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Strategic Investment in Open Science: Interests and Needs of the Research Community and Society

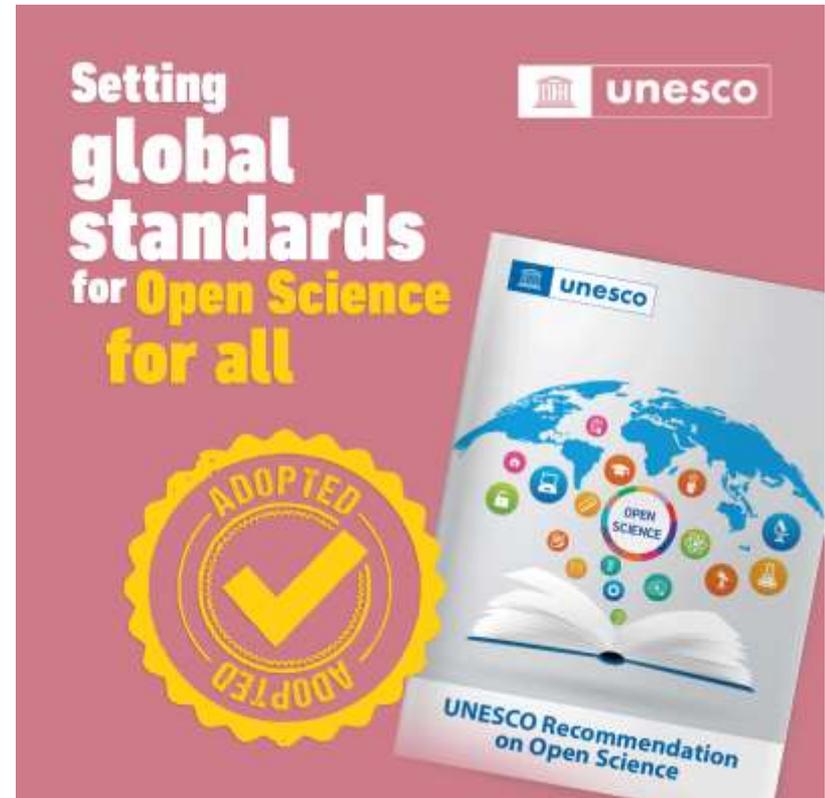


Nazar Hassan, Senior Specialist
UNESCO Bureau for Sciences for the Arab States

July 19th, 2022

UNESCO Recommendation on Open Science

- ❖ It is the first **international normative instrument** on Open Science;
- ❖ it contains the first **internationally agreed definition of Open Science**; opportunity!!!!!!
- ❖ it spells out the consensus **core values and guiding principles** of Open Science;
- ❖ it addresses **multiple actors and stakeholders** of Open Science;
- ❖ It recommends **actions on different levels** to operationalize the principles of Open Science;
- ❖ it proposes **innovative approaches for Open Science at different stages** of the scientific cycle;
- ❖ it calls for development of a **comprehensive Open Science monitoring framework**.



Definition of Open Science

Open Science: (makes it an excellent Opportunity for Arabs)

- ❖ makes scientific knowledge openly available, accessible and reusable for everyone,
- ❖ increases scientific collaboration and sharing of information for the benefits of science and society,
- ❖ opens up the processes of scientific knowledge creation, evaluation and communication to societal actors beyond the traditional scientific community.



Key challenges and high impact areas for the implementation of the UNESCO OSR



Change in the conventional scientific culture



Human and institutional capacity



Adequate infrastructures, including reliable internet connectivity (Vital)



Alignment of incentives and revision of criteria for evaluation of scientific excellence and **scientific careers**



Addressing the unintended negative consequences of open science practices

CAPACITY BUILDING POLICIES FINANCING/INCENTIVES **INFRASTRUCTURES** MONITORING



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Addressing the challenges for OSR Implementation

