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BIOECONOMY EXCELLENCE ALLIANCE FOR STIMULATING
INNOVATIVE AND INCLUSIVE GREEN TRANSITION

BEAMING

D7.1 – BEAMING

Open Science

Case Study Book

Lead Contractor: Institute for
Development and Innovation (IRI)

Authors: Siniša Borota

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This document corresponds to D7.1 of the BEAMING project (contract no. 101137131) and to Work Package 7 (M3 – M16).

This document contains the summarized findings of a series of case studies conducted on the Open Science practices of the 12 BEAMING partner HEI and research institutes, including roadmaps to successful implementation.

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CONTACT PERSONS	BALÁZS IMRE (IMRE.BALAZS@EDU.BME.HU) ANIKÓ FEHÉR (FEHER.ANIKO@VBK.BME.HU)		
WEBSITE	HTTPS://BEAMINGPROJECT.EU/		

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DELIVERABLE RESPONSIBLE	IRI	CONTACT PERSON	SINIŠA BOROTA

DELIVERABLE CONTRIBUTORS				
	NAME	ORGANISATION	ROLE	E-MAIL
DELIVERABLE LEADER	SINIŠA BOROTA	IRI	MAIN AUTHOR	SINISA.BOROTA@IRI.RS
CONTRIBUTING AUTHOR(S)	SINIŠA BOROTA	IRI	MAIN AUTHOR	SINISA.BOROTA@IRI.RS
REVIEWER(S)	SVETLANA VUJIĆ	UNSFA	REVIEWER	SVETLANA.VUJIC@POLJ.UNS.AC.RS
	MILICA VRANEŠEVIĆ	UNSFA	REVIEWER	MILICA.VRANESEVIC@POLJ.EDU.RS
FINAL REVIEW AND QUALITY APPROVAL	BALÁZS IMRE	BME	COORDINATOR	IMRE.BALAZS@EDU.BME.HU
	ANIKÓ FEHÉR	BME	COORDINATOR	FEHER.ANIKO@VBK.BME.HU

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Acronyms and Abbreviations

Acronyms	Explanation
APC	ARTICLE PROCESSING CHARGE
D	DELIVERABLE
EC	EUROPEAN COMMISSION
EOSC	EUROPEAN OPEN SCIENCE CLOUD
ERA	EUROPEAN RESEARCH AREA
EU	EUROPEAN UNION
FAIR	FINDABILITY, ACCESSIBILITY, INTEROPERABILITY AND REUSABILITY
GA	GRANT AGREEMENT
HEI	HIGHER EDUCATION INSTITUTION
OS	OPEN SCIENCE
OSTF	OPEN SCIENCE TASK FORCE
OA	OPEN ACCESS
RI	RESEARCH INSTITUTE
WP	WORK PACKAGE

1 Executive summary

The BEAMING Open Science Case Study Book was developed through the BEAMING Project's Work Package 7 (Boosting Open Science practices), Task 7.2 Assessment of Open Science practices in EU and widening countries which aims to perform a comprehensive review of institutional research policies, procedures, and practices, with a particular focus on Open Science practices and a comparison with international best practices.

The BEAMING Open Science Case Study Book presents findings of a series of case studies conducted on the Open Science practices of the 12 BEAMING partner higher education institutions and research institutes, including roadmaps to successful implementation.

It represents a baseline for the development of subsequent Action Plans for BEAMING partners, through T7.4 Developing individual Open Science Action Plans for BEAMING partners and D7.1 Collection of individual Open Science Action Plans. Partners will use insights and roadmaps from The BEAMING Open Science Case Study Book and operationalise them further.

2 Project Overview

BEAMING aims to raise excellence by enhancing innovation and knowledge valorisation within the bioeconomy domain through cooperation between higher education institutions, with a particular focus on Widening countries in Central-Eastern (CEE) and South-Eastern European (SEE) EU Member States and the Western Balkans. Improved global competitiveness and visibility of higher education institutions (HEI) will be achieved through establishing effective technology and know-how transfer between Widening countries and EU14 member states with more developed bioeconomies and R&I ecosystems, exploring and adopting structural reforms, educational priorities, and a culture of excellence.

The BEAMING Alliance works towards 7 Specific Objectives: **1)** Build the capacity of early-career researchers in all aspects of bioeconomy research; **2)** Facilitate the reform of institutional practices and policy frameworks towards excellence; **3)** Foster networking, knowledge exchange, and cross-disciplinary collaboration by establishing sustainable Communities of Practice; **4)** Design joint research and innovation strategies and launch joint research projects; **5)** Design a complex portfolio of activities for adopting Open Science practices; **6)** Strengthen the valorisation of research results by increasing tech transfer capacity; **7)** Support the participating institutions to move towards inclusive institutional culture, including gender equality.

We aim to foster the uptake of the Quadruple Helix (QH) innovation ecosystem approach to provide a framework for higher education institutions to work collaboratively with industry, government, and civil society. Thereby, we aim to enhance their innovation capacity and the applicability of research results. Local and regional implementation strategies and roadmaps will be developed regarding the relevant ERA Policy Agenda actions in the higher education sector, particularly in the bioeconomy and circular economy domains.

3 Introduction

Deliverable D7.1 – BEAMING Open Science Case Study Book provides a systematic assessment of OS practices across the 12 BEAMING partner institutions. The essential aim of D7.1 is to support the 12 targeted HEIs and RIs in better understanding their current position in terms of OS practices and their implementation and to help them bridge the identified gaps by creating roadmaps.

The following chapters of this report will present the methodology applied in the process of selecting the relevant OS indicators and conducting the work related to the actual assessments of OS practices. This is followed by 12 case studies which contain the results of the GAP analyses and the roadmaps for successful implementation.

4 Methodology

This chapter outlines the methodology used for the purpose of producing the OS assessments and creating roadmaps for successful implementation for the 12 targeted HEIs and RIs.

The starting point was the extensive desk research primarily focused on building the relevant conceptual framework and gathering information on concrete OS practices, the newest developments in the related fields, previous relevant and complementary work, and the current state of the 12 targeted HEIs RIs in the context of OS practices.

HEIs that are included in this report are presented below.

Table 1 Higher Education Institutions in the BEAMING Project

No.	Short Name	Role	Type	Country
1	BME	Coordinator	HEI	HU
5	UnIOS	Partner	HEI	HR
6	AUP	Partner	HEI	BG
10	BOKU*	Partner	HEI	AT
11	EDU	Partner	HEI	RS
13	UNIBL	Partner	HEI	BA
14	UKIM	Partner	HEI	MK
15	AUT	Partner	HEI	AL
16	UNSFA	Partner	HEI	RS
17	UP	Associated Partner	HEI	HU

* EUI4 partner

RIs that are included as well, are presented below.

Table 2 Research Institutes in the BEAMING project

No.	Short Name	Role	Type	Country
3	FhG-ISI*	Partner	RI	DE
9	INCDSB	Partner	RI	RO

* EU14 partner

Next, a Table of Indicators was developed based on a literature review.¹ The most complementary indicators are chosen according to the needs of the BEAMING project (SO5) and through a deliberation process conducted during the Open Science Task Force meetings. This process was conducted in an iterative cycle of sharing drafted versions of the Table of Indicators, initiating discussions, and gathering and implementing comments.

The final version of the Table of Indicators was created by modifying and omitting certain indicators from the extensive and exhaustive preliminary Table of Indicators to harmonise them with the goals of the BEAMING project, match the scope of the T7.2 objectives, and ensure the optimal efficiency of the assessment process.

More specifically, omitted indicators from the relevant literature were the ones that represent subjective opinions or personal assessments rather than objective reports of certain practices being implemented and ways in which they are being implemented. Omitted were also indicators that are related to levels above or below the institutional level (e.g., national level indicators). Finally, omitted indicators were also the ones related to the measurements of particular OS outputs and complementary quantitative metrics (e.g., percentage of OA publications).²

¹ The Table of Indicators is presented in Annex I, and it includes the literature used for each indicator/question.

² For the representative relevant examples of omitted quantitative indicators, see:

On the other hand, the main focus was on indicators that are related to OS practices including organisational aspects, leadership, policies, and cultural shift.

Next, the Open Science Questionnaire was developed.³ It is important to note that most indicators were adopted and adapted from the relevant sources, including the connected questions, to build on the previous work in the field and produce comparative results for potential future assessments and analyses. The sources for each indicator and related question are listed in Annex I (the Table of Indicators). Nonetheless, some indicators were added through the deliberation process of the OSTF (e.g., ARRA).

Furthermore, the OSTF decided that a slight deviation from the interview method to the survey method would produce better outcomes for at least four reasons:

1. **Number of Questions:** There are over 60 indicators, and related questions and sub-questions. This was necessary to cover all OS pillars sufficiently. Nonetheless, this number of questions would not be adequate for the interview method.
2. **Low chances that all OS elements are covered by one group interview:** Questions are related to different OS elements that are related to different frameworks of particular HEIs and RIs, covered by various individuals with diverse job positions and backgrounds (e.g., technical frameworks, managerial frameworks, policy frameworks, etc.). This implies that the number of individuals within the organisation that would be needed to provide correct and knowledgeable answers to pertinent questions would be unpredictable. Organizing a group interview might not give the best results as relevant individuals might not be present and

Open Science Impact Pathways (PathOS), "Open Science Indicator Handbook," 2023. Technopolis Group Belgium, "Indicators and Metrics to Test in the Pilots" (Open Universal Science (OPUS), 2023).

³ The Open Science Questionnaire is presented in the Annex II.

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individual interviews would not be feasible from the organisational standpoint (e.g., total time, scheduling, and resources).

3. Questions are related to knowledge, not opinions: Indicators and questions are designed to extract information about an organisation and its frameworks related to OS, not to measure subjective variables such as attitudes, beliefs, or values. This means that interviews would not add epistemic value. On the other hand, they would require much more resources.
4. Most questions are open-ended but structured to infer yes/no/in-process responses, as the GAP analysis requires target values and as clear-cut indicators as possible. This means that interviews would not add value in this regard as well. On the other hand, they would make the process much more complicated for the interviewees.

Although the goal is to assess OS practices in relation to already established target values from the relevant literature, the questionnaire was designed to gather additional qualitative data, including an open-ended question at the end of the questionnaire designed to capture good practices that might be considered novel.

The Questionnaire, which follows the structure of the Table of Indicators, is essentially based on the 8 pillars of OS (sections 2–9), with an additional section that addresses some horizontal indicators that support the overall implementation of OS principles and practices (section 1).

1. Cultural Change/Leadership
2. The European Open Science Cloud (EOSC)
3. Next-generation Metrics
4. Mutual Learning/Collaboration
5. Future of Scholarly Communication and Publishing
6. Rewards, Incentives, and Recognition
7. Research Integrity

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8. Education and Skills
9. Citizen Science

As OS pillars are somewhat heterogeneous in the relevant literature, the complementary categories are harmonized (Future of Scholarly Communication and Future of Scholarly Publishing).⁴ Furthermore, OS pillars are, as such, understood slightly differently by different organisations and institutions and are heavily intertwined, interdependent, and complementary.

The questions are related to different aspects of Open Science practices that are being implemented in 12 targeted HEIs and RIs and have an aim to collect the information necessary for conducting GAP analyses.

Although most questions infer a yes/no type of answer, they are purposefully designed as open-ended. The respondents are actively encouraged to elaborate on the answers as much as possible, especially if the answer cannot fit into the simple yes/no dichotomy, as this presented valuable inputs to deliver higher-quality and tailored recommendations.

The target groups are representatives of the engaged HEIs and RIs, primarily:

- Institutional Leaders (e.g., Rectors, Vice-Chancellors, Directors of Research Institutes, Heads of Departments);
- Research Policy Makers (e.g., Individuals responsible for developing and implementing research policies at the HEI/RI level);

⁴ See: European Commission. Directorate General for Research and Innovation., *Future of Scholarly Publishing and Scholarly Communication: Report of the Expert Group to the European Commission*. (LU: Publications Office, 2019).

European Commission. Directorate General for Research and Innovation., *Progress on Open Science: Towards a Shared Research Knowledge System: Final Report of the Open Science Policy Platform*. (LU: Publications Office, 2020).

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- Open Science Practitioners (e.g., Open Science managers, Researchers actively involved in Open Science practices, and Open Science coordinators or officers);
- IT and Library Services (e.g., Heads of library services and IT managers responsible for research data infrastructure);
- Research Support Staff (e.g., Research managers, grants officers, data stewards, and repository managers);
- Researchers involved in Open Science practices (e.g., Early career researchers and senior researchers).

OSTF members were encouraged to analyse it and disseminate it to as many target groups/individuals as needed to complete it. Inputs were then compiled and consolidated.

4.1 Evaluation of the questionnaires

Questionnaires were analysed using the GAP analysis, using the following criteria. If the OS practice is fully implemented according to the target value or it is significantly close to being **fully implemented**, the indicator is considered as “fulfilled” and labelled with **green** colour. If the OS practice is not close to being fully implemented and significant gaps are present, but the HEI or RI is currently working on its implementation, it means that the **implementation is “in process”**, and the indicator was labelled with **yellow** colour. Finally, if an OS practice is **not being implemented** and there is no information that the HEI or RI is working on its implementation, the indicator is considered as “not fulfilled” and is labelled with **red** colour.

Indicators that were related to types of support that HEI or RI provides for different OS elements, which contain lists, the criteria were the following. **All ticked answers were awarded 1 point and non-ticked 0 points.** 80% or more of the ticked answers were considered exhaustive, and the indicator was labelled as “fulfilled” (green colour). 20%-79% of ticked answers were considered as the indicator being labelled “in

progress" (yellow colour). And 20% or below was labelled as "not fulfilled" (red colour). In addition, open-ended responses were used to supplement quantitative scores for nuanced evaluation.

Next, roadmaps were created for each HEI/RI and each OS section, containing clear and tailored recommendations for bridging identified gaps, that is, the OS practices which were assessed as "in process" or "not fulfilled". Target values, presented in the Table of Indicators, were used as a reference for the ideal level of fulfilment of particular indicators.

5 Case Studies

The 12 case studies will be presented in the upcoming subchapters, including the GAP analyses and roadmaps for successful implementation for each targeted HEI and RI.

5.1 Budapest University of Technology and Economics (BME)

Budapest University of Technology and Economics (BME) has eight faculties, Civil Engineering, Mechanical Engineering, Architecture, Chemical Technology and Biotechnology, Electrical Engineering and Informatics, Transportation Engineering and Vehicle Engineering, Natural Sciences, Economic and Social Sciences, and hosts around 24.000 students.⁵

BME has more than 1100 full-time lecturers and researchers, and according to QS ranking in engineering and technology in 2023, it held a 224th place.⁶

GAP Analysis and Roadmaps for Successful Implementation

The following section evaluates OS practices related to the Cultural Change/Leadership pillar, identifying key gaps.

⁵ Budapest University of Technology and Economics, "Bulletin 2022–2023," 2022.

⁶ Budapest University of Technology and Economics, "Tények És Adatok a Műegyetemről – BME in Facts and Figures," 2023.

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Table 3 Cultural Change/Leadership | GAP Analysis – BME

Indicator	Description	Result
Open Science Policy	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science	Yellow
Senior manager	Appointed senior manager for Open Science	Red
Programme of Cultural Change	Developed programme of cultural change	Yellow
Communication	Developed communication strategy	Red
Community	Established Open Science Community	Yellow

BME’s comprehensive OS strategy is currently in progress and the OA publication strategy is under development. Nonetheless, the University has OA publication guidelines.

HEI does not have an appointed senior manager responsible for the management of OS principles and practices. They have a Vice-Rector for Academic Affairs.

OS strategy is currently under development and should cover the segment related to cultural shifts in terms of OS. Furthermore, BME joined the National Position Paper on Open Science, which was developed by the National Research, Development, and Innovation Office.⁷

BME does not have a comprehensive communication strategy related to OS.

⁷ National Research, Development and Innovation Office (NRDI Office), “Open Science Position Paper,” 2021.

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The University is connected to the National Position Paper on Open Science⁸ developed by the National Research, Development and Innovation Office, which has the potential to be a foundation for establishing an Open Science Community.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 4 Cultural Change/Leadership | Roadmap for Successful Implementation – BME

Indicator	Recommendations
Open Science Policy	Finalize the comprehensive OS strategy and OA publication strategy, which are currently under development. Ensure that they cover all OS pillars and elements. Align OS policies with international best practices and regularly update them to reflect the latest developments in the global OS movement, but also take into consideration local idiosyncrasies and inputs from local stakeholders (e.g., researchers, students, etc.).
Senior manager	Identify and appoint a senior manager for OS. This role should have clear responsibilities and competencies for developing and implementing OS policies and practices across all eight pillars.
Programme of Cultural Change	Integrate a comprehensive programme of cultural change in the OS strategy, which is under development, to create the environment for the implementation of OS practices. Identify key actors and enablers of OS in your HEI, set specific goals, and define an impact-measuring framework.
Communication	Analyse your stakeholders (e.g., students, administrative staff, etc.), test multiple communication

⁸ National Research, Development and Innovation Office (NRDI Office), “Open Science Position Paper,” 2021, <https://nkfih.gov.hu/openscience/openscience-position>.

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methods/channels, monitor results, tailor and adjust them, and iterate in order to achieve the best results. Then, develop an OS communication strategy.

Community

Build on the initiative related to the National Position Paper on Open Science developed by the National Research, Development, and Innovation Office as a foundation for establishing an Open Science Community. Consult the guidelines created by the International Network of Open Science & Scholarship Communities.⁹

The following section evaluates OS practices related to the European Open Science Cloud (EOSC) pillar, identifying key gaps.

Table 5 The European Open Science Cloud (EOSC) | GAP Analysis – BME

Indicator	Description	Result
Policy Commitment	Signed EOSC Declaration	Yellow
International Collaboration	Involvement in the EOSC Association	Red
Infrastructure Access	Institutional access to the requisite infrastructure	Green
Infrastructure Development	Provided search and discovery service	Red

BME has not currently signed the EOSC Declaration and is not a member of the EOSC Association. Nonetheless, the National Position Paper on Open Science signed by BME encourages them to join EOSC.

⁹ International Network of Open Science & Scholarship Communities, “Open Science Community Starter Kit,” 2020, <https://inosc-starter-kit.netlify.app/>.

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The HEI has an established data repository operated by the University Library.

BME does not have an established search and discovery service which may inhibit researchers and other users to efficiently locate and utilize available scientific outputs and research data.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 6 The European Open Science Cloud (EOSC) | Roadmap for Successful Implementation – BME

Indicator	Recommendations
Policy Commitment	Implement provisions developed by the National Position Paper on Open Science to improve the harmonization with the principles of the EOSC. Consider formally signing the EOSC Declaration.
International Collaboration	Explore the possibility of becoming a direct member of the EOSC Association to participate actively in shaping OS policies and practices at the EU level and draw local benefits. Alternatively, ensure participation in EOSC events that are open for non-members before initiating the formal joining process.
Infrastructure Development	Develop a search and discovery service equipped with advanced search options and metadata standards to ensure easy navigation and accessibility. Integration with global research networks, including the EOSC, should be considered as well.

The following section evaluates OS practices related to the Next-Generation Metrics pillar, identifying key gaps.

Table 7 Next-Generation Metrics | GAP Analysis – BME

Indicator	Description	Result
HR	New forms of research evaluation	Yellow
Guidance	Guidance for research administrators and academics on good and bad practices	Red
Training	Training for junior researchers, particularly early-stage doctoral researchers	Yellow
DORA	Signing DORA and implementing DORA recommendations	Red
ARRA	Signing ARRA and implementing ARRA Principles	Green

BME has not yet embedded new forms of research evaluation in its internal processes for promotion, reward, and research evaluation. This is currently in progress.

HEI did not develop guidance for research administrators and academics on good and bad practices regarding the use of traditional bibliometrics and the development of next-generation metrics.

The University Library provides PHD courses about science metrics and OA publications. There is also a PHD subject related to publication practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 8 Next-Generation Metrics | Roadmap for Successful Implementation – BME

Indicator	Recommendations
HR	Finalize the implementation of new forms of research evaluation (alternative metrics) and new evaluation criteria tailored for the HEI’s idiosyncrasies. Include a broader range of qualitative indicators (e.g., interdisciplinary work) and move away from inappropriate uses of traditional metrics such as Journal Impact Factor (JIF) and h-index.
Guidance	Conduct a needs assessment to identify the most deficient fields for which guidance on Next-Generation Metrics is needed. Develop guidance for research administrators and academics that covers traditional bibliometrics and the development and implementation of new metrics related to research assessment.
Training	Adjust formal and structured training programs that focus specifically on the Next-Generation Metrics and are tailored to junior researchers.
DORA	Formalize the adoption of DORA by joining the signatories and initiate the implementation of DORA recommendations across the HEI.

The following section evaluates OS practices related to the Mutual Learning / Collaboration pillar, identifying key gaps.

