National Open Science Policy

PREFACE

LIST OF ABBREVIATIONS AND ACRONYMS

GLOSSARY

CHAPTER ONE: INTRODUCTION

CHAPTER TWO: POLICY DIRECTIONS

2.1. Vision

A vibrant knowledge-based digital economy and society driven by open science.

2.2 Policy Goal

The Policy goal is to enhance the efficiency, effectiveness and impact of science and research, increase innovation capacity, improve the trust of society in science, foster a culture of openness, collaboration and knowledge sharing for the benefit of society in <Country>.

2.3 Policy Outcomes

The desired Policy outcomes are:

i. Enabling legal, policy and regulatory environments at national and institutional levels, and embedded open science practices across research activities.

ii. Open science infrastructures and services are set up and strengthened.

iii. The availability of human resources for open science is ensured through capacity building, including researcher training.

iv. Research assessment is reformed to reward and incentivise quality, impact and openness.

2.4. Specific Policy Objectives

The specific Policy objectives are:

i. Put in place an enabling policy environment for open science, including legislative initiatives where appropriate;

ii. Set up and strengthen open science infrastructures and services;

iii. Invest in human resources and capacity building for open science;

iv. Foster a culture of open science among researchers and provide incentives and rewards for open science practice at all levels (assessment of institutions, research projects and individual researchers);

2.5 Core values and guiding principles

The Policy is based on the **core values** of open science listed in the UNESCO Recommendation on Open Science:

i. **Quality and integrity**: open science should respect academic freedom and human rights and support high-quality research by bringing together multiple sources of knowledge and making research methods and outputs widely available for rigorous review and scrutiny, and transparent evaluation processes that reward and incentivise the conduct of open science.

ii. **Collective benefit:** as a global public good, open science should belong to humanity in common and benefit humanity as a whole. To this end, scientific knowledge should be openly available and its benefits universally shared. The practice of science should be inclusive, sustainable and equitable, also in opportunities for scientific education and capacity development.

iii. **Equity and fairness**: open science should play a significant role in ensuring equity among researchers, enabling fair and reciprocal sharing of scientific inputs and outputs and equal access to scientific knowledge to both producers and consumers of knowledge regardless of location, nationality, race, age, gender, income, socio-economic circumstances, career stage, discipline, language, religion, disability, ethnicity or migratory status, or any other grounds.

iv. **Diversity and inclusiveness**: open science should embrace a diversity of knowledge, practices, workflows, languages, research outputs and research topics; as well as diversity of research communities as well as the wider public and knowledge holders beyond the traditional scientific community, including indigenous peoples and local communities.

The following **guiding principles for open science,** listed in the UNESCO Recommendation on Open Science, provide a framework for enabling conditions and practices of this Policy:

i. **Transparency, scrutiny, critique and reproducibility**: increased openness should be promoted in all stages of the scientific endeavour, with the view to reinforcing the strength and rigour of scientific results, enhancing the societal impact of science and increasing the capacity of society as a whole to solve complex interconnected problems. Increased openness leads to increased transparency and trust in scientific information and reinforces the fundamental feature of science as a distinct form of knowledge based on evidence and tested against reality, logic and the scrutiny of scientific peers.

ii. **Equality of opportunities**: all scientists and other open science actors and stakeholders, regardless of location, nationality, race, age, gender, income, socio-economic circumstances, career stage, discipline, language, religion, disability, ethnicity or migratory status, or any other grounds, have an equal opportunity to access, and contribute to and benefit from open science.

iii. **Responsibility, respect and accountability**: with greater openness comes greater responsibility for all open science actors, which, together with public accountability, sensitivity to conflicts of interest, vigilance as to possible social and ecological consequences of research activities, research integrity and respect for ethical principles and implications pertaining to research, should form the basis for good governance of open science.

iv. **Collaboration, participation and inclusion**: collaborations at all levels of the scientific process, beyond the boundaries of geography, language, generations and resources, should become the norm, and collaboration between disciplines should be promoted, together with the full and effective participation of societal actors and inclusion of knowledge from marginalised communities in solving problems of social importance.

v. **Flexibility**: due to the diversity of science systems, actors and capacities, as well as the evolving nature of supporting information and communication technologies, there is no one-size-fits-all way of practising open science. Different pathways of transition to and practice of open science need to be encouraged while upholding the above-mentioned core values and maximising adherence to the other principles hereby presented.

vi. **Sustainability**: to be as efficient and impactful as possible, open science should build on long-term practices, services, infrastructures and funding models that ensure the equal participation of scientific producers from less privileged institutions. Open science infrastructures should be organised and financed upon an essentially not-for-profit and long-term vision, which enhance open science practices and guarantee permanent and unrestricted access to all, to the largest extent possible.

