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OPEN ASIA
UNIFYING SCIENCE, EMPOWERING INNOVATION

OPEN-ASIA: Boosting engagement of HEIs in Open Science in India and Malaysia

OPEN SCIENCE INFRASTRUCTURE DEVELOPMENT PLAN P6-UNIMAS

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Universiti Malaysia Sarawak
P6-UNIMAS

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TABLE OF CONTENT

1. Executive Summary 4

2. Introduction 4

3. Goals and Objectives 6

4. Policy Framework 6

5. Infrastructure Components 9

6. Supporting Open Science Policies and Case Studies 11

7. Training and Capacity Building 12

8. Outreach and Community Engagement 13

9. Evaluation and Monitoring 14

10. Budget and Resource Allocation 15

11. Implementation Timeline 17

12. Conclusion 17

13. References 18

1. Executive Summary

Open Science is a global movement dedicated to ensuring that scientific research, data, and educational resources are openly accessible, advancing transparency, collaboration, and reproducibility. Recognising its transformative potential, Universiti Malaysia Sarawak (UNIMAS) has developed a comprehensive Open Science Infrastructure to serve as a robust foundation for collaborative, verifiable research. By aligning with the UNESCO Recommendation on Open Science (2021) and leveraging the ERASMUS+ OPEN-ASIA partnership, UNIMAS is dismantling traditional barriers to knowledge and strengthening its position as a regional leader in open, high-impact scientific discovery.

This infrastructure is already operational and delivering measurable results. At its core sit two repositories: PeTARY, the institutional publications repository, which now holds 19,276 scholarly outputs; and the UNIMAS Dataverse, a FAIR-compliant research-data platform governed by the Chief Digital Officer's Office, hosting 48 datasets across 33 dataverses with 112 registered users and DOIs assigned to 95% of deposits. These are supported by newly acquired Network Attached Storage for secure local staging and backup. Capacity-building has reached 84 researchers through mandatory Dataverse training, and a dedicated Open Science course has been approved and piloted in the Faculty of Cognitive Sciences and Human Development.

Beyond the campus, UNIMAS extends Open Science to society. The OS-Hub, delivered through the Digital Experience Hub as Science Shop 2.0, has engaged over 600 community members and students and will be officially launched in August 2026. Regional environmental data flows through the Borneo Satellite Network and the AiBoB (Biodiversity of Borneo) platform, now integrated live with the UNIMAS Dataverse, affirming the university's role as a research Gateway to Borneo. This plan sets out how UNIMAS will govern, sustain, and grow this infrastructure to deliver lasting openness, collaboration, and societal impact.

2. Introduction

The global shift towards Open Science has led higher education institutions worldwide to invest in dedicated infrastructure that supports open research practices — digital repositories, data-sharing platforms, and collaborative tools that enable scientists to work transparently and efficiently. Governments, funding agencies, and universities increasingly recognise such infrastructure as essential to accessibility, reproducibility, and collaboration. UNIMAS, as a key partner in the ERASMUS+ OPEN-ASIA project, is advancing institutional frameworks tailored to its regional context in Sarawak and Borneo while adhering to internationally agreed standards.

This document is structured around the OPEN-ASIA infrastructure-plan template and elaborated to meet the project's deeper analytical requirements. It is aligned with the UNESCO Recommendation on Open Science (2021) and the UNESCO Open Science Toolkit Guide Bolstering Open Science Infrastructures for All (2022), included as an annex.

2.1 Baseline Analysis of Existing OS Infrastructure

Establishing the current state is the basis for identifying gaps and planning developments. The following assessment distinguishes what exists now from what is planned; figures were confirmed by the CDO's Office as of June 2026.

Element	Current state (June 2026)
Publications repository (PeTARY)	Operational; 19,276 items; Library/CTAR; bibliometrics + APC support.
Research data repository (Dataverse)	Operational; 48 datasets, 33 dataverses, 112 users; 95% DOI coverage; open-source software.
Data storage / backup (NAS)	Deployed under OPEN-ASIA; staging and backup of raw datasets.
Persistent identifiers	DOI at 95% of deposits; ORCID in use; ROR/RAiD not yet adopted.
Long-term preservation	NAS backup in place; formal written policy to be established (see Budget § Sustainability).
OA publishing support fund	Operational; over RM300,000 disbursed in the last year (Library/CTAR).
OS-Hub / Science Shop 2.0	Active engagement; official launch August 2026.
Capacity-building programme	84 researchers trained; 2 (2024), 4 (2025), 2 (2026 planned) sessions.
Regional data-sharing (AiBoB/BoSaN)	AiBoB integrated with Dataverse; data live.
Research assessment / rewards	DORA-aligned policy; OS course piloted at FCSHD; reward mechanism developing.

