Declaration for the Sharing and Opening of Research Data for Sustainable Development

This declaration has been produced by the participants in the "Open Science in the South: Challenges and Perspectives for a New Dynamic" symposium, held in Dakar from 23 to 25 October 2019, by African and European organizations [i]. These participants (scientific information stakeholders and professionals, representatives of research and development institutions) want to draw on the principles of open science, to drive research in the interests of sustainable development. They therefore want to coordinate their efforts on the level of French-speaking sub-Saharan Africa

1. Driving research to aim sustainable development, thanks to open science

The participants believe that:

1. Sustainable development issues require fundamental commitments for the planet and the societies. These issues are particularly apparent for societies and territories in sub-Saharan Africa.

2. The open science movement is an opportunity to strengthen research operations and to help reaching the Sustainable Development Goals (SDGs).

3. The principles of open science should be applied, to enhance free access to scientific publications and research data.
   a. Efforts concerning publications were performed for around a decade, but it must be continues. We need in particular to strengthen the African initiatives, in line with the Dakar Declaration (CODESRIA, 2016) or the UNESCO open access guides (UNESCO, 2013).
   b. Efforts are now also required on the sharing and opening of research data, which are currently highly fragmented and dispersed.

The availability of research findings and outputs, academic publications and data, is an essential condition for the advancement of knowledge, and for the creation of decision-making support services to help achieve the SDGs. These data must be opened, documented, accessible and interoperable.

2. Objectives

The participants have set out the following preconditions, aims and shared principles:

Initial conditions: strengthening data connectivity and data services

The implementation of open science depends on two conditions to be pre-filled:

1. The development and strengthening of data infrastructures (observation and telecommunication networks, storage infrastructure, high-performing processing/calculation equipment) that can guarantee sufficient connectivity for the circulation and dissemination of data, as well as their processing, storage and long-term preservation.
2. The development of skills for the acquisition, management, exploitation and reuse of data.

Principles of best data management

The participants agree on the need to share and implement the principles of best data management. In particular, they will rely on the following best practices:

- Data should be progressively brought into alignment with the "FAIR" principles: (F) Findable, (A) Accessible, (I) Interoperable, (R) Reusable;
- Projects must have a data management plan (DMP);
- Data must be registered and preserved in sustainable data repositories managed by the African institutions;
- Legal and ethical principles must be taken into account, in order to better define the conditions of sharing.

Principles for data exploitation and involvement of data sharing stakeholders

The sharing and even opening, of data is an opportunity to speed up innovation and to develop new added-value services, to help achieving the Sustainable Development Goals:

- The aim of any value creation based on locally collected data should take into account the interests of the populations concerned and their aspirations to well-being;
- The analysis and exploitation of data should involve local stakeholders as far as possible, including through the transfer of proficiencies and capacity building process;
- The contributions of all those involved in the acquisition, management and sharing of data must be acknowledged through citations and through taking these contributions into account in research evaluation systems.

Data governance principles

Research data are highly valuable resources. Their sharing or opening must be entirely controlled by research operators, in true conditions of sovereignty. The establishment of data governance is requested, to control the conditions of data dissemination and exploitation. This particularly concerns:

- Best practices, defined within the disciplinary communities and coordinated with institutional, national, regional and international policies on the conditions of data dissemination and exploitation; such practices rely on the establishment of suitable conventions within multi-partner projects;
- the organization and the governance decisions, which must be done at the right level (that of the researcher, their establishment, or the State), regarding the data in question.

3. Increasing a dedicated network

To promote the application of best research data management practices and the associated policies, in particular in French-speaking sub-Saharan Africa, we are creating and wishing to organize a regional network of stakeholders, which will be used to promote a shared vision. The network's prioritary actions will be to:
- **Raise awareness** about the sharing and opening of data in all disciplinaries and thematic communities, with their own particularities, focusing on data management practices, while involving information stakeholders and experts in data law and data exploitation;
- **Train, support and advise** research partners towards transparent data management;
- **Support networking** of research stakeholders in French-speaking sub-Saharan Africa, in order to share knowledge, experiences, resources and skills;
- This open science network in French-speaking sub-Saharan Africa will work to **develop connections with other regions, initiatives and networks** (pan-African, international, and particularly English-speaking);
- **Interact** with the institutional authorities for French-speaking sub-Saharan African teaching and research establishments, to create suitable policies and to allow the establishment of the required means for best data governance.

The participants of the Open Science in the South Symposium are determined to support the creation and organization of the network by gathering their strengths and skills for research data management and sharing.

Dakar, Senegal, 25 October 2019.

