiatives designed to tackle them. The universities themselves, as corporate entities, have, through their various networks, the potential for great influence, both in the scientific contribution to the grand challenges of global policy and as powerful agents in developing robust open science systems. It is our judgement however that their role has been more muted than it should have been, and that the time is ripe for change. For example, the International Science Council is launching a campaign within the international scientific community and its stakeholders for reform of two major barriers to open science, the currently dysfunctional scholarly publishing system [4], and, in collaboration with the IAP and the Global Young Academy, science evaluation systems. Both these projects are central to the concerns of universities and involve fundamental issues of equity, inclusion, rigour and efficiency. The ISC will approach the IAU and other university networks to seek their involvement.

03 Open Science and the Impact on Global Universities

by **John Wood**, *Attract Project Office, CERN, Switzerland and former Secretary General of the Association of Commonwealth Universities (ACU), and member of the European Commission’s Open Science Policy Platform.*

Many believe Open Science is a new phenomenon. It is not. For centuries scholars have exchanged information either by letters or publications. There were scientists like Newton who demanded information to be sent to him and wrote rude letters when it did not arrive. Unfortunately, he did not reciprocate. Learned societies such as the Royal Society in London were set up to exchange scholarly information. For the past 20 years I have been involved in the more recent activities regarding Open Science starting with institutional repositories and Open Access. I have survived open opposition from academic publishers and even politicians worried about the tax implications. Even the European Commission 15 years ago was not convinced that Open Science was the way forward but is now openly promoting and supporting it. Why are things different now?

I go back to when I was a research student. To obtain relevant information for my research I had to write in long hand letters to professors in the USA and Japan (PCs and word processors did not exist then) asking for information about their publications. Replies came back months later and, in the case of Japan, the information was in a Japanese paper. I had to have the paper translated at a high cost so by the time I had sent the original letter to getting the information took about a year. My first paper took 18 months to be published from the time of acceptance. The X-ray experiments I did took over 24 hours per run and a few days to interpret. Current X-ray machines can do a million-million such runs and interpret the data in less than a second. Likewise, the exchange of information across the globe is now measured in fractions of seconds with software that translates the information into a form or language I can understand. All this has happened through the power of computers and the internet. Open Science is now a total eco-system with major implications for universities everywhere from teaching to research. Unfortunately, many universities have not responded to this change in culture and still try to continue as if nothing has happened.

The European Commission’s Open Science Policy Platform which produced its final report in 2020 [1] and represented all major stakeholders, looked at the following areas that Universities need to consider in addition to other stakeholders.

- Rewards and Incentives
- Indicators and next generation metrics (so called Altmetrics)
- Future of Scholarly Communications
- Impact of Research Clouds (specifically the European Open Science Cloud funded by the EC)
- Findable, Accessible, Interoperable, Reusable Data (so-called FAIR Data)
- Research IntegritySkills and Education
- Citizen Science

The following comments are made in the report for each of these areas concerning the difficulties universities have in taking full advantage of Open Science.

“Incentive and reward structures for academic careers remains an obstacle for the transition to Open Science. The lack of cost-neutral commercial Open Access publishing venues and

> “Open Science has to lead into Open Innovation so that funders and politicians can see the real benefits of Open Science.”

continued slow progress of Open Access transformation across scholarly publishers, including Gold and Green Open Access is another major problem. The final blocking factor lies in the lack of funding for additional support activities during the transition period (e.g. establishment of Open Science support services, infrastructures) and often a lack of funding for Open Access publishing. A concerted approach uniting the main actors is needed to meet those challenges, as well as a structured overview of the existing institutional and national efforts and their main elements. Other key challenges for universities and research performing organisations include: a. Using responsible research indicators and NextGeneration Metrics to validate a broader range of academic activities; b. Providing conditions conducive for the mainstreaming of FAIR research data management (i.e. supportive infrastructure, scientific protocols and workflows, improved acceptance, adequate funding etc); c. Training researchers and upskilling staff with new profiles (e.g. data stewards, experts in data management & data protection); d. Improving transparency and competition in scholarly publishing to improve knowledge dissemination and the progress towards a European research and innovation system based on excellent and Open Science; e. Mainstreaming Citizen Science and public engagement in the structure and working process of institutions (including training and education at undergraduate level).”

The report has similar comments for other stakeholders including funding organisations, research libraries, policy makers, publishers, physical and E-research infrastructures, researchers, scientific academies, bodies involved in public engagement.

In this short note it is impossible to analyse all the suggestions in the report for future action. I would argue that universities should undertake a thorough benchmarking exercise between themselves first to see what sort of teaching and research environment they wish to move to. It will involve much more of a holistic approach to learning and research. Achieving a culture change in the organisation will be resented by some but without a radical implementation plan both students and institutions will become obsolete. There are a vast number of supporting organisations available to help including the Global Research Data Alliance (currently involving academics in about 140 countries), Codata, GO-FAIR and many more.

And this is not all. Open Science has to lead into Open Innovation so that funders and politicians can see the real benefits of Open Science.

04 Open Access: Promises and Challenges

by **Andreas Corcoran**, *Deputy Secretary General, International Association of Universities (IAU) and* **Jeroen Huisman**, *Professor at the Centre for Higher Education Governance Ghent (CHEGG), Ghent University, Belgium and editor in chief, Higher Education Policy*

Open Access (OA) is an important element of the broader idea of Open Science. It entails a new perspective on ‘easy’ access to outputs of research. Open Science, however, also pertains to smooth access and re-use of research data, performance indicators that measure impact beyond citations and citizens’ involvement in science. In other words, Open Science relates to all aspects of the research process (input, process and outputs), OA primarily deals with the outputs of research.

What is Open Access?

A publication is OA if there are no financial, legal or technical barriers to accessing it. Undeniably, it would be great if more than just a selective group of academic experts were to access, share and reap the benefits of knowledge created through research, and thus make it a real common good. Authors subscribing to OA usually agree in advance to unrestricted reading, downloading, printing, storing, searching, linking and dissemination of their work in line with responsible scholarship, while protecting themselves from plagiarism, misrepresentation, and commercial use by others. Beyond a strong self-interest in wanting to advance their careers, most scholars do not have commercial interests. They write for impact and a desire to advance knowledge. From the authors’ perspective then, OA means greater outreach and exposure and thus perhaps greater impact.

Who pays?

In as much as OA is free for users, it still costs money to produce a peer-reviewed, edited, and formatted article. The challenge is therefore: if it is not the users who are paying for access, who will? What would be an appropriate and fair “business model” that meets the expectations of all stakeholders involved in knowledge production: producers (academics and their employers), those that more broadly defend the needs and wishes of the producers (learned societies, professional bodies), those in need of the knowledge

produced (citizens), and those that take care of the dissemination process (publishers)? A sustainable – one-size-fits-all – solution has yet to be found, but there are many initiatives that try to make OA work. Gold OA means that journals are fully OA yet depend on authors to pay a fee (APC, Article Processing Charge) once the article has been deemed publishable. APCs may range from $ 500 to $ 5000. Most of the more prestigious journals with high impact factors, that have opted for OA, are in this category. Green OA implies that if papers are accepted and published in OA journals, the publisher can set restrictions on OA: e.g. an embargo period before the paper can be shared in a repository and/or the prohibition of the dissemination of the (proof-set) paper as it appeared in the journal. The hybrid model journals adhere to the traditional way of publishing (access through subscription), but allow authors to publish OA, provided they pay the APCs. This means that university libraries and others continue to pay subscriptions for content already financed through APCs. Where traditionally the subscription system funded both, the publish and the read elements of scholarly communication, OA has split them. Recent attempts to overcome this can be seen in the negotiation of Publish-and-Read agreements (PARs) where subscriptions, i.e. access to paywalled content, is also tied to publishing rights.

> “If we wish to continue to uphold the idea that higher education is a public good, we need to reconnect OA with the public sphere and its stakeholders. At the moment, most of scholarly communication is concentrated among very few publishing houses with strong commercial interests.”

The persistence of inequalities

Given the benefits of OA, some public and private funders, especially in the global North are insisting that the research tied to their grants must be accessible to all, and some universities have committed to underwrite the costs associated with publishing in Gold OA for their research staff. Obviously, the underlying motive is a noble one: to stimulate change and make the entire system of academic publishing tilt from paywall-protected subscriptions to freely available knowledge in OA. But this is a slippery slope, as to successfully transform publishing and publishers, a global buy-in and traction is needed, which is not nearly the case today. In fact, the current structures of OA largely based on pay-to-publish may indeed have the opposite effect and exacerbate existing inequalities and epistemic injustice along disciplinary and geo-political lines. Disciplinary, because there is limited funding for APCs in the humanities and social sciences, and geo-politically, as scholarly communication is already skewed towards the global North. Simply put, researchers from the global South will be priced out of publishing in ‘leading’ journals. The vast majority of researchers do not have access to OA resources which obviously causes issues in terms of equity, equality, and fairness. Moreover, this process runs counter to the very idea of a free circulation of knowledge. As individuals will be left disenfranchised, the system also undermines an author’s full freedom in publication matters, which is after all a pillar of academic freedom.

If we wish to continue to uphold the idea that higher education is a public good, we need to reconnect OA with the public sphere and its stakeholders. At the moment, most of scholarly communication is concentrated among very few publishing houses with strong commercial interests. As long as OA is not truly open to all, the very idea of Open Science, too, will be compromised. Rather than debating different colour shades of OA, we must go to the larger question of who in this ecosystem should get to decide what the future of scholarly communication will be. OA must be a transparent and public process, one that embraces new models of knowledge distribution that lets all stakeholders in this ecosystem participate in a more democratic, balanced, and inclusive way.

AFRICA

05 Democratizing Knowledge in a Closed World: An African Perspective

by **Paul Mzee Okanda**, *Director of ICT and Associate Professor, School of Science and Technology &* **Paul Tiyambe Zeleza**, *Vice Chancellor and Professor of the Humanities and Social Sciences, USIU-Africa*

The contemporary world exhibits contradictory tendencies when it comes to knowledge production, dissemination and consumption. Hierarchical and asymmetrical structures and processes in the international division of intellectual labour persist, while at the same time they are undergoing important shifts and changes that open new possibilities.

Among the most powerful forces that reconfigure knowledge production and at the same time frustrate and facilitate its democratisation are globalization and digitalisation. The

intersections between the two are evident in the emergence of powerful academic publishing conglomerates that increasingly control an ever rising share of publications and databases that are increasingly digitalised. Many of these publishing behemoths are located in the Global North.

In response to the commercialization and concentration of knowledge production, and rising costs of scientific publications, the Open Access movement has grown as a powerful countervailing trend. The latter seeks to promote free access to information. The strongest advocates of open access can be found among research funding agencies, who value the impact of the research they fund, universities whose researchers often drive the scientific enterprise in most nations, and librarians who as information professionals are invested in its unfettered access.

The democratisation of knowledge entails both participation in knowledge production and access to the products of knowledge. For Africa, the first implies significantly raising Africa's share in global knowledge production which remains the lowest of any region. Currently, African countries account for less than 2% of global research and development and less than 3% of global scientific publications. Two dimensions are noteworthy in this context. First and foremost, there is need for increased research expenditure by African governments, the private sector, and higher education institutions, in addition to the generation of more resources from philanthropic foundations, international and intergovernmental agencies. Secondly, the need for expansion and support for vibrant academic and research communities is equally critical. Moreover, attention needs to be given to democratise knowledge production in terms of promoting diversity and inclusion of researchers and their teams in terms of gender, discipline, rank, and other social differentiations of the academy.

As a prerequisite for the second dimension, access to knowledge requires expansion and strengthening of the open access movement in Africa. It is encouraging that the movement is gaining traction in many countries among universities and university associations, libraries and library consortia, research networks and organisations, publishers and journal editors that have created open access digital repositories, collaborative platforms, and consultative forums. For their part governments are creating enabling policies, funding models, projects and initiatives. UNESCO's Global Access Portal contains detailed information on the Open Access movement across Africa and in each continent of the world.[1]

The opportunities for knowledge production and access may have been increased by COVID-19, notwithstanding the well-known challenges the pandemic has posed on African economies, health care systems, and educational institutions including universities. In response to the ravages of the COVID-19 pandemic, higher education institutions have had to go through a period of rapid transformation as staff, students and faculty increasingly realise there is an inevitable need

"The COVID-19 pandemic provides the continent with a window of opportunity to address the gap by pivoting on the advances in technology adoption in Africa to democratise knowledge and level the playing field in terms of access to it."

for technological adoption and for Africa to participate and accelerate the Fourth Industrial Revolution.

The use of technology has not only supported teaching and learning and facilitated continuity in daily operational services, it has also highlighted issues of democratisation in terms of knowledge production and access. Educational technology has resulted in rapid advances in the utilisation of mobile devices, augmented and virtual reality, broadband internet and all these advances have had their impact on internationalization of education globally. It has encouraged African academics and researchers to engage and collaborate with each other and with their international counterparts in studying the effects of the pandemic, devising biomedical solutions, and designing policy interventions.

Nevertheless, it has underscored the current divide between the global North and global South, which relegates Africa to a net consumer rather than producer of knowledge and in this paper we argue that the COVID-19 pandemic provides the continent with a window of opportunity to address the gap by pivoting on the advances in technology adoption in Africa to democratise knowledge and level the playing field in terms of access to it. Thus, the project of democratizing knowledge has an international dimension that needs to be examined and transformed.

