

ACADEMY OF SCIENCE OF SOUTH AFRICA OPEN SCIENCE POLICY



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



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Abbreviations

AI	Artificial Intelligence
AOSP	African Open Science Platform
ASD	African Scientists Directory
ASSAf	Academy of Science of South Africa
CARE	Collective Benefit, Authority to Control, Responsibility, and Ethics
CC	Creative Commons
CPD	Continuous Professional Development
DCC	Digital Curation Centre
DCDT	Department of Communities and Digital Technologies
DHET	Department of Higher Education and Training
DIRISA	Data Intensive Research Initiative of South Africa
DMP	Data Management Plan
DOAJ	Directory of Open Access Journals
DIRISA	Data Intensive Research Initiative of South Africa
DOAJ	Directory of Open Access Journals
DOI's	Digital Object Identifiers
DSI	Department of Science and Innovation
FAIR	Findable, Accessible, Interoperable, Reproducible/Reusable (incl. transparent)
HPC	High-performance Computing
IAP	InterAcademy Partnership
ICT	Information and Communication Technology
IKS	Indigenous Knowledge Systems
IPR	Intellectual Property Rights
NACI	National Advisory Council on Innovation
NASAC	Network of African Science Academies
NDP	National Development Plan
NICIS	National Integrated Cyber Infrastructure System
NIPMO	National Intellectual Property Management Office



NRF	National Research Foundation
NSI	National System of Innovation
ORCIDiDs	Open Researcher and Contributor Identifiers
OSI	Open Source Initiative
PAIA	Promotion of Access to Information Act
PKP OJS	Public Knowledge Project Open Journal Systems
POPIA	Protection of Personal Information Act
RDM	Research Data Management
ROR	Research Organisation Registry
SA RIR	SA Research Infrastructure Roadmap
SAJS	South African Journal of Science
SANReN	South African National Research Network
SAOSC	South African Open Science Cloud
SARDA	South African Research Data Archive
SciELO SA	Scientific Electronic Library Online South Africa
SDGs	Sustainable Development Goals
SES	Science Engagement Strategy
STI	Science, Technology and Innovation
TENET	Tertiary Education and Research Network of South Africa
TRUST	Transparency, Responsibility, User Community, and Sustainability, and Technology
TWAS	The World Academy of Sciences
UNESCO	United Nations Educational, Scientific and Cultural Organisation



SECTION A

1. Introduction

The Academy of Science of South Africa (ASSAf) acknowledges the inherent value, myriad benefits, and the profound importance of open science. Open science is an integral part of the ongoing digital transformation¹ of research and scientific communication at ASSAf.

By embracing open science, ASSAf seeks to achieve the following objectives:

- Foster scientific collaborations and information sharing for the betterment of both science and society, towards more innovations.
- Promote the adoption of open science principles and practices among the ASSAf Secretariat, its Members, stakeholders, and the various publics it engages with, including individual researchers (ASSAf Members), research teams, institutions, and funders.
- Encourage the use of open science principles and practices to enhance research ethics, quality, integrity, transparency, and reproducibility.
- Facilitate the sharing of quality research outputs, data and results, promoting collaboration, participation and inclusion, and accelerating scientific progress and innovation, in a transparent and ethical manner, in alignment with the CARE (Collective Benefit, Authority to Control, Responsibility, and Ethics)² principles.
- Increase the visibility and impact of ASSAf research by widely disseminating it and making it equally and openly accessible to all publics for all to benefit.
- Ensure the quality and integrity of ASSAf research outputs through facilitating opportunities for scrutiny and critique, rigorous peer-review and validation, whilst maintaining the highest standards of integrity amongst its actors.
- Ensure that all ASSAf knowledge systems are aligned with the TRUST (Transparency, Responsibility, User Community, and Sustainability, and Technology)³ principles.
- Stimulate and strengthen the contribution of indigenous knowledge to social and economic development in South Africa.
- Extend the processes of knowledge creation, evaluation, and communication, beyond the traditional scientific community, involving societal actors at large, thereby promptly translating publicly funded research into the public sphere, forging a vital connection between researchers and society to ensure that communities gain a profound appreciation of the significance of publicly funded scientific endeavours.
- Ensure the implementation model is sustainable in respect of long-term practices, services, infrastructure, and funding models.
- Recognise the need to implement a flexible approach for the implementation of open science at ASSAf that is context driven.

¹ Following discussions at the ASSAf Council Strategic Meetings in 2022 and 2023, the Council identified several areas of focus out of which the following thematic areas were prioritised: (a) climate change, (b) energy sustainability, **(c) digital transformation**, and (d) future of society.

² <https://www.gida-global.org/care>

³ <https://www.nature.com/articles/s41597-020-0486-7>

- Advocate for, democratise knowledge and facilitate equality of opportunity within the National System of Innovation (NSI).
- Through applying open science principles and practices, foster enhanced socio-economic development in South Africa and on a global scale.