CHAPTER THREE: POLICY PRIORITY AREAS

The Policy has the following four priority areas:

i. Enabling policy environment for open science;

ii. Open science infrastructures and services;

iii. Human resources and capacity building for open science;

iv. A culture of open science among researchers and incentives and rewards for open science practice at all levels (assessment of institutions, research projects and individual researchers);

Priority Area 1: Enabling policy environment for open science

Policy Statement
The Policy will put in place an enabling policy environment for open science, including legislative initiatives where appropriate.

Strategies
Government, universities and research institutions will
i. Implement policies and strategies for open science. Policies and strategies for science should be based on the core values and principles of open science.
ii. Foster the transition to open science and provide appropriate guidance and training to ensure the implementation of the policy.
iii. Introduce responsible research and researcher evaluation and assessment practices, which incentivise quality science, recognizing the diversity of research outputs, activities and missions.
iv. Support the necessary infrastructure and services such as open access repositories for publications and data, and open access platforms and journals.
v. Require immediate open access under an open content licence, such as Creative Commons Attribution licence (CC BY). It's required that a machine-readable electronic copy of the published version or the final peer-reviewed manuscript accepted for publication of all peer reviewed publications produced in Nigeria, is deposited in a repository and the full-text of all such publications be made openly available immediately. If a journal's permitted embargo period is longer than these, authors should either negotiate with the publisher to retain the rights so as to comply with this policy, or find a journal or publishing platform that enables them to comply without the need for negotiation.
vi. Favour and support inclusive publishing and distribution channels that don't exclude authors on economic grounds, taking advantage of and supporting open access journals that do not charge Article Processing Charges and repositories.

vii. Ensure, where possible, that scientific outputs related to publications (e.g. research data, software, source code, source materials, workflows and protocols) should also be made openly available in suitable repositories and linked to publications immediately upon publication.

viii. Require researchers to retain ownership of copyright and to licence to publishers only those rights necessary for publication.

ix. Encourage researchers and PhD students to post preprints of their work under a CC BY licence on a preprint platform/open access repository and prominently state whether or not it has undergone peer review.

x. While the dominant type of scientific publication in many disciplines is the journal article, strongly encourage researchers to provide open access to other types of publications such as monographs, book chapters, conference proceedings, grey literature, reports, etc.

xi. For purposes of individual or institutional evaluation of the research output of the institution and its members, only be considered as publications whose metadata and full texts are deposited in repositories according to the requirements stated above.

xii. Universities will require that an approved final version of the thesis or dissertation is deposited in a repository. Such thesis or dissertation will be made openly available to the public after filing, unless the graduate student obtains an embargo. Graduate and postgraduate students may delay the date their theses or dissertations become available in an open access repository by specifying the embargo period – up to two years – upon filing. Upon compelling circumstances, the Universities may grant embargoes of longer than two years or embargoes requested after filing.

xiii. Government research agencies, public research funders, universities and research institutions will follow the principle "as open as possible as closed as necessary" and will require that research data and other research outputs (such as software or models) are handled according to the CARE and FAIR principles. If data cannot be open due to legal, privacy or other concerns (for example personal or sensitive data, sacred and secret indigenous knowledge, rare, threatened or endangered species) this should be clearly explained. Researchers are required to deposit the research data needed to validate the results presented in scientific and scholarly publications and their metadata, preferably in a research data repository, and provide open access to it under an open content licence, such as Creative Commons (CC BY or CC0[1]); as well as provide information (via the same repository) about any research output or any other tools and instruments needed to re-use or validate the data.). Some data that are not openly available may nonetheless be shared among specific users according to defined data sharing agreements and access criteria made by local, national or regional pertinent governing instances. Tools and protocols for pseudonymising and anonymising data, as well as systems for mediated access, could facilitate data availability, so that as much data as possible can be shared as appropriate.

xiv. Researchers are required to prepare a Data Management Plan showing how data and other research outputs will be managed through the research process and handled according to the CARE and FAIR data principles and keep it updated throughout the course of the research project.

xv. Data needed for policy making and innovation in government and the private sector (e.g. geospatial, earth observation and environment, meteorological, statistics, mobility, productivity data and so on) should be made available in open, machine-readable, accessible, findable and re-usable formats under an open content licence, such as Creative Commons (CC0).