In the *5th IAU Global Survey Report – Internationalization of Higher Education: An Evolving Landscape, Locally and Globally*, [2] the International Association of Universities noted that regionally, Europe has the highest percentage of HEIs that have an institutional approach to internationalization of research while approximately half of Latin American, the Middle East and Caribbean HEIs have no or very little activity in international research. Evidently, there isn't much to report about Africa's engagement in this space. Yet, we know from other studies including UNESCO's *Science Report: Towards 2030* that Africa has the highest levels of international research dependency. While the world average of publications with foreign authors was 24.9 per cent, for Africa it was 64.6 per cent, compared to 26.1 per cent for Asia, 42.1 per cent for Europe, 38.2 per cent for the Americas and 55.7 per cent for Oceania.[3]

Thus Africa faces a dual challenge of low research productivity and scores on global research indicators and high levels of international epistemic dependency. This reflects and is often reproduced by the world's high rates of skilled labor migration

including academics. Many of the continent's best and brightest people leave the continent in search of "greener pastures" including access to research infrastructures, higher pay and an appreciation for innovation. However, there is hope in the horizon since Africa is posting impressive economic growth rates and has one of the youngest populations in the world.

Africa's prospects in the 21st century will be inextricably linked to the application of disruptive digital technologies to democratise knowledge and "open" a "closed" world coupled with gradual changes in world demography. This is characterised by, on the one hand, an aging population in the global North and China thanks to its one-child policy imposed from 1979 to 2015, and on the other, population explosion in some regions of the global South, principally Africa. Currently, 60% of the African population is below the age of 25. The continent is expected to have, on current trends, 1.70 billion people in 2030 (20% of the world's population), rising to 2.53 billion (26%) in 2050, and 4.5 billion (40%) in 2100. Thus, a focus on open access in developing economies in Africa is critical not just to the future of Africa itself but also to the rest of the world.

In conclusion, technology is making a dramatic impact in Africa and the continent's rate of technology adoption is unprecedented. It is for this reason that we believe that the African perspective to open science and democratisation of knowledge ought to be one in which the continent's economies adopt disruptive technologies in the COVID-19 pandemic era as a cornerstone that helps address the asymmetry between the global North and South.

06 Partaking in the global open science movement: Efforts and challenges in Ethiopian Higher Education

by **Wondwosen Tamrat**, *President, St. Mary's University, Ethiopia*

The advantages of the open science movement in solving the many challenges of Africa, strengthening its continental education and science systems and enhancing economic development are well-recognised. In fact, harnessing digital technologies is considered to be critical for Africa not only in adapting to this new global paradigm but also in making the continent a beneficiary of the evolving fourth Industrial Revolution (4IR).

There are examples of open science initiatives in Africa but in general they are considered to be limited and very weak compared to the rest of the world. Africa's open science landscape has been beset by a variety of challenges that include lack of political commitment, enabling policies and strategies, limited intra- African collaboration, poor data management capacities, lack of human and infrastructural capacity, and lack of research databases and journals.

"Africa's open science landscape has been beset by a variety of challenges that include lack of political commitment, enabling policies and strategies, limited intra- African collaboration, poor data management capacities, lack of human and infrastructural capacity, and lack of research databases and journals."

The last decade has seen a variety of efforts within the Ethiopian higher education sector in terms of promoting the open science movement. This includes efforts directed at open access publishing, the creation of institutional repositories and setting out appropriate policy directions. However, the full realisation of many of these individual initiatives still awaits meaningful interventions at all levels including higher education institutions.

Open access publishing

A national platform using Open Journal Systems (OJS) was launched in 2014 with the objective of improving the visibility and accessibility of Ethiopian journals and delivering free content to users. Known as the Ethiopian Journals Online (EJOL) the project was first launched with six journals. The launching of this project was accompanied by various awareness raising efforts, workshops and training directed at relevant stakeholders who had to be introduced with the basics of open access and open research data, open access publishing and OJS. However, achievements still remain limited. Currently EJOL hosts 34 journals from 10 universities and institutions with 228 issues and 1144 full text articles for download. Apart from the limited number of freely accessible articles, less than half of the available journals in the country make use of the EJOL platform.

Another prominent platform available for Ethiopian journals has been the African Journals Online (AJOL) that provides an online system for accessing African-published, open and subscription-based, peer-reviewed scholarly journals. AJOL currently hosts 526 journals from 32 countries, covering a wide array of academic disciplines. It accommodates 256 Open Access journals, and 180,186 full text articles, of which 120,750 are Open Access. Among the 32 countries that are featured on AJOL, Ethiopia ranks third with its 30 journals, next to Nigeria (222 journals) and South Africa (96), closely followed by Kenya (29) and Ghana (28). Despite this encouraging move, the current level of participation still requires improvement given the fact that the number of journals using the AJOL platform is still below 50% of the available journals in the country. From those participating, only a handful of journals offer full open and free access to their articles.

Institutional Repositories and Research Network

Efforts have also been made in establishing a national repository platform known as National Digital Repository of Ethiopia (NADRE) and encouraging the establishment of open institutional repositories at universities. The nation's flagship, Addis Ababa University, has been at the forefront of such efforts by launching the first institutional open access repository for theses and dissertations in 2007. However, many other universities are still trailing behind. Until 2020 only about 13 public universities were found to have developed institutional repositories, and only four institutional repositories are yet said to be openly available owing to policy and technical issues.

Another useful platform that supports the open science movement in Ethiopia is the Ethiopian Education and Research Network (EthERNet) platform which was first initiated in 2001 as part of a national capacity building program that included projects such as SchoolNet and WoredaNet and aimed at providing connectivity and specialised applications for educational institutes and for local governments. Now under the Ministry of Science and Higher Education (MoSHE), EthERNet provides significant support for public and private higher education institutions to share information and resources, disseminate and make available their outputs.

Policy Frameworks

In June 2019, Ethiopia succeeded in developing a national open access policy issued by MoSHE making it the first country in the continent to have a national, ministerial policy. The policy requires universities run by MoSHE to ensure that all publications resulting from publicly-funded research conducted by staff and students at universities run by MoSHE are deposited in NADRE and are made openly accessible. In addition, the policy identifies 'openness' as one major criteria for assessment and evaluation of research proposals. However, policy development at the levels of institutions is still progressing at snail's pace. Among 51 public universities only four have so far developed their own open access policies.

The 2020 national ICT Policy for HE and TVET institutions also identifies Open Educational Resources (OER) as one of the 13 policy focus areas identified in enhancing teaching learning, research and community service activities in the sector. The policy recognizes the advantages of OER in offering inclusive opportunities and access to a high-quality education in teaching learning and research and encourages the use, creation, and publication of OERs across the sector. It also encourages mechanisms to support the development, acquisition, and adaptation of quality OER in teaching learning and research.

A rare example of similar initiatives at continental level, Ethiopia's recently launched Digital Ethiopia 2025 Plan and its sectoral companion – Digital Skills Country Action Plan 2030 for higher education and technical and vocational education and training institutions are expected to enhance the further growth of the open science movement by creating the necessary environment and policy framework for the growth of the movement in the higher education sector.

Towards addressing inhibitors and challenges

Although the open science movement could be regarded as one major means of enhancing research and research-publishing practices in Africa, much remains to be desired in terms of exploiting its potential. The foregoing depicts that despite the encouraging policy directions and some practical efforts both at national and sectoral levels, the performance of Ethiopian HE as regards the open science movement still leaves room for improvement.

In terms of long-term strategies Ethiopia needs to take advantage by strengthening its initiatives as regards improved political commitment, mainstreaming and promoting open access policies, development of clear strategies, fostering and creating incentive schemes, developing the needed infrastructure and removing barriers to Open Science. With the increasing traction the open science movement is gradually gaining across the continent, higher education institutions should equally hasten to seize new opportunities, create innovative ways of enhancing the movement and supporting the new initiatives the movement has made possible.

ASIA & THE PACIFIC

07 Global Understanding and Local Action for Open Science

by **Eunjung Shin**, *Research fellow and head of Science Diplomacy Policy Office, Science and Technology Policy Institute, Republic of Korea*

Open Science is an ambiguous, yet ambitious term that describes a broad range of practices to open up knowledge creation processes in the digital era. It reflects technology-driven phenomena; at the same time, it stands for a movement made by intentional social actions around the world. Specifically, there are at least three streams of change that move open science forward – the development of digital technology, the quest for new and reliable discovery based on more open and collaborative methods, and open communication and participation to reduce the gap between science and society (Shin and Lee 2020). From a similar perspective, Dai *et al.* (2018) defines open science as

the effort to make research process more open and inclusive for all through the advancement of digitalization. In this sense, open science is meaningful not only to researchers but also to everyone, including teachers, trainees, entrepreneurs, policy-makers, citizens, and even those who have been not a part of scientific communities.

Acknowledging the importance of open science to the whole society, UNESCO devised the first draft of the Recommendation on Open Science last year. The first draft illustrates open science as various movements as well as practices that make science more accessible to society. It calls for open and universal access to scientific knowledge regardless of socio-economic, geo-political, and cultural differences. At the same time, respecting diverse knowledge systems developed in multi-lingual and multi-cultural contexts, it advocates empowering local and societal actors to govern their knowledge systems regarding their own resources and cultural heritages.

UNESCO's recent efforts to draft an international recommendation on open science are meaningful. First of all, the draft generated fruitful dialogue between scientists and societal actors, such as broad multi-stakeholder consultations, global open science partnerships, and open science advisory committee meetings, which contributed to bridging the gap between the two.

Second, the drafting has been accompanied with a series of regional meetings with the recognition of local contingencies even in a process of global rule-setting. Even though the draft recommendation aims to develop common understanding and call on collective actions around the world, it presents a balanced perspective by granting multi-layered local governance schemes and diverse knowledge systems.

> **"As science and society get closer, scientific rigor and integrity, and scientific values become increasingly challenged by societal urgent needs and interests. Tensions between open discovery and intellectual property rights protection increase, as scientific enterprises get involved in commercialisation."**

Nevertheless, the progress made so far with the first draft is a small step, compared to the vast potential of open science that can be achieved from now on. Additional policy discourse and actions are needed to tackle existing challenges and achieve the goals proposed. For example, as science and society get closer, scientific rigor and integrity, and scientific values become increasingly challenged by societal urgent needs and interests. Tensions between open discovery and intellectual property rights protection increase, as scientific enterprises get involved in commercialisation. According to the national survey of Korean researchers (Shin *et al.* 2018), about half of respondents were found to use social media and academic profile services to disseminate their knowledge but the proportion of researchers who participated in more interactive and participatory projects along with regular citizens was fairly small (less than 10 percent). Given the concerns on data privacy, intellectual property, and other unexpected loss or misuse of research data, data sharing remains restricted; only less than a quarter of respondents are found to release their research data online at the time of publication (Shin *et al.* 2018). A great deal remains to be done to develop diverse multi-cultural and multi-lingual knowledge systems that have been not fully appreciated so far, along with the advance in previously established scientific knowledge systems. These challenges of open science need to be further specified and properly dealt with when UNESCO's open science recommendation is approved and implemented afterwards.

As open science itself evolves over time, our solutions to fully utilise the benefits of open science cannot be static. Innovative tools and experiments proposed in diverse contexts are essential to obtain the benefits of open science in our daily lives. It needs to encourage societal actors within and beyond scientific communities to try new open science experiments that meet their specific needs and demands. In particular, a university or any other form of higher education institution can play a key role in promoting open science. Since a university serves as a local knowledge hub as well as a node of global science networks, it is recommended to expand its role and facilitate the two-way exchange of knowledge between global and local communities. A university library located in each region, in addition to a public library, can provide universal access to scientific knowledge across regions. In addition, a university, as a higher education institution, is the right place to nurture local capacities and skills and empower local actors to participate in the process of scientific development.

08 Malaysia's Initiative on Open Science

by **Noorsaadah Abd. Rahman**, *FASc, Deputy Vice-Chancellor's (Research and Innovation), University of Malaya, Malaysia and Chair, Malaysian Open Science Alliance, Malaysia Academy of Sciences*

The pace of scientific discoveries is moving very fast with the advancement of technology. Computers and the internet-of-things are enabling scientists and researchers to generate vast amounts of data annually. These data are reported by the researchers and published in various academic journals. Most publishers would vet the quality of the article via a peer review process before publication. However, important details such as the primary data and materials underlying the article are often

> Important details such as the primary data and materials underlying the article are often not included in the article and almost never reviewed. Making these materials and research data accessible will enable other scientists to evaluate, replicate and verify them more easily.

not included in the article and almost never reviewed. Making these materials and research data accessible will enable other scientists to evaluate, replicate and verify them more easily. It would enable other scientists and researchers to analyse the data in new ways that would speed up scientific endeavours and potentially lead to new discoveries. Hence, Open Science (OS) has been gaining traction with many nations and international bodies advocating the initiative.

Open Science allows research data to be more available and accessible digitally to the inquiring society, from professionals to citizens. Ultimately, it makes it easier for researchers to share and communicate their research findings and output. Malaysia has also embarked on the Open Science movement by launching a Malaysia Open Science Platform (MOSP) project aimed at gathering and consolidating Malaysia's research data in a platform that would enable accessibility and sharing of these research data in accordance with the FAIR principles (Findable, Accessible, Interoperable, Reusable). MOSP represented a strategic transformative initiative to strengthen Malaysia's STI collaborative ecosystem.

MOSP is a two-year pilot project (2019 to 2021), managed by the Academy of Sciences Malaysia. The first phase of the project involves the five Research Universities in Malaysia. As the first step to assess readiness for Open Science, a landscape study on Open Science awareness was conducted. This study gauged the respondents' knowledge, awareness and participation in Open Science activities.

Based on the input obtained from the landscape study, nine recommendations to support a rapid and effective implementation of Open Science in Malaysia are proposed to provide clear directions for future activities in achieving the Open Science goals as described below.

1. ***Provision for National Open Science Policy***
   A national Open Science policy is imperative to streamline data sharing among institutes of higher learning, research institutes, government agencies and non-government organisations in Malaysia.

2. ***Guidelines for Implementing Open Science***
   Best practice guidelines for Open Science should be established to facilitate Open Science and data sharing practices across different institutions and level of stakeholders.

3. ***Empowering Funding Bodies for Open Science***
   For a successful implementation of Open Science and data sharing practices, public funding bodies must be empowered to promote the principles of Open Science and encourage researchers to share their research datasets in an Open Science platform.