Gap reading. UNIMAS is strong on repository provision and storage. The principal development priorities are a formal preservation policy, extended persistent-identifier coverage beyond DOI/ORCID, and completion of the OS-Hub launch.

2.2 Status of the OS Platform and Equipment Established within the Project

The UNIMAS Dataverse is the OS platform established within OPEN-ASIA, running on the internationally adopted, community-governed open-source Dataverse software (the same platform used by Harvard's IQSS and NTU's DR-NTU). It hosts 48 datasets across 33 dataverses, serves 112 users, and assigns DOIs to 95% of deposits. The Network Attached Storage acquired under the project is inventoried in Infrastructure Components. The OS-Hub, run through the Digital Experience Hub as Science Shop 2.0, is operational and engaging communities ahead of its August 2026 launch.

3. Goals and Objectives

The development of Open Science Infrastructure at UNIMAS pursues the following goals, aligned with the four pillars of the UNESCO Recommendation and the OPEN-ASIA project objectives:

- Cultivate an open access publishing ecosystem: Institutional support for OA publishing, a repository for publications and preprints, and partnerships with open access publishers.
- Empower sustainable data exchange and reusability: A FAIR-compliant research-data repository, guidelines for data management and long-term preservation, and metadata standardisation for discoverability.
- Catalyse cross-disciplinary and community research: Networking and engagement platforms connecting researchers and society, including citizen science.
- Champion scientific integrity and verifiability: Open peer review, reproducible workflows, and the sharing of methods, code, and data.
- Embed governance and sustainability: Clear institutional ownership and a financing model that sustains the infrastructure beyond the project period.

Expected outcomes and target groups span researchers and principal investigators (reliable FAIR infrastructure and low-friction compliance); early-career researchers and students (training and recognised competencies); research-support units (defined roles and resources); civil society and community partners (a route to participate in research); and senior management and funders (evidence of operational, sustainable investment).

4. Policy Framework

A robust policy framework is crucial to governing Open Science practices at UNIMAS. Four policy areas anchor the framework, each benchmarked against established international models.

4.1 Mandates for Open Access Dissemination

To maximise the visibility and societal impact of university-led scholarly work, this policy requires that all research funded by UNIMAS be made openly accessible to the global community. Researchers are encouraged to use designated preprint servers for early dissemination prior to formal peer review. Recognising the financial barriers associated with modern publishing, the university provides dedicated funding to subsidise Article Processing Charges (APCs) for publication in reputable gold open-access journals; over RM300,000 was disbursed for this purpose in the last year. This approach mirrors the Massachusetts Institute of Technology (MIT) Open Access Policy (adopted by unanimous faculty vote in March 2009), under which faculty grant the university non-exclusive permission to make their scholarly articles freely available, defaulting to open dissemination. In line with UNESCO's emphasis on bibliodiversity, UNIMAS also promotes non-APC, community-driven (Diamond) routes and provides predatory-journal guidance following the UNESCO Open Science Toolkit factsheet.

4.2 Protocols for Research Data Stewardship

Responsible data governance is central to research integrity and reproducibility. Under this framework, researchers are required to submit a comprehensive Data Management Plan (DMP) as a foundational requirement for all funded projects, with the plan feeding deposit into the UNIMAS Dataverse. The policy actively encourages the curation and sharing of finalised datasets in institutional and recognised international repositories; currently, 95% of deposits carry an assigned DOI, with metadata following DataCite and Dublin Core standards. Strict adherence to data-privacy regulations and ethical considerations is maintained throughout, safeguarding sensitive or proprietary information while keeping non-sensitive data accessible. This follows the principle that data should be "as open as possible, as closed as necessary," adopted by the European Commission's Horizon Europe programme, and the model of Nanyang Technological University's (NTU) Research Data Policy, which requires DMPs and deposit of underlying data in its institutional repository, DR-NTU (Data), for long-term preservation.