Working Groups	Deliverables
OS capacity building	<ul style="list-style-type: none">• Compilation/index of the existing Open Science training modules and materials• Creation and delivery of new and additional necessary training modules on open science for different open science actors and much more...
OS policies and strategies	<ul style="list-style-type: none">• Global repository of open science policy instruments• Development of Open Science Policy Guide
OS financing and incentives	Proposals for regional and thematic open science funding mechanisms and recommendations for revision of the current research careers assessments and evaluation criteria
OS infrastructures	Support for /development of international, regional and thematic open science platforms for sharing of knowledge and best practices. Specific focus will be on thematic platforms in UNESCO's priority areas, including biodiversity, water, disaster risk reduction, geosciences, ocean sciences, climate change...
OS monitoring framework	Global monitoring framework for open science



Definition of Open Science Infrastructure

Open Infrastructure: refers to the sets of services, protocols, standards and software that the academic ecosystem needs — from the earliest phases of research, collaboration and experimentation through **data collection and storage, data mining and organization, data analysis and computation, authorship, submission, review and annotation, copyediting, publishing, archiving, citation, discovery and more.** (capacity building huge requirements)



WHAT IS SCOSS?

KEY FACTS & FIGURES

DEFINING OPEN INFRASTRUCTURE

WHO IS BEHIND SCOSS?

GOVERNANCE

PAST SCOSS AWARDEES

What is Open Infrastructure?

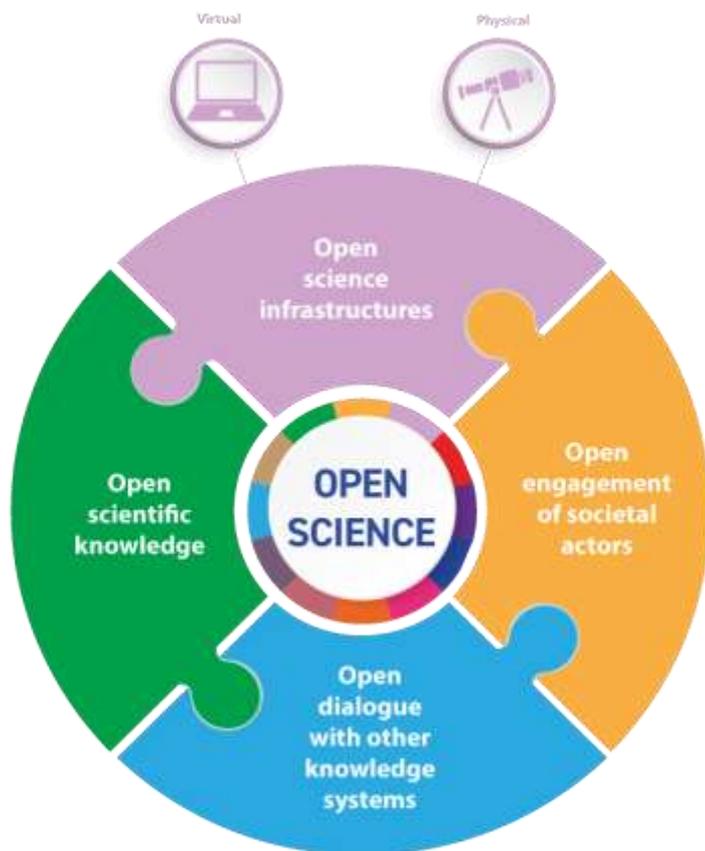
We intentionally use the term "infrastructure" for multiple reasons when we refer to what is eligible for funding. The Oxford definition states that infrastructure comprises the "basic physical and organizational structures and facilities needed for the operation of a society or enterprise."

In an **Open Science context**, "infrastructure" – the "structures and facilities" – refers to the scholarly communication resources and services, including software, that we depend upon to enable the scientific and scholarly community to collect, store, organise, access, share, and assess research.