4. ***Building a trusted and interoperable research data sharing platform***
   MOSP should play the role to capture and harvest all research metadata from the different institutions in Malaysia and ensure all deposited data are publicly available, preserved and secure, irrespective of levels of sensitivity of created data

5. ***Identifying funding streams to sustain MOSP operation***
   MOSP needs a sustainable plan, including financially, to ensure smooth, long-term operation of the data sharing platform.

6. ***Reform existing academic rewards system to incentivise data sharing practices***
   Universities and research institutes should explicitly support and reward efforts to facilitate the shift in Open Science culture.

7. ***Training for Open Science knowledge and skills, including data stewardship***
   The landscape study highlighted the importance to equip researchers in open science knowledge and skills and the crucial role of libraries in the promulgation of Open Science implementation.

8. ***Effective communication about Open Science and its incentives***
   Raising awareness about Open Science and FAIR principle and highlighting the differences between FAIR data and Open Data is essential.

9. ***More resources for research***
   For Open Science and data sharing practices to be embraced by researchers in Malaysia, it is important to implement strategies that will bring a change in existing data sharing culture among the researchers.

Open Science represents a change in the way communities in research, education and knowledge exchange, create, store, share and deliver the outputs of their activities. For Open Science principles, policies and practices to be fully embraced by all stakeholders, there needs to be a holistic and integrated approach to organize each Open Science initiative with the overall goal of Open Science being fully understood by all parties involved.

Ultimately, Open Science leads to Open Innovation where the fruits of research become more interconnected for rapid translations of R&D discoveries. Through Open Science and Open Innovation, more effective engagements of stakeholders can be achieved, plausibly facilitating effective commercialization of new knowledge to benefit society and the country.

09 A renewed impetus for open research in Australia


by **Ginny Barbour** *Director, Australasian Open Access Strategy Group &* **Fiona Bradley**, *Director Research Services and Corporate (Library), University of New South Wales, Australia*

Australia may be on the cusp of a new era in open research. On 17 March 2021, in her first major speech as Australia's new Chief Scientist, Dr Cathy Foley, stated that: *"Access to information is the great enabler for innovation"*. Australia has a long history of engagement and innovation in open access and open science but two recent crises affecting Australia, the 2019/20 bushfires and the COVID-19 pandemic, have increased interest in open science considerably.

Open initiatives in Australia can be traced back to 2000 with the university repository at the Australian National University (ANU) followed in 2003 by the founding of open publisher ANU press, and the world's first policy on open access (OA) via a university repository at Queensland University of Technology (QUT). Since that time a variety of actors have engaged in the open science debate, ranging from government initiatives to support repositories at all Australian universities in the mid-2000s, through to federally funded infrastructure to make data FAIR (Findable, Accessible, Interoperable, Reusable) via the Australian Research Data Commons. In the past few years advocacy has accelerated with concerted efforts via the Australasian Open Access Strategy Group (AOASG) and the Council of Australian University Librarians. Despite these efforts, in 2018 just 32% of Australian research reported for the national Excellence in Research Australia exercise was open. While the proportion of OA has undoubtedly increased year on year Australia lags behind comparable countries based on research output such as the Netherlands or the UK and lags further when compared with low and middle income countries. But why? To a large extent this low proportion reflects a lack of coordinated national leadership on open science and OA.

Policies on OA to publications such as those in place from 2013 from Australia's two primary government research funders are clearly not enough on their own to drive change without being backed by rigorous compliance mechanisms, infrastructure, and funding. What is needed now is a holistic approach that includes infrastructure support for the entire research dissemination system – ensuring that innovations and services at institutional or national level, be it book or journal publishing, institutional repository content, or datasets are interoperable and sustainable. Finally, and critically, research practices from the ground up and incentives need to go beyond research excellence to foster a change in culture.

The benefits of an open science approach both for how research is done and how it is communicated to policymakers, industry, and the public are clear, as Dr Foley's recent comments show. The COVID-19 pandemic provided impetus for discussions around OA and open science in Australia and internationally. In 2020 Australia's then Chief Scientist, Dr Alan Finkel was one of the group of high level leaders calling for open sharing of research during the pandemic. Coming on the back of ongoing work such as the draft open science recommendations from UNESCO, and the declaration in support of open science from Asia-Pacific Economic Cooperation (APEC), it seems that the role of open science in addressing international emergencies is now fully recognised by a growing number of intergovernmental agencies and governments. But while emergencies are often a catalyst, they cannot be the sole rationale and time when research is made openly available to everyone.

There is now potential for a national approach to open science in Australia. However, Australian research and funding has some specific characteristics that mean that approaches in Europe or North America are not always easy to adapt. Furthermore, respecting Indigenous knowledge practices are essential. Protocols and practices for culturally appropriate publishing and data sharing are not yet widely adopted by publishers and infrastructure, although there is work in this area such as the CARE principles for Indigenous Data Governance and a thirst for engagement as shown at a 2020 OA week panel hosted by Australasian Open Access Strategy Group (AOASG). There is also more work to do to ensure that research on emerging, or regionally specific issues such as certain tropical diseases, Australian legal research, or work aimed at medical practitioners in regional and remote parts of the country is available and discoverable.

> **"Universities must take the role as key drivers as well as final beneficiaries of more open science – since practices that drive open science will also support better reproducibility, robust translation and public trust in their research."**

So how do we take open science forward at national and international levels? We recognise and welcome that change comes from many directions – from national governments, institutions, funders, intergovernmental agencies such as UNESCO but also individual researchers and participants in research themselves. Ultimately, though, universities must take the role as key drivers as well as final beneficiaries of more open science – since practices that drive open science will also

support better reproducibility, robust translation and public trust in their research.

10 Open Science in a Developing Country's Context

by **Mercedes T. Rodrigo**, *Professor, Ateneo de Manila University, The Philippines*

This issue of *IAU Horizons* on Open Science asks the questions: *Will the process of discovery and development of solutions to complex problems be accelerated if scientific results and data were shared more openly? What opportunities and challenges can one expect moving forward? What levels of action or systemic changes are required if Open Science is to move from ideal to action within universities?*

As a researcher from a developing country, I consider myself to be part of the Open Science ecosystem. I access journal articles and conference papers on an almost daily basis. I have the good fortune of engaging with international collaborators who have been generous with their research methods, instruments, and data. My collaborators and I have leveraged on our respective strengths to produce research outputs that we have, in turn, shared with interested stakeholders following Open Science principles.

As a part of this ecosystem, I see how Open Science can jumpstart research and innovation in under-resourced contexts. I see how it can boost productivity and give researchers from developing countries voices and representation in international research communities. I am grateful for these opportunities. I recognise that my own research practice would be severely impoverished without Open Science.

However, if the goals of Open Science include the scaling of innovations and impact on complex problems then there are challenges that still have to be overcome. Among them are partnership asymmetry, limited linkages between universities and industry, and insufficient infrastructure for deployment.

Partnership asymmetry. Several years ago, my team in the Philippines and a partner from a developed nation succeeded in acquiring a grant for an international collaboration. The grant funding came from two agencies: An international agency provided the funds for the partner while a Philippine agency provided counterpart funding for the Philippine team. The overall amount of the grant was not large by international standards, but it was huge from the Philippine perspective. This asymmetry had a real impact on the work of the combined team. Our partners could only spend about five hours per week on the project

"I see how Open Science can jumpstart research and innovation in under-resourced contexts. I see how it can boost productivity and give researchers from developing countries voices and representation in international research communities."

whereas the Philippine team had several full-time employees on task. The Philippine team was expected to produce several publications from the grant. The partners were under no such pressure. Because of these asymmetries, the two teams worked in parallel instead of collaboratively, focusing on the expectations of their respective funders. The collaboration ended as soon as the grant ran its course and there was no follow up.

Limited linkages between universities and industry. For university innovations to scale as commercial products, there needs to be a strong link between industry and universities. Indeed, in countries such as Japan, a pipeline exists between university laboratories and corporations. Laboratories function almost like research and development arms of corporate partners. In a developing country like the Philippines, though, technology corporations tend to be marketing arms focused on selling products rather than developing them. When corporations look to universities, they are usually in search of marketing manpower or technology support personnel. They seldom look for engineers who can develop new products or services.

Insufficient infrastructure for deployment. My own field of specialisation is the use of technology in education. One of the lessons I have learned is that technology has the potential to augment school resources and make high-quality, state-of-the-art educational materials available to underserved students. Use of these materials, some of which make use of the latest in artificial intelligence research, has been shown to improve learning outcomes as well as the learning experiences. However, access to these materials is inhibited by the lack or absence of technology at the grassroots level. Government-run schools often have an insufficient number of computers or have limited to no Internet access. The schools that have the infrastructure to take advantage of educational innovations are those that cater to the well-to-do. The example I gave pertains to my own field of specialisation but the theme is universal: that those who are in most need of these innovations are the one least poised to take advantage of them.

Open Science is a necessary part of the larger goal of developing human capital. For those of us who work in the developing world, Open Science removes some of the impediments to scientific progress. However, the extent to which the developing world can make use of Open Science is restricted by, among other factors such as those discussed above. We continue to work to address these factors in order to close the loop from ideal to action.

11 University field stations – Site location-centered complex open datasets are essential for addressing environmental and public health challenges



by **Johannes (Jean) MH Knops**, *Professor & Head of Department, Health and Environmental Sciences:* **Yu Ding**, *Academic Administrator & Research Associate, Health and Environmental Sciences; &* **Xin Jiang**, *Scholarly Communication Librarian, all at Xi'an Jiaotong-Liverpool University, China*

Today the world faces vast air, water, and soil pollution; challenges from rapid urbanization and agricultural restructuring; emerging diseases; climate change; and changing lifestyles. These urban and rural environmental changes do not stay in their lane. When they interact, they can cause further local and global environmental and health challenges.

China is undergoing **rapid development** and **urbanisation**, which brings large changes in biodiversity, environmental quality, people's lifestyles, and health. Rural areas have a declining, older population because of migration, large structural land use changes and, increasingly, agricultural intensification. While an interdisciplinary approach is needed to tackle these emerging challenges, many university and government research efforts narrowly focus on specific areas such as economics, ecology, environmental science, sociology, public health, urban planning, and architecture. Different disciplines speak different languages; their data is incompatible and housed in different agencies. Collaborative research needs a common ground that allows researchers to communicate and collaborate. We believe a **site location-based approach** is needed to address these challenges that can integrate multiple, diverse research areas to develop a better understanding and ability to manage the intended and unintended consequences of these phenomena.

While site-based research can be in the form of field stations, we believe the concept of "site" needs to be considered in a broad sense – beyond the bounds of a local area, such as including entire cities, watersheds, valleys, or provinces. The key to site-based research is determining the footprint for which relevant data can be integrated. Once a footprint is identified, we are better able to find solutions to its urbanisation, environmental, and health challenges. Sites, such as field stations, both rural and urban, offer the opportunity to examine **linkages** between complex urban and rural changes in a specific area or wider region. Such an outdoor laboratory can stimulate research in a broad range of environmental topics associated with human-nature interactions, including ecology, social sciences, and cultural studies. The ability to combine different datasets is essential to this goal; datasets are vastly different – not only disciplinary, but also in format, spatial, and temporal structure. This requires **complex data analysis and modeling**. Recent developments in AI and machine learning may provide pathways to examine complex datasets. The development of novel computer-based analysis can also benefit from site location-derived datasets, as new analysis techniques not only depend on technology, but also – and even more importantly – having access to relevant, complex datasets that can benefit from new ways of analysing and visualizing.

However, the key first step to be successful is **data**, which is currently limited. Datasets are collected, archived, and used by quite different agencies, companies, and individual researchers, each of which has little to gain from making data openly available. Nonetheless, **open data** is essential to solving major environmental and public health challenges. Data should be considered as important as the scientific finding it leads to. To create greater value from data, a collaborative effort of all stakeholders is required.

> "Open data infrastructures need to facilitate heterogeneous data from different data holders and ensure data sustainability, authority, transparency, and openness. Data collected by university site-based field stations can complement government data, and researchers from universities have the expertise to process and analyse data and to translate data into smart decisions that help solve local and global challenges."

We argue that universities can be the central player transitioning to **open data** by creating a site-based multi-disciplinary data infrastructure. Universities have openness and transparency at their core, value different research areas and approaches, and have long supported site-based research via field stations. Partnerships between governments, universities and industry must be forged by forming data-sharing alliances essential to moving towards an **open data era**. Such alliances need to formulate procedures for obtaining, archiving, and sharing data within alliances that safeguard the benefit to stakeholders. We need a solid policy framework that facilitates the development of **open accessible datasets**, provides credits and incentives, and delivers ways to manage sensitive data and

safeguard intellectual property rights. Financial investment from governments and funders is needed to support the development and improvement of infrastructures and technologies for data curation, sharing, and governance. These open data infrastructures need to facilitate heterogeneous data from different data holders and ensure data sustainability, authority, transparency, and openness. Data collected by university site-based field stations can complement government data, and researchers from universities have the expertise to process and analyse data and to translate data into smart decisions that help solve local and global challenges.

It is essential for universities to take the lead now in solving the challenge of how to **expand the field station participants**; **develop the infrastructure required** for **assembling large, complex, open datasets; develop novel complex data analysis methods;** and **train the next generation of researchers** to use these data and tools to solve global and local environmental, public health and other urbanization challenges.