4.3 Intellectual Property and Open Licensing Framework

To facilitate the legal and frictionless reuse of academic outputs, UNIMAS recommends the adoption of standardised open licences, specifically Creative Commons (CC) licences, for both publications and curated datasets. The policy establishes clear guidelines on ownership, copyright retention, and permissible reuse, ensuring creators receive appropriate academic attribution while granting the public and fellow researchers the legal right to build upon their work. This draws on the University of California (UC) Academic Senate Open Access Policy (2013), under which copyright remains with the faculty author by default and the policy grants the university a prior non-exclusive licence, protecting author rights rather than transferring copyright to publishers. The use of Creative Commons Attribution (CC BY) licences is further endorsed by the UNESCO Recommendation on Open Science (2021) to standardise global sharing rights and reduce legal friction in collaborative research.

4.4 Meritocracy and Recognition in Open Science Practices

Transitioning to an open ecosystem requires shifting institutional culture and traditional reward mechanisms. This policy incorporates specific Open Science contributions, such as data sharing, open-source software development, and open peer review, into faculty performance and promotion considerations, and the university is developing formal recognition pathways, grants, and awards for researchers who champion open practices. As an early step, a dedicated Open Science course has been approved and piloted in the Faculty of Cognitive Sciences and Human Development (FCSHD). This objective is anchored by the San Francisco Declaration on Research Assessment (DORA, 2012), which advocates assessing research on its intrinsic qualitative merit rather than relying on journal impact factors; an operational reward mechanism is in development.

4.5 Governance and Management

Clear institutional ownership determines whether infrastructure operates reliably or decays after project funding ends. Responsibilities are assigned as follows:

Function	Responsibility	Lead unit
Overall OS governance	Strategic oversight; policy compliance; annual reporting.	OS Steering Committee
Research data repository	Dataverse administration; FAIR compliance; metadata QA; DOIs.	CDO's Office
Publications repository	PeTARY management; deposit; bibliometrics; APC fund.	Library (CTAR)
Storage & IT operations	NAS; backups; uptime; replacement planning.	CDO's Office / ICT
OS-Hub & engagement	Science Shop 2.0; citizen science; events.	Digital Experience Hub
Data protection & security	PDPA compliance; access control; ethics liaison.	CDO's Office / Legal
Monitoring & reporting	KPI collection; annual assessment; funder reporting.	OS Steering Committee

Coordination and reporting: the OS Steering Committee meets at minimum quarterly and reports annually to senior management and the OPEN-ASIA Coordinator, with a defined deposit → curation → preservation → access workflow and hand-offs between Library, CDO's Office, and ICT. Security and data protection follow Malaysia's PDPA, with a four-tier data-sensitivity classification (open, restricted, confidential, proprietary), CARE-based handling of community and indigenous data, and ICT-standard backup and incident-response workflows.

5. Infrastructure Components

UNIMAS's Open Science Infrastructure comprises five interrelated components, spanning repositories, storage, publishing support, collaboration platforms, and open-source tooling. Components that are operational are described as such; those still in development are clearly marked.

1. **Digital Research Repository**
   The cornerstone of UNIMAS's Open Science Infrastructure is its digital repository ecosystem, designed to archive and disseminate scholarly outputs globally. Central to this is PeTARY (Perpustakaan Tun Abdul Rahman Ya'kub), the university's institutional repository, which collects, preserves, and freely shares digital intellectual output while championing open research through bibliometric services and APC funding support; it currently holds 19,276 deposited items. Complementing PeTARY is the UNIMAS Dataverse, governed by the Chief Digital Officer's (CDO) Office, which provides a secure, structured environment for organising, sharing, and reusing datasets in adherence to FAIR principles. The Dataverse currently hosts 48 datasets across 33 dataverses, serves 112 registered users, and assigns DOIs to 95% of deposits. Both repositories run on community-governed open-source software and connect with international discovery services to maximise the visibility of UNIMAS research.

2. **Research Data Management Platform & Storage**
   To support the volume of modern research data, the university pairs its repository platform with dedicated physical storage. A critical asset is the Network Attached Storage (NAS) acquired under the OPEN-ASIA project, which expands local capacity to securely store, back up, and stage large-scale raw research data before it is curated and transferred to the Dataverse. The management platform supports standardised DOI assignment and metadata frameworks (DataCite and Dublin Core), enabling interoperability with global research-data repositories such as Zenodo and Dryad. CARE principles govern community and Borneo indigenous environmental data, and the AiBoB (Biodiversity of Borneo) platform is integrated with the Dataverse, with data appearing live. Full equipment details are provided in the inventory below.

