



DECLARATION OF G20 MINISTERS

on Leveraging Research, Higher Education and Digitalisation for a Strong, Sustainable, Resilient and Inclusive Recovery

We, the undersigned G20 Ministers, met on 6th of August 2021 in Trieste, Italy, to further our dialogue and cooperation on the role of research and higher education systems within the global digital transformation and their contribution to achieving the Sustainable Development Goals. We note that the pandemic has highlighted the use of digitalisation for higher education (People), sustainability (Planet), and research in support of economic growth and resilience (Prosperity).

Noting the impact of the COVID-19 pandemic on research and higher education communities, as well as on the overall wellbeing of our societies, we discussed ways to embrace opportunities and address challenges to fully realise the potential of digitalisation for a strong, sustainable, resilient and inclusive recovery. We addressed our priorities along three key pillars, i) how to address the changing nature of skills; ii) how to harness the potential of digital technology whilst upholding ethical principles and values; iii) how to leverage common digital infrastructures to support research collaboration, open science and higher education.

The meeting brought together all G20 members as well as guest countries and International Organizations (IOs), namely the Organisation for Economic Co-operation and Development (OECD), and the United Nations Educational, Scientific and Cultural Organization (UNESCO) as distinguished knowledge partners.

I. ADDRESSING THE CHANGING NATURE OF SKILLS

The rapid digitalisation of economy and society has changed skills needs. In all fields of knowledge, the new paradigms of data-intensive science and data-driven innovation continue to transform the landscape of research, technology and innovation, driving the use of digital tools that require researchers to have appropriate new skills. Digitalisation is also changing how higher education systems are managed and how the teaching-learning dialectic develops: the opportunities presented by the increasing use of digital resources, tools and data are changing and require updating how we educate our students.

We emphasize the importance of promoting human-centred technological development by increasing access to research and higher education for all, strengthening digital skills, and addressing the digital divide in research and higher education and mitigating the security risks in digital environments in an inclusive and equitable manner.

We encourage the development and sharing of best practices, in both the research and higher education sectors, to promote the growth of a digitally-skilled workforce. A non-exhaustive list of non-binding examples is given in the ANNEX. We recognise that enhanced collaboration, cooperation and exchange of best practices at the international level and interaction with stakeholders contribute to our common goal of utilising digitalization for sustainable, resilient and inclusive recovery and human capital development.



II. ETHICAL PRINCIPLES AND VALUES IN RESEARCH AND HIGHER EDUCATION

We note the importance of ethical principles and values for research and higher education and the impact of digitalisation on them. We endeavour to continue our work to identify the ethical principles and values required to shape inclusive, resilient and sustainable societies through Open Science and education initiatives taking into account the need to:

- Protect human rights, human dignity, privacy and personal data throughout the life cycle of the design and use of Artificial Intelligence (AI) and all digital technologies in research, education management, teaching, and learning.
- Ensure that inclusion, fairness, equality, non-discrimination and access define all Open Research and Education initiatives. Produce and share information about research and education in an open, secure and Findable, Accessible, Interoperable and Reusable (FAIR) way, while respecting national and international regulations and observing academic and ethical principles and values.
- Recognize the contributions of all partners in the research process while encouraging worldwide collaboration.
- Promote the participation of women and girls in STEM studies and in other subjects linked to the design and implementation of digital initiatives.
- Develop digital initiatives across all disciplines so as to promote equal access and participation by all communities in an inclusive and equitable manner.
- Ensure the sustainability of the development and use of trustworthy and robust digital resources for higher education, research and innovation.

[We affirm our commitment to the responsible, trusted and secure development and use of AI and] we support a human-centred approach based on the G20 AI principles set out in 2019 under the Japanese Presidency and endorsed in the Ministerial Declaration of the G20 Digital Economy Ministers of 2020 under the Saudi Presidency. We will work to explore how such principles could be further developed to support the responsible use of trustworthy AI in the fields of research and higher education.

III. TOWARDS A COMMON UNDERSTANDING OF DIGITAL SPACES

We acknowledge the growing importance of digital infrastructures for research and higher education in the advancement of science, in generating data and information and in providing training. Maintaining and strengthening this diverse ecosystem of national and international digital research infrastructures, and the necessary connections and interoperability between its various parts, requires common understanding and strategic collaboration across countries.

Access to data and to other research-relevant digital objects enhances the reproducibility of scientific results, facilitates inter-disciplinary co-operation, stimulates economic growth through better opportunities for innovation, enables re-use and sharing of data in social innovation, increases resource efficiency, improves transparency and accountability, delivers returns on public investment, fosters scientific enquiry, secures public support for research funding and reinforces public trust in research. We recognize the importance of



protecting human dignity, human rights, including privacy, and personal data as well as intellectual property rights while fostering such access.

We acknowledge the importance of a sound knowledge base for research and higher education policies and encourage improved measurement and assessment. To this end, we acknowledge the importance of developing sound statistical and research infrastructures, through, inter alia, dedicated statistical surveys, qualitative research, appropriate legal frameworks for data access sharing and use, stronger National Statistical Offices' capabilities in using linked data, increased availability of FAIR data, and enhanced collaboration with the private sector and relevant stakeholders.