12 Democratising Knowledge: Open Science in a Closed World

by **Ranbir Singh**, *Former Vice Chancellor, NALSAR University of Law, Hyderabad & National Law University Delhi, India, IAU Board Member*

Access to scientific literature is integral for the progress of science. The dominant medium of science communication today is publications through journal articles and monographs. While the journals were earlier controlled by the science community, today they are controlled by a few oligopolistic commercial publishers. According to a recent study, almost 55% of the world's scientific literature is published by just three publishers.[1] The consequences of this oligopolistic market are also obvious. Subscription rates for most journals have increased substantially over the years and the profit margins of some publishers like Elsevier are reported to be around 36%, which is far higher than profit margins in most other industries.[2] Even relatively well funded universities like Harvard University have indicated that they can no longer afford the price hikes imposed by publishers and one can imagine the extent of this crisis in the global South.[3]

It is also important to notice that most of the "high impact" journals, which have disproportionate influence on scientific debates/approaches in most disciplines, hardly have any editorial board representation from the global south.[4] This not just indicates under-representation of scientists from the global south in the global science communication process,

> "While the journals were earlier controlled by the science community, today they are controlled by a few oligopolistic commercial publishers."

but also indicates the broader issue of under-representation of scientific information produced from the global south in the global science discourse.

If access to knowledge and dissemination of knowledge produced in the global south are at the mercy of a handful of publishers, it is nothing but colonisation of knowledge. Unfortunately, most institutions in the global south also act as silent perpetrators of this colonisation through endorsement of metrics such as impact factor of a journal, while assessing scholarship.

Open Access Movement

One of the major responses of the global science community to the access crisis was open access. Open access literature is generally defined as any literature which is *digital, online, free of charge, and free of most copyright and licensing restrictions*.[5] As digital technologies provided enormous opportunities for removing the access barriers, researchers have tried to address the access crisis by contemplating open access to scholarly literature with the help of digital technologies.

While internet and digital communication technologies have provided significant opportunities to authors to claim back from publishers their autonomy and enable better dissemination of knowledge resources, developments in the recent years indicate that the publishers are also taking diverse steps to capture the open access movement. For example, recognising the inevitable shift among the research community to open access, most publishers are also now embracing open access. However, publishers are adopting open access in their own terms, solely with the aim of further increasing their profit margins and in effect, perpetuating the inequities in the current scholarly communication approaches. The most important among them is the strong push from the side of publishers for Article Processing Charges (APC) based gold open access models. The recent open access announcement from *Nature* that it will charge up to US$11,390 to make a paper open access in *Nature* is an example [6]. For many researchers, the publication charge suggested by *Nature* is more than their annual incomes. While the open access movement was expected to reduce the digital divide, this will only result in further exacerbating the divide between the global south and the global north, in terms of participation in science.

Democratising Knowledge

To address the challenge of knowledge colonisation in a holistic manner and to democratise knowledge production, we need to embrace the open science movement. Unlike the open access

movement which focused only on the access question, the open science movement looks at the broader challenges [7]. Three major paths in which it attempts to democratise knowledge are providing better access to knowledge resources like scholarly literature and data; promoting collaborative, equitable and inclusive approaches in research production; and supporting public participation in knowledge creation [8]. All these require considerable efforts from the part of both researchers as well as institutions. Only through such holistic approaches can we decolonise knowledge production and ensure better science by the people, and for the people.

13 Student's access to technology devices is as vital as the democratization of knowledge

by **Nancy Eunice Alas Moreno,** *Research Associate at the Graduate School of Law of Doshisha University, Japan*

There is no doubt that the sudden appearance of COVID-19 worldwide changed, for bad or good, how students and professors engage and participate in the learning process. Before 2020, it was almost taken for granted the possibility of moving freely and physically attend seminars, conferences, university courses, and other educative activities. But since March of that year (or even earlier in some countries), that possibility has been restricted and even compared as a reckless or suicidal act. In the light of that, the education community has gradually started to migrate through the internet from "physical" to "virtual" classrooms in the World Wide Web (WWW)- a new city located in a world made of bytes. For some, this process has not been traumatic at all, but for others, it has implied the possibility of not being able to graduate from university or even not being able to continue studying anymore. The differences in the facility and speed in which this migration process occurs are pronounced between developed and developing countries. Some insights are provided below on how developed and developing countries have tried to adjust to the "new normal" and how student's access to technological tools, like a computer, smartphone, and internet, is as vital as promoting Open Knowledge for democratising it.

It could be argued that to some degree, in developed countries, the current context accelerated progress towards more Open Science initiatives. For example, universities located in those countries had had the opportunity to migrate faster and efficiently to the WWW, starting to provide classes online, and professors and students have been making efforts to adapt to this new teaching-learning style and environment. Further, well-renowned universities around the world had been promoting free webinars on social networking sites. For those who have access to technological tools, this migration has opened a new world of knowledge in many ways. On the other hand, in developing countries, the above-mentioned migration has not been easier. Profound differences between students of low-income families and medium-high-income families regarding access to university and/or technological tools could be identified. Not all students from low-income families can go to university, and if they are able to, the above mentioned gradual digital migration has started to take its toll on them due to lack of laptops and poor internet connection. For example, in El Salvador, eighteen percent of students who assist to the National University of El Salvador dropped out in 2020 because they did not have the technological tools to study.[1] Moreover, internet connectivity is not strong in the countryside. In the same country, a young man became famous because he had to climb a tree every day to receive an internet signal on his smartphone to join online classes.[2] If the pre-pandemic world was already closed to some students, this new world made of bytes has become a more closed world to them.

> "If the pre-pandemic world was already closed to some students, this new world made of bytes has become a more closed world to them."

The Universal Declaration of Human Rights establishes in its Article 26 that everyone has the right to education. Further, in 2016, the United Nations General Assembly passed a non-binding Resolution that declared internet access as a human right. To ensure both rights, governments have to implement rules and policies that promote Open Knowledge on their territories for allowing students to access learning. For example, governments can design tax breaks and subsidies for investors, entrepreneurs, and companies that donate technological equipment to public universities for the student's benefit. Those fiscal measures can also be made available to telecommunication companies that allow students from low-income families to connect to the internet to continue studying.

Improving Open Knowledge in society is not restricted only to making information more accessible in the WWW. The above is only helpful to those who have the technological tools to access it, but it leaves behind those who do not have access to these resources. Giving students the technological tools for online education is also as crucial as opening the knowledge's gates. We should be vigilant that unequal access to technological tools for connecting to the new cyber world does not present obstacles to people's development and does not become a "privilege" that only a few can enjoy. Education, access to the WWW and Open Knowledge should not become a luxury.

14 Improving inclusivity of Massive Open Online Courses (MOOCs) through localisation and customisation



By **Bingran Zeng**, *Chief a.i., Knowledge Production and Communications Centre, UNESCO-ICHEI,* **Siyuan Feng**, *Co-Director, IIOE Management Centre, UNESCO-ICHEI and* **Lim Cher Ping**, *Chief Expert of IIOE, UNESCO-ICHEI, China and Associate Dean of International Engagement, Faculty of Education and Human Development, Chair Professor of Learning Technologies and Innovation at the Education University of Hong Kong*

The COVID-19 pandemic has not only impacted more than 220 million higher education students due to global institutional closures but has also emphasised the role of online and distance education in delivering quality and inclusive higher education [1]. Massive Open Online Courses (MOOCs) can provide such opportunities for educators, and institutional leaders and national policymakers have invested in the development and implementation of MOOCs. Despite such effort, MOOCs promise for inclusive and quality higher education is often not well taken up by higher education institutions (HEIs), especially those in developing countries. Although this concept of 'Open Science' resources may improve inclusivity, institutions in developing countries often face challenges in integrating existing MOOCs into their programmes or courses to support students' learning needs during the pandemic and beyond.

Issues and Challenges

While most existing MOOCs are designed to offer quality learning at scale, they are primarily based on existing courses that the HEIs offer for their student population -- most of which may represent world-class institutions from countries with robust and well-resourced higher education systems. As a result, the existing MOOCs may not meet the teaching and learning needs of teachers and students in many developing countries. The language barrier, differences in learning contexts, cost barriers, and limited computer self-efficacy are a few examples of the barriers students in developing countries face when adopting MOOCs in their learning [2] [3]. Therefore, the inclusivity of MOOCs in the context of 'Open Science' is critical to address these challenges – and the inclusivity of MOOCs could be achieved through customisation and localisation of course design.

> "The language barrier, differences in learning contexts, cost barriers, and limited computer self-efficacy are a few examples of the barriers students in developing countries face when adopting MOOCs in their learning."

From Supply-Driven to Demand-Driven

While approximately 40% of MOOC learners come from non-OECD countries, the proportion of MOOC developers from those countries is far lower [4]. Such an imbalance may lead to unmet demand for quality MOOCs to cultivate economically-in-demand competencies for teachers and students alike, especially in developing countries. We also know that more than 30% of MOOC learners identify as current or former teachers [5], making a strong case for the potential to leverage customised and localised MOOCs for professional teacher development. Tailor-designed MOOCs for teacher professional development could be powerful tools to enhance teachers' competencies, support the digital transformation of education, improve the relevance of curriculum, among other strategies to ensure quality and inclusive higher education.

International Institute of Online Education (IIOE): Localising and Customising MOOCs for Development

The International Institute of Online Education (IIOE) is an open-access online education platform jointly initiated by the International Centre for Higher Education Innovation under the auspices of UNESCO (UNESCO-ICHEI) in December 2019, together with 15 HEIs in Asia-Pacific and Africa, and nine enterprise partners. IIOE offers customised and localised online courses and training programmes for higher education teachers and administrators to develop their competencies for Information and Communication Technology (ICT) applications in teaching and learning.

A critical step for providing ***localised*** and ***customised*** open educational resources is to understand the local demand. In the case of IIOE, systematic needs and situation analysis was first carried out before designing and developing the educational resources. A survey to the IIOE partner institutions identified that the lack of digital competencies was a common issue faced by HEIs in developing countries. The survey results have informed and refined the direction of IIOE's focus on ICT-related professional development and capacity building for teachers and institutions, respectively. Moreover, a series of online self-assessment tools for both HEIs and teachers provide guidance for quality enhancement, blended teaching, and ICT-related teaching competencies.

The ultimate goal of IIOE's efforts in developing open educational resources is to achieve localised reproduction

and sharing of good practices. In this respect, IIOE provides channels for HEIs to access and localise open educational resources to improve inclusivity. Despite the mixed review on whether MOOCs is the answer to democratising knowledge in a closed world, MOOCs and online education, in general, will play an increasingly pivotal role in the post-pandemic higher education system. The customisation and localisation of MOOCs and related open educational resources will become critical strategies to enable quality and inclusive higher education.

EUROPE

15 Co-creating Open Science

by **Anja Smit**, *University Librarian, Utrecht University, The Netherlands*

'*Open*' is the key word on the cover of Utrecht University's Strategy for 2025. Open is a recurring theme throughout the Strategic Plan and interpreted into different areas of the university's functions. One of the areas is of course openness of research: Open Science. In our university, the Open Science Programme (2018-2025) currently addresses the topics of open access to publications, FAIR data, public engagement and last but certainly not least: development of new rewards & incentives: *"The transition to Open Science, in which we will prioritise both broader recognition and appreciation of our employees and the impact of education and research."* And we are not alone in this: the Dutch universities have all committed to spearhead these topics under the umbrella of an Open Science Strategy, supported by our national government.

The fact that Open Science is embedded in the research strategies in some countries, shows the success of many years of advocacy of voices within the research community, together with academic libraries. It is a complex transformation that in some cases has to change firmly rooted scholarly traditions. It cannot succeed without the research community acting itself, and at the same time, more is needed. Only when on the agenda of policy makers, politicians and governments, Open Science practices will be supported by the necessary policies, support, funding, laws and infrastructure.

In many cases, this kind of infrastructures and support is by nature local, even if organized within large areas like Europe, large countries or even continents. But local Open Science is a 'contradictio in terminis'. Only worldwide sharing of research results makes sense because, in this digital world, the research community is global, as are many scientific challenges. The COVID-19 pandemic serves as a very clear global use case

"The fact that Open Science is embedded in the research strategies in some countries, shows the success of many years of advocacy of voices within the research community, together with academic libraries. It is a complex transformation that in some cases has to change firmly rooted scholarly traditions."

for the need for unfettered access to scientific and scholarly information for the research community and beyond. Many researchers share their findings about the pandemic openly, for example supported by libraries and publishers. But of course, for concrete solutions such as vaccines, large pharmaceutical companies are crucial.

International bodies in the public domain are crucial to help bring Open Science to all corners of the world. Issuing statements, furthering collaboration and where possible, funding activities to accelerate Open Science is what lies within their reach and it is certainly important. But what is the role of the corporate world? Because private companies develop products based on scientific findings and traditionally play a role in publishing scholarly articles and books, it is important to think about both the public and private domain when it comes to the transformation to Open Science. Scientific Research is not contained within the public domain, nor is does it end at the doors of the universities.

At this point in time, there is no aligned vision around the world when it comes to the future of publishing. We all agree that publishing scientific results will at least stay important to document IP and receiving credit and that new formats of scholarly publications will arise. Most certainly everyone agrees that publishing research data is at least as important as publishing journal articles and books. But there are many views on what role the publishers will play or what we want them to play. National policies differ broadly regarding investing in open access via publishers (hybrid or gold), furthering publishing via repositories (green) or trying our new publishing platforms with different service levels and business models. Some believe it is best if universities and/or libraries will take on the role of publishers for 'their' researchers, others seek to collaborate with publishers, and sometimes different routes are explored at the same time.

Again, the most important actor is the research community itself. Organized in disciplines, researchers are able to drive and produce change of the scholarly communication system if they really want. However, their decisions are heavily influenced by requirements of research funders and changing reward systems of, for example universities. Therefore, the transition to requirements and rewarding systems that acknowledge FAIR or open access publishing, is crucial. We are currently experiencing this in Europe with open access requirements by cOAlitionS-

members and hopefully experience the impact of new, Open Science rewarding models within the Dutch universities in the next few years.

But this is not enough. Both the researcher community, scholarly societies and publishers will have to implement new and practical open science solutions globally for the transformation to Open Science to succeed. For example, large publishers do offer open access publishing, but mostly prepaid if tied to affordable contracts including reading rights. The next step is to break away, even if slowly, from this contract model with publishers to make room for new publishing solutions.