3. **Open Access Publishing Support**
   The infrastructure actively facilitates inclusive research dissemination. UNIMAS provides targeted financial assistance to subsidise publishing costs in gold open-access journals — over RM300,000 was disbursed for APCs in the last year — complemented by green (repository) and non-APC Diamond routes in line with UNESCO's emphasis on bibliodiversity. This support is bolstered by engagement with institutional open-access presses and by predatory-journal guidance following the UNESCO Open Science Toolkit factsheet.

4. **Research Collaboration and Networking Platforms**
   To foster interdisciplinary networking and accurate researcher profiling, the university plans to establish an online collaboration portal allowing researchers to connect, co-author, and share emerging ideas, integrated with global academic networking and citation systems

including ORCID, Google Scholar, and ResearchGate. (This collaboration portal is in development and not yet operational.) ORCID integration for researcher identification is already in use at the point of deposit, providing a foundation for this wider networking capability.

5. Open Source Tools and Software Development

To champion scientific integrity, transparency, and computational reproducibility, the infrastructure promotes the adoption of open-source tools and software-development practices. Researchers are encouraged to use applications such as Jupyter Notebooks, RStudio, and OpenRefine for data analysis and workflow documentation, and to share research code via version-control repositories such as GitHub and GitLab to enable open peer review and collaborative refinement. (Promotion and training for these tools is being rolled out through the capacity-building programme; adoption is at an early stage.) The choice of open-source Dataverse and DSpace software for the core repositories reflects this same commitment, in line with UNESCO's recommendation that digital infrastructures be based on open-source software stacks.

6. Access, User Support, and Management Procedures

All UNIMAS academic and research staff and postgraduate students may deposit (authenticated via institutional credentials); public access is open for unrestricted content and controlled by data-sensitivity class. User support is provided through mandatory quarterly Dataverse training (84 researchers trained to date) and the Digital Transformation Seminar Series. Day-to-day administration, metadata quality assurance, curation, and uptime are managed by the CDO's Office.

7. Equipment Inventory (acquired under the project)

Item	Specifications	Operational use	Maintenance owner
Network Attached Storage (NAS)	Model FS3410. 24-bay 2.5" SAS/SATA all-flash storage; 8-core 2.1 GHz CPU (turbo to 2.7 GHz); 16 GB RAM (expandable to 128 GB); 2×10GbE Base-T; redundant power; DDR4-3200 32 GB RDIMM; 3.84 TB enterprise-grade SATA SSD; rail kit; 5-year warranty.	Local staging and backup of large raw research datasets prior to curation and deposit to the UNIMAS Dataverse; supports FAIR data management and long-term preservation.	CDO's Office / ICT

All project-acquired equipment is managed under UNIMAS asset-management procedures and PDPA requirements; maintenance and replacement planning is addressed under Budget and Resource Allocation.

6. Supporting Open Science Policies and Case Studies

To ensure the infrastructure meets both national priorities and global standards, its components are modelled after leading Open Science frameworks and successful institutional case studies. These benchmarks were verified against official sources during preparation.

1. Malaysia Open Science Platform (MOSP)

Launched by the Ministry of Science, Technology and Innovation (MOSTI) in 2019 and managed by the Academy of Sciences Malaysia (ASM), MOSP is the primary national reference point. It emphasises treating raw research data as a national asset and mandates adherence to FAIR principles. UNIMAS's FAIR-compliant data-management approach aligns with the national MOSP framework and its objective of developing trusted digital data repositories. It should be noted that UNIMAS was not part of the original MOSP pilot (which comprised Universiti Malaya, Universiti Sains Malaysia, Universiti Putra Malaysia, Universiti Teknologi Malaysia, and Universiti Kebangsaan Malaysia); alignment with MOSP is therefore an objective rather than existing membership.