The present ASSAf Open Science Policy serves as a guiding document for the ASSAf Secretariat, its Members, stakeholders, and the publics ASSAf engage with concerning all research outputs produced under the auspices of ASSAf. This policy aims to effectively implement, promote, and facilitate the widespread adoption of open science principles across all sectors of society.

2. Definition

This policy adheres to the definition of open science as outlined by the UNESCO Recommendation on Open Science⁴. According to this definition, open science is an inclusive concept that encompasses various movements and practices aimed at making scientific knowledge freely accessible, available, and reusable in multiple languages. It also aligns with the FAIR principles, which emphasise that scientific datasets should be findable, accessible, interoperable, and reproducible/reusable (including transparent). The implementation of the FAIR principles shall consider an underlying principle of data being 'as open as possible, as closed as necessary'⁵.

Open scientific knowledge pertains to scholarly and scientific publications, research data, metadata, collaboration, innovation, peer-review, educational resources, software, source code, hardware, research methodologies and evaluation processes. These resources should be available in the public domain or under appropriate copyrights and licenced under open licences, allowing access, reuse, repurposing, adaptation, and distribution under specific conditions. Accessibility should be provided to all actors, regardless of their location, nationality, race, age, gender, income, socio-economic circumstances, career stage, discipline, language, religion, disability, ethnicity, migratory status, or any other grounds. The policy encompasses all scientific disciplines, including basic and applied sciences, natural and social sciences, as well as the humanities.

3. Scope

This policy shall be applicable to:

- all publicly funded ASSAf research processes and outputs; and
- data acquired or generated by ASSAf, utilising public funds that may have broader research use.

⁴ <https://en.unesco.org/science-sustainable-future/open-science/recommendation>

⁵ 'As open as possible, as closed as necessary' - means that research output shall be open and consistent with the objectives of this Open Science Policy, unless statutory, ethical, intellectual property, contractual or commercial, environmental or research credibility considerations would result in untenable risk to the key research subject(s) or stakeholders.



For clarity, publicly funded ASSAf research outputs shall be interpreted to mean outputs from 'research and development undertaken by or on behalf of ASSAf by individuals, research teams or publicly funded research performing organisations, using any funds allocated by a state funding agency'.

Where research that is funded by private sector or philanthropic funders is made subject to contractual conditions requiring open science, this policy shall be applied on a best-effort basis and within limitation that respects the relevant contractual funding conditions.

4. Policy Environment

South Africa has a well-established system of science, technology, and innovation (STI), supported by a strong policy framework that promotes the growth and development of the sector. The National Development Plan (NDP)⁶ has identified STI as the primary drivers of economic growth, job creation and socio-economic reform. The White Paper on Science, Technology, and Innovation (2019)⁷, guides the country's STI policies, outlining the government's vision for science, technology, and innovation in the country.

The South African government's STI policy aims to promote open science, and it recognises the potential benefits of open science, such as increasing the impact of research, improving collaboration, and enhancing the public's trust in science (refer to the objectives in section 1 of this document).

The ASSAf Open Science Policy is set within this broader national and governmental policy context of socio-economic development that takes cognisance of global issues codified within the Sustainable Development Goals (SDGs)⁸. The Policy complements the Academy's broader Strategic Plan 2021/22 – 2024/25, Transformation Strategy (2023/24) and Science Engagement Strategy (2023/24).

Several policies, science entities, and initiatives with which the ASSAf Open Science Policy is aligned have advanced open science in South Africa this far and continue to do so. These include:

- **UNESCO Recommendation on Open Science**⁹. The UNESCO Recommendation on Open Science provides an international framework for open science policy and practice aimed at reducing the technological and knowledge divide between and within countries.
- **African Open Science Platform (AOSP)**¹⁰. The AOSP landscape study¹¹ informed the implementation of the AOSP. The AOSP aims to put African scientists at the cutting edge of contemporary, data-intensive science.

⁶ <https://www.gov.za/issues/national-development-plan-2030>

⁷ https://www.gov.za/sites/default/files/gcis_document/201912/white-paper-science-technology-and-innovation.pdf