Maybe one step forward, two steps back, but we can only go the road to Open Science together.

16 The momentum of Open Science?

by **Delfim Leão**, *Vice-rector for Culture and Open Science, Coimbra University, Portugal and Member of the UNESCO Open Science Advisory Committee*

1. The paradigm of Alexandria and the quest for knowledge

Founded by Alexander the Great in 331 BC, the city of Alexandria was enriched under the Ptolemies with the construction of two of the most charismatic monuments of antiquity: the Museum (or 'temple of the Muses', a veritable research centre) and the Library. Both the Museum and the Library represent the cosmopolitanism of this great city and the golden age of science that it stimulated, in a culturally exuberant context such as that of ancient Egypt, but the Library would remain for posterity as the symbol par excellence of knowledge and scientific seriousness. To be included and indexed in the Library's collections was equivalent to a seal of quality: the Library of Alexandria did not collect everything that was produced in antiquity, but what it filtered to be preserved and catalogued would define the canon of what would be studied and admired in the future. It also set a model replicated, on a varied scale, by thousands of libraries which have since become a particularly successful means of preserving human memory and an essential basis for all research.

2. The pandemic and the temporary 'end' of physical libraries

Never, in the recent past, have libraries and knowledge centres faced such a huge and cross-cutting collective challenge. In effect, access to information by physical means has suffered severe limitations, greatly affecting the work of millions of people all over the world, including students, teachers and researchers. The situation has only not become truly dramatic because it has been possible to make use of databases, digital libraries and open resources, and many libraries have also developed remarkable programmes of partial digitisation of collections for distance support to the community of readers and researchers. But the factor that has most marked this recent phase of the quest for knowledge is the unprecedented availability of information in open access, whether in the form of publications or as research data, essential for the scientific community to contribute to studying and overcoming the pandemic crisis. Indeed, the time needed to find a vaccine and effective treatments has never been made faster by the sharing and the ability to critically analyse massive amounts of data. This reality may present us with a dilemma: disinvesting in traditional physical libraries and their central function in preserving and promoting knowledge would be a mistake with tragic consequences, especially in the areas of Culture and Social Sciences and Humanities. However, to ignore the need to articulate the traditional action of libraries with databases and open resources would be a basic programmatic failure. Success will be on the side of those who are quickest to implement a harmonious junction of printed, analogue and digital resources, stimulating the future sustainability of open access, from knowledge production to publication and dissemination.

“Success will be on the side of those who are quickest to implement a harmonious junction of printed, analogue and digital resources, stimulating the future sustainability of open access, from knowledge production to publication and dissemination.”

3. The open science momentum: a new golden age of science?

Despite being traumatic on many levels, the experience of the pandemic has nevertheless provided a fertile field for testing the human capacity to collaborate in the search for a common solution. For that reason, it has also been a real momentum for open science, a still emerging concept that is much broader than the more commonly known open access to publications, which was initially its driving force. Indeed, to give just a few examples, open science involves much greater transparency throughout the whole scientific research and innovation process: access to open data ('as open as possible, as closed as necessary'), marked by FAIR ('Findable, Accessible, Interoperable, Reusable') principles; citizen science, which presupposes the involvement of citizens and society in the use, scrutiny and production of science; institutional and scientific funding and evaluation mechanisms, for their ability to reward the best practices, promoting the 'pleasure' of researching and publishing over the 'pressure' of doing so. There is still a long way to go to make these concepts a widely shared reality, but academic institutions have a central obligation in the process, as do policy makers and society at large. Even though, the reasons for strengthening the commitment to open science have reached a point of no return, which clearly projects into the future: the ways of managing, generating, transmitting

and preserving knowledge will never be the same again. The very confidence in science as a 'common good' – owned by all, produced by all and openly made available to all – will depend on them, and it is imperative to stimulate and defend it in all its embracing line of value. But this 'common good' is still far from being taken for granted: the same momentum that confirms the beneficial centrality of open science also illustrates the major challenges that its full affirmation still faces in a world that is yet too closed.

17 Transition to open science culture will take longer than overcoming the current health crisis

by **Katrine Krogh Andersen**, *Dean, Faculty of SCIENCE, University of Copenhagen, Denmark*

Winston Churchill famously said "Never waste a good crisis" and that is exactly what Copenhagen University and its Faculty of Science are doing as they promote open science in research and education. This effort will persist beyond overcoming the current world health crisis, as changing to an open science culture is quintessentially a change in culture, not only at universities but also in society, and those changes take time. Much like overcoming the COVID crisis, other crises like the climate crisis, biodiversity loss and rampant pollution can only be tackled through collaboration in global networks.

These COVID times certainly have created more awareness about the importance of sharing scientific information among researchers, informing and explaining to citizens about health risks and infection-mitigation measures and involving people and organisations in finding creative solutions to keep society running. For example, the early publication of the SARS-CoV2 virus sequence by Chinese researchers fast-tracked the development of infection-screening tests for this virus and the development of vaccines. There is pressure on pharmaceutical companies to share knowledge of vaccines against COVID-19 and their production in order to boost vaccine production. Finally, educators have stepped up their digital game and now routinely record and publish their lectures on the internet.

However, more awareness about the benefits of open science and associated actions do not immediately make our culture an open science culture. This simply takes time. Especially because an open science culture consists of a complex matrix involving many ingredients and many actors, each with their own values, rules and interests that may sometimes be in conflict with each other. The ingredients of an open science culture range from open access publications, open data,

"More awareness about the benefits of open science and associated actions do not immediately make our culture an open science culture. This simply takes time. Especially because an open science culture consists of a complex matrix involving many ingredients and many actors, each with their own values, rules and interests that may sometimes be in conflict with each other."

citizen science, open educational resources, to scientific social networks, open peer review and open innovation. The actors are individual researchers with their individual values, universities and companies with their (commercial) policies and governments with their legislation, economic and security interests.

Signs of a more permanent open science culture are already emerging. Funders of project grants, like the European Commission and the Independent Research Fund Denmark, require researchers who received a grant from them to make publications and data accessible for the broader public. In addition, Elsevier and the Royal Danish Library National License consortium of universities have entered an agreement that offers Danish researchers the opportunity to publish their research in open access in Elsevier journals without having to pay a publication fee. For researchers in some natural sciences and engineering like genetics, astronomy and computer sciences, it is already second nature to share data and algorithms in databases and open source community databases. Citizen science is being used in biology, climatology and hydrology. As a prominent example, the collections of national history and science museums in Denmark will now be digitalised and made accessible for everyone in the world. High performance computing and data storing facilities are set up and being shared among European universities. Finally, national and local policies on (elements of) open science are actively being adopted.

There is nevertheless a long way to go before all actors embrace the different elements of an open science culture. To achieve this goal, our university and other organisations will need to overcome a multitude of additional hurdles like limited awareness of benefits of open science, concerns over increased costs of IT-infrastructure and specialised staff, and absence of incentives for researcher careers to adopt an open science attitude. Lastly, the herculean task to continuously remind ourselves of the need to transition into a truly open science research culture will be there for many years to come.

I have no doubt that a transition into an open science culture will take longer than overcoming the current health crisis, but at least the health crisis has definitely expedited this change.

18 Research Data and Open Science

by **Algis Krupavičius**, *Professor, Mykolas Romeris University, Lithuania*

What will be the *new normal* and the future of research and higher education beyond the pandemic? These are perhaps the most frequently asked questions nowadays. A division line here is not only between before the pandemic and after the pandemic, it is equally important what is happening during the pandemic.

What is clear is that the COVID-19 pandemic has generated a huge increase in demand for research data. What we observe now is a sudden demand of multiple and different data, i.e., public health data to understand pandemic developments in a single country and in many countries, public opinion and survey data about its effects on social relations in national and cross-national perspective, economic data on outcomes of COVID-19 on global markets and national economies, political and management data to learn what kind of decision-making and management solutions we need to take and so on.

Before the pandemic, we needed research data, especially in social sciences, to understand and explain our societies in medium- and long-term perspectives. Today we need detailed and multiple data to monitor what is happening, to try to understand and explain what is going on, and to forecast what will come next. So, we see the growing demand for more timely and accurate data. In 2016 the Independent Review of UK Economic Statistics noted that "*the longer a decision maker has to wait for the statistics, the less useful are they likely to be*". Nowadays more than ever, decision makers and public policy in general need good evidence, timely and reliable data as it is a key to more effective governance.

In Europe and around the globe we have been discussing at length about data-driven and evidence-based research even prior to the pandemic. Science Europe, a leading European association of major public research Funding organizations and research performing organizations, not only advocated for access and sharing of research data as central pillars of Open Science, but strongly and permanently supported the European Open Science Cloud (EOSC) initiative launched by the European Commission. The EOSC is seen as a trusted, virtual, federated digital environment for hosting and management research data to support EU science. Moreover, data storing, sharing, and re-using was based on FAIR Data Principles, or four foundational principles— Findable, Accessible, Interoperable, and Reusable data – in research data management. So already, we are trying to achieve more open data and more open science.

Today we live not only in times of growing data demand, but we are in a period of increased supply of research data. In a supply-demand chain, a crucial component is reliable data. More than three decades ago Gary King published a famous article entitled as *How Not to Lie With Statistics: Avoiding Common Mistakes in Quantitative Political Science* (1986) with an aim to show how to escape faulty statistical theory or erroneous statistical analysis in a social inquiry. Today it might be worthwhile and appropriate to rephrase King's ideas into *How Not to Lie With Research Data*?

Better data sharing and better accessibility in turn would (but not necessarily "will") lead to better data quality. Still, a holistic and coherent guidance for collecting, managing, and using data needs to be developed or rather needs to be agreed upon and internalised by academic communities. We have already observed some excellent initiatives like a report by the OECD Global Science Forum and Science Europe on *Optimising the Operation and Use of National Research Infrastructures* (2020) with a wide focus on data infrastructures, or *Practical Guide to the International Alignment of Research Data Management* (2021) by Science Europe with an aim to propose extensive guidance on how to organise and preserve research data.

> **"Universities need to foster and develop a sustainable data ecosystem based on data sharing culture within the higher education."**

Universities are very important arenas to make great improvements to how things are done with research data. Universities might act, at least in fivefold ways: to see data as their biggest research asset and improve understanding about how valuable data can be; to deliver effective data storage and access services; to bring up-to-date data training; to open newly collected data for a re-use instantly after collection and documentation; to support data-intensive research and connect evidence-based academic research with decision-making. In the other words, universities need to foster and develop a sustainable data ecosystem based on data sharing culture within the higher education.

Universities need to lead FAIR data management and to move to real Open Science of the 21st century. Are universities able to take a leadership role? Hopefully, the answer is "YES", because there are many excellent data-driven initiatives developed by universities as COVID Tracking Project by the Johns Hopkins University, Imperial College London, YouGov COVID-19 Behaviour Tracker, Our World in Data by the University of Oxford, and others. Moreover, due to the pandemic, academic research as a value-creating enterprise was brought to the forefront of public attention and now it needs to remain as a sustainable practice.

19 Open Knowledge as a Common Good

by **Pastora Martínez Samper**, *Vice president for Globalisation and Cooperation, Open University of Catalonia (UOC), Spain*

Knowledge is key for life. The COVID-19 pandemic has made that crystal clear. The scientific knowledge generated in countless labs around the world has been vital for understanding the SARS-CoV-2 virus and for working out how to treat the disease it causes. The basic knowledge we already had has also been crucial: our knowledge of the messenger RNA helped us develop some of the vaccines we are using today to counter the pandemic. And it is not just academic knowledge that we are garnering; we are also learning about other core aspects of how to live through this together, including how to manage the epidemic, its effects on society and the inequalities it is generating.

Knowledge is key for life, but have we learned the lesson? Despite unprecedented efforts made by many stakeholders over the last year to openly share the knowledge available to control the spread of COVID-19, there are still countless problems that hinder its free circulation and access for every community and every individual that needs it. It is not only about patents for vaccines, but about the whole data management system that still does not align with the FAIR (Findable, Accessible, Interoperable and Reusable) principles promoted by Open Science.

Open Science is a movement for more open and collaborative science, for more resilient generation and timely transfer of knowledge, but it is not new. It is already decades old and comes in the wake of many attempts to promote open access to research results. However, the impact made by this movement has varied significantly across different institutions and countries. Despite the fact that some policies clearly support Open Science practices, such as those promoted by the European Commission, there are other parts of the world where academics are still only just beginning to talk about it. UNESCO's recent proposal to establish an international framework (the *UNESCO Recommendation on Open Science*) is the first initiative that aims to transform this movement into a global commitment.

At this point, let me just add that when we talk about Open Science in the terms used by UNESCO, what we are really talking about is Open Knowledge: we are not limiting ourselves to the sciences, it covers all disciplines and even includes the different ways of sharing them, such as Open Educational Resources. Maybe we should think about adopting this much more inclusive term that covers all kinds of knowledge.

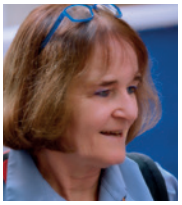
> "When we talk about Open Science in the terms used by UNESCO, what we are really talking about is Open Knowledge: we are not limiting ourselves to the sciences, it covers all disciplines and even includes the different ways of sharing them."

That said, UNESCO's proposal has come at a crucial time. It may be the best time to roll out policies based on evidence and the lessons learned, including those from the pandemic. Because we need a global commitment to be able to achieve the cultural change that Open Knowledge requires. Indeed, we need well-trained teams and infrastructure to make science more open and collaborative, but, above all, we need to change two aspects of academic life: the way we communicate the results of our research and the way we assess academic careers. They are two sides of the same coin and they both focus almost exclusively on one kind of output: academic publications – a kind of output that has not changed in centuries (although we have at least made the move from paper to digital media). Indeed, this idea has become so overriding that a phrase has been coined to capture it: *Publish or Perish*. Communicating the results of our research in a particular format has become not the means for sharing knowledge, but the end in and of itself. As a community, without meaning to, we have created a perverse mechanism that takes us away from what we really wanted when we decided on a career in academia.