Table 9 Mutual Learning / Collaboration | GAP Analysis – BME

Indicator	Description	Result
Stakeholders	Collaboration with external stakeholders	

BME is connected with the National Research, Development and Innovation Office¹⁰ through their Institutional senior management and Vice-Rector for Academic Affairs. Furthermore, BME coordinates the BEAMING project, which is a way of liaising with external stakeholders. However, the University lacks a concerted approach with more diverse stakeholders across the quadruple helix.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 10 Mutual Learning / Collaboration | Roadmap for Successful Implementation – BME




Indicator	Recommendations
Stakeholders	Build on the connection with the National Research, Development and Innovation Office and the existent project-based collaboration established through the projects in which BME is currently participating. Broaden these efforts to form strategic partnerships focused on different OS pillars. Focus on the collaboration with diverse stakeholders across the quadruple helix (government, academia, industry, and community), including the local actors.

The following section evaluates OS practices related to the Future of Scholarly Communication and Publishing pillar, identifying key gaps.

¹⁰ NKFIH, “National Research, Development and Innovation Office | English” (Nemzeti Kutatási, Fejlesztési és Innovációs Hivatal, 2008. Minden jog fenntartva., November 30, 2017), <https://nkfih.gov.hu/english-nkfih>.

Table 11 Future of Scholarly Communication and Publishing | GAP Analysis – BME

Indicator	Description	Result
Plan S	State of the implementation of Plan S	Green
Preprints Advocacy	Advocating for the share of research manuscripts as preprints	Yellow
Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	Red
ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	Red
University Press	The existence of the university press and its engagement with Open Access	Green
Open Access Support	Support to researchers to make their research publications available in Open Access	Yellow
FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	Red
FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	Red
FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	Green
FAIR Data/Information	Information about the data archived and published by own research community	Red
FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	Red
FAIR Data/Assessment	Including research data in the researcher assessment	Red

	methodology and research metrics	
Open Access Publishing	Harmonisation with Open Access standards	
Support	Support provided to researchers in research data management, FAIR data, and data sharing	

BME is implementing Plan S, supporting OA publishing via Read&Publish agreements and institutional resources.

BME provides an institutional repository for researchers to store preprint manuscripts but does not actively advocate it.

The HEI does not support new forms of scholarly publishing from third parties, which are dedicated to OA approaches.

The use of author identifier systems such as ORCID across the organisation is optional.

BME has a university press, which uses a repository and other types of OA publishing (websites).

Numerous forms of support for OA publishing are being provided. This includes training for researchers (including doctoral candidates), institutional website(s) on OA to research publications, developing an open research strategy and vision, and funding for publishing in OA journals (APCs).

BME currently does not have a research data policy or strategy that includes FAIR principles, and it does not operate a data stewardship service. Nonetheless, it operates an institutional data repository.

The HEI does not gather information about the data archived and published by its research community.

BME does not publish all metadata and does not recognize research data as a valuable output in research assessments.

The University publishes scientific journals. OA publishing is operated by the University Library using a diamond OA model (Periodica Polytechnica).

HEI provides various forms of support in the areas of research data management, FAIR data, and data sharing. This includes training for researchers (including doctoral candidates), using or developing FAIR research tools/services, publishing FAIR outputs on their own or recommended repositories, developing open research strategy and vision, and finding (other) sources of training and advice on FAIR data.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 12 Future of Scholarly Communication and Publishing / Roadmap for Successful Implementation – BME

Indicator	Recommendations
Preprints Advocacy	Initiate advocacy for the sharing of research manuscripts as preprints through a concise advocacy campaign.
Scholarly Publishing from Third Parties	Identify and evaluate suitable third-party OA initiatives (e.g., OpenEdition and Knowledge Unlatched), initiate collaborations, and develop more formalized support structures (e.g., financial support schemes, administrative assistance, etc.).
ORCID Advocacy	Initiate active advocacy for the usage of ORCID.
Open Access Support	Consider broadening the support that BME provides to researchers to make their research publications available in OA. Consider integrating linkages to career evaluation and promotion within the institution, facilitating administrative reporting of publications in projects, guidelines providing clarification of legal issues related to linking, sharing, and re-using Open Access content, the

FAIR Data/Policy Integration

establishment of specific services (e.g. helpdesks) for researchers, and legal support.

Initiate the development of a research data policy or strategy which will include FAIR principles. This document should contain policies and guidelines for managing, storing, and sharing research data and metadata.

FAIR Data/Stewardship

Assess the specific needs for data stewardship services at BME, then plan and initiate the establishment of a dedicated service to provide data stewardship to researchers.

FAIR Data/Information

Build on the infrastructure of the current BME repository to include gathering and managing information about the research data generated by researchers (e.g., datasets, code, etc.).

FAIR Data/Metadata Publishing

Establish and implement a standardized metadata framework for all research data generated or obtained at the University level. Furthermore, create a metadata publishing policy to enable publishing and provide free access to metadata. Develop a solution for publishing and providing free access to metadata with regard to FAIR principles. Explore integrating systems and solutions such as CRIS or PURE.

FAIR Data/Assessment

Integrate the recognition of research data as a valuable output for research assessments in the existing assessment framework. It is important to regulate how data contributions are measured and evaluated.

Support

Expand Institutional Resources and support that BME provides to researchers in the area of research data management, FAIR data, and data sharing. Precisely, consider developing and launching an institutional website(s) on research data management, planning stewardship and sharing of FAIR outputs, finding and reusing data from existing sources, preparing and

documenting data/code to make outputs FAIR, recognising, citing and acknowledging contributions, complying with legal and ethical requirements, FAIR principles, and funding for implementing FAIR principles.

The following section evaluates OS practices related to the Rewards, Incentives, and Recognition pillar, identifying key gaps.

Table 13 Rewards, Incentives, and Recognition | GAP Analysis – BME

Indicator	Description	Result
Open Science Incentives	Incentives for researchers developing Open Science activities	Yellow
Academic assessment	Open Science elements as part of academic assessment	Yellow
HR	Open Science dimensions in HR and career frameworks	Red
Recognition and Rewards	Recognising and rewarding Open Science practices	Red
Policy Transparency	Open and easily accessible policies on researcher evaluation	Yellow

BME provides incentives for researchers developing OS practices such as OA publishing and Citizen Science.

The University integrates several OS elements into its academic assessment framework, including depositing of research articles in a repository, OA publishing of research articles in OA journals (via payment of APCs), OA books, OA archival or special collections, preprints, depositing of data in a repository, and Citizen Science. However, there are gaps regarding other key OA elements that are not of the University’s approach to academic assessment.

There is an absence of integration of OS principles into HR and career frameworks at BME, which indicates a gap in aligning HR policies with OS best practices.

The University does not have a system in place to assess how individuals, teams, or units integrate OS into their daily practices. Therefore, they cannot be adequately rewarded.

There is a repository only for internal use for researchers' evaluation. OS aspects in this regard are still under development and will be covered by the OS strategy.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 14 Rewards, Incentives, and Recognition | Roadmap for Successful Implementation – BME

Indicator	Recommendations
Open Science Incentives	Expand the pool of OS practices that BME Incentives beyond OA publishing and Citizen Science.
Academic assessment	Incorporate additional OS elements into BME's academic assessment frameworks. Consider missing OS elements such as research data management plans, data sharing, open research protocols, open source research software and code, open education, open evaluation, open collaborative tools, co-creation platforms, transdisciplinary research platforms, co-design of research projects, crowdsource practices, and science outreach and communication.
HR	Develop OS-focused HR Policies or review and revise existing HR policies to explicitly integrate OS criteria regarding recruitment, performance evaluations, and career advancements. Clearly define how engagement in OS activities influences these processes.

- Recognition and Rewards** Develop and establish assessment frameworks that contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).
- Policy Transparency** Ensure that the new OS strategy includes provisions about making researcher evaluation policies easily accessible to all stakeholders, ideally through the University's official website, and available in multiple formats.

The following section evaluates OS practices related to the Research Integrity pillar, identifying key gaps.

Table 15 Research Integrity | GAP Analysis – BME

Indicator	Description	Result
Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	
ALLEA Code	Harmonisation with ALLEA Code	
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	
Training and Accreditation	Training and accreditation on research integrity pertaining to Open Science	

BME currently does not have a research integrity code/policy that embraces the OS principles. This will be covered by the OS strategy, which is under development.

The University does not currently adhere to the ALLEA Code.

Furthermore, BME has not yet adopted the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers.

Finally, BME does not provide regular training or accreditation programs on research integrity that incorporate OS principles at this moment, which can inhibit researchers from fully understanding and integrating ethical OS standards into their daily practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 16 Research Integrity | Roadmap for Successful Implementation – BME

Indicator	Recommendations
Research Integrity Code/Policy	Conduct a review of the existing research integrity code/policy to identify which OS principles are missing and effectively integrate them into the OS strategy that is currently under development.
ALLEA Code	Adopt the ALLEA Code, and align institutional policies and practices accordingly.
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adopt the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers and align institutional policies and practices accordingly.
Training and Accreditation	Develop and implement regular training and accreditation programs on research integrity related to OS. Ethical, legal, and social aspects of research should be covered.

The following section evaluates OS practices related to the Education and Skills pillar, identifying key gaps.

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Table 17 Education and Skills | GAP Analysis – BME

Indicator	Description	Result
Training	Skill training in Open Science	
Audience	Mandatory Open Science skills training for staff, researchers, and students	
Rewards and Incentives	Rewarding and incentivising Open Science skills development	
Tailored Skill Training	Open Science skill training specifically tailored to groups of staff/students	

BME does not provide skill training that covers all OS pillars, which is a gap in providing the support necessary for researchers to fully engage with OS practices. The second indicator is, therefore, absent as well.

The University currently does not provide rewards or incentives to staff and students with regard to OS skills development, which is a gap that may inhibit motivation and, therefore, lower participation rates.

The institution may not have a systematic, tailored training program for all groups yet. However, the occasional workshops and PhD student training indicate that there are efforts underway to provide some level of training.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 18 Education and Skills | Roadmap for Successful Implementation – BME

Indicator	Recommendations
Training	Develop an extensive, exhaustive, and structured OS skills training program that covers all OS pillars.
Audience	Ensure that the future established OS skills training program has mandatory participation for certain stakeholders according to their roles in developing OS practices at BME (staff, students, etc.). Also, consider making participation mandatory during the onboarding phase for new staff members.
Rewards and Incentives	Develop and implement a program that specifically rewards, and incentivises staff and students with regard to OS skills development. Take into consideration integrating things like certificates and various forms of public acknowledgment. Also, consider integrating participation in OS skill training into the performance evaluation frameworks and career advancement processes.
Tailored Skill Training	Ensure that the future established OS skills training program is tailored specifically to the needs of diverse stakeholders across the HEI. This can be done by assessing the training needs of different groups of stakeholders early in the development process.

The following section evaluates OS practices related to the Citizen Science pillar, identifying key gaps.

Table 19 Citizen Science | GAP Analysis – BME

Indicator	Description	Result
Citizen Science Policy	Documents that guide Citizen Science	
Single Point of Contact	Single point of contact for Citizen Science	
Assessment	Assessing Citizen Science contributions and adapting	

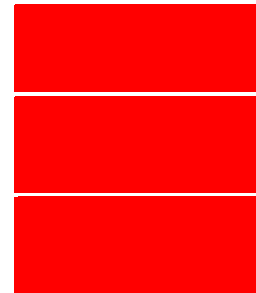
ECSA Principles

research evaluation and reputation systems accordingly

ECSA principles implementation support

Support and Training

Support and training for researchers in Citizen Science



Regarding the Citizen Science OS pillar, BME lacks specific documents that guide related activities, which is a strategic gap. This may inhibit the effectiveness and scalability of Citizen Science initiatives.

BME lacks a single point of contact for Citizen Science as an information hotspot and as a point for overseeing and supporting Citizen Science activities across the HEI.

Citizen Science contributions are currently not being assessed, and the formal research evaluation or reputation systems have not been adapted accordingly. This can inhibit recognition and incentivization for researchers who engage in Citizen Science activities.

BME does not implement the ECSA 10 Principles of Citizen Science, which may inhibit the effectiveness of existing Citizen Science efforts and the University's ability to engage with the community.

HEI currently does not provide support and training for researchers in regard to Citizen Science which may limit the capacity of researchers to conduct effective and ethical Citizen Science projects.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 20 Citizen Science | Roadmap for Successful Implementation – BME

Indicator	Recommendations
Citizen Science Policy	<p>Develop a document that guides Citizen Science at BME and which aligns with your OS frameworks and engagement goals. This document should define Citizen Science principles, address ethical considerations (e.g., data privacy, recognition of citizen scientists, etc.), and provide clear guidelines or policies related to the main elements of Citizen Science and relevant processes.</p>
Single Point of Contact	<p>Establish a single point of contact for Citizen Science by integrating a dedicated role or office into existing research support structures (e.g., Citizen Science officer, participatory research engagement officer, etc.), to coordinate efforts across departments, provide tailored support for Citizen Science projects, communicate across the University and advocate for the integration of Citizen Science elements into institutional policies.</p>
Assessment	<p>Develop specific criteria for assessing the value of Citizen Science contributions and modify the current research evaluation frameworks to consider Citizen Science contributions. This can include recognizing various outputs such as Citizen Science datasets, community reports, etc.</p>
ECSA Principles	<p>Ensure the formal recognition of the ECSA 10 Principles at the institutional level, adapt the necessary strategic documents accordingly, and enable their effective implementation.</p>
Support and Training	<p>Establish dedicated support mechanisms for Citizen Science at the institutional level (e.g., helpdesk, online resources, mentorship programs, etc.). Develop specific Citizen Science training programs in deficient areas, in accordance with researchers' needs, which cover important subjects such as designing Citizen Science projects, community engagement mechanisms, and ethical considerations. If applicable, integrate Citizen Science training into the existing and broader researcher development programs.</p>

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5.2 Fraunhofer Gesellschaft Zur Forderung Der Angewandten Forschung Ev (FhG-ISI)

The Fraunhofer Institute for Systems and Innovation Research ISI has seven competence centers, including 28 business units, and employs over 300 employees from 25 countries.¹¹

Fraunhofer ISI was founded in 1972, and today it hosts scientists from diverse fields who are working on approximately 400 research projects yearly, having an annual budget of 36,9 million euros (2023).¹²

Even though FhG-ISI currently does not have a clear strategic approach to OS their respondents are aware that the future will bring a more strategic and systemic approach concerning OS.

FhG-ISI also has a special status, as it receives public and private funding. Public clients such as ministries or the European Commission expect more and more that outcomes of (semi-)publicly funded research projects to be accessible to everyone. This is also why we do a lot of communication about the research outcomes and often put links in press releases to OA publications.

Finally, a lot depends on the Institute's organisational structure, which is very decentralized, as the headquarters deliver services to 80 institutes and a lot depends on them.

¹¹ "Profile - Fraunhofer ISI," Fraunhofer Institute for Systems and Innovation Research ISI, accessed November 30, 2024, <https://www.isi.fraunhofer.de/en/profil.html>.

¹² "Annual Report 2023 - Fraunhofer ISI," Fraunhofer Institute for Systems and Innovation Research ISI.

GAP Analysis and Roadmaps for Successful Implementation

The following section evaluates OS practices related to the Cultural Change/Leadership pillar, identifying key gaps.

Table 21 Cultural Change/Leadership | GAP Analysis – FhG-ISI

Indicator	Description	Result
Open Science Policy	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science	Yellow
Senior manager	Appointed senior manager for Open Science	Red
Programme of Cultural Change	Developed programme of cultural change	Red
Communication	Developed communication strategy	Red
Community	Established Open Science Community	Red

FhG-ISI provides information on OA publishing (“How To Open Access Publishing”) through their Intranet, so it is not accessible to everyone but employees.

The Institute has no senior manager appointed to lead OS development, although several researchers have knowledge about this topic including the Library staff.

Furthermore, FhG-ISI has not yet developed a programme of cultural change which is important for the practical implementation of OS principles.

FhG-ISI does not have established communication strategies to promote OS across the Institute. Nonetheless, relevant information is regularly given to their researchers (by the Library staff or from their headquarters in Munich).

FhG-ISI is not connected to an Open Science Community.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 22 Cultural Change/Leadership | Roadmap for Successful Implementation – FhG-ISI

Indicator	Recommendations
Open Science Policy	Develop a comprehensive OS policy that aligns with the FhG-ISI’s strategic goals. This policy should cover aspects across all OS pillars.
Senior manager	Identify and appoint a senior manager for OS. This role should have clear responsibilities and competencies for developing and implementing OS policies and practices across all eight pillars.
Programme of Cultural Change	Develop a comprehensive programme of cultural change for creating the environment for the implementation of OS practices. Identify key actors and enablers of OS in your Institute, set specific goals, and define an impact-measuring framework.
Communication	Analyse your stakeholders (e.g., students, administrative staff, etc.), test multiple communication methods/channels, monitor results, tailor and adjust them, and iterate in order to achieve the best results. Next, develop a comprehensive and targeted communication strategy, which will enable all institutional stakeholders to become familiar with OS practices. Use diverse communication channels, tools and platforms tailored to reaching different stakeholders.

Community

Build on existing partnerships within current Horizon projects and consider developing a local or regional OS community. Consult the guidelines created by the International Network of Open Science & Scholarship Communities.¹³

The following section evaluates OS practices related to the European Open Science Cloud (EOSC) pillar, identifying key gaps.

Table 23 The European Open Science Cloud (EOSC) | GAP Analysis – FhG-ISI

Indicator	Description	Result
Policy Commitment	Signed EOSC Declaration	Red
International Collaboration	Involvement in the EOSC Association	Red
Infrastructure Access	Institutional access to the requisite infrastructure	Red
Infrastructure Development	Provided search and discovery service	Green

FhG-ISI has not yet signed the EOSC Declaration, and it is not involved in the EOSC Association, thus lacking the formal commitment to this OS pillar.

The Institute does not have a data repository but has an established search and discovery service with a user-friendly interface. Furthermore, it provides access to data through their Library staff.

¹³ International Network of Open Science & Scholarship Communities, “Open Science Community Starter Kit,” 2020, <https://inosc-starter-kit.netlify.app/>.

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The following roadmap outlines actionable recommendations to address the identified gaps.

Table 24 The European Open Science Cloud (EOSC) | Roadmap for Successful Implementation – FhG-ISI

Indicator	Recommendations
Policy Commitment	Assess the benefits and requirements related to joining the EOSC. Formalize the commitment to the EOSC initiative by signing the EOSC Declaration. Systematically align FhG-ISI’s policies to comply with the requirements and standards of the EOSC.
International Collaboration	Enable and advocate for active participation of the Institute’s stakeholders in EOSC events that are open for non-members. Subsequently, initiate the process of joining the EOSC Association.
Infrastructure Access	Initiate the development of a data repository, and ensure that it is compatible with EOSC

The following section evaluates OS practices related to the Next-Generation Metrics pillar, identifying key gaps.

Table 25 Next-Generation Metrics | GAP Analysis – FhG-ISI

Indicator	Description	Result
HR	New forms of research evaluation	
Guidance	Guidance for research administrators and academics on good and bad practices	
Training	Training for junior researchers, particularly early-stage doctoral researchers	

DORA

Signing DORA and implementing DORA recommendations



ARRA

Signing ARRA and implementing ARRA Principles



FhG-ISI has not embedded new forms of research evaluation in its internal processes for promotion, reward, and research evaluation.

The Institute has developed a general guidance for research administrators and academics which applies also to the good and bad practices regarding the use of traditional bibliometrics and the development of next-generation metrics.

FhG-ISI has its own publishing service which is addressing young researchers and supporting them when publishing their PhD. It is a body for 80 institutes and the necessary information is given here to early career researchers. Nonetheless, this does not represent a structured approach to training early career researchers, particularly doctoral students, on the responsible use of metrics. It currently depends on the will, awareness, and knowledge of individual staff members that inform the students.

The Institute did not sign the San Francisco Declaration on Research Assessment (DORA) nor the Agreement on Reforming Research Assessment (ARRA), and it did not start implementing its principles. This indicates a strong level of reliance on traditional bibliometrics.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 26 Next-Generation Metrics | Roadmap for Successful Implementation – FhG-ISI

Indicator	Recommendations
HR	Explore, test and implement new forms of research evaluation (alternative metrics) and develop new evaluation criteria

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tailored to the Institute’s idiosyncrasies. Include a broader range of qualitative indicators (e.g., interdisciplinary work) and move away from inappropriate uses of traditional metrics such as Journal Impact Factor (JIF) and h-index.

Training Develop formal and structured training programs that focus on the Next-Generation Metrics and are tailored to junior researchers.

DORA Formalize the adoption of DORA by joining the signatories, and initiate the implementation of DORA recommendations across the HEI.

ARRA Formalize the adoption of ARRA by joining the signatories, and initiate the implementation of ARRA Principles across the HEI.

The following section evaluates OS practices related to the Mutual Learning / Collaboration pillar, identifying key gaps.