⁸ <https://sdgs.un.org/goals>

⁹ <https://unesdoc.unesco.org/ark:/48223/pf0000379949>

¹⁰ <https://aosp.org.za/>

¹¹ <http://hdl.handle.net/20.500.11911/177>

- **National Development Plan (NDP)**. The NDP recognises the importance of open science in promoting innovation and economic growth. The NDP supports open science through investing in research and development, promoting collaboration, enhancing access to data, and supporting open access.
- The **White Paper on Science, Technology and Innovation (2019)** is also referred to as the STI Policy. The White Paper emphasises that adopting an open science approach is essential for facilitating broader access to existing information, which is also critical for effectively implementing institutional science engagement strategies.
- The **Intellectual Property Rights from Publicly Funded Research and Development Act**¹² will be reconsidered to ensure that it supports the FAIR guiding principles for scientific data management and storage.
- **National Open Science Policy**¹³. The draft DSI National Open Science Policy, which has been introduced to parliament, requires both open access to publicly funded scholarly publications and research outputs, and an open data policy that facilitates equal opportunity of access to research data. The policy also endorses the depositing, discovery and dissemination of data and metadata in a manner consistent with the FAIR principles – making data and metadata FAIR.
- **National Data and Cloud Policy (NDCP)**¹⁴. The NDCP promotes the open sharing of data, the use of cloud computing for research, and the development of open science infrastructure.
- **DHET Research Outputs Policy (2015)**¹⁵. The DHET Research Outputs Policy (2015) states that only articles published in scholarly journal titles listed on a DHET accredited list will receive subsidy from the DHET. This is an important incentive for South African higher education institutions and a major income stream, among other income streams. The Directory of Open Access Journals (DOAJ)¹⁶ became an accredited DHET list in 2021¹⁷.
- **Protection of Personal Information Act (POPIA)**¹⁸. POPIA gives effect to the constitutional right to privacy, balanced with the constitutional values of democracy and openness, and the need for economic and social progress, within the framework of the information society, which require the removal of unnecessary impediments to the free flow of information, including personal information. Personal information should be collected and used in a responsible and ethical manner that complies with the requirements of POPIA, while also promoting the sharing of scientific knowledge and data in a way that is consistent with the principles of open science. A Code of Conduct for Research¹⁹, as per Chapter 7 of the POPIA, providing both legal and practical guidelines on the interpretation of POPIA in the research sector, has been submitted by ASSAf to the Information Regulator for approval and is currently being revised.

¹² https://www.gov.za/sites/default/files/gcis_document/201409/33433675.pdf

¹³ Work in progress

¹⁴ Work in progress

¹⁵ <https://www.dhet.gov.za/Policy%20and%20Development%20Support/Research%20Outputs%20Policy%202015.pdf>

¹⁶ <https://doaj.org/>

¹⁷ <https://blog.doaj.org/2021/02/04/south-african-government-places-doaj-on-list-of-accredited-journals/>

¹⁸ <https://popia.co.za/>

¹⁹ <https://www.assaf.org.za/wp-content/uploads/2023/04/ASSAf-POPIA-Code-of-Conduct-for-Research.pdf>



- **Promotion of Access to Information Act (PAIA) 2 of 2000**²⁰. This Act governs the access to information held by public and private bodies. PAIA promotes transparency and the right to access information, which aligns with the principles of open science.
- **Copyright Act No 98 of 1978**²¹. The South African Copyright Amendment Bill is currently under consideration by government which remedies the gaps in the existing Act concerning the digital space, and has provisions for open access, open science and open educational resources, persons with disabilities, fair use, and digitisation and preservation of collections.
- **The Intellectual Property Rights (IPR) from Publicly Financed Research and Development Act (No. 51 of 2008)**²², makes provision that intellectual property emanating from publicly financed research and development is identified, protected, utilised, and commercialised for the benefit of South Africa. Databases, or collections of data, fall within the scope of the IPR Act and are therefore likely to be viewed as potential Intellectual Property (IP), requiring declaration to the National Intellectual Property Management Office (NIPMO). Following evaluation of a disclosure, researchers may publish their research findings for the public good.
- **Indigenous Knowledge Act (No. 6 of 2019)**. Open Science provides an enabling environment for researchers in Indigenous Knowledge Systems (IKS), and the principle of 'as open as possible, as closed as necessary' is vital in the prevention of exploitation of indigenous knowledge.
- **National Research Big Data Strategy**²³. This strategy does not explicitly address open science. However, the strategy focuses on leveraging big data to advance research and innovation in various sectors. It indirectly supports open science principles since big data and open science are intertwined in their pursuit of advancing scientific knowledge through data-driven research, fostering interdisciplinary collaboration, promoting transparency, and finding innovative approaches to addressing societal challenges.
- **SA Research Infrastructure Roadmap (SARIR)**²⁴. This roadmap is a strategic plan that outlines the priorities for research infrastructure in South Africa. The SARIR identifies several ways in which research infrastructure can benefit or support open science. It identifies the need for a national data repository, open source software, cloud computing for research (see *South African Open Science Cloud (SAOSC)* below), etc.
- **National Integrated Cyber Infrastructure System (NICIS)**²⁵. NICIS is committed to supporting open science by providing researchers with the tools and resources they need to share their research data and findings globally. Services provided by NICIS in support of open science include Research Data Management (RDM), high-speed connectivity to research and education (through SANReN), and research computing resources (high-performance computing (HPC) clusters,