Examples of Open Infrastructure include those which SCOSS has endorsed to date:

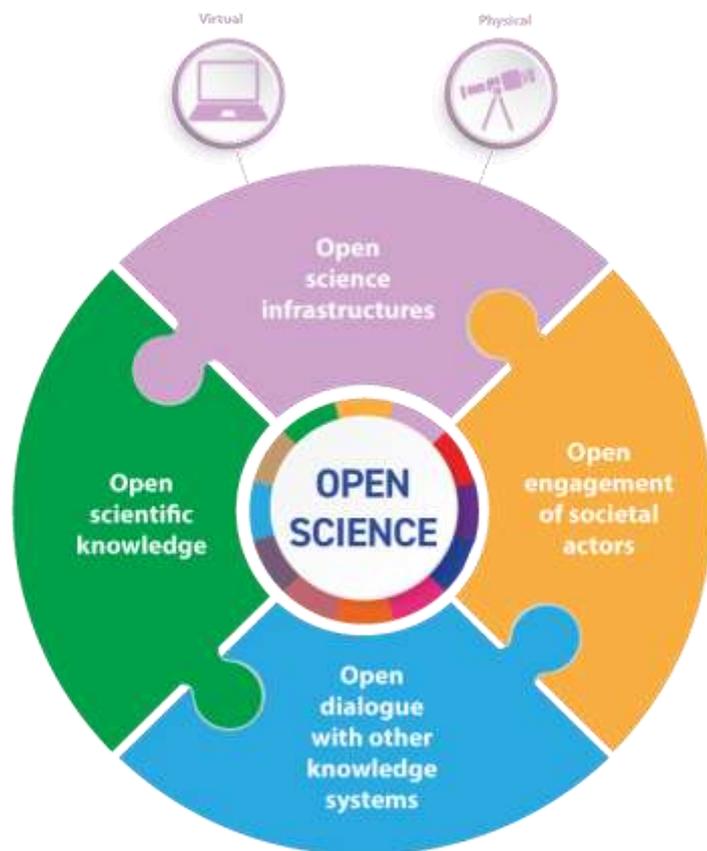
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Open Science Infrastructures in the OSR



- ❖ **Shared research infrastructures** that are needed to support open science and **serve the needs of different communities; (low hanging fruits)**
- ❖ Provide essential **open and standardized services to manage and provide access, portability, analysis and federation** of data, scientific literature, thematic science priorities or community engagement; **(low hanging fruits)**
- ❖ **Major scientific equipment or sets of instruments, collections, journals and open access publication platforms, repositories, archives..., open computational and data manipulation service infrastructures** that enable collaborative and multidisciplinary data analysis...

Open Science Infrastructures in the OSR



- ❖ **Different repositories** are adapted to the specificity of the objects they contain (publications, data or code), to local circumstances, user needs and the requirements of research communities, yet should adopt **interoperable standards** and best practices to ensure the content in repositories is appropriately vetted, discoverable and reusable by humans and machines; (**be part to benefit**)
- ❖ **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**.

Open Science Infrastructures Working Group – Who are its members?

Open-ended, technical, multidisciplinary and multistakeholder group
(more than 100 registered – from 35 countries)

All the regions represented with representatives from :

- ❖ Universities and Research institutes **in all scientific fields**, from PhD candidates to research directors,
- ❖ International, Regional and thematic open science infrastructures
- ❖ Research Funders
- ❖ National Academies of Science
- ❖ Associations of Universities and Scientific Unions
- ❖ Librarians
- ❖ Data organizations
- ❖ Citizen science experts
- ❖ OA Publishers
- ❖ Permanent Delegations to UNESCO
- ❖ Other national , regional and international organizations and Institutions





The Global Sustainability Coalition for Open Science Services (SCOSS)

WHAT IS SCOSS?

KEY FACTS & FIGURES

Our Story

The Global Sustainability Coalition for Open Science Services (SCOSS), established in 2017, is a network of influential organisations committed to helping secure OA and OS infrastructure well into the future.



WHAT IS SCOSS?

KEY FACTS & FIGURES

DEFINING OPEN INFRASTRUCTURE

WHO IS BEHIND SCOSS?