4. Definitions

Open science (OECD, 2015): "Open science encompasses unhindered access to scientific articles, access to data from public research, and collaborative research enabled by ICT tools and incentives. Broadening access to scientific publications and data is at the heart of open science, so that research outputs are in the hands of as many as possible, and potential benefits are spread as widely as possible:

Open science (1) promotes a more accurate verification of scientific results. By combining the tools of science and information technologies, scientific enquiry and discovery can be sped up for the benefit of society. Open science (2) reduces duplication in collecting, creating, transferring and re-using scientific material. Open science increases productivity in an era of tight budgets. Open science (3) results in great innovation potential and increased consumer choice from public research. Open science promotes citizens' trust in science. Greater citizen engagement leads to active participation in scientific experiments and data collection." (from: https://www.oecd.org/science/inno/open-science.htm)

Research data (OECD, 2006): "In the context of these Principles and Guidelines, 'research data' are defined as factual records (numerical scores, textual records, images and sounds) used as primary sources for scientific research, and that are commonly accepted in the scientific community as necessary to validate research findings. A research data set constitutes a systematic, partial representation of the subject being investigated.

This term does not cover the following: laboratory notebooks, preliminary analyses, and drafts of scientific papers, plans for future research, peer reviews, or personal communications with colleagues or physical objects (e.g. laboratory samples, strains of bacteria and test animals such as mice). Access to all of these products or outcomes of research is governed by different considerations than those dealt with here."

Open Data: according to the World Bank (World Bank, 2019), "data are considered to be 'open' if anyone can freely use, re-use and redistribute them, for any purpose, without restrictions. [...]. To be considered 'open,' the data must be re-usable, meaning they can be downloaded in open formats and read by software, and users have a legal right to re-use it."

According to the OLF (Office de la langue française, 2013), open data are "raw, non-personal, freely available data that are produced or collected by a public or private body and are accessible to citizens online. Open data are ideally provided in an open (non-proprietary) format that facilitates their re-use [...]."

Data warehouse: data platform/portal; IT system allowing the collection, storage/integration, management and dissemination/sharing of data.

FAIR principles (GO FAIR, 2019)

- **Findable:** "The first step in (re)using data is to find them. Metadata and data should be easy to find for both humans and computers. Machine-readable metadata are essential for automatic discovery of datasets and services, so this is an essential component of the *FAIRification* process."
- **Accessible:** "Once the user finds the required data, she/he needs to know how can they be accessed, possibly including authentication and authorisation."
- **Interoperable:** "The data usually need to be integrated with other data. In addition, the data need to interoperate with applications or workflows for analysis, storage, and processing."

- **Reusable:** "The ultimate goal of FAIR is to optimise the reuse of data. To achieve this, metadata and data should be well-described so that they can be replicated and/or combined in different settings."

(from: https://www.go-fair.org/fair-principles/)

The 15 FAIR principles are described in Wilkinson et al., 2016, Dzale, 2016.

5. Reference documents

- World Bank, 2019: Open Data in 60 Seconds.
  http://opendatatoolkit.worldbank.org/en/open-data-in-60-seconds.html

- CODESRIA, 2016: Dakar Declaration.
  https://www.codesria.org/spip.php?article2595&lang=en

- Dzale, Esther, 2016: Les principes FAIR. Cahiers des Techniques de l'INRA.
  https://www6.inra.fr/cahier_des_techniques/content/download/5106/51886/version/5/file/CTh2018bis _Art1 _DZA-4.pdf

- OECD, 2015: Open science, https://www.oecd.org/science/inno/open-science.htm

- OECD, 2006: OECD Principles and Guidelines for Access to Research Data from Public Funding. https://www.oecd.org/sti/inno/38500813.pdf

- Office de la langue française, 2013: http://www.gdt.oqlf.gouv.qc.ca/ficheOqlf.aspx?Id_Fiche=26519745

- OCSDnet: Open Science Manifesto, https://ocsdnet.org/manifesto/open-science-manifesto/

- Sci-GaIA, 2016: Dakar Declaration on Open Science in Africa, http://www.sci-gaia.eu/dakar-declaration/

- UNESCO, 2013: Policy guidelines for the development and promotion of open access. https://unesdoc.unesco.org/ark:/48223/pf0000215863

- Wilkinson, M. D., Dumontier, M., Aalbersberg, I. J., Appleton, G., Axton, M., Baak, A., ... & Bouwman, J. (2016). Comment: the FAIR Guiding Principles for scientific data management and stewardship. Scientific Data 3: 9. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4792175/

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[i] https://opensciencesud.sciencesconf.org/