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[1] https://creativecommons.org/publicdomain/zero/1.0/

xvi. Request the use of Persistent identifiers such as ORCID, Handle/DOIs/ARKs, ROR or others which are free or affordable.

xv. Mainstream gender equality aspects into open sciences policies, strategies and practices.

xvi. Enhance the inclusion of community and participatory science as integral parts of open science policies and practices. Design models that allow co-production of knowledge with communities and establish guidelines to ensure the recognition of such collaborations.

xvii. Foster equitable public-private partnerships for open science and engage the private sector in open science, provided that there is appropriate certification and regulation to prevent vendor lock-in, predatory behaviour and unfair and/or inequitable extraction of profit from publicly funded scientific activities.

Priority Area 2: Open science infrastructures and services

Policy Statement
The Policy will set up and strengthen open science infrastructures and services.

Strategies
Government, universities and research institutions will

i. Recognize that open labs, open science platforms and repositories for publications, research data and source codes, software forges and virtual research environments, and digital research services, in particular those that allow to identify unambiguously scientific objects by persistent unique identifiers (e.g. DOI, Handle, ORCID, ROR), are among the critical components of open science infrastructures. They provide essential open and standardised services to manage and provide access, portability, analysis and federation of data, scientific literature, thematic science priorities or community engagement. Open science infrastructures are often the result of community-building efforts, which are crucial for their long-term sustainability and therefore should be not-for-profit and guarantee permanent and unrestricted access to all public to the largest extent possible.

ii. Acknowledge that open science both requires and merits systematic and long-term strategic investment in science technology and innovation, with emphasis on investment in technical and digital infrastructures and related services, including their long term maintenance. These investments should include both financial and human resources.

iii. Ensure adequate investment in reliable Internet connectivity and bandwidth for use by scientists and science users across the country, with interconnectivity to the region and the world; and in non-commercial open science infrastructures and services, including high-performance computing, cloud computing, research data and publications repositories, open access journals.

vi. Participate in North-South, South-South, triangular cooperation and national collaborations to optimise infrastructure use and joint strategies for shared, multinational, regional and national open science platforms.

Priority Area 3: Human resources and capacity building for open science

Policy Statement

The Policy will ensure investments in human resources and capacity building for open science.

Strategies

Government, universities and research institutions will

i. Provide systematic and continuous capacity building on open science practices (at the institutional and national levels), including technical skills and capacities in digital literacy, digital collaboration practices, data science and stewardship, curation, long-term preservation and archiving, information and data literacy, web safety, content ownership and sharing, as well as software engineering and computer science.

ii. Agree on a framework of open science competencies aligned with specific disciplines for researchers at different career stages, as well as for actors active in the private and public sectors; and develop skills and training programmes in support of the attainment of these competencies. A core set of data science and data stewardship skills, skills related to intellectual property law, as well as skills needed to ensure open access and engagement with society, as appropriate, should be regarded as part of the foundational expertise of all researchers and incorporated into higher education research skills curricula.

iii. Invest in and promote advanced education and the professionalisation of roles in data science and data stewardship. Enabling open science also requires data governors capable, in cooperation with the scientific community, of setting strategic directions for data management and openness at the national or local levels and advanced and professional data stewards who manage and curate data according to CARE and FAIR principles.

iv. Allocate resources for training and awareness-raising on open science. Researchers should have access to appropriate training and support activities on open science on their institutional level.

v. Promote the use of Open Educational resources (OER), as an instrument for open science capacity building.

vi. Support science communication accompanying open science practices with a view to the dissemination of scientific knowledge to scholars in other research fields, decision-makers and the public at large. Dissemination of scientific information through scientific journalism and media, popularisation of science, open lectures and various social media communications builds public trust in science while increasing the engagement of societal actors beyond the scientific community.

Priority Area 4: Fostering a culture of open science and aligning incentives and rewards for open science

Policy Statement

The Policy will reform research assessment and evaluation (at institutional, research projects and individual researchers levels - research and career evaluation and awards systems) to reward and incentivise quality, impact and openness.