GOVERNANCE

PAST SCOSS AWARDEES

4,806,044

TOTAL PLEDGED TO DATE

Total Euros pledged encompassing both the pilot, second, and third funding round.

311

NUMBER OF INSTITUTIONS THAT HAVE PLEDGED

Total number of institutions that have pledged funds.

8

INFRASTRUCTURE FUNDED

Total number of infrastructure funded.

WHAT IS SCOSS?

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Our Coalition

SCOSS is backed by a coalition of Open Science leaders representing regions from across the globe with a thorough understanding of what is needed to deliver on Open Access and Open Science.

At present, the coalition is comprised of the following with representatives from most continents: Association of African Universities ([AAU](#)), Association of Research Libraries ([ARL](#)), Canadian Association of Research Libraries ([CARL](#)), the Council of the Australian University Librarians ([CAUL](#)), [EIFL](#), [Qatar National Library](#), [LIBER](#), [Ministry of Higher Education, Research and Innovation, France](#), [REDALYC](#), and [SPARC Europe](#). Membership is open to organisations that can represent significant communities of research funding and/or performing organisations, including those that represent libraries and researchers.

Also involved in the initial planning for the coalition were the Australasian Open Access Strategy Group ([AOASG](#)), The Confederation of Open Access Repositories ([COAR](#)), The European Research Council ([ERC](#)), The European University Association ([EUA](#)), The International Federation of Library Associations and Institutions ([IFLA](#)), and [Science Europe](#). Initial input was also provided by [SPARC](#).

HOME

WHAT IS SCOSS?

Key facts & figures

NEED FUNDING FOR OPEN INFRASTRUCTURE?

Application process

Key dates

NEWS & VIEWS

Newsletter

HELP ADVOCATE FOR OPEN INFRASTRUCTURE

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SEARCH

Journals

with 7,715,292 indexed articles

All fields 



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APCs: 2500000 (IRR)

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The Future
European Energy
System



Literatura
latinoamericana
mundial



Religion and
Governance in
England's Emerging



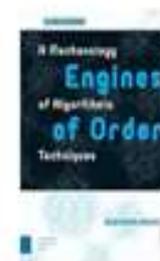
Open Science:
the Very Idea



Embodying
Contagion



Thou Shalt Forget



Engines of Order

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TOP SUBJECTS

Sociology



Politics & government



Society & culture: general



Social research & statistics



Human geography



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arXiv is a free distribution service and an open-access archive for 2,097,130 scholarly articles in the fields of physics, mathematics, computer science, quantitative biology, quantitative finance, statistics, electrical engineering and systems science, and economics. Materials on this site are not peer-reviewed by arXiv.

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Physics

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includes: Astrophysics of Galaxies; Cosmology and Nongalactic Astrophysics; Earth and Planetary Astrophysics; High Energy Astrophysical Phenomena; Instrumentation and Methods for Astrophysics; Solar and Stellar Astrophysics
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includes: Disordered Systems and Neural Networks; Materials Science; Mesoscale and Nanoscale Physics; Other Condensed Matter; Quantum Gases; Soft Condensed Matter; Statistical Mechanics; Strongly Correlated Electrons; Superconductivity
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Mathematics

- **Mathematics** ([math](#) [new](#), [recent](#), [search](#))
includes (see [detailed description](#)): Algebraic Geometry; Algebraic Topology; Analysis of PDEs; Category Theory; Classical Analysis and ODEs; Combinatorics; Commutative Algebra; Complex Variables; Differential Geometry; Dynamical Systems

COVID-19 Quick Links

See COVID-19 SARS-CoV-2 preprints from

- [arXiv](#)
- [medRxiv](#) and [bioRxiv](#)

Important: e-prints posted on arXiv are not peer-reviewed by arXiv; they should not be used to guide practice or health-related behavior and should not be reported in news media as established experts in the field.

July 20th, 2021 | Metadata and Vocabularies, News, Resources

[ALL RESOURCES](#)

Members

A global repository network

COAR is an international association with 156 members and partners from 51 countries, representing libraries, universities, research institutions, government funders and others.