Table 27 Mutual Learning / Collaboration | GAP Analysis – FhG-ISI

Indicator	Description	Result
Stakeholders	Collaboration with external stakeholders	

The Institute invites external researchers and researchers from other Fraunhofer institutes to publish together with open accessible papers or publications available on their official website (e.g. the “Working Papers Sustainability and Innovation”). Nonetheless, FhG-ISI lacks a concerted approach in this context, with more diverse stakeholders across the quadruple helix.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 28 Mutual Learning / Collaboration | Roadmap for Successful Implementation – FhG-ISI

Indicator	Recommendations
Stakeholders	Build on the existent collaboration with external researchers and researchers from other Fraunhofer institutes as well as with the current project-based collaboration established through projects (e.g., BEAMING). Broaden these efforts to form strategic partnerships focused on different OS pillars. Focus on the collaboration with diverse stakeholders across the quadruple helix (government, academia, industry and community), including the local actors.

The following section evaluates OS practices related to the Future of Scholarly Communication and Publishing pillar, identifying key gaps.

Table 29 Future of Scholarly Communication and Publishing | GAP Analysis – FhG-ISI

Indicator	Description	Result
Plan S	State of the implementation of Plan S	Red
Preprints Advocacy	Advocating for the share of research manuscripts as preprints	Green
Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	Red
ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	Yellow
University Press	The existence of the university press and its engagement with Open Access	Green

Open Access Support	Support to researchers to make their research publications available in Open Access	Yellow
FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	Red
FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	Red
FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	Green
FAIR Data/Information	Information about the data archived and published by own research community	Green
FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	Red
FAIR Data/Assessment	Including research data in the researcher assessment methodology and research metrics	Yellow
Open Access Publishing	Harmonisation with Open Access standards	Yellow
Support	Support provided to researchers in research data management, FAIR data and data sharing	Red

FhG-ISI is not explicitly implementing the Plan S principles at the moment.

The Institute is actively advocating for the share of research manuscripts as preprints.

FhG-ISI does not support new forms of scholarly publishing from third parties that are dedicated to OA approaches.

The use of author identifier systems such as ORCID is being advocated across the Institute.

FhG-ISI has an established University Press, "Fraunhofer Verlag".¹⁴ Many publications are OA but not all. Nonetheless, as an institution for applied research, we want our research outcomes to be widely spread. And more and more of their clients also want open accessible publications and to remove the barriers of not-accessible publications.

A certain amount of support for OA publishing is being provided, including, institutional website(s) on Open Access to research publications, facilitating administrative reporting of publications in projects, and establishment of specific services (e.g. helpdesks) for researchers. Nonetheless, there are several areas where support is lacking and can be broadened.

At the moment, FhG-ISI does not have a research data policy or strategy in place which limits its ability to ensure that the data generated by the researchers are managed according to best practices, that is, the FAIR principles.

FhG-ISI currently lacks a dedicated service to provide data stewardship to its researchers, which presents a gap in supporting effective research data management practices.

The institute provides access to an infrastructure storage and publication of research data and gathers information about the data archived and published by its research community.

FhG-ISI does not currently publish all metadata about research data generated or obtained within its research community.

The Institute is continuously increasing the inclusion of research data as a valuable output in research assessments.

¹⁴ Fraunhofer-Gesellschaft, "Der Verlag der Fraunhofer-Gesellschaft – Fraunhofer Verlag," accessed November 30, 2024, <https://www.verlag.fraunhofer.de/de.html>.

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Working and discussion paper series are published on the official website. They reflect the research outcomes of FhG-ISI's projects and are OA. Many papers published by the Institute's researchers, findable through their search and discovery service are OA as well. However, the Institute itself does not publish scientific journals.

FhG-ISI supports its researchers in the area of research data management, FAIR data and data sharing by recognising, citing and acknowledging contributions, and complying with legal and ethical requirements, and FAIR principles.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 30 Future of Scholarly Communication and Publishing / Roadmap for Successful Implementation – FhG-ISI

Indicator	Recommendations
Plan S	Conduct an internal review to determine the level of harmonization of current FhG-ISI OS practices and initiatives to Plan S. Next, develop and adopt policies, and guidelines or update articles in existing documents to align with Plan S.
Scholarly Publishing from Third Parties	Identify suitable third-party OA initiatives (e.g., OpenEdition and Knowledge Unlatched) and develop complementary support frameworks (e.g., financial support schemes, administrative assistance, etc.).
University Press	Increase the level of harmonization of “Fraunhofer Verlag” with OA. Consider prioritizing OA by adopting a hybrid or full OA publishing model, ensuring that all publications have an OA option. This could involve waiving or subsidizing APCs for affiliated researchers and establishing an institutional OA mandate. When working with private clients, “Fraunhofer Verlag” can balance OA and try to balance the confidentiality requirements with rich and openly published detailed

metadata and other strategies that are based in selective openness. For sensitive work strategies like delayed OA can be feasible as well.

Open Access Support

Consider increasing the types of support that FhG-ISI provides to researchers to make their research publications available in OA. This includes training for researchers (including doctoral candidates), developing an open research strategy and vision, linkages to career evaluation and promotion within the institution, funding for publishing in Open Access journals (APCs), guidelines providing clarification of legal issues related to linking, sharing and re-using Open Access content, and legal support.

FAIR Data/Policy Integration

Initiate the development of a research data policy or strategy which will include FAIR principles. This document should contain policies and guidelines for managing, storing, and sharing research data and metadata.

FAIR Data/Stewardship

Assess the specific needs for data stewardship services at FhG-ISI, then plan and initiate the establishment of a dedicated service to provide data stewardship to researchers.

FAIR Data/Metadata Publishing

Establish and implement a standardized metadata framework for all research data generated or obtained at the Institute level. Furthermore, create a metadata publishing policy to enable publishing and providing free access to metadata. Develop a solution for publishing and providing free access to metadata with regard to FAIR principles. Explore integrating systems and solutions such as CRIS or PURE.

FAIR Data/Assessment

Fully, integrate the recognition of research data as a valuable output for research assessments in the existing assessment framework. Concisely regulate

Open Access Publishing

how data contributions are measured and evaluated.

First, promote OA publishing by encouraging researchers to submit their work to reputable OA journals, and provide guidance on selecting suitable OA platforms, but avoiding predatory journals. Support APC costs. Consider and explore partnerships with existing publishers to co-publish or improve OA support for FhG-ISI researchers.

Support

Expand the types of support that FhG-ISI provides for the researchers in the area of research data management, FAIR data and data sharing. First, conduct a needs assessment to identify key areas where support is most needed for researchers in terms of research data management, FAIR principles, or data sharing. Next, focus on identified key areas and establish basic support structures. Consider integrating support mechanisms such as training for researchers (including doctoral candidates), institutional website(s) on research data management, planning stewardship and sharing of FAIR outputs, finding and reusing data from existing sources, using or developing FAIR research tools/services, preparing and documenting data/code to make outputs FAIR, publishing FAIR outputs on own or recommended repositories, developing open research strategy and vision, funding for implementing FAIR principles, and finding (other) sources of training and advice on FAIR data.

The following section evaluates OS practices related to the Rewards, Incentives, and Recognition pillar, identifying key gaps.

Table 31 Rewards, Incentives, and Recognition | GAP Analysis – FhG-ISI

Indicator	Description	Result
Open Science Incentives	Incentives for researchers developing Open Science activities	Green
Academic assessment	Open Science elements as part of academic assessment	Yellow
HR	Open Science dimensions in HR and career frameworks	Red
Recognition and Rewards	Recognising and rewarding Open Science practices	Red
Policy Transparency	Open and easily accessible policies on researcher evaluation	Red

FhG-ISI provides notable Incentives for researchers developing OS activities, specifically related to OA to research publications, data sharing, and Citizen Science.

The Institute integrates several OS elements into its academic assessment framework. This includes OA publishing of research articles in OA journals (via payment of APCs), OA books, preprints, depositing of data in a repository, data sharing, open source research software and code, transdisciplinary research platforms, Citizen Science, and science outreach and communication.

OS is not explicitly integrated as a criterion in recruitment, performance evaluation, or career advancement policies.

FhG-ISI currently does not assess the extent to which OS is integrated into the daily practices of individuals, teams, or units, and therefore did not develop complementary mechanisms for recognition and rewards.

Finally, policies on researcher evaluation are open and easily accessible to all stakeholders within the Institute.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 32 Rewards, Incentives, and Recognition | Roadmap for Successful Implementation – FhG-ISI

Indicator	Recommendations
Academic assessment	Revise academic assessment frameworks and incorporate additional OS elements. The missing elements include depositing of research articles in a repository, OA archival or special collections, research data management plans, open research protocols, open education, open evaluation, open collaborative tools, co-creation platforms, co-design of research projects, and crowdsource practices.
HR	Review and revise HR policies to explicitly integrate OS criteria regarding recruitment, performance evaluations, and career advancements. Clearly define how engagement in OS activities influences these processes.
Recognition and Rewards	Develop and establish mechanisms which contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).
Policy Transparency	Ensure that the researcher evaluation policies are easily accessible to all stakeholders, ideally through the Institute's official website, and available in multiple formats.

The following section evaluates OS practices related to the Research Integrity pillar, identifying key gaps.

Table 33 Research Integrity | GAP Analysis – FhG-ISI

Indicator	Description	Result
Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	Yellow
ALLEA Code	Harmonisation with ALLEA Code	Red
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Red
Training and Accreditation	Training and accreditation on research integrity pertaining to Open Science	Red

FhG-ISI currently does not have a research integrity code/policy which fully embraces the OS principles. It has a general guideline that also includes OA.

The Institute does not currently adhere to the ALLEA Code and has not yet adopted the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers.

Finally, FhG-ISI does not provide regular training or accreditation programs on research integrity that incorporate OS principles at this moment, which can inhibit researchers from fully understanding and integrating ethical OS standards into their daily practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 34 Research Integrity | Roadmap for Successful Implementation – FhG-ISI

Indicator	Recommendations
Research Integrity Code/Policy	Conduct a review of the general guideline to identify which OS principles are missing and effectively integrate them.
ALLEA Code	Adopt the ALLEA Code, and align institutional policies and practices accordingly.
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adopt the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers, and align institutional policies and practices accordingly.
Training and Accreditation	Develop and Implement regular training and accreditation programs on research integrity related to OS. Ethical, legal, and social aspects of research should be covered.

The following section evaluates OS practices related to the Education and Skills pillar, identifying key gaps.

Table 35 Education and Skills | GAP Analysis – FhG-ISI

Indicator	Description	Result
Training	Skill training in Open Science	
Audience	Mandatory Open Science skills training for staff, researchers, and students	
Rewards and Incentives	Rewarding and incentivising Open Science skills development	
Tailored Skill Training	Open Science skill training specifically tailored to groups of staff/students	

There is an absence of skill training that covers all OS pillars, which is a gap in providing the support necessary for researchers to fully engage with OS practices. The second and fourth indicators are, therefore, absent as well.

FhG-ISI currently does not provide rewards or incentives to staff and students with regard to OS skills development which is a gap that may inhibit motivation and therefore lower participation rates.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 36 Education and Skills | Roadmap for Successful Implementation – FhG-ISI

Indicator	Recommendations
Training	Develop an extensive, exhaustive and structured OS skills training program that covers all OS pillars.
Audience	Ensure that the future established OS skills training program has mandatory participation for certain stakeholders according to their roles in developing OS practices at FhG-ISI (staff, students, etc.). Also, consider making participation mandatory during the onboarding phase for new staff members.
Rewards and Incentives	Develop and implement a program that specifically rewards, and incentivises staff and students with regard to OS skills development. Take into consideration integrating things like certificates and various forms of public acknowledgement. Also, consider integrating participation in OS skill training into the performance evaluation frameworks and career advancement processes.
Tailored Skill Training	Ensure that the future established OS skills training program is tailored specifically to the needs of diverse stakeholders across the Institute. This can be done by assessing the

training needs of different groups of stakeholders early in the development process.

The following section evaluates OS practices related to the Citizen Science pillar, identifying key gaps.

Table 37 Citizen Science | GAP Analysis – FhG-ISI

Indicator	Description	Result
Citizen Science Policy	Documents that guide Citizen Science	
Single Point of Contact	Single point of contact for Citizen Science	
Assessment	Assessing Citizen Science contributions and adapting research evaluation and reputation systems accordingly	
ECSA Principles	ECSA principles implementation support	
Support and Training	Support and training for researchers in Citizen Science	

FhG-ISI is currently lacking documents that guide Citizen Science activities across the Institute, which represents a strategic gap, although they have implemented projects with Citizen Science elements.

The lack of a single point of contact for Citizen Science indicates a structural and organisational gap needed to effectively support and expand Citizen Science initiatives.

Citizen Science contributions are currently not being assessed and the formal research evaluation or reputation systems are not adapted accordingly.

FhG-ISI does not widely, strategically and formally support the implementation of the ECSA 10 Principles of Citizen Science, which is a gap in adopting widely recognized best practices in Citizen Science.

The Institute currently does not provide support and training for researchers in regard to Citizen Science which may limit the capacity of researchers to conduct effective and ethical Citizen Science projects.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 38 Citizen Science | Roadmap for Successful Implementation – FhG-ISI

Indicator	Recommendations
Citizen Science Policy	Develop a document that guides Citizen Science at FhG-ISI. Ensure that it aligns with the Institute’s OS frameworks and engagement goals. This document should define Citizen Science principles, address ethical considerations (e.g., data privacy, recognition of Citizen Scientists, etc.), and provide clear guidelines or policies related to the main elements of Citizen Science and relevant processes.
Single Point of Contact	Establish a dedicated Citizen Science point of contact (e.g., Citizen Science officer, participatory research engagement officer, etc.), to coordinate efforts across departments, provide tailored support for Citizen Science projects, communicate across the Institute and advocate for the integration of Citizen Science elements into institutional policies.
Assessment	Develop concise assessment criteria for Citizen Science contributions, and modify the current research evaluation frameworks to consider Citizen Science contributions. This can include recognizing various outputs such as Citizen Science datasets, community reports, etc.

ECSA Principles

Familiarize internal stakeholders with ECSA 10 Principles. Next, engage in the formal recognition of the ECSA 10 Principles at the institutional level, adopt the necessary strategic documents accordingly and enable their effective implementation.

Support and Training

Establish dedicated support mechanisms for Citizen Science at the institutional level (e.g., helpdesk, online resources, mentorship programs, etc.). Develop specific Citizen Science training programs in deficient areas, in accordance with researchers' needs, which cover important subjects such as designing Citizen Science projects, community engagement mechanisms, and ethical considerations. If applicable, integrate Citizen Science training into the existing and broader researcher development programs.

5.3 University of Osijek Faculty of Food Technology (UniOS)

University of Osijek (UniOS) was founded in 1975.¹⁵ Today, UniOS consists of 11 faculties, one Academy of Arts and Culture and four university departments, and it emphasizes the harmonization with the processes of the Bologna reform, student and teacher mobility, liberalization and permanent development of the higher education space in the Republic of Croatia, as well as the increasing availability of international research programs and projects and the development of new technologies in the European Research Area.¹⁶

GAP Analysis and Roadmaps for Successful Implementation

The following section evaluates OS practices related to the Cultural Change/Leadership pillar, identifying key gaps.

Table 39 Cultural Change/Leadership | GAP Analysis – UniOS

Indicator	Description	Result
Open Science Policy	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science	

¹⁵ Sveučilište Josipa Jurja Strossmayera u Osijeku, "Strategija Sveučilišta Josipa Jurja Strossmayera u Osijeku 2021. – 2030.," 2021.

¹⁶ "O Sveučilištu," *Rektorat Sveučilišta Josipa Jurja Strossmayera u Osijeku* (blog), accessed August 31, 2024, <https://www.unios.hr/o-sveucilistu/o-sveucilistu-ukratko/>.

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Senior manager	Appointed senior manager for Open Science	Yellow
Programme of Cultural Change	Developed programme of cultural change	Red
Communication	Developed communication strategy	Yellow
Community	Established Open Science Community	Yellow

The Policy of Open Science of Josip Juraj Strossmayer University of Osijek guides OS at UniOS.¹⁷

The senior manager for OS is not formally appointed. OS is currently in the scope of the Vice Dean for Science and International Cooperation. UniOS has not yet developed a programme of cultural change which is important for the practical implementation of OS principles.

The University currently does not have a communication strategy related to OS practices. Nonetheless, information on OS is provided on the official website of the Faculty Library.¹⁸ This approach could be improved in order to enable a university-wide commitment to OS practices.

UniOS is connected to Journal Croatian Journal of Food Science and Technology (JFST) which is in OpenAIRE and indexed by DOAJ as well as organisations on the national level CroRIS and HRČAK. However, the University is missing substantial and continuous engagement with networks or communities that are dedicated to the comprehensive promotion of OS principles.

¹⁷ Sveučilište Josipa Jurja Strossmayera u Osijeku, "Politika Otvorene Znanosti Sveučilišta Josipa Jurja Strossmayera u Osijeku," 2024.

¹⁸ Sveučilište Josipa Jurja Strossmayera u Osijeku, "Online pretraživanje," accessed December 1, 2024, <https://www.ptfos.unios.hr/index.php/online-pretrazivanje>.

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The following roadmap outlines actionable recommendations to address the identified gaps.

Table 40 Cultural Change/Leadership | Roadmap for Successful Implementation – UniOS

Indicator	Recommendations
Senior manager	Formalize a senior manager role for OS. This role should have clear responsibilities and competencies for developing and implementing OS policies and practices across all eight pillars.
Programme of Cultural Change	Develop a comprehensive programme of cultural change for creating the environment for the implementation of OS practices. Identify key actors and enablers of OS in your Institute, set specific goals, and define an impact-measuring framework.
Communication	Expand the communication channels beyond the official website of the Faculty Library. Analyse your stakeholders (e.g., students, administrative staff, etc.), test multiple communication methods/channels, monitor results, tailor and adjust them, and iterate in order to achieve the best results. Then, develop an OS communication strategy.
Community	Consider joining an existing OS community, and indulge in the sharing of best practices, and mutual support in OS initiatives. Alternatively, assess the possibility of establishing a local or regional OS community in cooperation with other stakeholders to foster a collaborative environment that can address specific challenges and opportunities. Organize regular meetings, workshops, and conferences with a focus on OS, encouraging interdisciplinary collaborations, and utilizing shared resources.

The following section evaluates OS practices related to the European Open Science Cloud (EOSC) pillar, identifying key gaps.

Table 41 The European Open Science Cloud (EOSC) | GAP Analysis – UniOS

Indicator	Description	Result
Policy Commitment	Signed EOSC Declaration	Yellow
International Collaboration	Involvement in the EOSC Association	Yellow
Infrastructure Access	Institutional access to the requisite infrastructure	Green
Infrastructure Development	Provided search and discovery service	Yellow

UniOS did not sign the EOSC Declaration and it is not involved in the EOSC Association, thus lacking the formal commitment to this OS pillar. It is engaged with EOSC indirectly through the national platform SRCE.

The University does not have an established data repository, but it is connected to 3rd party repositories which can interact with the EOSC including DABAR and CroRIS, which are coordinated by SRCE.

UniOS has search engines that are located on the official website of the Faculty Library. Nonetheless, this framework lacks advanced features that search and discovery services typically include such as interoperability with other repositories, and integration with international infrastructures.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 42 The European Open Science Cloud (EOSC) | Roadmap for Successful Implementation – UniOS

Indicator	Recommendations
Policy Commitment	Assess the benefits and requirements related to joining the EOSC. Formalize the commitment to the EOSC initiative by signing the EOSC Declaration. Systematically align the University’s policies to comply with the requirements and standards of the EOSC.
International Collaboration	Enable and advocate for active participation of the institutional stakeholders in EOSC events that are open for non-members. Subsequently, initiate the process of joining the EOSC Association.
Infrastructure Development	Develop a search and discovery service, equipped with advanced search options and metadata standards to ensure easy navigation and accessibility. Integration with global research networks, including the EOSC, should be considered as well.

The following section evaluates OS practices related to the Next-Generation Metrics pillar, identifying key gaps.

Table 43 Next-Generation Metrics | GAP Analysis – UniOS

Indicator	Description	Result
HR	New forms of research evaluation	
Guidance	Guidance for research administrators and academics on good and bad practices	
Training	Training for junior researchers, particularly early-stage doctoral researchers	

DORA

Signing DORA and implementing DORA recommendations



ARRA

Signing ARRA and implementing ARRA Principles



UniOS did not incorporate new forms of research evaluation into its internal processes for promotion, reward, and research evaluation, and it currently lacks a formal guide or set of guidelines regarding the use of traditional bibliometrics and the development of new metrics.

The University lacks a structured approach to training early career researchers, particularly doctoral students, on the responsible use of metrics. It currently depends on the will, awareness, and knowledge of individual professors who decide to transfer the knowledge to their students.

There are gaps regarding the signing of the San Francisco Declaration on Research Assessment (DORA) and the Agreement on Reforming Research Assessment (ARRA), which also delays the implementation of their principles.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 44 Next-Generation Metrics | Roadmap for Successful Implementation – UniOS

Indicator	Recommendations
HR	Conduct an assessment of the current research evaluation practices to identify areas where new forms of evaluation could be integrated. Next, integrate new forms of research evaluation in internal processes for promotion/reward and research evaluation itself. Extend the existing evaluation frameworks to include OS practices (e.g., public engagement, and collaborative efforts).