2. UNESCO Recommendation on Open Science

The UNESCO Recommendation on Open Science (2021) — the first international standard-setting instrument on open science, adopted by 193 countries — explicitly identifies open science infrastructures as one of its four core pillars. It recommends that infrastructures support persistent identifiers, ensure long-term preservation and community control over research products, and be based on non-commercial, open-source foundations. The UNIMAS plan responds directly to these provisions through its open-source repositories, persistent-identifier strategy, and CARE-based data stewardship. The UNESCO Open Science Toolkit guide Bolstering Open Science Infrastructures for All (2022) is included as an annex to this deliverable.

3. European Open Science Cloud (EOSC) and Regional University Models

The UNIMAS infrastructure draws on the federated, interoperable data-sharing model demonstrated by the European Open Science Cloud (EOSC), which connects existing infrastructures as a "system of systems" rather than duplicating them — the same anti-fragmentation principle UNESCO promotes. Regionally, Nanyang Technological University's (NTU) DR-NTU (Data) repository demonstrates the value of embedding Data Management Plan requirements directly into the institutional ecosystem; notably, DR-NTU (Data) is built on the same open-source Dataverse software as the UNIMAS Dataverse and Harvard University's Dataverse, situating UNIMAS on an internationally adopted, community-governed software stack.

7. Training and Capacity Building

Sustainable adoption of Open Science requires both cultural change and practical skills. UNIMAS delivers capacity-building through structured workshops, hands-on technical training, and a network of faculty champions, integrated into institutional processes.

1. **Workshops on Open Science Principles**

   To build a strong foundational understanding of the open research ecosystem, UNIMAS conducts comprehensive workshops on core principles such as Open Access publishing, FAIR data compliance, and research reproducibility. These modules are integrated into the established UNIMAS Digital Transformation Seminar Series to ensure a streamlined onboarding process. To bridge the gap between academia and society, the university also hosts dedicated seminars on citizen science, highlighting the importance of public participation and educating faculty on how to crowdsource data and engage the community in collaborative discovery. Building on this foundation, a dedicated Open Science course has been approved and piloted in the Faculty of Cognitive Sciences and Human Development (FCSHD) — the first curricular embedding of Open Science at UNIMAS — with resulting Open Educational Resources deposited via PeTARY.

2. **Hands-on Training for Researchers**

   Moving from theory to practice, the university provides specialised, hands-on technical sessions on the daily application of Open Science tools. A central component is the UNIMAS Dataverse training, conducted by the Chief Digital Officer's (CDO) Office on a quarterly basis and mandatory for any researcher receiving research funding, whether from UNIMAS or external agencies. To date, 84 researchers have completed this training, delivered across two sessions in 2024, four in 2025, and two planned for 2026. While the university does not currently issue formal certifications for these modules, the sessions focus on practical competency — directly assisting researchers in uploading data, managing metadata, and applying open licences. This framework leverages established institutional benchmarks such as the AiBoB (Biodiversity of Borneo) Training Workshop, which equipped international delegates with the skills to manage and share critical environmental data.

3. **Open Science Ambassadors Programme**

   To ensure the long-term sustainability and cultural integration of the infrastructure, UNIMAS is establishing an Open Science Ambassadors Programme. This initiative identifies and empowers a network of faculty champions across faculties and institutes who are early adopters of open research methodologies. These ambassadors serve as peer mentors and localised advocates — helping to demystify Open Science practices, address discipline-specific technical concerns, and promote the tangible benefits of data sharing at the grassroots level. The university is developing formal recognition pathways to acknowledge their contributions to shifting institutional research culture.

Lessons learned. The principal implementation challenge has been building researcher understanding of Open Science and willingness to share data, with the main concern being copyright and ownership in relation to funding parties. Future capacity-building and policy guidance address these concerns directly, and the mandatory Data Management Plan requirement links funded projects to deposit in the UNIMAS Dataverse to reinforce practice.

8. Outreach and Community Engagement

Community engagement is a cornerstone of the Open Science framework at Universiti Malaysia Sarawak. To bridge the gap between academia and society, UNIMAS delivers its public-facing Open Science activity through the OS-Hub. To avoid ambiguity, one convention is used throughout this plan: the OS-Hub is the institutional function; at UNIMAS it is hosted by the Digital Experience Hub (DEX Hub) and delivered to the public under the Science Shop 2.0 banner. In line with UNESCO's anti-fragmentation principle, the Hub repurposes this existing institutional unit rather than creating a new standalone body. It is already running engagement activities — having reached over 600 community members and students to date — and is scheduled for official launch in August 2026. Science Shop 2.0 fosters inclusive and responsible research by providing a dedicated, safe space for civil society to engage directly with the scientific process and to make use of institutional research outputs.