[MEET OUR MEMBERS](#)





Home > About ERC > Thematic working groups > Working Group on Open Science.

WORKING GROUP ON OPEN SCIENCE



GENDER AND DIVERSITY
ISSUES



OPEN SCIENCE



INNOVATION AND
RELATIONS WITH
INDUSTRY



WIDENING EUROPEAN
PARTICIPATION



SCIENCE BEHIND THE
PROJECTS



KEY PERFORMANCE
INDICATORS (2013-2018)

Since its creation, the ERC has been a strong supporter of the idea that the results stemming from publically funded research – including publications and primary data – should be made freely accessible on the Internet.

In December 2006, long before any grant was awarded, the ERC Scientific Council issued its first statement on Open Access. This statement was followed a year later by specific

MORE INFO

Documents

- [Open Access Guidelines for ERC funded researchers](#)

News

- [ERC Scientific Council Statement on Berlin "Expression of Interest in the Large-scale Implementation of Open Access to Scholarly Journals"](#)
- [ERC renews its commitment to open access by joining Europe PubMed Central](#)
- [ERC takes a further step forward towards open access by joining arXiv](#)
- [ERC supports OAPEN library for open access books](#)

Links

- [Europe PubMed Central](#)
- [arXiv](#)
- [OpenAIRE](#)
- [Zenodo](#)
- [OAPEN Library](#)
- [Guide to intellectual property rules](#)

Presentations

- [Europe PMC](#) by Jo McEntyre
- [Research Data Management](#) by Tim Hubbard (King's College), Michael Sterzik (ESO), James Banks (Univ. Manchester / IFS)
- [Finshare](#) by Mark Hahnel

Latest

Rethinking our aspiration, role, and theory of change

Next steps for the Catalog of Open Infrastructure Services (COIs)

Preliminary investigation: Defining Open Scholarly Infrastructure

Strategy Retreat Recap: Key learnings and resources

About IOI

Invest in Open Infrastructure is an initiative dedicated to improving funding and resourcing for open technologies and systems supporting research and scholarship. We do this by shedding light on challenges, conducting research, and working with decision makers to enact change.

Founding Premises:

Invest in Open Infrastructure (IOI) was founded on two core premises:

Invest in Open Infrastructure (IOI)

IOI: defines Open infrastructure as the narrower sets of services, protocols, standards and software that can empower communities to collectively build the systems and infrastructures that deliver new improved collective benefits without restrictions, and for a healthy global interrelated infrastructure system.

Our aim at IOI is to provide targeted, evidence-based guidance to institutions and funders of open infrastructure to help them become wiser about where to invest. The end result: improve the funding and sustainability of the sector, in ways that are in line with the values of the academy and not one that is co-opted or controlled by commercial interests.

IOI: Founding Premises:

Invest in Open Infrastructure (IOI) was founded on two core premises:

Open, community-owned infrastructure is necessary for research to thrive; and,

The way we fund and resource open projects we rely on is insufficient, and working against our aims to build a healthy, collaborative ecosystem.

We strive through our work to shed light on the challenges and ultimately, improve funding and resourcing for the open infrastructure that research relies on.



Invest in Open Infrastructure (IOI)

IOI: History of the project:

Invest in Open Infrastructure (IOI) arose as a concept and coalition from the 2018 Joint Roadmap for Open Science Tools (JROST) conference, held in Berkeley, CA. That event brought together over 86 participants from over 50 organizations in the open research sector, including developers, institutional leaders, publishers, and funders.

Between August 2018 and March 2020, IOI existed solely as a volunteer effort, led by a 20 person Steering Committee of leaders in this sector. In late 2019, the effort secured initial funding from Schmidt Futures and the Alfred P. Sloan Foundation, and was established as a fiscally sponsored project of [Code for Science & Society](#) (CS&S), a leading 501(c)3 supporting the public interest technology space. IOI's inaugural Executive Director (Kaitlin Thaney) was hired in March 2020.