²⁰ <https://www.gov.za/documents/promotion-access-information-act>

²¹ https://www.gov.za/sites/default/files/gcis_document/201504/act-98-1978.pdf

²² <https://www.gov.za/documents/intellectual-property-rights-publicly-financed-research-and-development-act-regulations-1>

²³ https://www.csir.co.za/sites/default/files/Documents/BDpublicationFinal22021003_0.pdf

²⁴ https://www.gov.za/sites/default/files/gcis_document/201610/sa-research-infrastructure-road-map-a.pdf

²⁵ <https://www.nicis.ac.za/>



cloud computing services (through the *South African Open Science Cloud (SAOSC)*), and data visualisation tools.

- **South African Open Science Cloud (SAOSC)²⁶**. SAOSC is a national research infrastructure that provides a secure, reliable, and scalable platform for the storage, management, and sharing of research data.
- **National Research Foundation (NRF) Statement on Open Access²⁷**. This statement, which was released in 2015, requires that all research funded by the NRF be made available in open access format within 12 months of publication.
- **ASSAf Strategic Plan for 2020/21 – 2024/25²⁸**. ASSAf is a thought leader in open science in SA and has been actively collaborating with the DSI in this regard. It was instrumental in doing initial groundwork towards the drafting of a *National Open Science Policy*. The ASSAf Open Science Policy and the implementation thereof, are aligned with the following ASSAf strategic outcomes:
 - Outcome 3: Mobilising Knowledge
 - Outcome 4: Facilitating Partnerships
 - Outcome 5: Scholarship Support
- **ASSAf Transformation Strategy (2023/24)**. This Strategy includes digital transformation, of which open science is an integral part of the ongoing digital transformation of research and scientific communication.
- **Draft ASSAf Intellectual Property Rights Policy (2023/24)²⁹**. The purpose of this policy will be to establish guidelines and principles regarding the ownership, protection, and management of intellectual property within ASSAf. It will help define the rights and responsibilities of ASSAf, its employees, and other stakeholders in relation to intellectual property, within the open science environment.
- **Draft ASSAf Science Engagement Strategy (2023/24)³⁰**. The purpose of the ASSAf Science Engagement Strategy is to facilitate and enhance the interaction and communication between the scientific community and the broader society, among others. Open science is essential for effective science engagement as it promotes transparency, accessibility, collaboration, and relevance, fostering a more inclusive and participatory scientific culture that encourages meaningful interactions between the scientific community and the broader society.

²⁶ Work in progress

²⁷ <https://www.nrf.ac.za/wp-content/uploads/2022/02/NRF-Open-Access-Statement.pdf>

²⁸ https://static.pmg.org.za/ASSAf_SP_2020-2025.pdf

²⁹ Work in progress

³⁰ Work in progress

SECTION B

5. ASSAf Open Science Framework

5.1 Purpose of this Strategy

The ASSAf Open Science Policy is aligned with various policies, strategies and initiatives which aims to democratise knowledge and facilitate equality of opportunity within the National System of Innovation (NSI), leading to environmentally sustainable and inclusive socio-economic development.

The ASSAf policy outlines the Academy's commitment to open science, including its support for open access publishing, open data sharing, and transparent research practices not only within its own research output activities but also open science of national and international research. It also provides advocacy, guidance, and resources for ASSAf Members and the NSI who wish to engage in open science practices related to ASSAf.

6. ASSAf Open Science Principles

The following guiding principles shall inform the adoption and implementation of open science at ASSAf.

6.1 Open Access

ASSAf supports the principle of open access to scientific/research publications. This means that all ASSAf scientific/research publications, including peer-reviewed articles and evidence-based studies, among others, will be made available online, without any barriers to access, paywalls or subscription fees.

Open access will be implemented as follows:

- All ASSAf branded research output, output to which ASSAf contributed, or output generated/funded/commissioned by ASSAf, will be made openly and freely discoverable and accessible to all, in compliance with the CARE and FAIR principles.
- An approach of "as open possible, as closed as necessary" will be followed. In cases where research outputs cannot be openly accessible, systems for mediated access will be put in place.
- A Creative Commons (CC-BY)³¹ licence will be attributed to ASSAf research outputs. This licence will allow re-users to distribute, remix, adapt, and build upon the material in any medium or format, so long as attribution is given to the creator. The licence allows for commercial use.
- The open access ASSAf institutional research repository (ASSAf Research Repository)³² will be used to host and disseminate ASSAf research outputs, including publications in the form of reports and evidence-based studies, small datasets of

³¹ <https://creativecommons.org/about/ccliances/>

³² <https://research.assaf.org.za/>

potential research value, videos, and other research materials. See section 6.2 for the approach towards bigger datasets.