So, what can be done now to break this vicious circle? We can all come together, each of us doing our best to promote Open Knowledge. However, those of us who are in a leading position at academic institutions and regulatory bodies we have the responsibility to make it happen introducing other elements for the academic assessment. We can assess other research outputs (and, indeed, outcomes and impacts, as well). We can include qualitative assessment to go alongside the simply quantitative. This is the only way we can spark the cultural change that academia needs to be able to make Open Knowledge a common good.

LATIN AMERICA AND THE CARRIBEAN

20 A state of play of Open Science within Universities in Latin America and the Caribbean and in the context the Covid 19 pandemic


by **Laura Rovelli**, *Coordinator, Latin American Forum on Scientific Evaluation (FOLEC) – Latin American Council of Social Sciences (CLACSO),* **Dominique Babini**, *Open Science Adviser CLACSO and* **Pablo Vommaro**, *Research Director CLACSO*

The need for open access to scientific information and open research data has been amplified and strengthened in the context of the Covid-19 pandemic and is back to the top of the agendas of governments and universities worldwide. It is expected to contribute openly and publicly available vaccines, medical treatments against the virus and adequate preventive health and social measures. From an educational and research perspective, there is a need to expand information and communication technologies to facilitate teaching, learning and training in contexts of isolation or restrictions in academic mobility, as well as to promote new forms of international collaboration [1]. At this point, both public and institutional policies and scientific and academic communities' engagement are decisive to move on to a transition to open science.

In general terms, the principles of open science include open access, open research data, open peer review and open science policies, which are complemented by other more specific components such as open research practices, reproducible research, open source software, open licenses and open educational resources [2]. Given its situated nature, there is no single way to carry out open science. However, the previous principles propose constructing more inclusive orientations and experiences of science in the context of sustainable development.

One of the most relevant proposals of progress is the public consultation process for the drafting of the UNESCO Recommendation on Open Science, where the representation of Latin America and the Caribbean has prepared and agreed on a large first draft that strengthens the position in favour of open access and public, common knowledge managed by the academic community as a commons, where non-profit good stands out [3]. However, despite the fact that Latin America and the Caribbean is the most advanced territory in adopting open access for scientific and academic publications, these publications are not widely incorporated into the research assessment processes of institutions, science councils and science funding agencies in the region. In this regard, the Declaration of Principles of the Latin American Forum for Scientific Evaluation (FOLEC) of CLACSO-FOLEC [4] – in line with the Declaration on Research Assessment (DORA) [5] – proposes the review of research assessment policies and practices based on incentives for publishing in journals with an Impact Factor because these practices of research assessment affect the local autonomy of the research agendas, while discouraging quality open access practices and open research processes in interaction with society.

A recent report prepared by the Latin American Forum for Research Assessment (FOLEC- CLACSO) and the Carolina Foundation [6] indicates that in the region, university publishing presses and university journals and repositories and, in a comprehensive way, the centrality of academic editorial management, favors a set of actions linked to open access and open evaluation. As long as researchers publish outside of and within the region, the aim is then to complement the current evaluation indicators provided by international commercial services – where the wealth of knowledge published in the region is depreciated – with new indicators from the region.

> “One of the greatest challenges is to be able to advance in the interoperability of the metadata and indicators of these portals to allow an integrated interoperable access to metadata and to make visible the wide and rich spectrum of publications and their indicators.”

Another strong instrument in terms of open access policies has been the development of Iberoamerican portals of scientific journals, which provide open access and indicators to scientific and academic journals published mainly by universities in the region. Among them, the following stand out: LATINDEX, Redalyc, SciELO, Dialnet, AmeliCA, CLACSO and REDIB. One of the greatest challenges is to be able to advance in the interoperability of the metadata and indicators of these portals to allow an integrated interoperable access to metadata and to make visible the wide and rich spectrum of publications and their indicators.

On the other hand, the digital university repositories, which form part of the national systems of science repositories, that in

turn contribute to the network of repositories of Iberoamerican countries "La Referencia", have been the response from the universities to the policies and legislations requiring that publications with research outputs from publicly-funded research be available in open access repositories, along with research data. University repositories offer mainly open access to full-text publications from each university, and collections of university journals. More recently, the process of offering open access to research data has begun, moving towards the FAIR principles for data (Findable, Accessible, Interoperable and Reusable).

One of the greatest challenges is to transform scientific production and research assessment cultures and practices. In addition, linking financial support to ensure the necessary opening of publications and research data and the infrastructure and training of human resources to advance the open science processes. Coordinated and collaborative action among different institutions, especially teaching and research institutions, and those dedicated to the promotion and execution of scientific and technological activity, is a key contribution for guaranteeing and expanding the right to education in our societies and to face, from the production and open/collaborative circulation of knowledge, the challenges of recovering from the pandemic, reversing structural and other emerging inequalities, and addressing the critical socio-economic and environmental problems underway in our societies.

21 Open Science: putting the puzzle together

by **Paola Andrea Ramirez**, *Librarian. Information Specialist for Evidence-based Medicine. Medellín, Colombia &* **Daniel Samoilovich**, *Executive Director, Columbus Association, France*

Open science is a long-term project aiming to adapt the scientific research cycle in the framework of the conditions of the Internet era. It proposes greater collaboration of the scientific community and improved access and communication channels to reach society in general. Its first move, open access to publications, opened the possibility of sharing other dimensions of scientific activity, such as access to data and shared infrastructures.

In our recent research – a Policy Brief, three Scooping Reviews and a Synthesis of interviews to qualified experts- we see a fragmented panorama. Some factors push in one direction and others in another one, sometimes directly opposite. There are many interests at stake: diversity and disparity occur not only between regions, but also within each country and between scientific disciplines. We often see a scattering of efforts and resources driven by misconceptions, biased analysis and overly ideological approaches about the actual scope and future impact of open science.

Facts count. Progress has been made with the communication of open science principles as well as success stories, and more academics are convinced of the benefits of open science. But the kind of transformation will depend on the commitment of the different actors and the intricate elements of the scientific research cycle. Top-down strategies from governments and funding agencies, and bottom up from universities and their researchers, especially young people, are needed.

Available evidence shows that the existence of policies or laws do not always determine concrete advances in the implementation of open science practices. Even if there is political will and trained people, resources may be lacking to ensure implementation. But it is also the case that weak political will or inertia do not enable obvious barriers, such as prevailing evaluation practices and incentives for scientific publications to be overcome, with negative effects on scientific communication.

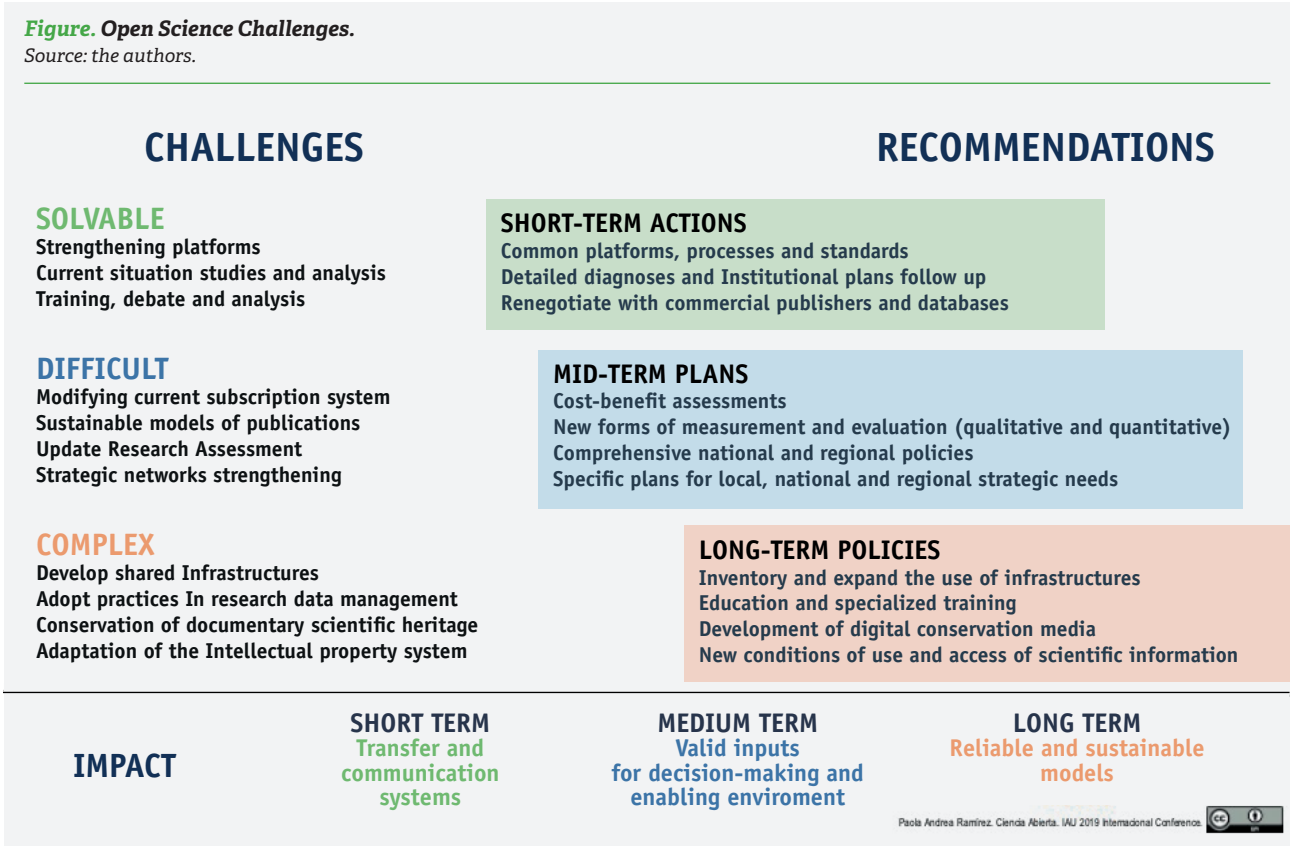
> "Research funding agencies are key in promoting open science practices. They increasingly perceive in open science an impulse for a greater return on investment in research and ultimately for greater research impact for society."

Research funding agencies are key in promoting open science practices. They increasingly perceive in open science an impulse for a greater return on investment in research and ultimately for greater research impact for society. The hypothesis is that, to the extent that it stimulates communication between scientists, Open Science will facilitate the impact of science in general, and thus also economic and social research impact.

One of the main drivers of Open Science is the desire for academia to regain control of publications and not lose control of research data, as well as the growing importance of research in solving economic, social and environmental problems. This trend has been reinforced in recent months by the health crisis caused by the pandemic.

Universities are a key actor. To better understand how they may navigate these multiple challenges, we propose a framework combining challenges, activities and the impact of open science policies, allowing progress to be achieved over time, taking into account the complexity of the problems addressed. This diagram

Figure. ***Open Science Challenges.***
Source: the authors.



was presented in a first version in November 2019, at the IAU 2019 International Conference "Transforming Higher Education for the Future".

According to the scope of the transformation underway and the barriers involved in the cultural changes implied in open science, it is possible to identify activities aiming at solving the challenges and promoting the desired impacts in the short, medium and long term.

Depending on the level of complexity, the challenges can be grouped as follows:

Solvable in the short term, activities for which there is general consensus regarding the process, conditions and benefits, based on the evidence and the experts'opinion; their results are needed for the design of policies and deployment of strategic plans. These actions are already underway at different levels in most Latin American countries.

Difficult aspects, requiring medium-term plans as they involve the interaction of different decision-making actors and significant investment of resources, in addition to the harmonisation of institutional, local, national and regional strategies based on international agreements.

More complex Issues, requiring more time for observation, analysis and evaluation of the development and impact of short and medium-term actions, as well as cultural changes and the renewal of international scientific communication systems, including problems for which we do not yet have clear solutions, such as the conservation of digital scientific heritage.

In the aforementioned Policy Brief, which was prepared for UNESCO [1], we have identified **six key roles and responsibilities** for Universities and research institutions to contribute to the Open Science movement.

- Adopt principles and define specific development models.
- Design and apply institutional policies in open science
- Update the conditions of evaluation, recognition and incentives.
- Inform, train and educate all members of the community.
- Provide, adopt and develop information services and communication technology platforms.
- Ensure the financial sustainability of institutional platforms.

What **specific actions** can universities take to put together the puzzle pieces? There are basically four.

- Design institutional strategies and plans based on the framework policies.
- Integrate incentives and recognition for the adoption of open practices.
- Regain control of scientific publications and update their business models.
- Promote the training of researchers and of support professionals, as well as for new related professions.

What **impacts and benefits** can universities and research institutions expect?

- Increased capacity for regional and international networking.
- Cooperative development of information resources and technological platforms.
- Improvement of cooperative investment in technical and information services.
- Identification and visibility of own information resources.
- Availability, conservation and protection of their documentary scientific heritage.

As we can see, the key to an active contribution of universities to the Open Science movement is to develop an integrated strategy that considers the different dimensions mentioned here, putting researchers at the centre of attention, enhancing the benefits of open science and making the necessary support services available **simultaneously** with the deployment of any strategy.

22 Promoting Usability and Open Science in Latin America

by **Gustavo E. Fischman**, *Professor of educational policy and comparative education at the Mary Lou Fulton Teachers College, Arizona State University, USA*

The extraordinary pace of contributions by the global scientific communities to the COVID-19 pandemic provide compelling evidence that when there is political will and adequate support for Open Science, it is possible to address – effectively and ethically — extreme crisis. The rapid sequencing of the COVID-19 genetic code, the myriad international collaborations between for-profit and non-profit organisations, the coordination among public and private institutions, the development of massive information systems, and the fast distribution of health materials, personnel, and tools, could not have been possible without the intervention of researchers and scholars globally. The willingness to recognise the urgency of open access to scientific scholarship was a key factor in the process. Granted, not all science-based responses were universally accepted, and some of the recommendations were far from perfect. Indeed, very costly mistakes happened, but the overall response of the scholarly community to the global pandemic and its multifaceted challenges offers important lessons for the future of the research and development and university sectors in Latin America (RDULA).