- Guidance** Initiate the development of comprehensive guidelines for research administrators and academics that cover traditional bibliometrics and the development and implementation of new metrics related to research assessment.
- Training** Develop formal and structured training programs that focus on the Next-Generation Metrics and are tailored to junior researchers.
- DORA** Formalize the adoption of DORA by joining the signatories, and initiate the implementation of DORA recommendations across the HEI.
- ARRA** Formalize the adoption of ARRA by joining the signatories, and initiate the implementation of ARRA Principles across the HEI.

The following section evaluates OS practices related to the Mutual Learning / Collaboration pillar, identifying key gaps.

Table 45 Mutual Learning / Collaboration | GAP Analysis – UniOS

Indicator	Description	Result
Stakeholders	Collaboration with external stakeholders	

UniOS has cooperation with the national-level stakeholders. Various Horizon projects related to OS practices, including the BEAMING project, are a way of liaising with external stakeholders. Nonetheless, the University lacks a concerted approach with diverse stakeholders across the quadruple helix.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 46 Mutual Learning / Collaboration | Roadmap for Successful Implementation – UniOS

Indicator	Recommendations
Stakeholders	Build on the existent project-based collaboration established through the projects in which UniOS is currently participating (e.g., BEAMING). Broaden these efforts to form strategic partnerships focused on different OS pillars. Focus on the collaboration with diverse stakeholders across the quadruple helix (government, academia, industry and community), including the local actors.

The following section evaluates OS practices related to the Future of Scholarly Communication and Publishing pillar, identifying key gaps.

Table 47 Future of Scholarly Communication and Publishing | GAP Analysis – UniOS

Indicator	Description	Result
Plan S	State of the implementation of Plan S	Yellow
Preprints Advocacy	Advocating for the share of research manuscripts as preprints	Green
Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	Red
ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	Yellow
University Press	The existence of the university press and its engagement with Open Access	Green

Open Access Support	Support to researchers to make their research publications available in Open Access	Yellow
FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	Green
FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	Red
FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	Green
FAIR Data/Information	Information about the data archived and published by own research community	Green
FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	Green
FAIR Data/Assessment	Including research data in the researcher assessment methodology and research metrics	Green
Open Access Publishing	Harmonisation with Open Access standards	Green
Support	Support provided to researchers in research data management, FAIR data and data sharing	Yellow

UniOS is currently not formally implementing the Plan S principles but has implemented numerous complementary and semi-complementary practices. Scientists employed at the Faculty are publishing articles in OA journals (although not exclusively in OA journals), all theses defended at the Faculty are OA published in the Faculty repository, and Research Data Management Plans are published in the Faculty repository.

The HEI is actively Advocating for the share of research manuscripts as preprints.

UniOS does not currently actively support new forms of scholarly publishing from third parties that are dedicated to OA approaches.

All researchers at UniOS have CroRIS IDs, Google Scholar profiles and the majority have ORCID and Publons. Yet the University does not actively advocate for the use of ORCID and other complementary author identifier systems.

UniOS has a University Press. Authors decide if the publication (book, handbook, manual etc.) will be OA or not.

Numerous forms of support for OA publishing are being provided. This includes training for researchers (including doctoral candidates), institutional website(s) on OA to research publications, and guidelines providing clarification of legal issues related to linking, sharing and re-using OA content.

The University's research data policy or strategy includes FAIR principles.

UniOS does not have a dedicated service to provide data stewardship to its researchers.

The University provides access to an infrastructure storage and publication of research data, publishes all metadata about research data generated or obtained within its research community, gathers information about the data archived and published by its research community through the CROSBİ platform, and includes research data as a valuable output in research assessments.

UniOS publishes two scientific journals, the Croatian Journal of Food Science and Technology (publisher) and Food in Health and Disease (co-publisher). Both are using a diamond OA model.

The University provides various forms of support in the area of research data management, FAIR data and data sharing including training for researchers (including doctoral candidates), publishing FAIR outputs on

own or recommended repositories, and finding (other) sources of training and advice on FAIR data.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 48 Future of Scholarly Communication and Publishing / Roadmap for Successful Implementation – UniOS

Indicator	Recommendations
Plan S	Conduct an internal review to determine the level of harmonization of current UniOS OS practices and initiatives to Plan S. Next, develop and adopt policies, guidelines or updated articles in existing documents to align with Plan S.
Scholarly Publishing from Third Parties	Identify suitable third-party OA initiatives (e.g., OpenEdition and Knowledge Unlatched) and develop complementary support frameworks (e.g., financial support schemes, administrative assistance, etc.).
ORCID Advocacy Open Access Support	Initiate active advocacy for the usage of ORCID. Consider broadening the support that UniOS provides to researchers to make their research publications available in OA. Consider integrating, developing an open research strategy and vision, linkages to career evaluation and promotion within the institution, facilitating administrative reporting of publications in projects, funding for publishing in Open Access journals (APCs), the establishment of specific services (e.g. helpdesks) for researchers, and legal support.
FAIR Data/Stewardship	Assess the specific needs for data stewardship services at UniOS, then plan and initiate the establishment of a dedicated service to provide data stewardship to researchers.

Support

Expand the support that UniOS provides to researchers in the area of research data management, FAIR data and data sharing. Precisely, consider incorporating institutional website(s) on research data management, planning stewardship and sharing of FAIR outputs, finding and reusing data from existing sources, using or developing FAIR research tools/services, preparing and documenting data/code to make outputs FAIR, recognising, citing and acknowledging contributions, developing open research strategy and vision, complying with legal and ethical requirements, FAIR principles, and funding for implementing FAIR principles.

The following section evaluates OS practices related to the Rewards, Incentives, and Recognition pillar, identifying key gaps.

Table 49 Rewards, Incentives, and Recognition | GAP Analysis – UniOS

Indicator	Description	Result
Open Science Incentives	Incentives for researchers developing Open Science activities	
Academic assessment	Open Science elements as part of academic assessment	
HR	Open Science dimensions in HR and career frameworks	
Recognition and Rewards	Recognising and rewarding Open Science practices	
Policy Transparency	Open and easily accessible policies on researcher evaluation	

UniOS does not currently provide any incentives for researchers to engage in OS activities.

The University integrates two OS elements into its academic assessment framework, depositing research articles in a repository and research data management plans.

OS is not currently explicitly integrated as a criterion in recruitment, performance evaluation, or career advancement policies.

HEI currently does not assess the extent to which OS is integrated into the daily practices of individuals, teams, or units, and therefore did not develop complementary mechanisms for recognition and rewards.

UniOS currently does not make its researcher evaluation policies openly and easily accessible.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 50 Rewards, Incentives, and Recognition | Roadmap for Successful Implementation – UniOS

Indicator	Recommendations
Open Science Incentives	Establish incentive programs tailored to the University’s researchers. Ensure that HEI provides incentives for researchers developing OS activities (e.g., financial rewards, research grants, recognition awards, project participation opportunities, career evaluation incentives, etc.).
Academic assessment	Revise academic assessment frameworks and incorporate additional OS elements. The missing elements include OA publishing of research articles in OA journals (via payment of APCs), OA books, OA archival or special collections, preprints, depositing of data in a repository, data sharing, open research protocols, open source research software and code, open education, open evaluation, open collaborative tools, co-creation platforms, transdisciplinary research platforms, co-design

of research projects, Citizen Science, crowdsource practices, and science outreach and communication.

HR

Review and revise HR policies to explicitly integrate OS criteria regarding recruitment, performance evaluations, and career advancements. Clearly define how engagement in OS activities influences these processes.

Recognition and Rewards

Develop and establish mechanisms which contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).

Policy Transparency

Ensure that the researcher evaluation policies are easily accessible to all stakeholders, ideally through the University's official website, and available in multiple formats.

The following section evaluates OS practices related to the Research Integrity pillar, identifying key gaps.

Table 51 Research Integrity | GAP Analysis – UniOS

Indicator	Description	Result
Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	Green
ALLEA Code	Harmonisation with ALLEA Code	Red
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Red
Training and Accreditation	Training and accreditation on research integrity pertaining to Open Science	Red

UniOS’s research integrity code/policy embraces OS principles.

The University does not currently adhere to the ALLEA Code and it did not adopt the Declaration of Commitment to the European Researchers Charter and the Code of Conduct for Recruitment of Researchers.

Currently, UniOS does not provide regular training or accreditation programs on research integrity that incorporate OS principles, which may inhibit researchers from fully understanding and integrating ethical OS standards into their daily practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 52 Research Integrity | Roadmap for Successful Implementation – UniOS

Indicator	Recommendations
ALLEA Code	Adopt the ALLEA Code, and align institutional policies and practices accordingly.
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adopt the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers, and align institutional policies and practices accordingly.
Training and Accreditation	Develop and Implement regular training and accreditation programs on research integrity related to OS. Ethical, legal, and social aspects of research should be covered.

The following section evaluates OS practices related to the Education and Skills pillar, identifying key gaps.

Table 53 Education and Skills | GAP Analysis – UniOS

Indicator	Description	Result
Training	Skill training in Open Science	
Audience	Mandatory Open Science skills training for staff, researchers, and students	
Rewards and Incentives	Rewarding and incentivising Open Science skills development	
Tailored Skill Training	Open Science skill training specifically tailored to groups of staff/students	

The University does not provide skill training that covers all OS pillars, which is a gap in providing the support necessary for researchers to fully engage with OS practices. The second and fourth indicators are, therefore, absent as well.

UniOS currently does not provide rewards or incentives to staff and students with regard to OS skills development which is a gap that may inhibit motivation and therefore lower participation rates.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 54 Education and Skills | Roadmap for Successful Implementation – UniOS

Indicator	Recommendations
Training	Develop an extensive, exhaustive and structured OS skills training program that covers all OS pillars.
Audience	Ensure that the future established OS skills training program has mandatory participation for certain stakeholders according to their roles in developing OS practices at UniOS (staff, students, etc.). Also, consider making participation

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mandatory during the onboarding phase for new staff members.

Rewards and Incentives

Develop and implement a program that specifically rewards, and incentivises staff and students with regard to OS skills development. Take into consideration integrating things like certificates and various forms of public acknowledgement. Also, consider integrating participation in OS skill training into the performance evaluation frameworks and career advancement processes.

Tailored Skill Training

Ensure that the future established OS skills training program is tailored specifically to the needs of diverse stakeholders across the HEI. This can be done by assessing the training needs of different groups of stakeholders early in the development process.

The following section evaluates OS practices related to the Citizen Science pillar, identifying key gaps.

Table 55 Citizen Science | GAP Analysis – UniOS

<i>Indicator</i>	<i>Description</i>	<i>Result</i>
Citizen Science Policy	Documents that guide Citizen Science	
Single Point of Contact	Single point of contact for Citizen Science	
Assessment	Assessing Citizen Science contributions and adapting research evaluation and reputation systems accordingly	
ECSA Principles	ECSA principles implementation support	
Support and Training	Support and training for researchers in Citizen Science	

UniOS is currently lacking documents that guide Citizen Science activities across the University, which represents a strategic gap, although they have implemented projects with Citizen Science elements.

The lack of a single point of contact for Citizen Science indicates a structural and organisational gap needed to effectively support and expand Citizen Science initiatives.

Citizen Science contributions are currently not being assessed and the formal research evaluation or reputation systems are not adapted accordingly.

UniOS does not support the implementation of the ECSA 10 Principles of Citizen Science, which is a gap in adopting widely recognized best practices in Citizen Science.

The University currently does not provide support and training for researchers in regard to Citizen Science which may limit the capacity of researchers to conduct effective and ethical Citizen Science projects.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 56 Citizen Science | Roadmap for Successful Implementation – UniOS

Indicator	Recommendations
Citizen Science Policy	Develop a document that guides Citizen Science at UniOS. Ensure that it aligns with the University’s OS frameworks and engagement goals. This document should define Citizen Science principles, address ethical considerations (e.g., data privacy, recognition of Citizen Scientists, etc.), and provide clear guidelines or policies related to the main elements of Citizen Science and relevant processes.
Single Point of Contact	Establish a dedicated Citizen Science point of contact (e.g., Citizen Science officer, participatory research engagement

officer, etc.), to coordinate efforts across departments, provide tailored support for Citizen Science projects, communicate across the University and advocate for the integration of Citizen Science elements into institutional policies.

Assessment

Develop concise assessment criteria for Citizen Science contributions, and modify the current research evaluation frameworks to consider Citizen Science contributions. This can include recognizing various outputs such as Citizen Science datasets, community reports, etc.

ECSA Principles

Familiarize internal stakeholders with ECSA 10 Principles. Next, engage in the formal recognition of the ECSA 10 Principles at the Institution level, adapt the necessary strategic documents accordingly and enable their effective implementation.

Support and Training

Establish dedicated support mechanisms for Citizen Science at the institutional level (e.g., helpdesk, online resources, mentorship programs, etc.). Develop specific Citizen Science training programs in deficient areas, in accordance with researchers' needs, which cover important subjects such as designing Citizen Science projects, community engagement mechanisms, and ethical considerations. If applicable, integrate Citizen Science training into the existing and broader researcher development programs.

5.4 Agricultural University Plovdiv (AUP)

The Agricultural University Plovdiv (AUP) is a public higher education institution, established in 1945, which is specialized in the field of agrarian sciences.

AUP contains the Faculty of Agronomy, Faculty of Horticulture with Viticulture, Faculty of Plant Protection and Agroecology, Faculty of Economics, and Department of Languages and Sports.

In recent years, AUT is increasingly harmonizing its activities with new trends in modern agricultural practice (e.g., digitalization, precision agriculture, adaptation to climate change, etc.).¹⁹

GAP Analysis and Roadmaps for Successful Implementation

The following section evaluates OS practices related to the Cultural Change/Leadership pillar, identifying key gaps.

Table 57 Cultural Change/Leadership | GAP Analysis – AUP

Indicator	Description	Result
Open Science Policy	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science	Yellow
Senior manager	Appointed senior manager for Open Science	Green

¹⁹ Аграрен Университет Пловдив, “Стратегия За Развитие На Научните Изследвания в Аграрен Университет – Пловдив 2018 – 2030” (Академичния съвет, Аграрният университет – Пловдив, January 29, 2021).

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Programme of Cultural Change

Developed programme of cultural change



Communication

Developed communication strategy



Community

Established Open Science Community



AUP addresses OS in the Strategy for the development of scientific research at the Agricultural University – Plovdiv 2018 – 2030. Specific objective 3 of the Strategy contains a set of measures related to OS.²⁰

Specifically, Measure 3.9 is related to the creation of an institutional OA repository in the Republic of Bulgaria, supporting "The Open Archives Initiative Protocol for Metadata Harvesting" and links to the Bulgarian OS portal.

Measure 3.10 addresses developing skills and competencies in relation to the storage, organization and management of OA research data.

Measure 3.11, and 3.12 consider integration of the scientific infrastructures of the AUP into the scientific infrastructures of the European Union, and participation in the EOSC, and other similar initiatives.

Measure 1.13 is related to creating incentives for the active participation of scientists in the culture of sharing scientific information and adopting it as standard practice.

Nonetheless, the OS aspects covered by the Strategy are not exhaustive, meaning that they do not cover all OS pillars.

Furthermore, AUP has appointed a senior manager to lead OS, ensuring a coordinated approach to integrating OS principles at the institutional level.

²⁰ Аграрен Университет Пловдив, "Стратегия За Развитие На Научните Изследвания в Аграрен Университет – Пловдив 2018 – 2030" (Академичния съвет, Аграрният университет – Пловдив, January 29, 2021).

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The absence of a program for cultural change represents a gap which may impede the effective and widespread adoption and integration of OS principles across the institution.

While AUP has made OS resources accessible through its library system and electronic catalogue, which represents a certain level of openness, the University lacks broader and a comprehensive communication OS strategy.

AUP is engaged with some external stakeholders in terms of OS. For example, the Ministry of Education and Science of the Republic of Bulgaria has established an agreement with Elsevier to support authors in Bulgaria who wish to publish in OA.²¹ This means that when publishing in hybrid journals, eligible corresponding authors do not have to pay an article publishing charge (APC). However, AUP is missing substantial and continuous engagement with networks or communities that are dedicated to the comprehensive promotion of OS principles.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 58 Cultural Change/Leadership | Roadmap for Successful Implementation – AUP

<i>Indicator</i>	<i>Recommendations</i>
Open Science Policy	Review and update existing strategic documents to integrate the missing OS elements, or consider developing a separate policy document that will guide the development and implementation of OS principles at AUP and be exhaustive.
Programme of Cultural Change	Initiate the development of a program of cultural change tailored to promote and support the adoption of OS practices at AUP. Begin with an assessment phase

²¹ “Open Access Agreement Bulgaria | Elsevier,” www.elsevier.com, accessed December 27, 2024, <https://www.elsevier.com/open-access/agreements/bulgaria>.

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where current practices and attitudes towards OS are evaluated. Based on this, plan targeted initiatives that can help inform, motivate and empower researchers, students and other institutional stakeholders to develop and implement OS practices.

Communication

Develop a comprehensive and targeted communication strategy, which will enable all institutional stakeholders to become familiar with OS practices. Use diverse communication channels, tools and platforms tailored to reaching different stakeholders.

Community

Consider joining an existing OS community, and indulge in the sharing of best practices, and mutual support in OS initiatives. Alternatively, assess the possibility of establishing a local or regional OS community in cooperation with other stakeholders to foster a collaborative environment that can address specific challenges and opportunities. Organize regular meetings, workshops, and conferences with a focus on OS, encouraging interdisciplinary collaborations, and utilizing shared resources.

The following section evaluates OS practices related to the European Open Science Cloud (EOSC) pillar, identifying key gaps.

Table 59 The European Open Science Cloud (EOSC) | GAP Analysis – AUP

Indicator	Description	Result
Policy Commitment	Signed EOSC Declaration	Red
International Collaboration	Involvement in the EOSC Association	Yellow
Infrastructure Access	Institutional access to the requisite infrastructure	Green

Infrastructure Development Provided search and discovery service



AUP is involved in Bulgaria’s national efforts towards EOSC participation through the Bulgarian Portal for Open Science which provides quick and easy access to scientific information and publicly funded research outputs, including resources from institutional open-access repositories in Bulgaria.²² AUP accents that the development of the Portal and the integration with OpenAIRE infrastructure is an important step towards the active participation of the Bulgarian research community in the EOSC initiative.

On the other hand, AUP does not have a formal commitment to the EOSC in terms of signing the Declaration and it is not a direct member of the EOSC Association. This indicates a certain level of commitment to the EOSC principles but further steps could be taken to formalize and deepen the engagement with the EOSC frameworks.

AUP has ensured access to third-party solutions which can be part of the EOSC such as online databases (annual subscription) and science metrics databases (national subscription). In addition, its Digital Science Repository allows for connection to EOSC.²³

While AUP provides access to external databases, it lacks an internal search and discovery service.

The following roadmap outlines actionable recommendations to address the identified gaps.

²² “Българския Портал За Отворена Наука,” 2024, <https://bpos.bg/>.

²³ Аграрен Университет Пловдив, “Цифров Научен Архив,” accessed December 28, 2024, <http://lib.au-plovdiv.bg:8081/aupsp/index.php>.

Table 60 The European Open Science Cloud (EOSC) | Roadmap for Successful Implementation – AUP

Indicator	Recommendations
Policy Commitment	Consider formally signing the EOSC Declaration, and move towards adhering to the principles of the EOSC.
International Collaboration	Explore the possibility of becoming a direct member of the EOSC Association to participate actively in shaping OS policies and practices at the EU level and draw local benefits. Alternatively, ensure participation in EOSC events that are open for non-members before initiating the formal joining process.
Infrastructure Development	Develop a search and discovery service, equipped with advanced search options and metadata standards to ensure easy navigation and accessibility. Integration with global research networks, including the EOSC, should be considered in the future as a next step.

The following section evaluates OS practices related to the Next-Generation Metrics pillar, identifying key gaps.

Table 61 Next-Generation Metrics | GAP Analysis – AUP

Indicator	Description	Result
HR	New forms of research evaluation	
Guidance	Guidance for research administrators and academics on good and bad practices	
Training	Training for junior researchers, particularly early-stage doctoral researchers	
DORA	Signing DORA and implementing DORA recommendations	

ARRA

Signing ARRA and implementing
ARRA Principles



AUP has a sustainable financial model which emphasizes traditional research evaluation metrics centred on publication outputs and participation in research and development activities. It lacks explicit incorporation of new forms of research evaluation that contain elements such as collaboration or societal impact.

HEI currently lacks established guidance on traditional bibliometric practices and the development of new metrics, which is crucial for ensuring that research evaluation is adapted to contemporary OS standards.

AUP provides training specifically for early career researchers and doctoral students, focusing on the responsible use of bibliometrics and Next-Generation metrics.