- Scholarly journals indexed by the Scientific Electronic Library Online South Africa (SciELO SA)³³ and hosted on the Khulisa Journals³⁴ platform, the *Quest Science for South Africa*³⁵ popular science magazine, and the scholarly *South African Journal of Science (SAJS)*³⁶ will be made available as open access through the respective platforms for each.
- The Principles of Transparency and Best Practice in Scholarly Publishing³⁷ will apply to all published content, including special issues by scholarly journals and conference proceedings.

6.2 Open Research Data

ASSAf supports the principle of open research data. This means that all data with potential research value generated as part of ASSAf published articles, evidence-based studies, or other research output, will be made available online, without any barriers to access, paywalls, or subscription fees. This can be in raw and/or processed format, including analysis code. Open data will help facilitate equal opportunity of access to research data to enable re-production of published results, and the re-use of publicly funded data to enhance discovery potential and opportunity. The sharing of research data is further crucial for the development and training of AI (Artificial Intelligence) algorithms. Access to diverse and comprehensive datasets enables the training of AI models, leading to more accurate and robust AI systems.

A distinction will be made between big and small data with potential research value, where ASSAf research data is concerned.

Open data will be implemented as follows:

- All ASSAf branded research data, data to which ASSAf contributed or data generated/funded/commissioned by ASSAf, and which underlies ASSAf research output and have potential research value, will be made openly and freely discoverable and accessible to all, in compliance with the CARE and FAIR principles.
- An approach of “as open possible, as closed as necessary” will be followed. In cases where research data cannot be openly accessible, systems for mediated access will be put in place.
- A Creative Commons (CC-BY)³⁸ licence will be attributed to ASSAf data with potential research value. This licence will allow re-users to distribute, remix, adapt, and build upon the data in any medium or format, so long as attribution is given to the creator. The licence allows for commercial use.
- Data with potential research value supporting ASSAf research will be deposited and made available as open access through either the ASSAf Research Repository

³³ <http://www.scielo.org.za/>

³⁴ <https://journals.assaf.org.za/>

³⁵ <https://questonline.org.za/>

³⁶ <https://sajs.co.za/>

³⁷ <https://publicationethics.org/resources/guidelines/principles-transparency-and-best-practice-scholarly-publishing>

³⁸ <https://creativecommons.org/about/cclicences/>



(smaller data sets), the DIRISA Data Submit Tool³⁹ (bigger data sets) or any other preferably certified⁴⁰ trustworthy repository.

- Metadata (incl. provenance, descriptive, structural, and administrative metadata) describing the data sets/objects will be made available in an accessible, standardised and machine-readable, interoperable format, following ethical guidelines and best practices.
- Personal information will be collected and used in a responsible and ethical manner that complies with the requirements of POPIA.
- A data management plan (DMP) must be made available by the principal investigator (PI) or the lead researcher, in collaboration with the research team and ASSAf representative/s. This DMP must be digitally preserved along with the final research output product. ASSAf requires generating a DMP through the online SA DMP Tool⁴¹ by the Data Intensive Research Initiative of South Africa (DIRISA)⁴² or the online DMP tool⁴³ by the Digital Curation Centre (DCC)⁴⁴, which can be downloaded and uploaded along with the final research output to the ASSAf Research Repository.
- The final research output, data and data management plan must interlink to one another.

6.3 Open Research Infrastructure

ASSAf will rely on existing infrastructure as well as planned infrastructure such as the SAOSC when implementing its Open Science Policy. It will align with the Principles of Open Scholarly Infrastructure⁴⁵ as best possible.

Open research infrastructure will be implemented as follows:

- Persistent identifiers in the form of digital object identifiers (DOIs) for digital research objects/items (research outputs and data sets), Open Researcher and Contributor Identifiers (ORCID) for individual researchers, and open persistent identifiers for research organisations (through the Research Organisation Registry (ROR)), will be incorporated as part of all ASSAf research output. Persistent identifiers are a fundamental component of open science, as they provide the necessary infrastructure for linking, citing, and accessing research outputs in a persistent and reliable manner. They support the principles of openness, transparency, and reproducibility, fostering collaboration and advancing scientific knowledge.
- Open citations will be applied across all systems in accordance with the I4OC⁴⁶. Open citations are important for open science because they allow researchers to easily find and cite the work of others. This will help to improve the reproducibility of ASSAf research and make it easier for new discoveries to be made.

³⁹ <https://www.dirisa.ac.za/dmp-tool/>

⁴⁰ Data repositories can be certified through any of the following instruments: [CoreTrustSeal \(CTS\)](#), [Nestor Seal: verification according to DIN 31644](#) or [ISO 16363 certification](#).