It is an amazing and humbling exercise to compare the current scholarly landscape with the pre-COVID situation. Not long ago, the general pace of RDULA changes were painfully slow, and scientific agencies focused on efforts to increase RDULA's scientific relevance by measuring "productivity". The "typical" understanding of scientific productivity was based on the number of articles with copious citations, awards, and funded grants published in journals with high impact factors. As Heller (2015) noted, "This is the crest point of a culture that holds "productivity" to be a value in itself. It doesn't really matter what you are producing, as long as you're doing it constantly".

RDULA did not escape the global metric-tide and its embedded biases, which generated perverse incentives for the scientific community throughout the region (Alperin & Fischman, 2015). The purpose here is not to add more items to the long list of problems affecting RDULA, but to argue that a better way of addressing these problems is to recognise that "typical" models of scientific accountability made the problems even greater.

> "Without a serious commitment to the public good, and fair and effective open access policies and infrastructures, Open Science is just a chimera."

There is no simple formula for changing well-established reductionist accountability patterns, but we also know that many scholars in the region already embrace and are promoting Open Science (Babini, & Rovelli, 2020). The various conceptions of "open" science merit closer scrutiny (Sadler, 2014). Indeed, the discrepancies between its defenders appear to be as serious as its critics (Mirowski, 2018; Piper, 2017). Broadly speaking, Open Science is based on the principles of inclusion, fairness, and sharing for the benefits of the public good. It embraces transparency for increased efficiency and scientific rigour. In short, notions about Open Science cannot be separated from two complementary ideals: science-oriented to promote the public good, which requires Open Access for publicly funded scholarship; and the widest and most accessible dissemination of research. In other words, without a serious commitment to the public good, and fair and effective open access policies and infrastructures, Open Science is just a chimera (Alperin *et al.*, 2019).

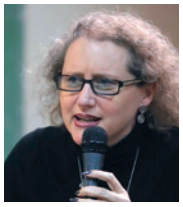
Many challenges remain (Chan, *et al.*, 2020), but some of the strategies implemented during the COVID crisis show promising pathways to face these problems. First, the region has great assets to move to open access/open science (Alperin *et al.*, 2015; Chan *et al.*, 2019). The RDULA community has a long tradition of and commitment to contributing to the public good as well as robust experiences with non-profit, publicly funded models of scholarly communications (Becerril-García & Aguado-Lopez, 2019; Fischman, 2020). Second, there is a broad movement ready to replace simplistic productivity models with alternatives that increase the usability of scientific knowledge (Babini, & Rovelli, 2020; CILAC, 2018). By usability, I mean the potential of a research study to enhance reflection and participation — within and beyond disciplinary,

professional, or technical communities—to foster and sustain broader civic processes of conceptual inquiry or problem solving (Albagi, 2019).

An important lesson from the responses to COVID globally, and particularly relevant in Latin America, is that the value of research should not be decoupled from the public trustworthiness of the scientists and the institutions involved in the research process. Sustained processes of research utilisation are as important for the specific scientific communities as for the societies that support them. Better incentives for research usability require us to consider the socio-cultural ecologies of relationships, where competing motives, conflicting ideological interests, and distinct time frames influence the understanding of RDULA.

In highly polarised and politicised contexts, the biggest challenge to develop a more effective RDULA is not to produce more or better data (we are already doing that), but for regional scientific communities to collaborate in sustained efforts to confront those who by ignoring the Latin American scientific production are implementing ineffective science policies and to expose those who manipulate scholarship for ideological and/or economic gains. It's time to move away from the simplistic publish or perish productivity model and begin implementing research usability.

23 Open science with closed research assessment systems?



by **Fernanda Beigel**, *Principal Researcher at CONICET, Head Professor at National University of Cuyo, Mendoza-Argentina and Chair of the Advisory Committee for Open Science at UNESCO*

An increasingly digital world gives us an unprecedented opportunity to harness the scientific potential inherent to all countries and academic communities. The internet made it possible for scientists on opposite sides of the Earth to collaborate without meeting face to face. The trend towards international co-authorship is picking up speed, in hegemonic and non-hegemonic countries. Scientists can now share their research data by making them freely available online, under terms that enable this research to be re-used, reproduced, redistributed and credited. The open access movement has gradually evolved into an open science movement that seeks to make the entire scientific process more accessible and transparent by sharing data, protocols, software and infrastructure (Persic, Beigel, Hodson & Oti-Boateng, 2021). However, daily life at universities and research centres presents performance pressures that counteract these opportunities and slow down the drive for openness, traditionally in the nature of scientific culture.

> **"The continuous reproduction for more than 50 years of a publishing system based on journals (only accessible through expensive suscriptions), concentrated recognition in hegemonic academic institutions, even at the expense of creativity."**

Several studies show that research assessment has been increasingly restricted to publishing performance, measurable through a unique pattern based on citation of mainstream journals: the Impact Factor. Boosted by university rankings and funding agencies, this reoriented the evaluative cultures at universities, where tenure and promotion have led to uses and abuses of impact factors (Gingras, 2016) which has concerned scholars and institutions for the social relevance of science. The continuous reproduction for more than 50 years of a publishing system based on journals (only accessible through expensive suscriptions), concentrated recognition in hegemonic academic institutions, even at the expense of creativity. Eventually, the hypercentrality of these mainstream databases in academic evaluations marginalised alternative circuits of circulation, pushing backwards bibliodiversity and multilingualism. For non-hegemonic countries, this asymmetry was reinforced by unequal access to specific training required for academic writing in English. However, several alternative publishing circuits have co-existed and some of them became particularly relevant: the Latin American publishing circuit is a great example of an open access environment with non-commercial journals managed by the academic community, mostly edited by public universities.

The limitations of the research assessment systems that are tied to performance in the mainstream databases are particularly visible when observing the small share of the production of peripheral and semi-peripheral regions represented. This narrowness particularly affects the social sciences and humanities because it reflects 50% of the output of these disciplines in the North, while in the South the share is significantly lower. There is also extensive evidence of the reproduction of gender asymmetries that have been intensified during the COVID-19 pandemic. Accordingly, the mainstream databases represent an increasingly endogenous environment not refeclective of the multiple language fluxes, formats and circuits of circulation at work today. Additionally, several authors have pointed out that the Impact Factor and journal rankings are not useful to determine the scientific value of an academic contribution. Moreover, it has been broadly noxious to assess the social relevance of a given research project.

This debate is nowadays present in most countries around the globe because more and more researchers are expressing a general discomfort with the evaluation indicators used by the institutions. But what changes and which new indicators can contribute to Open Science at the same time achieving an equilibrium between global standards and local needs? Ràfols (2019) argues that indicators must be *contextualised*, building them according to their pertinence for the assessment space

(country/institution). A critical suggested change is to reduce the amount of evaluation procedures to give priority to in-depth evaluations, with less bureaucratic exigences and more formative features. A *pluralisation* of evaluation criteria is also required because scientific research involves diverse academic practices according to the methodological design, the institution involved, interdisciplinarity and nexus with society. A *diversification* of the social profile of the evaluators is finally critical to boost participatory science and advance towards the assessment of social relevance against purely academicist evaluations.

There is a certain amount of consent among experts in scientific policies that the most effective path to produce changes in the production and circulation of research is to change the rewards system. Of course, implementing this shift and adopting localised criteria depends on the existence of a certain degree of governance autonomy at the level of the institutions. Accordingly, a "new deal" between global, national and local standards should be pushed. The Recommendation on Open Science in progress within UNESCO precisely addresses these tensions and seeks to pave the road.

24 To foster Open Science we need a new system to protect intellectual creation

by **Gregory Randall**, *Professor in the School of Engineering, Universidad de la República, Uruguay*

Humanity is facing enormous challenges, many of them produced by human action itself: climate change, health crises, social problems generated by an increasingly populated, degraded and unequal world. Understanding these complex problems requires the collaboration of all the capabilities that humanity has developed. This includes diverse knowledge systems, research capacities, technologies, and forms of organisation.

The complexity of these problems, as well as the growing dimension of scientific research systems in the world, drives the need for open science. Free circulation of knowledge and collaboration contribute decisively to the advancement of science. Thus, increasingly dense circuits of exchange between researchers from all over the world have been formed: scientific publications, conferences, joint projects, cross-training, etc. The scientific community itself has realised that open science is the most efficient way to address the problems we face. Open science means breaking down borders: between researchers, disciplines, countries, approaches, cultures. Open science also means breaking down boundaries between academia and society in its many facets.

Science has developed in an extraordinary way over the last several hundred years and has become a central aspect of society. Today we speak of a knowledge society. In this context, science is becoming an increasingly powerful factor. From this stems the multiform attempt to appropriate science: to set the agenda and channel major resources to certain problems (to the detriment of others), to direct the results of scientific research to solve the problems of part of society, to exploit discoveries for some economic or military purposes, and so on.

Open science is a movement with growing strength, driven by researchers themselves who know from experience the power of collaboration and by institutions that realise that breaking down barriers has great benefits. But there are important difficulties in its development. One is the belief that it goes against the "intellectual property" framework and therefore could become a negative incentive to further scientific development.

The so called "intellectual property" system is the main legal tool to guaranteeing the appropriation of knowledge. It is based on secrecy and on asserting the monopoly of the use of certain knowledge by the owners of patents and similar instruments. The current "intellectual property" framework prioritises the appropriation by a few in detriment of collective benefit and makes the free collaboration necessary for the advancement of science more difficult.

It is often said that the intellectual property system protects the rights of scientists for their scientific production and is therefore a necessary incentive for promoting research. This is a fallacy. In universities, where much of the research takes place, we are fuelled by curiosity, love, a sense of duty to our fellow humans, or vanity, among other reasons. The idea that the results of research can be converted into a product that generates economic profit is a recent phenomenon and rather alien to most researchers. In many institutions a specific effort must be made to change their academics' naturally open attitude to a sort of "intellectual property friendly" approach to research, which gives greater importance to closeness.

On the other hand, in a world characterised by the dominance of a few over a large part of humanity, many rightfully fear that without proper regulation open science may facilitate the predatory behavior of the powerful.

> **"In order to strengthen the necessary movement towards open science, it is of utmost importance that we create a true system of protection of intellectual creation (no longer intellectual property, words matter), which asserts authorship recognition and truly promotes collaboration and openness instead of private appropriation and secrecy."**

The COVID pandemic has been an extraordinary example. During 2020, we witnessed a collective, collaborative and generous effort to address a health crisis of major proportions. It allowed us to better understand the problem and make scientific progress in record time. In 2021, we are returning to the "intellectual property" mode of science, marked by selfishness, secrecy and greed. The results on public health of this way of acting are a true moral catastrophe, as pointed out by Tedros Adhanom Ghebreyesus, director of the World Health Organization (WHO).

There are instruments for protecting intellectual property that go in the same direction as open science, for example Creative Commons licenses. But, in order to strengthen the necessary movement towards open science, it is of utmost importance that we create a true system of protection of intellectual creation (no longer intellectual property, words matter), which asserts authorship recognition and truly promotes collaboration and openness instead of private appropriation and secrecy. We need a system that effectively protects open knowledge, preventing some people from misappropriating open knowledge.

25 The Contribution of Costa Rican Public Universities to Open Science

by **Saray Córdoba González**, *Honorary member of Latindex, University of Costa Rica, Costa Rica*

Costa Rica is a country located in the Central American Isthmus that has five public universities (which are financed by the Costa Rican state through constitutional mandate) and 54 private universities. The University of Costa Rica (1941) is the largest and oldest of them and they are all grouped in the National Council of Rectors (CONARE), which is the coordinating body and developer of joint programmes throughout the country. One of its organisations is called "Open Knowledge" and it is the one that has initiated and developed most of the activities to promote Open Science (OS). Since 2010 it has been organising activities, first to promote OS through repositories and journal portals and secondly, it has been involved in the promotion of OS [1], mainly with regard to research data, the application of open indicators and the inclusion of preprints in some journals.

Since commercial trade and profit have never been common practices (albeit there´s a tradition of library exchange and networking throughout Latin America), Costa Rica's journal system like those of other countries in the region, was born with an open access concept in its academic publications. Indeed, the vast majority of these are financed with public funds from the universities and constitute a fundamental piece in the fabric of the science produced in the country. The open access diamond path has been the strongest option for journals, and the green path or the repositories options are strengthened.

> "There is reluctance in academia, not only because these are new and unusual practices, but also because they require a process of sensitisation to orient more towards "the common good", which collides with individualism, commercial interests, lack of incentives and the fear of change. However, in Costa Rica, as in other Latin American countries, public universities have redoubled their efforts to achieve these changes."

As part of this process, Latin American information systems – which the country is a part of – have been the cornerstone of open access since 1997. Latindex, SciELO, Redalyc, LA Referencia, CLACSO, LatinRev and AmeliCA are services that bring together and disseminate the publications born and developed in the region. Most of these are distinguished by promoting non-commercial open access and represent, in many cases, unique examples in the world due to their characteristics. Some are promoted and sponsored by the universities. They were born with the aim of highlighting the scientific production of the region and as an alternative to paid publication of scientific articles. In addition, it is calculated that there are about 380 scientific journal portals and 665 repositories in the Latin American region, which is an important example of this development.

However, these conditions are currently the focus of extensive discussions, as we cannot stay on the sidelines of what is happening in the world. The influence of the market is a real threat. We observe that universities' budgets are reduced and commercial practices are consolidated in the scientific field; science evaluation systems are increasingly inclined to privileged mainstream journals, rather than the intrinsic quality of the article, thus causing an exclusion of local journals instead of strengthening them. We concentrate on reflecting where we are going and how we can get around those impositions. The path to OS is interfered with by these superstructures that become the puppeteer who pulls the strings of the system.