There is a gap regarding the signing of the San Francisco Declaration on Research Assessment (DORA) and the Agreement on Reforming Research Assessment (ARRA), which also delays the implementation of their principles. Over-reliance on traditional bibliometric indicators for research assessment indicates a gap in adopting new research evaluation practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 62 Next-Generation Metrics | Roadmap for Successful Implementation – AUP

Indicator	Recommendations
HR	Integrate new forms of research evaluation in internal processes for promotion/reward and research evaluation itself. Extend the existing evaluation frameworks to include OS practices (e.g., public engagement, and collaborative efforts).

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- Guidance** Initiate the development of comprehensive guidelines for research administrators and academics that cover traditional bibliometrics and the development and implementation of new metrics related to research assessment.
- DORA** Formalize the adoption of DORA by joining the signatories, and initiate the implementation of DORA recommendations across the HEI.
- ARRA** Formalize the adoption of ARRA by joining the signatories, and initiate the implementation of ARRA Principles across the HEI.

The following section evaluates OS practices related to the Mutual Learning / Collaboration pillar, identifying key gaps.

Table 63 Mutual Learning / GAP Analysis – AUP

Indicator	Description	Result
Stakeholders	Collaboration with external stakeholders	

AUP’s Director of Library has established connections with external stakeholders that facilitate some aspects of OA publishing, such as an used open-source software DSpace. Nonetheless, this does not fully capture a concerted strategy with diverse stakeholders across the complete spectrum of OS practices. This may limit AUP’s potential for creating new partnerships to improve the adoption of various OS practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 64 Mutual Learning / Roadmap for Successful Implementation – AUP

Indicator	Recommendations
Stakeholders	Expand the collaborative efforts and identify, analyse and engage with diverse stakeholders across the quadruple helix in order to establish a concerted approach in the area of OS and enable a mutual learning environment.

The following section evaluates OS practices related to the Future of Scholarly Communication and Publishing pillar, identifying key gaps.

Table 65 Future of Scholarly Communication and Publishing | GAP Analysis – AUP

Indicator	Description	Result
Plan S	State of the implementation of Plan S	Green
Preprints Advocacy	Advocating for the share of research manuscripts as preprints	Red
Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	Green
ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	Green
University Press	The existence of the university press and its engagement with Open Access	Green
Open Access Support	Support to researchers to make their research publications available in Open Access	Yellow

FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	Red
FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	Red
FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	Green
FAIR Data/Information	Information about the data archived and published by own research community	Red
FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	Red
FAIR Data/Assessment	Including research data in the researcher assessment methodology and research metrics	Green
Open Access Publishing	Harmonisation with Open Access standards	Green
Support	Support provided to researchers in research data management, FAIR data and data sharing	Yellow

AUP is implementing the Plan S principles which indicate a strong commitment to advancing OA elements. On the other hand, there is a lack of advocacy for sharing research manuscripts as preprints which is a gap in realising the full benefits of this practice which can accelerate the dissemination of research findings, enhance collaboration, and improve transparency within the research community.

Furthermore, AUP is supporting new forms of scholarly publishing from third parties which have an OA approach, and advocates for the use of ORCID.

AUP has a university press, the Academic Publishing House of the Agricultural University, established in 1994.²⁴

The Journals of Agricultural University Plovdiv are indexed in Web of Science through CABI, EBSCO Academic Search Ultimate, and AGRIS and are OA, providing unrestricted access to all its academic journals..

The University provides substantial support for OA publishing, covering aspects such as training for researchers (including doctoral candidates), Institutional website(s) on OA to research publications, Developing open research strategy and vision, Linkages to career evaluation and promotion within the institution, Facilitating administrative reporting of publications in projects, Funding for publishing in OA journals (APCs), and Legal support. However, there is a little room for improvement and broadening the support.

While AUP utilizes plagiarism detection tools which contribute to the integrity and quality of research outputs, there is a certain gap regarding the implementation of FAIR principles. They are not a part of research data policy or strategy.

AUP provides its researchers with a legal framework for personal data protection (compliance with GDPR and privacy),²⁵ but does not directly

²⁴ Agricultural University Plovdiv, "Academic Publishing House," accessed December 28, 2024,

<https://www.au-plovdiv.bg/en/%D1%86%D0%B5%D0%BD%D1%82%D1%80%D0%BE%D0%B2%D0%B5-%D0%B8-%D0%B7%D0%B2%D0%B5%D0%BD%D0%B0/%D0%B0%D0%BA%D0%B0%D0%B4%D0%B5%D0%BC%D0%B8%D1%87%D0%BD%D0%BE-%D0%B8%D0%B7%D0%B4%D0%B0%D1%82%D0%B5%D0%BB%D1%81%D1%82%D0%B2%D0%BE>.

²⁵ Аграрен Университет Пловдив, "Закон За Защита На Личните Данни," accessed December 28, 2024,

<https://www.au-plovdiv.bg/%D0%B7%D0%B0%D0%BA%D0%BE%D0%BD-%D0%B7%D0%B0-%D0%B7%D0%B0%D1%89%D0%B8%D1%82%D0%B0-%D0%BD%D0%B0-%D0%BB%D0%B8%D1%87%D0%BD%D0%B8%D1%82%D0%B5-%D0%B4%D0%B0%D0%BD%D0%BD%D0%B8>.

refer to research data stewardship in the context of managing, sharing, or applying FAIR principles to research data.

The University has established the Center for Scientific Research, Technology Transfer and Intellectual Property Protection of the Agricultural University.²⁶ Even though this center supports research-related activities, it primarily focuses on the organization and operation of the Center, and areas like intellectual property rather than providing dedicated services for research data stewardship. Currently, there is no dedicated service explicitly focused on research data stewardship.

There is an infrastructure in place to support the storage and publication of research outputs. Furthermore, AUP gathers information about the outputs published by their research community facilitated through its Digital Science Repository.²⁷ This repository includes the scientific products of the University, it adheres to the latest interoperability standards, and the information is indexed by OpenAIRE. However, while the repository catalogues bibliographic information and documentation of traditional research outputs such as dissertations, books, and journals, it lacks gathering and managing information about the research data generated by the researcher (e.g., datasets, code, etc.).

There is also a gap in publishing metadata and ensuring free access to metadata, which is one of the fundamental elements of FAIR principles. Nonetheless, AUP does incorporate research data into its research assessments.

AUP publishes two scientific journals, the Agricultural Sciences and Scientific Works both harmonised with OA principles.

AUP provides a substantial amount of support for researchers in the area of research data management, FAIR data and data sharing. This

²⁶ Аграрен Университет Пловдив, "Pravilnik CNITT," 2020, https://www.au-plovdiv.bg/docs/NIC/2023_2024/Pravilnik_CNITT.pdf.

²⁷ Аграрен Университет Пловдив, "Цифров Научен Архив," accessed December 28, 2024, <http://lib.au-plovdiv.bg:8081/aupsp/index.php>.

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includes areas such as training for researchers (including doctoral candidates), using or developing FAIR research tools/services, recognising, citing and acknowledging contributions, developing an open research strategy and vision, and complying with legal and ethical requirements and FAIR principles. However, there are some support mechanisms which AUP could consider integrating as well.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 66 Future of Scholarly Communication and Publishing | Roadmap for Successful Implementation – AUP

Indicator	Recommendations
Preprints Advocacy	Establish clear guidelines that encourage and motivate researchers to share their manuscripts as preprints. Include suitable preprint repositories, and communicate the benefits of preprints for early feedback, and other benefits for researchers. In addition, organise workshops and seminars to inform researchers about the advantages of preprints and how to effectively use preprint platforms.
Open Access Support	Consider implementing additional support mechanisms. Develop Guidelines providing clarification of legal issues related to linking, sharing and re-using OA content and establish specific services (e.g. helpdesks) for researchers.
FAIR Data/Policy Integration	Develop a comprehensive data management policy that explicitly incorporates FAIR principles. Make sure it outlines all specific procedures and standards for making data findable, accessible, interoperable, and reusable.
FAIR Data/Stewardship	Assess the specific needs for data stewardship services at AUP, then plan and initiate the

FAIR
Data/Information

establishment of a dedicated service to provide data stewardship to researchers.

Build on the infrastructure of the Digital Science Repository to include gathering and managing information about the research data generated by the researcher (e.g., datasets, code, etc.).

FAIR
Data/Metadata
Publishing

Establish and implement a standardized metadata framework for all research data generated or obtained at the University level. Furthermore, create a metadata publishing policy to enable publishing and providing free access to metadata. Finally, upgrade AUP's Digital Science Repository to support the storage and publication of metadata alongside research datasets.

Support

Expand support to researchers in the area of research data management, FAIR data and data sharing by including the missing elements such as an institutional website(s) on research data management, planning stewardship and sharing of FAIR outputs, finding and reusing data from existing sources, preparing and documenting data/code to make outputs FAIR, publishing FAIR outputs on own or recommended repositories, funding for implementing FAIR principles, and finding (other) sources of training and advice on FAIR data.

The following section evaluates OS practices related to the Rewards, Incentives, and Recognition pillar, identifying key gaps.

Table 67 Rewards, Incentives, and Recognition | GAP Analysis – AUP

Indicator	Description	Result
Open Science Incentives	Incentives for researchers developing Open Science activities	Yellow
Academic assessment	Open Science elements as part of academic assessment	Red
HR	Open Science dimensions in HR and career frameworks	Red
Recognition and Rewards	Recognising and rewarding Open Science practices	Red
Policy Transparency	Open and easily accessible policies on researcher evaluation	Green

AUP offers some form of support for OS activities, particularly in facilitating OA publishing through national agreements.²⁸ However, direct institutional incentives for other OS elements are lacking.

The University’s academic assessment framework incorporates one OS element, the co-design of research projects. This is a gap, and the approach to academic assessment can be improved.

AUP lacks integration of OS in its HR and career frameworks, which can inhibit the HEI from encouraging and rewarding OS practices. Furthermore, the University currently does not recognize how OS practices are integrated into the work of its researchers, teams, or units, and therefore does not reward them in this context.

The researcher evaluation policies are openly available and easily accessible.

²⁸ “Open Access Agreement Bulgaria | Elsevier,” www.elsevier.com, accessed December 27, 2024, <https://www.elsevier.com/open-access/agreements/bulgaria>.

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The following roadmap outlines actionable recommendations to address the identified gaps.

Table 68 Rewards, Incentives, and Recognition | Roadmap for Successful Implementation – AUP

Indicator	Recommendations
Open Science Incentives	Expand Incentives that AUP provides for researchers developing OS activities beyond free OA publishing.
Academic assessment	Revise academic assessment frameworks and incorporate additional OS elements. The missing elements include depositing of research articles in a repository, OA publishing of research articles in OA journals (via payment of APCs), OA books, OA archival or special collections, preprints, depositing of data in a repository, research data management plans, data sharing, open research protocols, open source research software and code, open education, open evaluation, open collaborative tools, co-creation platforms, transdisciplinary research platforms, Citizen Science, crowdsource practices, and science outreach and communication.
HR	Review and revise HR policies to explicitly integrate OS criteria regarding recruitment, performance evaluations, and career advancements. Clearly define how engagement in OS activities influences these processes.
Recognition and Rewards	Develop and establish assessment frameworks which contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).

The following section evaluates OS practices related to the Research Integrity pillar, identifying key gaps.

Table 69 Research Integrity | GAP Analysis – AUP

Indicator	Description	Result
Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	
ALLEA Code	Harmonisation with ALLEA Code	
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	
Training and Accreditation	Training and accreditation on research integrity pertaining to Open Science	

AUP’s research integrity code/policy embraces OS principles. Furthermore, the University is adhering to the ALLEA Code and has adopted the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers, with the integration of OS principles.

The University provides regular training and accreditation in research integrity, with a focus on OS.

There are no gaps identified regarding the Research Integrity pillar of OS.

The following section evaluates OS practices related to the Education and Skills pillar, identifying key gaps.

Table 70 Education and Skills | GAP Analysis – AUP

Indicator	Description	Result
Training	Skill training in Open Science	Green
Audience	Mandatory Open Science skills training for staff, researchers, and students	Yellow
Rewards and Incentives	Rewarding and incentivising Open Science skills development	Red
Tailored Skill Training	Open Science skill training specifically tailored to groups of staff/students	Green

AUP has implemented skill training across all eight OS pillars. Skill training is mandatory for PhD students. Here there is a certain gap as not all target groups are included.

There is an absence of rewards or incentives for staff and students with regard to OS skills development which may limit the effectiveness of the training and the overall adoption of OS practices within the HEI.

AUP is tailoring OS skills training to specific groups which enhances the relevance and effectiveness of the training provided.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 71 Education and Skills | Roadmap for Successful Implementation – AUP

Indicator	Recommendation
Audience	Expand the requirement for OS training to include all staff, researchers, and students (undergraduate and postgraduate).

**Rewards
and
Incentives**

Develop and implement a program that specifically rewards, and incentivises staff and students with regard to OS skills development. Take into consideration integrating things like certificates and various forms of public acknowledgement. Also, consider integrating participation in OS skill training into the performance evaluation frameworks and career advancement processes.

The following section evaluates OS practices related to the Citizen Science pillar, identifying key gaps.

Table 72 Citizen Science | GAP Analysis – AUP

Indicator	Description	Result
Citizen Science Policy	Documents that guide Citizen Science	Green
Single Point of Contact	Single point of contact for Citizen Science	Red
Assessment	Assessing Citizen Science contributions and adapting research evaluation and reputation systems accordingly	Red
ECSA Principles	ECSA principles implementation support	Red
Support and Training	Support and training for researchers in Citizen Science	Red

AUP has developed and adopted policy documents that guide Citizen Science.

On the other hand, the University did not establish a single point of contact for Citizen Science as an information hotspot, and as a point for overseeing and supporting Citizen Science activities across the HEI.

Furthermore, Citizen Science contributions are currently not being assessed and the formal research evaluation or reputation systems are not adapted accordingly, which may limit recognition and incentivization for researchers who engage in Open Science activities.

AUP does not widely, strategically and formally support the implementation of the ECSA 10 Principles of Citizen Science.

Finally, AUP does not offer ongoing support and training for researchers in regard to Citizen Science, potentially limiting the capacity of researchers to engage effectively with the public and to conduct Citizen Science projects that follow high scientific and ethical standards.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 73 Citizen Science | Roadmap for Successful Implementation – AUP

Indicator	Recommendations
Single Point of Contact	Establish a dedicated Citizen Science point of contact (e.g., Citizen Science officer, participatory research engagement officer, etc.), to coordinate efforts across departments, provide tailored support for citizen science projects, communicate across the University and advocate for the integration of Citizen Science elements into institutional policies.
Assessment	Develop concise assessment criteria for Citizen Science contributions, and modify the current research evaluation frameworks to consider Citizen Science contributions. This can include recognizing various outputs such as Citizen Science datasets, community reports, etc.
ECSA Principles	Familiarize internal stakeholders with ECSA Principles. Next, engage in the formal recognition of the ECSA 10 Principles at the University level, adapt the necessary strategic

documents accordingly and enable their effective implementation.

Support and Training

Establish dedicated support mechanisms for Citizen Science at the institutional level (e.g., helpdesk, online resources, mentorship programs, etc.). Develop specific Citizen Science training programs in deficient areas, in accordance with researchers' needs, which cover important subjects such as designing Citizen Science projects, community engagement mechanisms, and ethical considerations. If applicable, integrate Citizen Science training into the existing and broader researcher development programs.

5.5 Institutul National De Cercetare Dezvoltare Pentru Stiinte Biologice Ra (INCDSB)

INCDSB is an institute that encompasses fundamental and applied scientific research activities, innovation and technological development in the field of life sciences, established in 1996, and which operates as a national research network, with branches and subsidiaries throughout Romania including ClujNapoca Biological Research Institute, Iași Biological Research Institute, Stejarul Biological Research Center, Murighiol Research Center, Constanța Research Center, and Curtea de Argeș Research Center.²⁹

INCDSB's mission is to achieve excellence in research in the life sciences, through the interdisciplinary integration of research activity in four essential fields (agriculture, food, nutrition and food security, environment and biodiversity, biomedicine and health, and circular bioeconomy) using the trans-disciplinarity approach provided by bioanalysis, bioinformatics, applied biotechnologies and research in extreme environments.³⁰

INCDSB is actively working on the alignment with OS pillars. Recent developments in this context include INCDSB participation at the 11th OPEN Science SCAR Conference, presenting findings on microbial biodiversity in polar ecosystems.³¹

²⁹ INCDSB, "Planul Strategic de Dezvoltare 2025-2029".

³⁰ INCDSB, "Planul Strategic de Dezvoltare 2025-2029".

³¹ INCDSB, "Newsletter 12/2024 - National Research and Development Institute for Biological Sciences," National Institute of Research and Development for Biological Sciences, accessed December 28, 2024.

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The following section evaluates OS practices related to the Cultural Change/Leadership pillar, identifying key gaps.

Table 74 Cultural Change/Leadership | GAP Analysis – INCDSB

Indicator	Description	Result
Open Science Policy	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science	Yellow
Senior manager	Appointed senior manager for Open Science	Red
Programme of Cultural Change	Developed programme of cultural change	Yellow
Communication	Developed communication strategy	Yellow
Community	Established Open Science Community	Green

Various OS aspects are included in policy documents or strategies at INCDSB. INCDSB and its partner institutes adopt internal policies regarding data sharing and open collaboration in biological science and biotechnology projects.³² However, there is still room for expansion of these policies and strategies to capture other OS elements as well.

³² INCDSB, “Strategii,” Institutul Național de Cercetare-Dezvoltare pentru Științe Biologice, October 1, 2024, <https://www.incdsb.ro/despre-noi/strategii/>.

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Currently, no senior manager has been appointed to lead OS development at INCDSB.

INCDSB develops an annual general program that includes training and awareness campaigns for research staff, which also includes aspects related to the OS principles and practices. This suggests a commitment to initiating a cultural shift, although the program's scope and depth in covering all aspects of OS might need further expansion.

The Institute does not have a developed communication strategy, but it is currently in the process of developing an extensive one in the near future.

INCDSB is connected to an Open Science Community, to stimulate the OS movement.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 75 Cultural Change/Leadership | Roadmap for Successful Implementation – INCDSB

Indicator	Recommendations
Open Science Policy	Consider consolidating and expanding the existing policies which contain some OS elements into a unified, comprehensive OS guideline document that covers all relevant aspects of OS practices across all pillars.
Senior manager	Identify and appoint a senior manager for OS. This role should have clear responsibilities and competencies for developing and implementing OS policies and practices across all eight pillars.
Programme of Cultural Change	Expand the existing annual program to ensure it covers all eight pillars of OS comprehensively at the level of cultural shift, that is for the purpose of creating the environment for the implementation of OS practices.

Communication

Finalize and implement communication strategies that are currently in the development stage. Ensure the strategies are tailored to your target groups and consider using diverse communication channels (e.g., social media pages or groups, newsletters, physical bulletin boards, etc.).

The following section evaluates OS practices related to the European Open Science Cloud (EOSC) pillar, identifying key gaps.

Table 76 The European Open Science Cloud (EOSC) | GAP Analysis – INCDSB

Indicator	Description	Result
Policy Commitment	Signed EOSC Declaration	Red
International Collaboration	Involvement in the EOSC Association	Red
Infrastructure Access	Institutional access to the requisite infrastructure	Yellow
Infrastructure Development	Provided search and discovery service	Green

INCDSB has not yet signed the EOSC Declaration, and it is not involved in the EOSC Association, thus lacking the formal commitment to this OS pillar.

On the other hand, INCDSB has initiated the development of a data repository, indicating that the necessary steps are being taken to establish an adequate infrastructure that ought to be compatible with EOSC.

INCDSB has an established search and discovery service, allowing users to find what research data is available and where it is located.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 77 The European Open Science Cloud (EOSC) | Roadmap for Successful Implementation – INCDSB

Indicator	Recommendations
Policy Commitment	Assess the benefits and requirements related to joining the EOSC. Formalize the commitment to the EOSC initiative by signing the EOSC Declaration. Systematically align INCDSB’s policies to comply with the requirements and standards of the EOSC.
International Collaboration	Enable and advocate for active participation of the Institute’s stakeholders in EOSC events that are open for non-members. Subsequently, initiate the process of joining the EOSC Association.
Infrastructure Access	Finalize the data repository, and ensure that it is compatible with EOSC

The following section evaluates OS practices related to the Next-Generation Metrics pillar, identifying key gaps.

Table 78 Next-Generation Metrics | GAP Analysis – INCDSB

Indicator	Description	Result
HR	New forms of research evaluation	Green
Guidance	Guidance for research administrators and academics on good and bad practices	Yellow
Training	Training for junior researchers, particularly early-stage doctoral researchers	Green

DORA

Signing DORA and implementing DORA recommendations



ARRA

Signing ARRA and implementing ARRA Principles



INCDSB has embedded new forms of research evaluation into its internal processes for promotion, rewards, and research assessment, continuously aligning itself with national and international criteria for research assessment.