⁴¹ <https://www.dirisa.ac.za/dmp-tool/>

⁴² <https://www.dirisa.ac.za/>

⁴³ <https://dmponline.dcc.ac.uk/>

⁴⁴ <https://www.dcc.ac.uk/>

⁴⁵ <https://openscholarlyinfrastructure.org/>

⁴⁶ <https://i4oc.org/>



- SANReN will continue to provide broadband connectivity for the ASSAf Secretariat.
- The DIRISA DMP tool will be used for data management planning by ASSAf research teams, when embarking on new evidence-based studies.
- The DIRISA Data Submit Tool will be utilised for preserving bigger datasets of potential research value and the ASSAf Research Repository (using DSpace open source software) for preserving smaller datasets of potential research value.
- Scholarly journals will be indexed through SciELO SA, and in selected cases SciELO SA journals will be hosted on the Khulisa Journals platform, using the Public Knowledge Project (PKP) Open Journals System (OJS), both open source software.

6.4 Open Peer-review or Informed Peer Review

ASSAf undertakes to have research data and research publication systems and practises in place that are open to scrutiny. This applies to both data and research output made available through the ASSAf Research Repository, and through journal indexing and publication systems, such as SciELO SA and Khulisa Journals. All journals, regardless of the peer review processes they use, will be required to have systems and practices in place which are open to scrutiny.

Open peer-review or Informed Peer Review is still being explored by ASSAf, but for now the following will apply:

- An approach of “as open possible, as closed as necessary” will be followed.
- ASSAf will ensure that all publications (e.g. SAJS, evidence-based studies, etc) and publications indexed/hosted by ASSAf, are subject to rigorous peer-review and validation, following established ethical and quality standards. Scholarly journals should adhere to the ASSAf *Code of Best Practice in Scholarly Journal Publishing, Editing and Peer Review*⁴⁷.

6.5 Open Software and Hardware

Although ASSAf itself does not develop open source software or hardware, or develop source code and algorithms, it supports the principle of the use of open source software and hardware. ASSAf relies on globally available open source software and hardware for its service offering.

Open software and hardware will be implemented as follows:

- ASSAf undertakes to advocate for the use of these, and for newly developed source code to be licenced as open source (see Open Source Initiative (OSI) approved licences⁴⁸).
- Open source systems implemented by ASSAf towards advancing open science will include the ASSAf Research Repository using DSpace⁴⁹, the SciELO SA open journal index using SciELO⁵⁰ software, and Khulisa Journals open journal management

⁴⁷ <https://www.assaf.org.za/wp-content/uploads/2015/05/NSEF-Code-of-Best-Practice-March-2018.pdf>

⁴⁸ <https://opensource.org/licences/>

⁴⁹ <https://dspace.lyrasis.org/>

⁵⁰ <https://www.scielo.br/>

system using the Public Knowledge Project Open Journal Systems (PKP OJS)⁵¹. ASSAf also aims to contribute to the codes of open source software where possible

- A digital preservation system which supports systems will be put in place to guarantee access to research outputs for the unforeseeable future (e.g. Portico⁵²).
- Back-ups will be conducted of content which forms part of all mentioned systems.
- For more advanced data activities, ASSAf will make use of services provided by NICIS in support of open science, including the DIRISA DMP Tool, high-speed connectivity to research and education (through SANReN), and research computing resources (high-performance computing (HPC) clusters, cloud computing services (SAOSC), the DIRISA Data Submit Tool and data visualisation tools, where needed.
- ASSAf will ensure that all knowledge systems are aligned with the TRUST principles.

6.6 Open Research Methods

Open research methods are an important part of the open science movement. By making research methods openly accessible, the reproducibility, collaboration, and transparency of scientific research can be improved. Methodologies, techniques, and protocols (both after, and during the course of, the primary research) can be re-used. This can lead to faster progress in scientific knowledge and better outcomes for society.

Open methods will be implemented as follows:

- ASSAf will promote the practice of openly publishing research methods used as part of research. This will be done through publishing detailed descriptions of methods used in evidence-based research, making any underlying data and/or code publicly available, or through using open source software.
- The DIRISA DMP Tool will require ASSAf research teams to share their data management plans/ release the plans under an open licence.

6.7 Open Educational Resources

Open educational resources (for teaching, learning and/or assessing) will be implemented as follows:

- ASSAf will promote open science education and training initiatives, providing opportunities for capacity building and awareness-raising among ASSAf Members, stakeholders, the wider scientific community and the public.
- ASSAf will further support the dissemination of scientific knowledge and literacy through open educational resources and open access publications, in particular those related to the understanding and use of other openly accessible scientific knowledge, training, and outreach programmes.
- Where resources are developed towards supporting capacity building, they will be made available as open access on open communication platforms.

