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OPEN SCIENCE : THE ESSENTIAL STANDARD FOR AFRICAN RESEARCH

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Poverty, health problems, difficulties of access to education, increasing inequalities... African scientific communities contribute significantly to the major societal challenges of current development that have a strong impact on the societies of the South. They produce a large amount of data and knowledge. But their scientific, political, economic and social potential remains too largely under-utilized, because it is not widely disseminated or accessible.

Recent surveys, including the one presented during the colloquium *Open Science in the South*¹, have highlighted the low level of dissemination and openness of research data in Africa. At a time when the practices of sharing and opening of scientific productions are almost generalized within scientific communities, it is essential and critical that African scientists include their research practices in this dynamic. This will reinforce the visibility of their work on an international scale, and will allow them to take their rightful place in the international research community. Nevertheless, beyond the awareness of the challenges and benefits related to the sharing of research data, the commitment of African scientists to these new practices depends on the control of the opening of data in real conditions of sovereignty. It also relies on their ability to use the data to boost innovation by enabling African economic stakeholders to develop new value-added services for African societies.

It is through the establishment of a trustworthy climate, through equitable sharing, inclusive and open access to data management facilities, that an ecosystem of research data sharing and dissemination will arise on the African continent



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► Research as a support for sustainable development goals through open science

As already mentioned in 2019 in *the declaration of Dakar*² issued from the first edition of the Open Science in the South conference, the challenges of sustainable development require fundamental commitments for the planet and for societies. These challenges are particularly evident for the societies and territories of sub-Saharan Africa. The open science movement is an opportunity to strengthen the implementation of research and to better contribute to the achievement of the Sustainable Development Goals (SDGs). The principles of open science should be thus implemented to increase open access to scientific publications and research data and sharing of open science practices offer an opportunity within the scientific community.

The availability of research results - academic publications, data, source codes, documented, accessible and interoperable algorithms - is a sine qua non condition for the progress of knowledge and of the decision-making support services to meet the challenges of the SDGs.



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*UNESCO recommendation on open science*³, unanimously adopted by its members in November 2021 in Paris at the organization general conference, strengthens and reaffirms the role of open science in addressing the environmental, social and economic challenges facing people and the planet.

This recommendation reminds us of the crucial importance of science and technology in addressing these challenges. It also highlights the strong transformative potential of the latter to accelerate progress towards achievement of the SDG, particularly in Africa.

² https://zenodo.org/record/3577891#_Xfj56tX0mpo

³ <https://unesdoc.unesco.org/ark:/48223/pf0000379949>

More importantly for the African continent, the implementation of this recommendation constitutes an opportunity to render science more accessible and inclusive, closer to the needs of society, to promote a strengthened dialogue between scientists, policy makers and practitioners, end-users of scientific results, tools and methods and community members. Dialogue that will provide to each stakeholder a voice in the development of a research compatible with their concerns, needs and aspirations.

Implementing this recommendation is also an opportunity for Southern scientific institutions to access academic productions to which they still have little access. In this context, it should be recalled that 192 governments, including those of the African continent, have committed to promoting an enabling environment and investment in infrastructure and capacity building for open science, a movement that has emerged from the scientific community.

► Barriers and obstacles to sharing scientific productions

*Recent studies*⁴ of open science practices in African research communities show that barriers to data sharing can be of different origins. The lack of policy frameworks and of institutional and national level directives are presented in all these studies as the main obstacle to the establishment of a true culture of open science within the continent's academic communities.

As a consequence, researchers deplore the insufficient level of funding for implementing the required resources for the adoption of open scientific practices, starting with the lack of digital infrastructures which, when they exist, are generally inadequate to the needs inherent to the management and dissemination of research data. On the other hand, the conditions of sharing between Northern and Southern partners are often considered unfair; as a result, African scientists may feel uncomfortable sharing their data (risk of data theft and of resource capture, unequal capacities between partners to reuse shared data).



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This lack of trust is also explained by the lack of information and awareness of the scientific, political, economic and social issues related to the sharing and opening of scientific productions. In addition, beyond their opening, good practices in data management are slow to disseminate within the scientific communities, which very often lack training on these subjects.

Finally, scientists do not always understand which individual benefits they can gain from sharing their data, especially since this practice is not valued by their affiliating institutions and career evaluation bodies.

► Making open science a scientific practice by default

Based on the various observations and expectations from the African research community noted at the Open Science in the South conference in Cotonou, we recommend acting on several levers and at several levels. In this regard, the UNESCO recommendation on open science offers a common framework and a real opportunity for a coordinated implementation of open science on the African continent.

1. **Governments must seize the UNESCO recommendation to develop their national policy.** Such policy should include a detailed roadmap, including the development of digital infrastructures required for data management and dissemination. The development of an open science culture within research communities is the guarantee of a sustainable integration of practices within research activities. On this last point, taking into account open science practices in the evaluation of researchers is a way to change their practices significantly and sustainably.
2. **Actions to raise awareness and provide training to the scientific community must be carried out in association with the implementation of national policies.** Moreover, open science must not be restricted to practicing scientists: it is important to propose new training programs, initial and in-service, on the various aspects of open science and data science. The control of the sharing and opening of research data and of their valorization within the African continent relies on the increase in skills in the digital professions of future African engineers and researchers.
3. **Open science must be inclusive in all its dimensions.** We have noted, in various forms and on various occasions, the importance for the participants for taking into account the diversity of approaches and practices in open science, and in particular multilingualism. It is important to promote the inclusion of all, whatever their gender, language or training, and thus to promote the widest access to the devices for the dissemination of research productions such as open archives, data repositories or access to storage and computing resources.
4. **Open science in Africa will require cooperation between African nations.** The opening and inclusion of science at the African level can only be achieved through international cooperation between all our countries, through the mutualization of resources, through the convergence of our research standards and practices, and finally through the networking of our different scientific communities.

The consideration and implementation of these different points will allow us to promote the access of all to academic productions, for all political, socio-economic, associative actors or simple citizens, with respect, justice and fairness.