In this scenario, OS could become a chimera because, in order to make it a reality, we must consider, in addition to the already mentioned challenges, the efforts necessary to achieve a cultural change. There is reluctance in academia, not only because these are new and unusual practices, but also because they require a process of sensitisation to orient more towards "the common good", which collides with individualism, commercial interests, lack of incentives and the fear of change.

However, in Costa Rica, as in other Latin American countries, public universities have redoubled their efforts to achieve these changes. Awareness-raising activities become the first step to advance towards OS, as well as the dissemination of its principles and proposals. The workshops, conferences and other activities that are directed towards the various actors involved, become the spearhead to achieve this end.

Likewise, more solid, cooperative, and in-depth efforts are being developed at the regional level. The formation of the Latin American Forum on Scientific Evaluation (FOLEC) in 2019 has been a good start and the Regional Consultation that was held to elaborate the Unesco Recommendation on Open Science for November 2021. Also, the Declaration of Panama on Open Science" (2018) proposed to promote an OS network in the region as well as national and institutional policies. In all these endeavors the collaboration and strengthening of regional systems stand out under the incentive that access to knowledge must be a human right.

NORTH AMERICA

26 Expanding the Influence of Open Science in the Undergraduate Classroom

by **Mathew Vis-Dunbar**, *Librarian, University of British Columbia, Okanagan, Canada*

Recent events have highlighted the beneficial role of collaborative, open efforts to move research forward. But Open Science is about more than increasing the speed at which research proceeds. Open Science should build public trust in scientific research; trust built through transparent processes and enabled by literacies in what underpins well done, trustworthy science. While Open Science practices stand to benefit society generally, the ethos and practices have focused on the domains of active researchers and training within the realm of graduate level education. These efforts need to be mirrored by strategies that target learners at the early stages of their careers; whether they are destined to practice research or consume the benefits of research. Although incentives can help enable change, shifts in cultures of practice and expectations are what will meaningfully impact how and why science is engaged.

Undergraduate students in the sciences are the researchers, policy makers, and citizens of the future. These students should be graduating from their programmes well versed in a philosophy and practice of science that is underpinned by Open Science; one that embraces science as a partnership between researchers and those impacted by their research and that is critical of lack of disclosure, questionable research practices, publication bias, and the current trend in academia to reward outputs generated from novel or popular discovery over those produced by transparent, reproducible research, and the implications these have for the evidence base that scientific inquiry produces.

> **"Undergraduate students in the sciences are the researchers, policy makers, and citizens of the future. These students should be graduating from their programmes well versed in a philosophy and practice of science that is underpinned by Open Science."**

Instructors have acted upon this, introducing content related to Open Science into individual courses – many before Open Science was a coined term. At the Okanagan campus of the University of British Columbia, Canada, faculty, librarians, lab managers and students are working to implement this approach to practice and learning at a programmatic level. This allows for much deeper integrations and scaffolded learning opportunities that reinforce and permit greater exploration of some of the nuances and complexities of the many facets of Open Science. With this approach, we are attempting to integrate Open Science principles and practices as part of the core narrative – informing teaching and learning practices – throughout the undergraduate Biology program.

This process has not been without its challenges. Open Science is about practices, approaches, and ways of understanding how to do science that brings enhanced benefits to society; these are enabled by tools and systems of rewards. These tools, and to some degree, systems of rewards are emerging for practicing researchers. Depending on one's jurisdiction of practice, however, they remain out of reach from the processes of teaching and learning. From a rewards perspective, students are measured on output not process – a right answer not the methods of pursuing this answer. Open Science is rooted in process. In an era of standardized evaluations, this is challenging to overcome. From a tools perspective, lack of localization of software platforms and collection of data by software providers limits their use in the context of adhering to important privacy considerations when working with students.

This latter issue is further hindered by digital infrastructure supports that generally fall under one of three categories – teaching and learning platforms, research platforms, and administrative platforms. Teaching and learning that attempts to introduce systems designed for research – systems that support practical engagement with tools that enable the implementation of Open Science – are met with barriers as

the units that oversee the implementation of teaching and learning supports and those that oversee research supports are administratively unique. Gaining support for localised – nationally or institutionally – research platforms used in real world research for the purposes of teaching and learning, becomes entangled in an administrative web. Without systems of reward and practice in the classroom that support transparent, reproducible research, we limit the skills and literacies our learning institutions can help to foster.

Enabling Open Science among active researchers requires a culture of change and a network of services including incentives, software, hardware, policy and jurisdictional guidance. Likewise, empowering all future graduates – regardless of career path – to make decisions as members of society that are informed by the best available evidence requires our educational institutions to implement systems of reward and provide opportunities to engage with the tools that support and enable Open Science practices at early stages in their education.

27 Towards a More Open – and Equitable – Future

by **Yasmeen Shorish**, *Associate Professor, James Madison University, USA*

There is little question that the practice of making knowledge more openly accessible to more people is a benefit to humanity. The economic barriers to access and the negative impact that they have on society are well documented [1]. Most often, open access refers to articles and sometimes monographs. In light of the urgent need for information sharing due to the coronavirus pandemic, we now have a cohesive focus on open data [2]. However, while open data and open science [3] can be a societal benefit, anyone engaging in the open science space must still be a critical evaluator – not just of the data itself but of the process and methods by which we create/collect the data and how we make it accessible. Indeed, in this moment in time, the practice of open science has the opportunity – and the challenge – to be a truly inclusive and democratising effort if we are willing to invest in an ethics of care [4] [5] mindset.

For data to be as useful as possible, it must be properly managed and should attend to the FAIR Principles: data should be findable, accessible, interoperable, and reusable. However, to think expansively and through a lens of care, researchers and their institutions should also be cognisant of the ethical considerations of data sharing, beyond those mandated by institutional review boards and laws. Consider the CARE Principles for Indigenous Data Governance [6]: data

“To democratise knowledge, we must consider how we can fully enfranchise the world’s researchers and knowledge producers in this work. Rather than adopt a colonising mindset to knowledge production, we must embrace epistemological diversity and do the work to be truly inclusive and equitable.”

ecosystems should consider collective benefit, authority to control, responsibility, and ethics. The CARE principles were developed as a response to the open data and open science movements that focus heavily on data access and reuse, without regard to the variety of cultural considerations of data and knowledge. Developing these principles in harmony with the FAIR principles reveals that while there may be tension between open activities and Indigenous data sovereignty, the work of advancing knowledge is not diminished. Rather, the work is more comprehensive and holistic, recognizing that there are many ways of knowing and creating and that – with care and attention – society as a whole can benefit when these myriad ways are allowed to flourish and thrive.

While the pandemic has sharpened the realisation that open data can potentially increase collective benefit in very real, global, life-altering ways, we must consider the knowledge production lifecycle as a continuous process of ethical interrogation. As we adapt workflows that result in more open science, we must ask “open for whom? [7]” What structures and mechanisms are at work that may be reinforcing unjust, undemocratic, and exclusive perspectives and practices? Applying the four frames of care [8]: attentiveness, responsibility, competence, and responsiveness to the knowledge production lifecycle can create opportunities to consider the knowledge producer and consumer in concert with one another, in a reciprocal, informed, and enfranchised manner. To focus solely on the output – the open data product – as a collective benefit repeats the same equity imbalances that already exist in the publishing landscape [9].

To democratise knowledge, we must consider how we can fully enfranchise the world’s researchers and knowledge producers in this work. Rather than adopt a colonising mindset to knowledge production (i.e., research methods must conform to North American practices), we must embrace epistemological diversity [10] and do the work to be truly inclusive and equitable. Adding an ethics of care consideration to the open science conversation will do more to advance humanity in a cooperative – and not competitive – manner.

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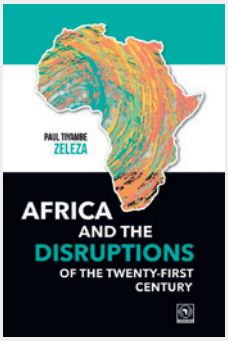
by Sjur Bergan, Tony Gallagher, Ira Harkavy, Ronaldo Munck, Hilligje van't Land, Eds. Strasbourg : Council of Europe Publishing, 2021 . - 325 p. (Council of Europe Higher Education Series, 25)
ISBN 978-92-871-8697-3

Public health was the immediate concern when the Covid-19 pandemic struck in Asia, then in Europe and other parts of the world. The response of our education systems is no less vital. Higher education has played a major role in responding to the pandemic and it must help shape a better, more equitable and just post-Covid-19 world. This book explores the various responses of higher education to the pandemic across Europe and North America, with contributions also from Africa, Asia and South America. The contributors, including from many IAU Members and partners from around the world, write from the perspective of higher education leaders with institutional responsibility, as well as from that of public authorities or specialists in specific aspects of higher education policy and practice. Some contributions analyse how specific higher education institutions reacted, while others reflect on the impact of Covid-19 on key issues such as internationalisation, finance, academic freedom and institutional autonomy, inclusion and equality and public responsibility. It is designed to help universities, specifically their staff and students as well as their partners, contribute to a more sustainable and democratic future.

Africa and the disruptions of the twenty-first century

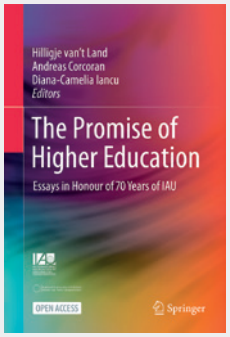
by Paul Tiyambe Zeleza. Dakar: Codesria, 2021. 367 p.
ISBN 978-2-86978-997-5



This collection of essays interrogates the repositioning of Africa and its diasporas in the unfolding disruptive transformations of the early twenty first century. The global perspective of the book reflects spatiotemporal positions in North America and Africa, the global North and the global South, the African continent and the diaspora. Divided into five parts, part 1 starts with the United States and its enduring legacy with slavery and discusses the racial violence impacting African American communities today. Part 2 focuses on navigating global turbulence in the 2010s, including topics such as shifting global hierarchies, the 'rebellion of nature' of Brexit and Covid. Part 3 dwells on Africa's Political Dramas, dissecting the political events the continent has embarked on along the road to democracy. Part 4 examines Africa's Persistent Mythologisation with the construction of negative images and knowledge and analyses how to decolonise and empower African knowledge. Part 5 entitled 'Disruption in Higher Education' examines the six capacity challenges of African universities: institutional supply, resource deficits, faculty shortages and research underperformance as well as the low quality of graduate outputs and weak governance and leadership and the impact of the fourth industrial revolution on higher education.
Classmark : AFR-32 ZEL

The promise of higher education: Essays in Honour of 70 Years of IAU

by Hilligje van't Land, Andreas Corcoran, Diana-Camelia Iancu, Eds. London, New York : Springer, 2021.
ISBN 978-3-030-67245-4



To mark the 70th anniversary of the IAU, experts from around the world share their insights into higher education's recent past, present and future. Part I – "70 years of Higher Education Cooperation and Advocacy" looks back at key events in IAU's history, its mission and significant activities over time, and remarks on the current global context informing its quest to promote academic partnerships and solidarity on a global scale. Part II – "Facilitating International Cooperation" provides for different perspectives on the transformation of the internationalisation of higher education and the contribution of higher education to international cooperation. Part III – "Coding the Values" debates the values upon which higher education was, is and will have to be built to provide for a democratic and inclusive society. Part IV – "The Changing Landscape" analyses various aspects of the transformation of higher education in an evolving context across the globe. Part V – "The Promise of Higher Education" reflects on the role of higher education, its ideals and shortfalls and what it must do to stay true to its promise to help shape our societies. Part VI – "Opening up – the Future of Higher Education" focuses on future scenarios of higher education.

Call for participation:

THE COUNCIL OF EUROPE REWARDS BEST PRACTICE IN ACADEMIC INTEGRITY

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Sjur Bergan, *Head of the Education Department of the Council of Europe*
and **Vesna Atanasova**, *Programme Manager, Education Department, Council of Europe*

Higher education cannot be of high quality, it cannot promote societal values, and it cannot educate the citizens of tomorrow unless the academic community itself practices academic integrity. Higher education's credibility depends on integrity. It is in recognition of these simple truths that the Council of Europe has established a platform to promote ethics, transparency, and integrity in education (ETINED Platform).

This is also the logic behind the Council of Europe's new **Best Practice Programme in Promoting Academic Integrity**, which focuses specifically on higher education. It is set up to reward institutions and academics whose promotion of academic integrity can serve as examples to others. The programme aims to identify, publicly recognise and disseminate good practices throughout higher education institutions in Europe. It is therefore important the practices be transferable to other contexts.

For this first year, the programme focuses on practices promoting academic integrity during the COVID-19 pandemic in the following six categories: teaching and learning, policy, procedures, communication, governance/structures, and training.

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The practices will be identified through a public call which is open until 20 August 2021. All higher education institutions recognised as belonging to the education system of one of the 50 States parties to the European Cultural Convention, as well student unions, are encouraged to apply.

The practices will be assessed by a panel of independent experts and will be endorsed by the Programme's Steering Committee composed of representatives of the Council of Europe Committee for Education Policy and Practice, the International Association of Universities, ETINED, the UNESCO International Institute for Educational Planning, the ENIC and NARIC Networks, the European University Association, the European Students´ Union, Transparency International EU, Education International and the Federation for Education in Europe.

The selected cases will be published and disseminated, and an award ceremony will be organised in Strasbourg or online in late autumn 2021.

The Best Practice Programme is a celebration of good practices rather than a competition. Participating in the programme will give higher education institutions the opportunity to showcase and publicise their practices, bring attention to them, and maybe even inspire others.

Those seeking **further information on the Call** are invited to consult the website of the Education Department of the Council of Europe: **www.coe.int/education**

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