INCDSB promotes the guidance available in the scientific community regarding good and bad practices in the use of traditional bibliometrics and in the development of new metrics. This shows a commitment to responsible traditional metrics use and the development of new metrics, although it lacks the development of internal, tailored guidance to increase the effectiveness of these OS practices on a local level.

The Institute gives particular focus to early career researchers and provides on-the-job training to help them embrace the cultural and practical changes associated with the responsible use of metrics.

INCDSB has not yet signed the San Francisco Declaration on Research Assessment (DORA) nor the Agreement on Reforming Research Assessment (ARRA), and it has not started implementing its principles, which indicates that systematic implementation of this pillar may still not be sufficient.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 79 Next-Generation Metrics | Roadmap for Successful Implementations – INCDSB

Indicator	Recommendations
Guidance	Initiate development of internal guidance documents that specifically address the use of bibliometrics and new metrics at

INCDSB, by conducting a needs assessment to identify the most deficient fields for which the guidance is needed.

DORA

Formalize the adoption of DORA by joining the signatories, and initiate the implementation of DORA recommendations across the Institute.

ARRA

Formalize the adoption of ARRA by joining the signatories, and initiate the implementation of ARRA Principles across the Institute.

The following section evaluates OS practices related to the Mutual Learning / Collaboration pillar, identifying key gaps.

Table 80 Mutual Learning / Collaboration | GAP Analysis – INCDSB

<i>Indicator</i>	<i>Description</i>	<i>Result</i>
Stakeholders	Collaboration with external stakeholders	




INCDSB has a concerted approach with external stakeholders regarding OS as it participates in national and international projects and collaborates with research networks in the field of biological sciences, which involves openness to mutual learning and the adoption of best practices.

There are no gaps identified regarding the Mutual Learning pillar of OS.

The following section evaluates OS practices related to the Future of Scholarly Communication and Publishing pillar, identifying key gaps.

Table 81 Future of Scholarly Communication and Publishing | GAP Analysis – INCDSB

Indicator	Description	Result
Plan S	State of the implementation of Plan S	Green
Preprints Advocacy	Advocating for the share of research manuscripts as preprints	Red
Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	Red
ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	Green
University Press	The existence of the university press and its engagement with Open Access	Red
Open Access Support	Support to researchers to make their research publications available in Open Access	Yellow
FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	Green
FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	Red
FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	Green
FAIR Data/Information	Information about the data archived and published by own research community	Green
FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	Red
FAIR Data/Assessment	Including research data in the researcher assessment	Green

	methodology and research metrics	
Open Access Publishing	Harmonisation with Open Access standards	
Support	Support provided to researchers in research data management, FAIR data and data sharing	

INCDSB is implementing the Plan S principles.

The Institute does not currently advocate the sharing of research manuscripts as preprints, which may limit its ability to enhance the early and open dissemination of research findings.

INCDSB does not currently support new forms of scholarly publishing from third parties that are dedicated to OA approaches.

The use of author identifier systems such as ORCID is being advocated across the Institute.

INCDSB does not have a university press. Nonetheless, it provides various forms of support to facilitate OA publishing. This includes training for researchers (including doctoral candidates), institutional website(s) on OA to research publications, facilitating administrative reporting of publications in projects, and funding for publishing in OA journals (APCs). However, there are certain gaps that the Institute may consider to bridge in the near future.

The institute’s research data policy or strategy includes FAIR principles, yet it does not currently possess a dedicated service for data stewardship, which may hinder researchers’ ability to manage their data effectively.

INCDSB provides access to an infrastructure storage and publication of research data and gathers information about the data archived and published by its research community.

The Institute does not currently publish all metadata about research data generated or obtained within its research community, but it includes research data in the researcher assessment methodology and research metrics.

INCDSB does not publish scientific journals. It provides various forms of support in the area of research data management, FAIR data and data sharing, including training for researchers (including doctoral candidates), recognising, citing and acknowledging contributions, developing open research strategy and vision, complying with legal and ethical requirements, FAIR principles, and finding (other) sources of training and advice on FAIR data.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 82 Future of Scholarly Communication and Publishing / Roadmap to Successful Implementation – INCDSB

Indicator	Recommendations
Preprints Advocacy	Initiate advocacy for the sharing of research manuscripts as preprints through a concise advocacy campaign.
Scholarly Publishing from Third Parties	Identify and evaluate suitable third-party OA initiatives (e.g., OpenEdition and Knowledge Unlatched), initiate collaborations, and develop certain support structures (e.g., financial support schemes, administrative assistance, etc.).
University Press	Consider establishing a university press by conducting a feasibility study to assess the potential benefits and challenges.
Open Access Support	Consider broadening the forms of support that INCDSB provides to researchers to make their research publications available in OA. This includes developing an open research strategy and vision,

linkages to career evaluation and promotion within the institution, guidelines providing clarification of legal issues related to linking, sharing and re-using Open Access content, the establishment of specific services (e.g. helpdesks) for researchers, and legal support.

FAIR Data/Stewardship

Assess the specific needs for data stewardship services at INCDSB, then plan and initiate the establishment of a dedicated service to provide data stewardship to researchers.

FAIR Data/Metadata Publishing

Establish and implement a standardized metadata framework for all research data generated or obtained at the Institute level. Furthermore, create a metadata publishing policy to enable publishing and providing free access to metadata. Develop a solution for publishing and providing free access to metadata with regard to FAIR principles. Explore integrating systems and solutions such as CRIS or PURE.

Open Access Publishing

First, promote OA publishing by encouraging researchers to submit their work to reputable OA journals, provide guidance on selecting suitable OA platforms, but avoiding predatory journals, and support APC costs. Next, consider and explore partnerships with existing publishers to co-publish or improve OA support for INCDSB researchers.

Support

Expand the support that INCDSB provides to researchers in the area of research data management, FAIR data and data sharing. Precisely, consider incorporating, institutional website(s) on research data management, planning stewardship and sharing of FAIR outputs, finding and reusing data from existing sources, using or developing FAIR research tools/services, preparing and documenting data/code to make outputs FAIR, publishing FAIR

outputs on own or recommended repositories, and funding for implementing FAIR principles.

The following section evaluates OS practices related to the Rewards, Incentives, and Recognition pillar, identifying key gaps.

Table 83 Rewards, Incentives, and Recognition | GAP Analysis – INCDSB

Indicator	Description	Result
Open Science Incentives	Incentives for researchers developing Open Science activities	Red
Academic assessment	Open Science elements as part of academic assessment	Yellow
HR	Open Science dimensions in HR and career frameworks	Red
Recognition and Rewards	Recognising and rewarding Open Science practices	Yellow
Policy Transparency	Open and easily accessible policies on researcher evaluation	Green

INCDSB does not currently provide incentives for researchers developing OS activities which may limit the adoption and development of OS practices on the Institute level.

The Institute integrates several OS elements into its academic assessment framework including, depositing of research articles in a repository, OA publishing of research articles in OA journals (via payment of APCs), OA books, and Open source research software and code. Nonetheless, there are gaps regarding other key OA elements which are not of the Institute’s approach to academic assessment.

There is an absence of integration of OS principles into HR and career frameworks at INCDSB, which indicates a gap in aligning HR policies with OS best practices.

INCDSB assesses the extent to which individuals, teams or units integrate OS into their daily practice. However, it currently does not provide recognition or rewards for those who actively engage in these practices.

Finally, INCDSB makes information about its policies on researcher evaluation open and easily accessible.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 84 Rewards, Incentives, and Recognition | Roadmap for Successful Implementation – INCDSB

Indicator	Recommendations
Open Science Incentives	Establish incentive programs tailored to INCDSB’s researchers. Ensure that INCDSB provides incentives for researchers developing OS activities (e.g., financial rewards, research grants, recognition awards, project participation opportunities, career evaluation incentives, etc.).
Academic assessment	Incorporate additional OS elements into INCDSB’s academic assessment frameworks. Consider missing OS elements such as OA archival or special collections, preprints, depositing of data in a repository, research data management plans, data sharing, open research protocols, open education, open evaluation, open collaborative tools, co-creation platforms, transdisciplinary research platforms, co-design of research projects, Citizen Science, crowdsource practices, and science outreach and communication.
HR	Develop OS-focused HR Policies or review and revise existing HR policies to explicitly integrate OS criteria regarding

recruitment, performance evaluations, and career advancements. Clearly define how engagement in OS activities influences these processes.

Recognition and Rewards

Develop and establish assessment frameworks which contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).

The following section evaluates OS practices related to the Research Integrity pillar, identifying key gaps.

Table 85 Research Integrity | GAP Analysis – INCDSB

Indicator	Description	Result
Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	Green
ALLEA Code	Harmonisation with ALLEA Code	Red
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Green
Training and Accreditation	Training and accreditation on research integrity pertaining to Open Science	Red

The institute’s research integrity code/policy embraces OS principles.

INCDSB does not currently abide by the ALLEA Code and its OS provisions, but it has adopted the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers, with the integration of OS principles.

The absence of regular training or accreditation programs on research integrity that incorporate OS principles indicates a gap which may inhibit researchers from fully understanding and integrating ethical OS standards into their daily practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 86 Research Integrity | Roadmap for Successful Implementation – INCDSB

Indicator	Recommendations
ALLEA Code	Conduct a review of the ALLEA Code to understand its requirements and provisions. Determine the specific areas where a discrepancy exists and adjust/develop Policies to align with the ALLEA Code.
Training and Accreditation	Develop and Implement regular training and accreditation programs on research integrity related to OS. Ethical, legal, and social aspects of research should be covered.

The following section evaluates OS practices related to the Education and Skills pillar, identifying key gaps.

Table 87 Education and Skills | GAP Analysis – INCDSB

Indicator	Description	Result
Training	Skill training in Open Science	
Audience	Mandatory Open Science skills training for staff, researchers, and students	
Rewards and Incentives	Rewarding and incentivising Open Science skills development	

Tailored Skill Training

Open Science skill training specifically tailored to groups of staff/students



There is an absence of skill training that covers all OS pillars, which is a gap in providing the support necessary for researchers to fully engage with OS practices. The second and fourth indicators are, therefore, absent as well.

INCDSB currently does not provide rewards or incentives to staff and students with regard to OS skills development which is a gap that may inhibit motivation and therefore lower participation rates.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 88 Education and Skills | Roadmap for Successful Implementation – INCDSB

Indicator	Recommendations
Training	Develop an extensive, exhaustive and structured OS skills training program that covers all OS pillars.
Audience	Ensure that the future established OS skills training program has mandatory participation for certain stakeholders according to their roles in developing OS practices at INCDSB (staff, students, etc.). Also, consider making participation mandatory during the onboarding phase for new staff members.
Rewards and Incentives	Develop and implement a program that specifically rewards, and incentivises staff and students with regard to OS skills development. Take into consideration integrating things like certificates and various forms of public acknowledgement. Also, consider integrating participation in OS skill training into the performance evaluation frameworks and career advancement processes.

Tailored Skill Training

Ensure that the future established OS skills training program is tailored specifically to the needs of diverse stakeholders across the Institute. This can be done by assessing the training needs of different groups of stakeholders early in the development process.

The following section evaluates OS practices related to the Citizen Science pillar, identifying key gaps.

Table 89 Citizen Science | GAP Analysis – INCDSB

Indicator	Description	Result
Citizen Science Policy	Documents that guide Citizen Science	
Single Point of Contact	Single point of contact for Citizen Science	
Assessment	Assessing Citizen Science contributions and adapting research evaluation and reputation systems accordingly	
ECSA Principles	ECSA principles implementation support	
Support and Training	Support and training for researchers in Citizen Science	

INCDSB is currently lacking documents that guide Citizen Science activities across the Institute, which represents a strategic gap.

The lack of a single point of contact for Citizen Science indicates a structural and organisational gap needed to effectively support and expand Citizen Science initiatives.

Citizen Science contributions are currently not being assessed and the formal research evaluation or reputation systems are not adapted accordingly.

INCDSB does not widely, strategically and formally support the implementation of the ECSA 10 Principles of Citizen Science, which is a gap in adopting widely recognized best practices in Citizen Science.

The Institute currently does not provide support and training for researchers in regard to Citizen Science which may limit the capacity of researchers to conduct effective and ethical Citizen Science projects.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 90 Citizen Science | Roadmap for Successful Implementation – INCDSB

Indicator	Recommendations
Citizen Science Policy	Develop a document that guides Citizen Science at INCDSB. Ensure that it aligns with the Institute’s OS frameworks and engagement goals. This document should define Citizen Science principles, address ethical considerations (e.g., data privacy, recognition of citizen scientists, etc.), and provide clear guidelines or policies related to the main elements of Citizen Science and relevant processes.
Single Point of Contact	Establish a dedicated Citizen Science point of contact (e.g., Citizen Science officer, participatory research engagement officer, etc.), to coordinate efforts across departments, provide tailored support for Citizen Science projects, communicate across the Institute and advocate for the integration of Citizen Science elements into institutional policies.
Assessment	Develop concise assessment criteria for Citizen Science contributions, and modify the current research evaluation frameworks to consider Citizen Science contributions. This

can include recognizing various outputs such as Citizen Science datasets, community reports, etc.

ECSA Principles

Familiarize internal stakeholders with ECSA 10 Principles. Next, engage in the formal recognition of the ECSA 10 Principles at the Institution level, adapt the necessary strategic documents accordingly and enable their effective implementation.

Support and Training

Establish dedicated support mechanisms for Citizen Science at the institutional level (e.g., helpdesk, online resources, mentorship programs, etc.). Develop specific Citizen Science training programs in deficient areas, in accordance with researchers' needs, which cover important subjects such as designing Citizen Science projects, community engagement mechanisms, and ethical considerations. If applicable, integrate Citizen Science training into the existing and broader researcher development programs.

5.6 National Institute of Research and Development for Biological Sciences (BOKU)

University of Natural Resources and Life Sciences (BOKU) is a leading institution in the field of life sciences and sustainability research based in Vienna, Austria and established in 1872 as a small agricultural university. Today, it spans multiple locations, contains 15 departments, employs over 800 staff members, engages over 2.000 scientists and hosts over 10.000 students and over 1.000 graduates.³³

BOKU combines natural sciences, engineering, economics and social sciences in its degree programs and focuses on interdisciplinary and transdisciplinary education.

BOKU is committed to the Open Science Policy Austria and the UNESCO Recommendation on Open Science.

GAP Analysis Analysis and Roadmaps for Successful Implementation


The following section evaluates OS practices related to the Cultural Change/Leadership pillar, identifying key gaps.

Table 91 Cultural Change/Leadership | GAP Analysis – BOKU

Indicator	Description	Result
Open Science Policy	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science	

³³ University of Natural Resources and Life Sciences, “Facts & Figures 2022/23,” 2023.

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Senior manager	Appointed senior manager for Open Science	
Programme of Cultural Change	Developed programme of cultural change	
Communication	Developed communication strategy	
Community	Established Open Science Community	

At the highest strategic level, BOKU has adopted the Development Plan 2023, which contains a subchapter specifically dedicated to OS.³⁴ This document outlines BOKU’s strategic commitments to OS manifested in the continuous development of specific guidelines so that the openness of research results and research data becomes the standard. BOKU supports the Austrian Science Fund (FWF), cOAlition S, and Open Science Austria, and it is a signatory to the Berlin Declaration. Other specific documents include the Open Access Strategy³⁵ and Guidelines to Ensure Good Scientific Practice³⁶ which addresses FAIR principles. Although BOKU has quite an exhaustive policy related to OS pillars, some specific documents are still under development.

BOKU has appointed a senior manager to lead some aspects of OS, but not all.

HEI does not have a developed programme of cultural change to support the transition to the widespread acceptance of OS practices.

The absence of a communication strategy could provide room for improvement in order to enable a university-wide commitment to OS practices.

³⁴ University of Natural Resources and Life Sciences, “Entwicklungsplan 2030,” 2023.

³⁵ University of Natural Resources and Life Sciences, “Open Access Strategie Der Universität Für Bodenkultur Wien,” June 16, 2015.

³⁶ University of Natural Resources and Life Sciences, Vienna, “Guidelines to Ensure Good Scientific Practice at the University of Natural Resources and Life Sciences, Vienna,”.

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BOKU is connected to an Open Science Community, to boost the OS movement.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 92 Cultural Change/Leadership | Roadmap for Successful Implementation – BOKU

Indicator	Recommendations
Open Science Policy	Finalize and Publish Remaining Policies, specifically the Policy for Research Data Management, the Policy for Open Educational resources, and a new version of the Affiliation Policy.
Senior manager	Expand the role of the existing senior manager to cover all OS pillars. Ensuring the senior manager has the authority and resources to be effective.
Programme of Cultural Change	Initiate the development of a program of cultural change tailored to promote and support the adoption of OS practices at BOKU. Begin with an assessment phase where current practices and attitudes towards OS are evaluated. Based on this, plan targeted initiatives that can help inform, motivate and empower researchers, students and other institutional stakeholders to develop and implement OS practices.
Communication	Develop a comprehensive and targeted communication strategy, which will enable all institutional stakeholders to become familiar with OS practices. Use diverse communication channels, tools and platforms tailored to reaching different stakeholders.

The following section evaluates OS practices related to the European Open Science Cloud (EOSC) pillar, identifying key gaps.

Table 93 The European Open Science Cloud (EOSC) | GAP Analysis – BOKU

Indicator	Description	Result
Policy Commitment	Signed EOSC Declaration	Yellow
International Collaboration	Involvement in the EOSC Association	Red
Infrastructure Access	Institutional access to the requisite infrastructure	Yellow
Infrastructure Development	Provided search and discovery service	Red

BOKU has not currently signed the EOSC Declaration and is not a member of the EOSC Association. However, the harmonization with EOSC is in the process and explicitly planned in the Development Plan 2030.³⁷

Furthermore, HEI is actively engaged in establishing a data repository infrastructure that interacts with the EOSC. Development Plan 2030 states that a joint repository is under development and that BOKU is following the EOSC process and sets clear goals for the future connection of the repository with the EOSC. In addition, there is an established BOKU Community in Zenodo.³⁸

BOKU does not have an established search and discovery service which may inhibit researchers and other users to efficiently locate and utilize available scientific outputs and research data.

³⁷ University of Natural Resources and Life Sciences, “Entwicklungsplan 2030,” 2023.

³⁸ University of Natural Resources and Life Sciences, “Zenodo Community,” accessed August 29, 2024, <https://zenodo.org/communities/boku/records?q=&l=list&p=1&s=10&sort=newest>.

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The following roadmap outlines actionable recommendations to address the identified gaps.

Table 94 The European Open Science Cloud (EOSC) | Roadmap for Successful Implementation – BOKU

Indicator	Recommendations
Policy Commitment	Continue with the implementation of the Development Plan 2030 to improve the harmonization with the principles of the EOSC. Consider formally signing the EOSC Declaration.
International Collaboration	Explore the possibility of becoming a direct member of the EOSC Association to participate actively in shaping OS policies and practices at the EU level and draw local benefits. Alternatively, ensure participation in EOSC events that are open for non-members before initiating the formal joining process.
Infrastructure Access	Prioritize the completion of the data repository which is currently under development. Ensure that it fully meets EOSC principles regarding interoperability, security, and accessibility standards.
Infrastructure Development	Develop a search and discovery service, equipped with advanced search options and metadata standards to ensure easy navigation and accessibility. Integration with global research networks, including the EOSC, should be considered as well.

The following section evaluates OS practices related to the Next-Generation Metrics pillar, identifying key gaps.

Table 95 Next-Generation Metrics | GAP Analysis – BOKU

Indicator	Description	Result
HR	New forms of research evaluation	Green
Guidance	Guidance for research administrators and academics on good and bad practices	Red
Training	Training for junior researchers, particularly early-stage doctoral researchers	Red
DORA	Signing DORA and implementing DORA recommendations	Red
ARRA	Signing ARRA and implementing ARRA Principles	Green

BOKU has various types of evaluations and guidelines which include many elements besides JIF and h-index.

The absence of guidance on traditional bibliometric practices and the development of new metrics indicates a gap.

The HEI currently does not provide training for early career researchers on the responsible use of research metrics.

While BOKU has not signed the San Francisco Declaration on Research Assessment (DORA) specifically, the signing of the Agreement on Reforming Research Assessment (ARRA) indicates a commitment to reforming research assessment practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 96 Next-Generation Metrics | Roadmap for Successful Implementation – BOKU

Indicator	Recommendations
Guidance	Initiate the development of comprehensive guidelines for research administrators and academics that cover traditional bibliometrics and the development and implementation of new metrics related to research assessment.
Training	Create specialized training programs for junior researchers, particularly early-stage doctoral researchers, enabling them to learn about the use, implications, and limitations of traditional and next-generation metrics. Alternatively, integrate this type of training into existing programs.
DORA	Formalize the adoption of DORA by joining the signatories, and initiate the implementation of DORA recommendations across the HEI.

The following section evaluates OS practices related to the Mutual Learning / Collaboration pillar, identifying key gaps.