⁵¹ <https://pkp.sfu.ca/software/ojs/>

⁵² <https://www.portico.org/>

6.8 Open Collaboration and Dialogue (incl. Citizen Science, Science Engagement, Science Communication)

This principle hinges on the *Draft ASSAf Science Engagement Strategy* and the *Draft ASSAf Communication Strategy*⁵³. Open collaboration and dialogue will be implemented as follows:

- ASSAf will encourage and support collaborative research initiatives that foster interdisciplinary and global collaborations among researchers, institutions, stakeholders, and all publics in general, using open communication platforms and tools. This will foster interdisciplinary and global research, knowledge transfer, and innovation. Open communication platforms and tools include – among others – open access institutional repositories (incl. data repositories), open source journal management systems and third-party preprint platforms such as arXiv⁵⁴, AfricArXiv⁵⁵, SciELO Preprints⁵⁶ and others included as part of ASAPbio⁵⁷ (not verified by ASSAf).
- New forms of collaboration and work such as crowdfunding, crowdsourcing, citizen science, scientific volunteering, research networks, hackathons, data jams, and more will be encouraged to make the scientific process more inclusive and accessible to the broader inquiring society.
- In particular, building the links with indigenous knowledge systems will be done in line with the 2007 *United Nations Declaration on the Rights of Indigenous Peoples*⁵⁸ and *Principles for Indigenous Data Governance*, such as, for example, the CARE (Collective Benefit, Authority to Control, Responsibility and Ethics) data principles⁵⁹. Such efforts acknowledge the rights of indigenous peoples and local communities to govern and make decisions on the custodianship, ownership and administration of data on traditional knowledge and on their lands and resources.
- ASSAf will foster a culture of open collaboration, communication, and transparency among ASSAf Members and affiliates through its networks, conferences, workshops, mailing lists, directories such as the African Scientists Directory (ASD)⁶⁰, and official events.
- ASSAf will establish partnerships with national and global organisations to promote open science initiatives and collaborations. This includes the Network of African Science Academies (NASAC)⁶¹ and Member Academies, the InterAcademy Partnership (IAP)⁶², as well as The World Academy of Sciences (TWAS)⁶³, among many others.
- ASSAf will partner with the South African National Research Network (SANReN) group and the Tertiary Education and Research Network of South Africa (TENET) to provide an enabling Information and Communication Technology (ICT)

⁵³ Work in progress

⁵⁴ <https://arxiv.org/>

⁵⁵ <https://info.africarxiv.org/>

⁵⁶ <https://preprints.scielo.org/index.php/scielo>

⁵⁷ <https://asapbio.org/preprint-servers>

⁵⁸ https://www.un.org/development/desa/indigenouspeoples/wp-content/uploads/sites/19/2018/11/UNDRIP_E_web.pdf

⁵⁹ https://en.wikipedia.org/wiki/CARE_Principles_for_Indigenous_Data_Governance

⁶⁰ <https://africanscientists.africa/>

⁶¹ <https://nasaonline.org/>

⁶² <https://www.interacademies.org/>

⁶³ <https://twas.org/>

environment for ASSAf and its collaborators, including high and stable connectivity/bandwidth and other services to further implement open science.

- ASSAf will create opportunities for citizens to engage with research data and academics, e.g. during national science forums and institutional science forums. This is to further increase trust in science.

Section C

7. Implementation, Monitoring and Evaluation

7.1 Open Research Support and Advocacy/Awareness

Open research support will be provided by ASSAf, and ASSAf will advocate for the adoption of open science principles through the following:

- Encourage and support ASSAf researchers (incl. Members) and scholarly journals to adopt open science principles, open data practices, and implement data management plans.
- Engage with the realities of open science publishing, including price barriers. Barriers to readership must not be replaced with barriers to authorship.
- Direct researchers/scientists to appropriate training and capacity building programmes, infrastructure, and support services for open data management, curation, and sharing.
- Promote the responsible use of open source software and tools for scientific research, data analysis, and publication. This includes open source Artificial Intelligence (AI) tools.
- Develop and maintain a website which will act as a portal to all ASSAf open science related knowledge products and resources.
- Advocate for the implementation of open science principles by DSI science entities, key ASSAf stakeholders and the public.

7.2 Open Incentives and Recognition/Rewards

Open incentives and recognition/rewards will be implemented as follows:

- Clearly acknowledge copyright for research outputs. Align this policy with POPIA and the *Draft ASSAf Intellectual Property Rights Policy*.
- Apply the relevant CC-BY-licence across all ASSAf research outputs (incl. research data) funded with public money.
- Allocate unique persistent identifiers to research outputs submitted to ASSAf digital platforms, e.g. handles, DOIs, ORCiDs, and RORs (institutional IDs).
- Incentivise and recognise researchers contributing to ASSAf knowledge products through integrating Open Researcher and Contributor IDs (ORCiDs)⁶⁴ as part of

⁶⁴ <https://orcid.org/>

open source systems, and awarding Continuous Professional Development (CPD) points to research contributors.