Strategies

Government, universities and research institutions will

i. Develop a framework for research assessment and evaluation that incentivizes research quality and open science behaviours and practices that:

a) build on the existing global efforts to improve the ways in which the scientific outputs are evaluated with an increased focus on the quality of research outputs rather than quantity, and by fit-for-purpose use of diversified indicators and processes that forego the use of journal based metrics such as the journal impact factor, consider the intrinsic merit of the work, not the title of the journal or publisher, when research outputs are assessed;

b) give value to all relevant research activities and scientific outputs including high-quality FAIR data and metadata, well-documented and reusable software, protocols and workflows, machine-readable summaries of findings, and teaching, outreach and engagement of societal actors;

c) take into account evidence of research impact and knowledge exchange, such as widening participation in the research process, influence on policy and practice and engaging in open innovation with partners beyond academia;

d) take into account the fact that assessment of researchers against open science criteria should be fit for different stages of careers, with particular attention to researchers at the beginning of their careers;

e) ensure that the practice of open science is well known, and is taken into account as a scientific and academic recruitment and promotion criterion.

ii. Combine efforts of research funders, universities, research institutions, publishers and editors, and scientific societies across disciplines and countries, to change the current research culture and to recognize researchers for sharing, collaborating and engaging with other researchers and society, and to support, in particular, early-career researchers to drive this cultural change. iii. Ensure diversity in scholarly communications with adherence to the principles of open, transparent and equitable access and supporting non-commercial publishing models and collaborative publishing models with no article processing charges or book processing charges.

iv. Prevent predatory publishing behaviours and promote high-quality and responsible research, explore the potential of open science practices to reduce scientific misconduct, including the fabrication and falsification of results, violation of scientific ethical norms, and plagiarism.

CHAPTER FOUR: IMPLEMENTATION ARRANGEMENTS

4.1 Institutional Arrangements

4.2 Implementation Plan

4.3 Monitoring and Evaluation

4.4. Implementation Cost

ANNEXES

Annex 1: Implementation Plan for the National Open Science Policy

Priority Area 1: Enabling policy environment for open science			
Policy Statement: The Policy will put in place an enabling policy environment for open science, including legislative initiatives where appropriate			
OBJECTIVE	**STRATEGY**	**RESPONSIBILITY**	**TIMEFRAME**
Priority Area 2: Open science infrastructures and services			
Policy Statement: The Policy will set up and strengthen open science infrastructures and services			
OBJECTIVE	**STRATEGY**	**RESPONSIBILITY**	**TIMEFRAME**
Priority Area 3: Human resources and capacity building for open science			
Policy Statement: The Policy will ensure investments in human resources and capacity building for open science			
OBJECTIVE	**STRATEGY**	**RESPONSIBILITY**	**TIMEFRAME**
Priority Area 4: Fostering a culture of open science and aligning incentives and rewards for open science			
Policy Statement: The Policy will reform research assessment and evaluation (at institutional, research projects and individual researchers levels - research and career evaluation and awards systems) to reward and incentivise quality, impact and openness			
OBJECTIVE	**STRATEGY**	**RESPONSIBILITY**	**TIMEFRAME**

Annex 2: Monitoring and Evaluation Framework

Priority Area 1: Enabling policy environment for open science						
Outcome: Enabling legal, policy and regulatory environments at national and institutional levels, and embedded open science practices across research activities						
Objectives	**Output (s)**	**Performance Indicator(s)**	**Baseline**	**Target**	**Source (s) of Verification**	**Assumptions/Risks**
Priority Area 2: Open science infrastructures and services						
Outcome: Open science infrastructures and services are set up and strengthened						
Objectives	**Output (s)**	**Performance Indicator(s)**	**Baseline**	**Target**	**Source (s) of Verification**	**Assumptions/Risks**
Priority Area 3: Human resources and capacity building for open science						
Outcome: The availability of human resources for open science is ensured through capacity building, including researcher training						
Objectives	**Output (s)**	**Performance Indicator(s)**	**Baseline**	**Target**	**Source (s) of Verification**	**Assumptions/Risks**
Priority Area 4: Fostering a culture of open science and aligning incentives and rewards for open science						
Outcome: Research assessment is reformed to reward and incentivise quality, impact and openness						
Objectives	**Output (s)**	**Performance Indicator(s)**	**Baseline**	**Target**	**Source (s) of Verification**	**Assumptions/Risks**

Annex 3: Costing Summary