Table 97 Mutual Learning / Collaboration | GAP Analysis – BOKU

Indicator	Description	Result
Stakeholders	Collaboration with external stakeholders	

BOKU has established a comprehensive concerted approach with other stakeholders in the area of OS. This is done through various networks

and projects such as Cluster Forschungsdaten³⁹, AT2OA2⁴⁰, Co-
coordination Austrian Datahub⁴¹, RIS Synergy⁴², and Österreich Forscht⁴³.

The HEI is also a member of FIS/CRIS Austria, a consortium of all Austrian
universities dedicated to research documentation.

Diverse stakeholders at the institutional level are involved in
collaborative activities including Research Support, Innovation &
Technology Transfer (OA, RDM, ORD, Citizen Science, and FIS), the Library
(OA), and E-learning and didactics (OER).

There are no gaps identified regarding the Mutual
Learning/Collaboration OS pillar.

The following section evaluates OS practices related to the Future of
Scholarly Communication and Publishing pillar, identifying key gaps.

**Table 98 Future of Scholarly Communication and Publishing | GAP
Analysis – BOKU**

Indicator	Description	Result
Plan S	State of the implementation of Plan S	Yellow
Preprints Advocacy	Advocating for the share of research manuscripts as preprints	Green

³⁹ Cluster Forschungsdaten, accessed November 29, 2024,
<https://forschungsdaten.at/>.

⁴⁰ Austrian Transition to Open Access, "AT2OA," accessed November 29, 2024,
<https://at2oa2.univie.ac.at/>.

⁴¹ Austrian Open Access Datahub, "OA Monitor," accessed November 29, 2024,
<https://oamonitor.obvsg.at/>.

⁴² "RIS Synergy," Cluster Forschungsdaten, accessed November 29, 2024,
<https://forschungsdaten.at/ris/>.

⁴³ "Citizen Science Projects - Österreich Forscht," accessed November 29, 2024,
<https://www.citizen-science.at/en/>.

Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	Red
ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	Green
University Press	The existence of the university press and its engagement with Open Access	Red
Open Access Support	Support to researchers to make their research publications available in Open Access	Yellow
FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	Green
FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	Green
FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	Green
FAIR Data/Information	Information about the data archived and published by own research community	Yellow
FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	Red
FAIR Data/Assessment	Including research data in the researcher assessment methodology and research metrics	Yellow
Open Access Publishing	Harmonisation with Open Access standards	Green
Support	Support provided to researchers in research data management, FAIR data and data sharing	Green

BOKU is currently not explicitly implementing the Plan S principles.

The HEI is actively Advocating for the share of research manuscripts as preprints.

BOKU does not currently actively support new forms of scholarly publishing from third parties that are dedicated to OA approaches.

The use of author identifier systems such as ORCID is being advocated across the HEI.

There is an absence of a university press which may limit the direct management of scholarly works produced by HEI's researchers.

Numerous forms of support for OA publishing are being provided. This includes institutional website(s) on OA to research publications, linkages to career evaluation and promotion within the institution, funding for publishing in OA journals (APCs), guidelines providing clarification of legal issues related to linking, sharing and re-using OA content, establishment of specific services (e.g. helpdesks) for researchers, and support from being a part of big Austrian consortia via KEMÖ.⁴⁴ The results are measurable as well and the proportion of OA publications at BOKU has been continuously rising in recent years and is currently over 70%.⁴⁵ Nonetheless, there are several areas where support can be broadened.

BOKU is in the process of developing a specific and focused research data policy. Nonetheless, its current strategic document includes the FAIR principles.

HEI has established a dedicated data stewardship service which provides 3 data stewards, which is a significant step towards enhancing data management support for researchers. There are concise plans for

⁴⁴ Kooperation E-Medien Österreich, "KEMÖ: Open Access," accessed November 29, 2024, <https://www.kemoe.at/english/open-access>.

⁴⁵ University of Natural Resources and Life Sciences, "Entwicklungsplan 2030," 2023.

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the expansion of this service as well, that is to have 12 data stewards (2 for each department) until 2027.

BOKU provides access to an infrastructure storage and publication of research data.

At the moment, BOKU does not gather information about the data archived and published by its research community but is planning to do so in the near future.

The HEI currently does not publish all metadata about research data generated or obtained within its research community.

Including research data as a valuable output in research assessments is currently in the planning stage.

BOKU publishes *Die Bodenkultur: Journal for Land Management, Food and Environment* which uses the diamond OA model which allows free access to content without charging authors any article processing charges (APCs), thus removing financial barriers to OA publishing.⁴⁶

BOKU provides extensive support in the area of research data management, FAIR data and data sharing including training for researchers (including doctoral candidates), institutional website(s) on research data management, planning stewardship and sharing of FAIR outputs, finding and reusing data from existing sources, using or developing FAIR research tools/services, preparing and documenting data/code to make outputs FAIR, publishing FAIR outputs on own or recommended repositories, complying with legal and ethical requirements, FAIR principles, funding for implementing FAIR principles and finding (other) sources of training and advice on FAIR data.

The following roadmap outlines actionable recommendations to address the identified gaps.

⁴⁶ "Die Bodenkultur: Journal of Land Management, Food And...," Sciendo, accessed November 29, 2024, <https://sciendo.com/journal/BOKU>.

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Table 99 Future of Scholarly Communication and Publishing / Roadmap for Successful Implementation – BOKU

Indicator	Recommendations
Plan S	Conduct an internal review to determine the level of harmonization of current BOKU OS practices and initiatives to Plan S. Next, develop and adopt policies, and guidelines or update articles in existing documents to align with Plan S.
Scholarly Publishing from Third Parties	Identify suitable third-party OA initiatives (e.g., OpenEdition and Knowledge Unlatched) and develop complementary support frameworks (e.g., financial support schemes, administrative assistance, etc.).
University Press	Consider establishing a university press by conducting a feasibility study to assess the potential benefits and challenges.
Open Access Support	Consider broadening the support BOKU provides to researchers to make their research publications available in OA. Consider integrating training for researchers (including doctoral candidates), developing an open research strategy and vision, facilitating administrative reporting of publications in projects, and providing legal support.
FAIR Data/Information	Expand the current repository to include gathering and managing information about the research data generated by the researcher (e.g., datasets, code, etc.).
FAIR Data/Metadata Publishing	Establish and implement a standardized metadata framework for all research data generated or obtained at the University level. Furthermore, create a metadata publishing policy to enable publishing and providing free access to metadata. Finally, upgrade BOKU’s current repository to support the storage and publication of metadata alongside research datasets.

FAIR
Data/Assessment

Integrate the recognition of research data as a valuable output for research assessments in the existing assessment framework. It is important to regulate how data contributions are measured and evaluated.

The following section evaluates OS practices related to the Rewards, Incentives, and Recognition pillar, identifying key gaps.

Table 100 Rewards, Incentives, and Recognition | GAP Analysis – BOKU

Indicator	Description	Result
Open Science Incentives	Incentives for researchers developing Open Science activities	Red
Academic assessment	Open Science elements as part of academic assessment	Yellow
HR	Open Science dimensions in HR and career frameworks	Red
Recognition and Rewards	Recognising and rewarding Open Science practices	Yellow
Policy Transparency	Open and easily accessible policies on researcher evaluation	Green

BOKU participates in numerous third-party-funded projects which require their researchers to follow the funders' criteria related to OA and data sharing. Other OS practices are optional. The HEI, however, does not provide institutional incentives that could further motivate researchers to implement a wider range of OS practices.

The HEI has not formally integrated specific OS elements into its academic assessment criteria. Nonetheless, publications indexed in

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DOAJ are recognized as a category for evaluation, and the majority of other OS practices are part of self-evaluation processes done by researchers.

There is an absence of integration of OS principles into HR and career frameworks at BOKU, which indicates a gap in aligning HR policies with OS best practices.

BOKU implements some form of assessment of the extent to which individuals, teams or units integrate OS into their daily practice. However, these efforts are not formalized and the HEI currently does not provide recognition or rewards for those who actively engage in these practices.

Finally, HEI makes information about its policies on researcher evaluation open and easily accessible.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 101 Rewards, Incentives, and Recognition | Roadmap for Successful Implementation – BOKU

Indicator	Recommendations
Open Science Incentives	<p>Establish incentive programs tailored to BOKU’s researchers. Ensure that the HEI provide incentives for researchers developing OS activities (e.g., financial rewards, research grants, recognition awards, project participation opportunities, career evaluation incentives, etc.).</p>
Academic assessment	<p>Develop and implement policies to formally recognize a wider range of OS activities in academic assessments, such as depositing of research articles in a repository, OA publishing of research articles in OA journals (via payment of APCs), OA books, OA archival or special collections, preprints, depositing of data in a repository, research data management plans, data sharing, open research protocols, open source research software and code, open education,</p>

open evaluation, open collaborative tools, co-creation platforms, transdisciplinary research platforms, co-design of research projects, Citizen Science, crowdsource practices, and science outreach and communication.

HR Develop OS-focused HR Policies or review and revise existing HR policies to explicitly integrate OS criteria regarding recruitment, performance evaluations, and career advancements. Clearly define how engagement in OS activities influences these processes.

Recognition and Rewards Develop and establish assessment frameworks which contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).

The following section evaluates OS practices related to the Research Integrity pillar, identifying key gaps.

Table 102 Research Integrity | GAP Analysis – BOKU

Indicator	Description	Result
Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	Yellow
ALLEA Code	Harmonisation with ALLEA Code	Yellow
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Red
Training and Accreditation	Training and accreditation on research integrity pertaining to Open Science	Yellow

BOKU's research integrity code/policy partially embraces OS principles, indicating a gap.

The HEI abides by the ALLEA Code and its OS provisions in the most part, indicating a significant yet partial compliance. The University did not adopt the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers, with the integration of OS principles.

The absence of regular training or accreditation programs on research integrity that incorporate OS principles indicates a gap which may inhibit researchers from fully understanding and integrating ethical OS standards into their daily practices. However, BOKU is currently actively working on this.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 103 Research Integrity | Roadmap for Successful Implementation – BOKU

Indicator	Recommendations
Research Integrity Code/Policy	Conduct a review of the existing research integrity code/policy to identify which OS principles are missing and how can they be effectively integrated.
ALLEA Code	Assess the current level of compliance with the ALLEA Code to identify specific areas where adherence to the OS provisions is lacking. Next, update existing policies, create new ones, and revise current practices where gaps are identified.
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adopt the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers, and align institutional policies and practices accordingly.

Training and Accreditation

Finalize the development of training and accreditation program on research integrity related to OS. Ensure that ethical, legal, and social aspects of research are covered.

The following section evaluates OS practices related to the Education and Skills pillar, identifying key gaps.

Table 104 Education and Skills | GAP Analysis – BOKU

Indicator	Description	Result
Training	Skill training in Open Science	Yellow
Audience	Mandatory Open Science skills training for staff, researchers, and students	Yellow
Rewards and Incentives	Rewarding and incentivising Open Science skills development	Red
Tailored Skill Training	Open Science skill training specifically tailored to groups of staff/students	Yellow

BOKU provides skill training in OS. However, this training does not cover all OS pillars, which may limit its effectiveness.

Skill training is currently optional, but the University is actively planning mandatory OS skills training for staff, researchers, and students.

Currently, BOKU does not offer rewards, and incentives to staff and students with regard to OS skills development, that is, for the participation in OS training.

OS skills training is not specifically tailored to different groups within the HEI. Nonetheless, BOKU is currently planning to tailor its OS skill training for academic staff, researchers (including early career researchers) and PhD students.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 105 Education and Skills | Roadmap for Successful Implementation – BOKU

Indicator	Recommendations
Training	BOKU does provide OS skills training that is specifically tailored to different groups within the institution. This pertains to academic staff, researchers (including early career researchers) and PhD students.
Audience	Finalize and implement the revision of current OS skills training programs that will make participation mandatory. Explore the options regarding which categories of staff and students could this be applied to, for which OS elements or at which career development stage. For example, consider making participation mandatory during the onboarding phase for new staff members.
Rewards and Incentives	Develop and implement a program that specifically rewards, and incentivises staff and students with regard to OS skills development. Take into consideration integrating things like certificates and various forms of public acknowledgement. Also, consider integrating participation in OS skill training into the performance evaluation frameworks and career advancement processes.
Tailored Skill Training	Ensure that the planned modifications of OS skills training are in line with the tailored approach, considering the specific needs of diverse stakeholders across the HEI. This can be done by assessing training needs for different groups of stakeholders as early in the planning process as possible.

The following section evaluates OS practices related to the Citizen Science pillar, identifying key gaps.

Table 106 Citizen Science | GAP Analysis – BOKU

Indicator	Description	Result
Citizen Science Policy	Documents that guide Citizen Science	Green
Single Point of Contact	Single point of contact for Citizen Science	Green
Assessment	Assessing Citizen Science contributions and adapting research evaluation and reputation systems accordingly	Yellow
ECSA Principles	ECSA principles implementation support	Green
Support and Training	Support and training for researchers in Citizen Science	Green

BOKU has an extensive framework which guides Citizen Science activities and a centralized point for Citizen Science. All these elements are open and available through a dedicated section of the HEI’s website.⁴⁷

The University recognizes Citizen Science contributions through researchers’ self-evaluations, indicating a strong commitment. However, this recognition is not fully integrated into the formal research evaluation processes, and reputation systems are not adapted accordingly.

BOKU fully supports the implementation of the ECSA 10 principles and provides comprehensive support and training for researchers in Citizen Science.

⁴⁷ University of Natural Resources and Life Sciences, “Citizen Science: BOKU,” accessed November 29, 2024, <https://boku.ac.at/en/citizen-science>.

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The following roadmap outlines actionable recommendations to address the identified gaps.

Table 107 Citizen Science | Roadmap for Successful Implementation – BOKU

Indicator	Recommendations
Assessment	Develop clear guidelines and criteria for assessing the value of Citizen Science contributions, and fully incorporating Citizen Science contributions into formal research evaluation frameworks. Next, integrate Citizen Science into BOKU's reputation systems.

5.7 Educons University (EDU)

Educons University (EDU) is located in Novi Sad, Serbia. EDU offers 26 study programs across 10 faculties, employs around 130 staff members and its campus area spans 10,000 square meters.⁴⁸

EDU has formalized its commitment to OS through the development and adoption of the Rulebook on Open Science at Educons University⁴⁹. This document represents a form of harmonisation with the national-level Open Science frameworks. It focuses on the implementation of the National Open Science Platform⁵⁰ by defining specific obligations, responsibilities, measures and procedures.

It addresses Open Access regarding scientific publications and other research outputs (e.g., pre-prints) through the University's digital institutional repository. Furthermore, it defines the roles and obligations of the University's staff and its Library and describes the implementation monitoring mechanism.

Questionnaire respondents from EDU indicated that OS and its elements are quite novel and that their staff and researchers are still in the process of getting to know it. They have accented the importance of further education of researchers in all elements of OS, including the institutional and systematic introduction of OS in numerous elements of scientific research.

⁴⁸ Educons Univerzitet, "Informator," 2018.

⁴⁹ Educons Univerzitet, "Pravilnik o otvorenoj nauci na Univerzitetu Edukons," May 15, 2023.

⁵⁰ Ministry of Education of the Republic of Serbia, "National Open Science Platform," 2018, <http://www.open.ac.rs/>.

GAP Analysis and Roadmaps for Successful Implementation

The following section evaluates OS practices related to the Cultural Change/Leadership pillar, identifying key gaps.

Table 108 Cultural Change/Leadership | GAP Analysis – EDU

Indicator	Description	Result
Open Science Policy	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science	Yellow
Senior manager	Appointed senior manager for Open Science	Yellow
Programme of Cultural Change	Developed programme of cultural change	Red
Communication	Developed communication strategy	Red
Community	Established Open Science Community	Yellow

EDU has taken an initial step in terms of Open Science policy by developing and adopting a rulebook on Open Science – which mainly regulates issues related to the digital institutional repository that was established in 2023. However, the scope of this rulebook is limited, and OS practices covered could be expanded.

a dedicated senior manager has not been appointed although, currently, the Vice-rector for science and the Head of the Scientific Research Center share the responsibilities related to the management of Open Science frameworks. EDU is also currently looking for the right person for the role of research manager.

EDU has not developed a programme of cultural change necessary for OS development in practice. On the other hand, they strongly encourage Open Science practices by providing related information and attending seminars and workshops in order to educate their staff members. These efforts are meaningful but not systematically integrated across the HEI which may limit their effectiveness.

The University currently does not have a communication strategy related to OS practices. This aspect is being covered by email notifications to teaching and research staff. This approach could be improved in order to enable a university-wide commitment to OS practices.

HEI displays a significant commitment to the OS movement through various connections with the national-level frameworks, whether they are mandatory or not, but it has not developed nor it is connected to an OS community. The most significant example is the HEI's connection to eScience, which opened in full capacity to all active researchers in Serbia in July 2023, as a publicly available portal for monitoring the scientific performance of researchers and institutions in the Republic of Serbia.⁵¹ It is intended for the unified display of scientific production, research areas and achievements of scientific research organizations and their researchers.

Furthermore, EDU is connected to the previously mentioned National Open Science Portal and National Repository of Dissertations in Serbia (NaRDuS) as a common OA portal for PhD dissertations and thesis evaluation reports from all Serbian universities.⁵²

Finally, there is a certain Open Science Movement within the HEI with a positive trend towards developing an OS community. It primarily involved three persons from their project office and the librarian.

⁵¹ Ministry of Science, Technological Development and Innovation of the Republic of Serbia, "eNauka Portal," 2023, <https://enauka.gov.rs/>.

⁵² Ministry of Education of the Republic of Serbia, "National Repository of Dissertations in Serbia (NaRDuS)," accessed December 22, 2024, <https://nardus.mpn.gov.rs/>.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 109 Cultural Change/Leadership | Roadmap for Successful Implementation – EDU

Indicator	Reccomendations
Open Science Policy	Expand the Scope of OS Policies by developing additional policies that cover missing OS pillars and elements (e.g., Citizen Science). Align Open Science policies with international best practices, and regularly update them to reflect the latest developments in the global OS movement, but also take into consideration local idiosyncracies and inputs from local stakeholders (e.g., researchers, students, etc.).
Senior manager	Identify and appoint a senior manager for OS. Nonetheless, the Vice-rector for science and the Head of the Scientific Research Center should maintain a strategic oversight over the OS practices.
Programme of Cultural Change	Develop a comprehensive programme of cultural change for creating the environment for the implementation of OS practices. Identify key actors and enablers of OS in your HEI, set specific goals, and define an impact-measuring framework.
Communication	Expand the use of communication channels beyond email (e.g., social media pages or groups, newsletters, physical bulletin boards, etc.). Analyse your stakeholders (e.g., students, administrative staff, etc.), test multiple communication methods/channels, monitor results, tailor and adjust them, and iterate in order to achieve the best results. Then, develop an OS communication strategy.
Community	Consider developing a local OS community. Consult the guidelines created by the International Network of Open

Science & Scholarship Communities.⁵³ In addition, consider liaising with the existing OS community in your country. For example, the Open Science Community Serbia.⁵⁴

The following section evaluates OS practices related to the European Open Science Cloud (EOSC) pillar, identifying key gaps.

Table 110 The European Open Science Cloud (EOSC) | GAP Analysis – EDU

Indicator	Description	Result
Policy Commitment	Signed EOSC Declaration	Red
International Collaboration	Involvement in the EOSC Association	Red
Infrastructure Access	Institutional access to the requisite infrastructure	Green
Infrastructure Development	Provided search and discovery service	Red

EDU did not sign the EOSC Declaration and it is not involved in the EOSC Association, thus lacking the formal commitment to this OS pillar. On the other hand, HEI has established a data repository, operated by the university library and accessible through a dedicated portal.⁵⁵ This data repository is a prerequisite for the harmonisation with the EOSC. EDU

⁵³ International Network of Open Science & Scholarship Communities, “Open Science Community Starter Kit,” 2020, <https://inosc-starter-kit.netlify.app/>.

⁵⁴ Open Science Community Serbia, accessed December 23, 2024, <https://oscs.open.ac.rs/index.php/sr/>.

⁵⁵ Educons University, “REDUN – Repository of Educons University,” 2023, <https://redun.educons.edu.rs/>.

currently does not have a search and discovery service for research data, which is a limitation regarding the OS infrastructure.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table III The European Open Science Cloud (EOSC) | Roadmap for Successful Implementation – EDU

Indicator	Reccomendations
Policy Commitment	Assess the benefits and requirements related to joining the EOSC. Formalize the commitment to the EOSC initiative by signing the EOSC Declaration. Systematically align EDU’s policies to comply with the requirements and standards of the EOSC.
International Collaboration	Enable and advocate for active participation of the institutional stakeholders in EOSC events that are open for non-members. Subsequently, initiate the process of joining the EOSC Association.
Infrastructure Development	Develop a search and discovery service which is harmonized with the needs of EDU. Use a user-friendly interface design as a search and discovery service containing advanced search options.

The following section evaluates OS practices related to the Next-Generation Metrics pillar, identifying key gaps.