UNIMAS further extends its reach through cross-border data sharing via the Borneo Satellite Network (BoSaN) and the AiBoB (Biodiversity of Borneo) platform. By integrating AiBoB with the UNIMAS Dataverse — an integration now live, with environmental data appearing in the repository — the university disseminates real-time environmental data, unites partner institutions, and solidifies its role as the primary research "Gateway to Borneo" for tackling critical challenges such as climate change. To actively involve the public and the wider academic ecosystem, UNIMAS conducts dedicated citizen-science seminars in which community and student participation are central to grassroots data collection and scientific discovery; 186 participants have taken part to date. Community-generated data is curated under CARE principles and deposited in the UNIMAS Dataverse, ensuring it is both protected and reusable.

In tandem with these activities, the university hosts the UNIMAS Open Science Conference, a flagship event that gathers national and international stakeholders to share innovative methods, policy frameworks, and best practices for advancing Open Science and Citizen Science; the most recent edition drew 109 participants. Building on this momentum, the OS-Hub intends to host further workshops on community-engaged research and digital-literacy upskilling, aligned with national, state, and university digital-transformation agendas. The OS-Hub is embedded within the Digital Experience Hub as its host unit and works in coordination with the Library and the CDO's Office for repository, data-stewardship, and training connections. Continuous collaboration with funding agencies and institutional libraries is maintained to engage funders directly and to sustain Open Science compliance across the university's research endeavours.

9. Evaluation and Monitoring

Monitoring combines quantitative reach indicators with qualitative practice and impact indicators, consistent with UNESCO's quality-over-quantity position and DORA. Volume-based ranking of individual researchers is avoided. Baselines reflect confirmed June 2026 figures.

9.1 Infrastructure usage and accessibility indicators

Indicator	Method	Baseline (Jun 2026)
Datasets deposited in the Dataverse	Platform analytics	**48 (33 dataverses)**
Registered Dataverse users	Platform analytics	**112**
DOI coverage of deposits	Repository audit	**95%**
Items in PeTARY	Library records	**19,276**
Researchers trained (cumulative)	CDO training records	**84**

9.2 Stakeholder engagement and outreach indicators

Indicator	Method	Baseline (Jun 2026)
Citizen-science participants	Event records	**186**
Community / students engaged via OS-Hub	OS-Hub records	**600+**
Open Science Conference attendance	Event records	**109 (most recent)**

9.3 Quality-of-practice and qualitative impact indicators

- Metadata completeness and share of deposits with open licences (curation review).
- Documented cases of data reuse by researchers or community groups.
- Evidence of influence on community decision-making or policy; early-career-researcher feedback.

9.4 Monitoring procedures and evidence collection

An annual OS Infrastructure Assessment compiles indicator data from platform analytics, curation review, training records, event records, and a researcher survey, reported to the OS Steering Committee, senior management, and the OPEN-ASIA Coordinator. Monitoring remains under institutional and public oversight, not delegated to a commercial provider, in line with UNESCO's guidance.

10. Budget and Resource Allocation

A sustainable funding model underpins the infrastructure. Indicative allocations support secure digital architecture, researcher support, and OS mandates.

Allocation category	Indicative budget	Purpose
Data storage infrastructure	RM120,000 (project)	NAS integration and maintenance; supplementary cloud hosting.
Digital repository development	RM50,000 (university)	PeTARY upgrades and Dataverse development for FAIR sharing.
Open access publishing fund	RM100,000 (university)	APC subsidy for gold OA (over RM300,000 disbursed last year across sources).
Training and capacity building	RM50,000 (university)	OS modules and Dataverse training.
Outreach and community engagement	RM150,000 (project + sponsors)	Public seminars, BoSaN initiatives, OS-Hub launch, conference.

10.1 Sustainability and operationalisation

Post-project ownership is assigned: the UNIMAS Dataverse to the CDO's Office; PeTARY to the Library; NAS and storage to CDO's Office / ICT; the OS-Hub to the Digital Experience Hub; and AiBoB/BoSaN to the CDO's Office with the relevant research centre. Open-source software eliminates licence costs and ensures community support. Core recurring costs are met from the institutional operating budget; consistent with UNESCO's recommendation, UNIMAS will progress a sustained funding model supported by institutional funding and a contribution from funded research grants, with cost and revenue transparency reported through the annual OS assessment.