7.3 Open Monitoring and Evaluation

ASSAf will continuously monitor and evaluate the implementation and impact of this policy, and evaluate its impact on scientific progress, collaboration, and innovation in consultation with its Members, partners, and stakeholders.

7.4 Open Governance

ASSAf will follow an open governance approach, which will be implemented as follows.

- Develop and maintain a comprehensive open science policy and guidelines for implementation, in consultation with ASSAf Council, its Members, partners, and stakeholders. The policy will be aligned with the *UNESCO Recommendation on Open Science*, the *Draft National Open Science Policy* by the DSI, the POPIA, the *Draft ASSAf Intellectual Property Rights Policy*⁶⁵, the *Draft ASSAf Science Engagement Strategy* and the *Draft ASSAf Communication Strategy*⁶⁶.

8. Intellectual Property

Intellectual property rights (IPR) will apply as defined in the work contract between the researcher and ASSAf. Further agreements (e.g. funder, grant or consortia agreements) will be respected. Where the IPR belongs to ASSAf as defined in the work agreement, ASSAf will have the right to choose how to publish and share science/research outputs. This will be done in consultation with the researcher, serving the best interest of society.

ASSAf will by default make research outputs available under an open licence (CC-BY), unless legal obligations, third party rights, intellectual property rights and privacy rights preclude this. The licence will be selected according to the type of research output and to label the research output and facilitate its utilisation. For source code, a General Public Licence (GPL)⁶⁷ will be considered. For all other data, CC-BY⁶⁸ licences will be considered. Data which are not restricted by copyright will be marked with the Creative Commons Public Domain Mark⁶⁹.

⁶⁵ Work in progress

⁶⁶ Work in progress

⁶⁷ <https://www.gnu.org/licenses/gpl-3.0.en.html>

⁶⁸ <https://creativecommons.org/licenses/by/2.0/za/>

⁶⁹ <https://creativecommons.org/share-your-work/public-domain/pdm/>

9. Operational and Financial Sustainability

ASSAf will establish a sustainable framework for its Open Science Policy, ensuring the long-term viability and effectiveness of its practices, services, infrastructures, and funding models in support of the broader scientific community, following the key strategies below:

- **Long-Term Planning and Vision:** ASSAf will develop a comprehensive long-term plan and vision for open science that outlines the objectives, goals, and desired outcomes of the policy, as part of its strategic planning. This plan will consider evolving trends and technological advancements in the field of open science to ensure the policy remains relevant and effective over time.
- **Capacity Building and Training:** ASSAf will invest in the training and capacity building of its staff to ensure they have the necessary skills and knowledge to effectively implement and adhere to open science practices. This can include attending workshops, seminars, and online resources to promote a culture of open science within the organisation.
- **Collaboration and Partnerships:** ASSAf will continue to collaborate with other research institutions, funding agencies, and governmental organisations to share resources, best practices, and infrastructure for sustaining open science initiatives, e.g. NRF, NICIS. By leveraging these partnerships, ASSAf will enhance the impact and reach of its open science policy.
- **Diversification of Funding Sources:** ASSAf will explore various funding sources to diversify its funding streams for sustaining open science practices. Khulisa Journals already generate some income for this purpose.
- **Continuous Evaluation and Improvement:** ASSAf will regularly evaluate the effectiveness and impact of its Open Science Policy through performance metrics, feedback from stakeholders, and comprehensive assessments. Based on these evaluations, ASSAf can make necessary adjustments and improvements to its policy to ensure its long-term sustainability and relevance.
- **Infrastructure Development and Maintenance:** ASSAf will continue to invest in the development and maintenance of robust infrastructures, including the ASSAf Research Repository, SciELO SA, and Khulisa Journals, to support the storage, sharing, and dissemination of research data and outputs. Regular maintenance and updates of these infrastructures will be essential to ensure their long-term sustainability and efficiency.

10. Dispute Resolution

Any disputes arising out of this policy will be resolved by mediation or arbitration, as agreed by the parties involved.

11. Conclusion

The Open Science Policy for ASSAf is a key step towards promoting open science principles and practices in the scientific community.

The global community is embracing open science, as the benefits to society are evident and far outweigh the potential risks. Therefore, it is essential that ASSAf follows suit to ensure that maximum benefit is derived from all publicly funded research. All citizens have the right to responsible access to the scientific data and other resources through an open science ecosystem created with safeguards in place to ensure ethical use of these resources. This policy was designed to promote, facilitate and enable open science, taking into account existing policies, practices and legislation, and being cognisant of protecting privacy and consent. The desired outcome is a change in scientific culture and practice to increase the reach of those who benefit from science. To conclude: this policy intends to promote what ASSAf stands for, namely: to “*Apply scientific thinking in the service of society*”.