We recognise that international co-operation in research is critically important for advancing science and technology and for solving societal and global challenges, which cannot be solved by one country alone. We recognise the value of UNESCO's Recommendation on Science and Scientific Researchers and the recent OECD Council Recommendation on Access to Research Data from Public Funding.

We encourage the continued exchange of best practices and strengthening collaboration and cooperation in research and higher education at international level, with a special focus on critical areas. A non-exhaustive list of such areas is given in the ANNEX.

WAY FORWARD

We will continue to work towards digitalisation for strong, sustainable, resilient and inclusive recovery and growth and we recognise the role and contribution of IOs and other stakeholders to our work in the field of higher education and research. We believe in increasing digitalization to deal with the major challenges the world will face after COVID-19.

Based on the discussion started in 2021 and acknowledging the central role of research and higher education for the three 2021 G20 Presidency themes of People, Planet and Prosperity, we look forward to continuing our work in 2022, under Indonesia's G20 Presidency.



ANNEX

Several international initiatives are being undertaken in order to enhance access to research data, to promote scientific cooperation and to improve access to educational resources, notably the draft UNESCO Recommendation on Open Science, the OECD Recommendation on International Cooperation in Science and Technology, and the UNESCO Recommendation on Open Educational Resources (OER) as well as the UNESCO Global Convention on the Recognition of Qualifications concerning Higher Education.

The purpose of this ANNEX is to identify concrete instances of experiences developed in single or multiple countries in facing the issues discussed in the declaration.

The list is non-exhaustive, non-binding and is not meant to be prescriptive with respect to specific actions for collaboration between G20 members, however, it provides examples of potential best practices or innovative case studies at national and international level that may become the stimulus for potential larger collaborations.

- Collecting and sharing experiences with policies, actions, and competency frameworks implemented or planned by G20 countries and international bodies that incorporate basic and advanced digital skills in higher education curricula in different fields of study.
- Surveying and sharing repositories of open educational resources for digital skills in G20 countries, including materials for continuing education programmes.
- Encouraging the mobility of students, researchers and academic staff to enhance their digital skills and share their digital expertise taking into account national circumstances on certifications, mobility and visas across G20 countries.
- Sharing best practices on new educational models including personalised education, and innovative use cases making use of advanced digital technologies such as Artificial Intelligence (AI), data, learning analytics, extended reality, digital twins, blockchain and robotics.
- Creating international centres of excellence for advanced (e.g., PhD-level) data-intensive research and data science skills suitable to discipline-specific needs.
- Promoting initiatives that strengthen digital ethics and raise awareness of potential bias in datasets, algorithms and resulting analyses and developing effective approaches, including explainability, to promote fairness and transparency.
- Exchanging good practices regarding the certification and rewarding of data management skills and software development skills as high value added to publicly funded research and innovation.
- Making research data and other research-relevant digital objects from public funding openly accessible and reusable to the largest extent possible, while taking into account the need to restrict access for legitimate public, community and private interests, including through the adoption of national regulations and policies.



- Promoting establishment of and compliance with technical standards and practices that make research data and other research-relevant digital objects that are based on public funding findable, accessible, interoperable and re-usable.
- Fostering the allocation of responsibility, ownership, and stewardship for access to publicly funded research data and other research-relevant digital objects from public funding across the research data ecosystem, while also tailoring and implementing licensing and other management of intellectual property rights to optimise scientific discovery and innovation and protect research data and the rights of digital object producers.
- Supporting the development and implementation of effective models of reward and recognition that provide incentives and remove disincentives for researchers and research support staff to open up research data and other research-relevant digital objects from public funding.
- Taking measures to support the development and maintenance of sustainable infrastructures to support the findability, accessibility, interoperability, and reusability of research data and other research-relevant digital objects from public funding free of charge at the point of use.
- Collaborating at the international level on access to research data and other research-relevant digital objects from public funding in order to enable the free exchange of ideas and enhance scientific discovery, in particular, when the use of cross-border data sets on a bilateral or multilateral basis can help advance science and contribute to solving global challenges, while complying with relevant national laws and regulations on cross border data flow.
- Facilitating worldwide access to public and open digital learning resources with full transparency of the development and source of these materials.
- Collaborating in further developing an infrastructure for verifiable digital credentials (e.g., on blockchain) compliant with data privacy and protection rules and with relevant national digital identity and attribution rules and frameworks.
- Collaborating at the international level to share experiences and lessons learned about countries' public digital learning infrastructure (e.g. online learning platforms, education and management information systems, early warning systems, proctoring systems, etc.).
- Discussing and promoting standards for research on the use of advanced technologies, including smart technologies, in learning and teaching in higher education.
- Exploring and sharing information about different types of learning and teaching models in higher education, including hybrid, and competency-based models, preserving diversity as a mechanism of social responsibility on an intergenerational scale.
- Developing new comparative information and indicators about higher education, including digital aspects of teaching and learning in higher education.