10.2 Future development priorities (next 1–2 years).

The following priorities are confirmed by UNIMAS:

- Upgrade the UNIMAS Dataverse to the current release series for enhanced metadata, ORCID linking, and preservation features.
- Extend persistent identifiers beyond DOI/ORCID to include ROR (organisations) and track RAiD (projects) for adoption as it matures regionally, moving towards UNESCO's full PID set.
- Formalise a written long-term preservation and retention policy, building on NAS-based backup.
- Deepen federation with the national MOSP and regional infrastructures for interoperability and discoverability.

- Expand storage capacity (NAS and/or cloud overflow) as dataset volume grows, with periodic hardware refresh provided for within the institutional ICT capital cycle.

10.3 Infrastructure Development Policy

To ensure that infrastructure decisions are coherent, sustainable, and aligned with Open Science principles rather than ad hoc, UNIMAS adopts an Infrastructure Development Policy to govern how OS infrastructure is selected, developed, maintained, and retired. The policy rests on the following principles:

- Open-source first. New OS infrastructure should, as far as possible, be based on community-governed, open-source software stacks (as with the Dataverse and DSpace platforms already in use), to ensure long-term sustainability, avoid commercial lock-in, and comply with the UNESCO Recommendation on Open Science.
- Federation over duplication. Before commissioning new infrastructure, UNIMAS assesses whether existing institutional, national (MOSP), or regional infrastructure can be federated with or reused, avoiding fragmentation and unnecessary duplication of effort.
- FAIR and CARE by design. All data infrastructure must support persistent identifiers, standardised metadata, and the FAIR principles, with CARE principles applied to community and indigenous data.
- Defined ownership and lifecycle. Every infrastructure component must have a named institutional owner responsible for its operation, maintenance, security, and eventual upgrade or decommissioning, with provision made in institutional budgets for its full lifecycle, not only its acquisition.
- Sustainability and security review. New infrastructure proposals are assessed for long-term financial sustainability, PDPA and data-protection compliance, and alignment with the institutional OS Strategy and this plan before approval.
- Monitoring and review. Infrastructure performance and usage are reviewed through the annual OS Infrastructure Assessment (see Evaluation and Monitoring), informing decisions on upgrades, expansion, or retirement.

This policy is overseen by the OS Steering Committee and applied in coordination with the CDO's Office, Library, and ICT, ensuring that infrastructure development remains strategic, accountable, and sustainable.

11. Timeline and Implementation Plan

Implementation proceeds in phases, with key milestones and assigned responsibilities.

Phase	Timeline	Key milestones
Strategic planning & policy design	2025 Q1–Q2	OS policies finalised; infrastructure frameworks selected.
Technical development & deployment	2025 Q3–Q4	UNIMAS Dataverse set up; NAS deployed.
Capacity building & adoption	2026 Q1–Q2	Workshops and Dataverse training delivered; FCSHD OS course piloted.
Full implementation & launch	2026 Q3–Q4	OS-Hub / Science Shop 2.0 official launch (August 2026); annual KPI monitoring begins.

12. Conclusion

This Open Science Infrastructure Development Plan presents a comprehensive and operational roadmap for transforming the research landscape at Universiti Malaysia Sarawak. Through centralised, open-source platforms — the PeTARY institutional repository, now holding over nineteen thousand outputs, and the UNIMAS Dataverse, with a growing body of FAIR-compliant datasets — supported by robust storage and progressive policies, UNIMAS has built a secure and accessible foundation for scholarly dissemination. Capacity-building has already reached scores of researchers, a dedicated Open Science course is embedding the practice in the curriculum, and community engagement through Science Shop 2.0 and the AiBoB platform is extending the benefits of open research to society and the Borneo region.

Crucially, this plan looks beyond establishment to endurance: it assigns clear institutional ownership, commits to a sustainable financing model, and sets a roadmap for continued development. By dismantling traditional barriers to knowledge while ensuring the infrastructure is governed, monitored, and sustained, UNIMAS affirms its commitment to openness, collaboration, and innovation — and to driving impactful, reproducible science that benefits society on a regional and global scale.

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UNESCO sources and benchmark claims were verified against official sources.

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