Why this, why now?

The way we have historically sustained the development of open source technology in research has relied on grant funding and institutional support, both financially and in terms of project governance and staffing.

Today, funding for open infrastructure is not coordinated. This has led to three key issues that negatively impact open infrastructure's sustainability and resilience. First, the lack of coordinated strategy has led to a perceived scarcity of funds in the landscape, which drives both users and talent to the corporate spaces that appear more stable. Second, beneficiaries of open technology have not been incentivized to contribute back in a way that invests back in the system. And lastly, for those with budgets investing in the space, there's a lack of guidance on where best to direct those funds that maximize impact, resilience, and lead to product excellence.

To date, conversations around investment strategy are often left in the hands of a chosen few administrators at an institution, removed from the needs of the research community. As a result, decisions are easily swayed by commercial vendors who appear to offer efficiency, stability, and continuity. More often, these vendors lock institutions into expensive, non-mission-aligned contracts that act against the broader aims of access and knowledge sharing in the academy.

And this is just the beginning. It continues to be a struggle to understand how much funding has been allocated by top philanthropies in open research technology and systems over the past five years and for what, let alone how much is being allocated to supporting open technology development and maintenance at the institutional level. The costs of open infrastructure remains difficult to calculate, and as a result, piecemeal support often limits a project's potential to corner the market and scale operations.

We aim to address the existing gaps in understanding to make the costs associated with open infrastructure development and maintenance accessible, verifiable, and actionable. That research and information is a critical foundation for our work in shedding light on more effective means to invest in open in ways that are cost-effective, impactful, and aligned with the mission of the academy.



Investing in open science infrastructures and services



AREAS OF ACTION: A call for a regional initiative with serious regional sponsors

Investing in open science infrastructures and services focusing on:

- STI
- **Internet connectivity (TOP PRIORIT)**
- NRENs
- **Non-commercial computing facilities and digital public infrastructure and services supporting the open science approach** (long-term preservation, stewardship and community control of research products)
- **Community managed** infrastructures, protocols and standards to support biblio-diversity and engagement with society
- **ICTs that automate** searching and analyzing linked publications and data
- Infrastructure for **non-digital materials**
- Platforms for exchanges and **co-creation of knowledge**
- **Community-based monitoring** and info systems



Investing in open science infrastructures and services



AREAS OF ACTION: A call for a regional initiative
Investing in open science infrastructures and services focusing on:

- 1) **High-speed Internet connection for all in the REGION (all on the previous list of stakeholders) to ensure the real success of education and research digitalization;**
- 2) The creation of a series of knowledge hubs for **Sustainable Development Technologies Education and Utilization (SDPTEU)** to guide the national and therein municipal communities in each subregion with all technical and financial requirements clearly identified to implement the SDGs in the poor rural areas, , through carefully pre-defined set of projects, must-have policies and programs.

Investing in open science infrastructures and services



The creation of a **Sustainable Development Proven Technologies Education and Utilization (SDPTEU) Centers of Excellence**, mainly virtually operated (as part of the **Proposed Arab Open Science Cloud**) in each sub-region to guide targeted therein municipal communities with all technical and financial requirements clearly identified to implement the SDGs in the poor rural areas, through carefully pre-defined set of technology standards, projects, must-have policies and programs it advocates for;

Capacity Building: Unemployed college graduates capacitated and trained as the required critical mass of technical force and practitioners and deploy them back to their rural areas to support efforts for SDGs implementation. Rural villagers to be trained on relevant TVET to resume one of the many jobs facilitated by the new community setup

♦ Utilize **technology universities and research institutes worldwide** to design the online CB platform for SDPTEU;

Governance: (monitoring and accountability) by using evidence based trends embedded into the SDPTEU centers and technopolis; And the well-educated youth to lead the management of each Technopolis.



Keep in touch



UNESCO Open science website:
<https://on.unesco.org/openscience>



Contact: openscience@unesco.org



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