Table 112 Next-Generation Metrics | GAP Analysis – EDU

Indicator	Description	Result
HR	New forms of research evaluation	Red
Guidance	Guidance for research administrators and academics on good and bad practices	Red
Training	Training for junior researchers, particularly early-stage doctoral researchers	Green
DORA	Signing DORA and implementing DORA recommendations	Red
ARRA	Signing ARRA and implementing ARRA Principles	Red

EDU has not yet embedded new forms of research evaluation in its internal processes for promotion, reward, and research evaluation, and did not develop guidance for research administrators and academics on good and bad practices regarding the use of traditional bibliometrics and the development of next-generation metrics.

Nonetheless, the HEI shows focus on early career researchers, particularly, through the implementation of the Horizon Europe project BETTER Life. This project aims to enhance the capacity of early career researchers to engage in socially engaged research that addresses social challenges through interdisciplinary collaboration and interaction with various stakeholders.

Systematic implementation of this pillar is still not sufficiently present as EDI did not sign the San Francisco Declaration on Research Assessment (DORA) nor the Agreement on Reforming Research Assessment (ARRA), and it did not start implementing its principles. This indicates a certain continuation of reliance on traditional bibliometrics at this point.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 113 Next-Generation Metrics | Roadmap for Successful Implementation – EDU

Indicator	Recommendations
HR	Explore, test and implement new forms of research evaluation (alternative metrics) and develop new evaluation criteria tailored to the HEI's idiosyncrasies. Include a broader range of qualitative indicators (e.g., interdisciplinary work) and move away from inappropriate uses of traditional metrics such as Journal Impact Factor (JIF) and h-index.
Guidance	Conduct a needs assessment to identify the most deficient fields for which guidance on Next-generation metrics is needed. Develop guidance for research administrators and academics that covers traditional bibliometrics and the development and implementation of new metrics related to research assessment.
DORA	Formalize the adoption of DORA by joining the signatories, and initiate the implementation of DORA recommendations across the HEI.
ARRA	Formalize the adoption of ARRA by joining the signatories, and initiate the implementation of ARRA Principles across the HEI.

The following section evaluates OS practices related to the Mutual Learning / Collaboration pillar, identifying key gaps.

Table 114 Mutual Learning / Collaboration | GAP Analysis – EDU

Indicator	Description	Result
Stakeholders	Collaboration with external stakeholders	

While EDU’s active participation in the BETTER Life and BEAMING projects shows a form of liaising with external stakeholders in the field of OS, this does not indicate a comprehensive or concerted approach as the engagement can be characterised as project-specific rather than an institution-wide and systematic. Nonetheless, these collaborative projects present great opportunities for wider networking and establishing long-term cooperation.

The following roadmap outlines actionable recommendations to address the identified gaps.




Table 115 Mutual Learning / Collaboration | Roadmap for Successful Implementation – EDU

Indicator	Recommendations
Stakeholders	Build on the existent project-based collaboration established through the BETTER Life and BEAMING projects and broaden these efforts to form strategic partnerships focused on different OS pillars. Focus on the collaboration with diverse stakeholders across the quadruple helix (government, academia, industry and community), including the local actors.

The following section evaluates OS practices related to the Future of Scholarly Communication and Publishing pillar, identifying key gaps.

Table 116 Future of Scholarly Communication and Publishing | GAP Analysis – EDU

Indicator	Description	Result
Plan S	State of the implementation of Plan S	Green
Preprints Advocacy	Advocating for the share of research manuscripts as preprints	Yellow
Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	Red
ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	Green
University Press	The existence of the university press and its engagement with Open Access	Red
Open Access Support	Support to researchers to make their research publications available in Open Access	Yellow
FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	Red
FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	Red
FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	Yellow
FAIR Data/Information	Information about the data archived and published by own research community	Green
FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	Red
FAIR Data/Assessment	Including research data in the researcher assessment	Red

	methodology and research metrics	
Open Access Publishing	Harmonisation with Open Access standards	
Support	Support provided to researchers in research data management, FAIR data and data sharing	

EDU is implementing the Plan S principles. All results from research funded by national, provincial and international research funding bodies, are published in OA journals. HEI also has an OA scientific journal of national importance - *Business Economics*. EDU's OA institutional repository is operating and promoting Plan S principles.

An institutional repository for researchers to store preprint manuscripts is provided by the University as a basic level of support, However, active advocacy is currently absent.

EDU currently does not support new forms of scholarly publishing from third parties that are dedicated to OS approaches which may limit the exposure of researchers to a wider range of OS publishing opportunities.

The use of ORCID is being actively advocated across the HEI as the researchers are linked to the national eScience platform through ORCID.

Even though it publishes an OA journal of national importance, the HEI does not have a university press.

Notable support for OA publishing is being provided, including training for researchers, development of an open research strategy and vision, linkages to career evaluation and promotion within the institution, and funding for publishing in Open Access journals (APCs). However, there are several areas where support is lacking and can be broadened.

At this point, EDU does not have a research data policy or strategy in place which limits its ability to ensure that the data generated by the researchers are managed according to best practices, that is, the FAIR Principles.

EDU currently lacks a dedicated service to provide data stewardship to its researchers, which presents a gap in supporting effective research data management practices.

EDU has an institutional data repository⁵⁶ which primarily facilitates access to scholarly works like Articles, conference objects, and doctoral theses. It does not provide access to research data.

HEI gathers information about the data archived and published by its own research community, but does not publish all metadata, and does not recognize research data as a valuable output in research assessments. EDU publishes an OA scientific journal called "*Business Economics*".

Finally, EDU provides various forms of support in the area of research data management, FAIR data and data sharing. This includes training for researchers (including doctoral candidates), finding and reusing data from existing sources, using or developing FAIR research tools/services, recognising, citing and acknowledging contributions, developing open research strategy and vision, and finding (other) sources of training and advice on FAIR data. However, several areas lack support, such as funding for implementing FAIR principles.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 117 Future of Scholarly Communication and Publishing / Roadmap for Successful Implementation – EDU

Indicator	Recommendations
Preprints Advocacy	Enhance advocacy for the sharing of research manuscripts as preprints through a clear advocacy campaign.

⁵⁶ Educons University, "REDUN - Repository of Educons University," 2023, <https://redun.educons.edu.rs/>.

Funded by the European Union under grant agreement N° 101137131. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.

Scholarly Publishing from Third Parties

Identify suitable third-party OA initiatives (e.g., OpenEdition and Knowledge Unlatched) and develop certain support structures (e.g., financial support schemes, administrative assistance, etc.).

University Press

Consider establishing a university press by conducting a feasibility study to assess the potential benefits and challenges.

Open Access Support

Consider increasing the types of support your HEI provides to researchers to make their research publications available in OA. This includes developing an institutional website on OA for research publications, facilitating administrative reporting of publications in projects, establishing guidelines that provide clarification of legal issues related to linking, sharing and re-using OA content, establishing specific services (e.g. helpdesks) for researchers, and providing legal support.

FAIR Data/Policy Integration

Initiate the development of a research data policy or strategy which will include FAIR principles. This document should contain policies and guidelines for managing, storing, and sharing research data and metadata.

FAIR Data/Stewardship

Assess the specific needs for data stewardship services at EDU, then plan and initiate the establishment of a dedicated service to provide data stewardship to researchers.

FAIR Data/Infrastructure

Expand the existing repository (REDUN) to include access to research data or consider establishing a dedicated data repository. Alternatively, explore partnerships with other organisations that offer data repository services.

FAIR Data/Metadata Publishing

Establish and implement standardized metadata frameworks for all research data generated or obtained at the University level. Furthermore, create

a metadata publishing policy to enable publishing and providing free access to metadata. Develop a solution for publishing and providing free access to metadata with regard to FAIR principles. Explore integrating systems and solutions such as CRIS or PURE.

FAIR
Data/Assessment

Integrate the recognition of research data as a valuable output for research assessments in the existing assessment framework. It is important to regulate how data contributions are measured and evaluated.

Support

Expand institutional resources and support that EDU provides to researchers in the area of research data management, FAIR data and data sharing. Precisely, consider developing and launching an institutional website dedicated to research data management, incorporating planning stewardship and sharing of FAIR outputs, and securing funding for implementing FAIR principles. Furthermore, develop supporting mechanisms for researchers in preparing and documenting data/code to make outputs FAIR, publishing FAIR outputs on their own or recommended repositories, and complying with legal and ethical requirements regarding FAIR principles.

The following section evaluates OS practices related to the Rewards, Incentives, and Recognition pillar, identifying key gaps.

Table 118 Rewards, Incentives, and Recognition | GAP Analysis – EDU

Indicator	Description	Result
Open Science Incentives	Incentives for researchers developing Open Science activities	Green
Academic assessment	Open Science elements as part of academic assessment	Yellow
HR	Open Science dimensions in HR and career frameworks	Red
Recognition and Rewards	Recognising and rewarding Open Science practices	Red
Policy Transparency	Open and easily accessible policies on researcher evaluation	Green

EDU provides notable Incentives for researchers developing OS activities. Researchers who develop and implement OS activities are more often included in R&I projects as team members. Furthermore, developing and implementing OS activities is linked to career evaluation, which opens additional promotion possibilities within the institution. In these ways, HEI actively encourages its researchers to adopt and develop OS practices and also recognises and rewards their contributions.

The University integrates several OS elements into its academic assessment framework. This includes depositing of research articles in a repository, OA publishing of research articles in OA journals (via payment of APCs), OA books, OA archival or special collections, preprints, depositing of data in a repository, co-design of research projects, and science outreach and communication. However, there are multiple gaps regarding other key OA elements which are not of the HEI’s approach to academic assessment, such as research data management plans, data sharing, open research protocols, open source research software and code, open education, open evaluation,

open collaborative tools, co-creation platforms, transdisciplinary research platforms, citizen science, and crowdsourcing practices.

EDU recognizes the importance of OS in its broader HR strategy, particularly under the strategic priority of training, skill enhancement, and career development. Their new Human Resource Strategy with action plan, contains a strategic priority No.5 – Training, skill enhancement and career development, all new and relevant topics of importance for the development of HR (including OS) are listed to be part of activities of education and training of researchers. On the other hand, OS is not explicitly integrated as a criterion in recruitment, performance evaluation, or career advancement policies.

HEI currently does not assess the extent to which OS is integrated into the daily practices of individuals, teams, or units, and therefore did not develop complementary mechanisms for recognition and rewards.

Finally, policies on researcher evaluation are open and easily accessible to all stakeholders within the HEI.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 119 Rewards, Incentives, and Recognition | Roadmap for Successful Implementation – EDU

Indicator	Recommendations
Academic assessment	Revise academic assessment frameworks and incorporate additional OS elements. The missing elements include research data management plans, data sharing, open research protocols, open source research software and code, open education, open evaluation, open collaborative tools, co-creation platforms, transdisciplinary research platforms, citizen science, and crowdsourcing practices.
HR	Review and revise HR policies to explicitly integrate OS criteria regarding recruitment, performance evaluations,

and career advancements. Clearly define how engagement in OS activities influences these processes.

Recognition and Rewards

Develop and establish mechanisms which contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).

The following section evaluates OS practices related to the Research Integrity pillar, identifying key gaps.

Table 120 Research Integrity | GAP Analysis – EDU

Indicator	Description	Result
Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	Red
ALLEA Code	Harmonisation with ALLEA Code	Green
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Red
Training and Accreditation	Training and accreditation on research integrity pertaining to Open Science	Red

EDU has developed the Academic Integrity Code for Educons University, which was officially adopted in 2017.⁵⁷ However, this document does not include OS principles.

⁵⁷ Educons Univerzitet, “Kodeks o Akademskom Integritetu Univerziteta Edukons,” June 27, 2017.

The University adheres to the European Code for Research Integrity (ALLEA Code), ensuring compliance with one of the most important established international standards related to research integrity, but it has not yet adopted the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers.

Finally, EDU does not provide regular training or accreditation programs on research integrity that incorporate OS principles at this moment, which can inhibit researchers from fully understanding and integrating ethical OS standards into their daily practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 121 Research Integrity | Roadmap for Successful Implementation – EDU

Indicator	Recommendations
Research Integrity Code/Policy	Initiate a review of the currently operative Academic Integrity Code for Educons University to identify necessary updates that would include OS principles relevant to this pillar.
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adopt the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers, and align institutional policies and practices accordingly.
Training and Accreditation	Develop and Implement regular training and accreditation programs on research integrity related to OS. Ethical, legal, and social aspects of research should be covered.

The following section evaluates OS practices related to the Education and Skills pillar, identifying key gaps.

Table 122 Education and Skills | GAP Analysis – EDU

Indicator	Description	Result
Training	Skill training in Open Science	Green
Audience	Mandatory Open Science skills training for staff, researchers, and students	Red
Rewards and Incentives	Rewarding and incentivising Open Science skills development	Red
Tailored Skill Training	Open Science skill training specifically tailored to groups of staff/students	Green

EDU offers skill training specifically in OS considering all of the eight pillars. In the last 18 months, the University has organised several OS trainings for its researchers.

Skill training is not mandatory. It is optional for academic staff, researchers and PhD students. This is a gap which might inhibit wider adoption of OS practices.

HEI, at this moment, does not offer rewards, and incentives to staff and students with regard to OS skills development, that is, for the participation in OS training. This gap may be one of the motivation inhibitors which could lower participation rates.

EDU does provide OS skills training that is specifically tailored to different groups within the institution. This pertains to academic staff, researchers (including early career researchers) and PhD students.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 123 Education and Skills | Roadmap for Successful Implementation – EDU

Indicator	Recommendations
Audience	Consider revising the OS skills training framework to make participation mandatory. Explore the options regarding which categories of staff and students could this be applied to, for which OS elements or at which career development stage. For example, consider making participation mandatory during the onboarding phase for new staff members.
Rewards and Incentives	Develop and implement a program that specifically rewards, and incentivises staff and students with regard to OS skills development. Take into consideration integrating things like certificates and various forms of public acknowledgement. Also, consider integrating participation in OS skill training into the performance evaluation frameworks and career advancement processes.

The following section evaluates OS practices related to the Citizen Science pillar, identifying key gaps.

Table 124 Citizen Science | GAP Analysis – EDU

Indicator	Description	Result
Citizen Science Policy	Documents that guide Citizen Science	[Red]
Single Point of Contact	Single point of contact for Citizen Science	[Red]
Assessment	Assessing Citizen Science contributions and adapting research evaluation and reputation systems accordingly	[Red]
ECSA Principles	ECSA principles implementation support	[Red]



Regarding the Citizen Science OS pillar, EDU lacks specific documents that guide related activities. This presents a gap in the strategic sense, potentially limiting the effectiveness and scalability of Citizen Science initiatives.

EDU is also missing a single point of contact for Citizen Science as an information hotspot and as a point for overseeing and supporting Citizen Science activities across the HEI.

Furthermore, Citizen Science contributions are currently not being assessed and the formal research evaluation or reputation systems are not adapted accordingly, which may limit recognition and incentivization for researchers who engage in OS activities.

EDU does not widely, strategically and formally support the implementation of the ECSA 10 Principles of Citizen Science. While there might be individual research and projects that align totally or partially with ECSA Principles, the lack of formal, wide and strategic support may limit the broader adoption and impact of ECSA Principles across the HEI. This gap may also inhibit the effectiveness of existing Citizen Science efforts and the University's ability to engage with the community.

Currently, EDU does not offer ongoing support and training for researchers in regard to Citizen Science. Nonetheless, fundamentals of Citizen Science was part of training on science communication that was organised recently for academic staff, researchers and PhD students. Although it is evident that the HEI has begun to integrate some aspects of Citizen Science into its training frameworks, this is still not a part of a comprehensive and regular curriculum or training programme.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 125 Citizen Science | Roadmap for Successful Implementation – EDU

Indicator	Recommendations
Citizen Science Policy	Develop a document that guides Citizen Science at EDU, and which aligns with your OS frameworks and engagement goals. This document should define Citizen Science principles, address ethical considerations (e.g., data privacy, recognition of citizen scientists, etc.), and provide clear guidelines or policies related to the main elements of Citizen Science and relevant processes.
Single Point of Contact	Establish a single point of contact for Citizen Science by integrating a dedicated role or office into existing research support structures (e.g., Citizen Science officer, participatory research engagement officer, etc.), to coordinate efforts across departments, provide tailored support for Citizen Science projects, communicate across the University and advocate for the integration of Citizen Science elements into institutional policies.
Assessment	Develop specific criteria for assessing the value of Citizen Science contributions, and modify the current research evaluation frameworks to consider Citizen Science contributions. This can include recognizing various outputs such as Citizen Science datasets, community reports, etc.
ECSA Principles	Ensure the formal recognition of the ECSA 10 Principles at the institutional level, adapt the necessary strategic documents accordingly and enable their effective implementation.
Support and Training	Establish dedicated support mechanisms for Citizen Science at the institutional level (e.g., helpdesk, online resources, mentorship programs, etc.). Develop specific Citizen Science training programs in deficient areas, in accordance with researchers' needs, which cover important subjects such as designing Citizen Science projects, community engagement mechanisms, and ethical considerations. If applicable, integrate Citizen Science training into the existing and broader researcher development programs.

5.8 University of Banja Luka (UNIBL)

The University of Banja Luka (UNIBL) is the leading HEI in the Republic of Srpska and the second-largest university in Bosnia and Herzegovina. It was established in 1975, and today it has 16 faculties, the Academy of Arts and the Institute for Genetic Resources. The HEI currently hosts approximately 15.000 students.⁵⁸

Development Strategy of the University of Banja Luka for the period 2017–2025 is the main strategic document which is focused on enhancing UNIBL’s educational quality, research excellence, international cooperation, and financial sustainability.⁵⁹

UNIBL is in the process of integration with the ERA Priorities (European Research Area).

GAP Analysis and Roadmaps for Successful Implementation

The following section evaluates OS practices related to the Cultural Change/Leadership pillar, identifying key gaps.

⁵⁸ Univerzitet u Banjoj Luci, “O Универзитету,” UNIBL, accessed September 29, 2024, <https://unibl.org/sr/univerzitet/o-univerzitetu>.

⁵⁹ Univerzitet u Banjoj Luci, “Strategija Razvoja Univerziteta u Banjoj Luci Za Period 2017–2025. Godine,” 2017.

Table 126 Cultural Change/Leadership | GAP Analysis – UNIBL

Indicator	Description	Result
Open Science Policy	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science	Red
Senior manager	Appointed senior manager for Open Science	Red
Programme of Cultural Change	Developed programme of cultural change	Red
Communication	Developed communication strategy	Red
Community	Established Open Science Community	Yellow

At the moment, UNIBL does not have any documents that guide researchers with regard to OS, which is a significant strategic gap, and no senior manager has been appointed to lead OS development.

Furthermore, UNIBL has not yet developed a programme of cultural change which is important for practical implementation of OS principles.

UNIBL does not have established communication strategies to promote OS across the University which is needed for enabling a university-wide commitment to OS practices.

UNIBL is connected to external stakeholders through the implementation of the Horizon projects such as NI4OS⁶⁰, WBC-RRI.net⁶¹

⁶⁰ “NI4OS- Europe – National Initiatives for Open Science in Europe,” accessed November 29, 2024, <https://ni4os.eu/>.

⁶¹ “WBC-RRI – Responsible Research and Innovation in the Western Balkans,” accessed November 29, 2024, <https://wbc-rri.net/>.

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and Policy Answers⁶², but is not yet strategically connected to an Open Science Community.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 127 Cultural Change/Leadership | Roadmap for Successful Implementation – UNIBL

Indicator	Recommendations
Open Science Policy	Develop a comprehensive OS policy that aligns with the UNIBL’s strategic goals as outlined in the 2017–2025 development strategy. This policy should cover aspects across all OS pillars.
Senior manager	Identify and appoint a senior manager for OS. This role should have clear responsibilities and competencies for developing and implementing OS policies and practices across all eight pillars.
Programme of Cultural Change	Develop a comprehensive programme of cultural change for creating the environment for the implementation of OS practices. Identify key actors and enablers of OS in your HEI, set specific goals, and define an impact-measuring framework.
Communication	Analyse your stakeholders (e.g., students, administrative staff, etc.), test multiple communication methods/channels, monitor results, tailor and adjust them, and iterate in order to achieve the best results. Next, develop a comprehensive and targeted communication strategy, which will enable all institutional stakeholders to become familiar with OS

⁶² “Policy Answers: R&I Policy Making, Implementation and Support in the Western Balkans,” accessed November 29, 2024, <https://www.westernbalkans-infohub.eu/theme/policy-answers-ri-policy-making-implementation-and-support-in-the-western-balkans/>.

Community

practices. Use diverse communication channels, tools and platforms tailored to reaching different stakeholders.

Build on existing partnerships within current Horizon projects and consider developing a local or regional OS community. Consult the guidelines created by the International Network of Open Science & Scholarship Communities.⁶³

The following section evaluates OS practices related to the European Open Science Cloud (EOSC) pillar, identifying key gaps.

Table 128 The European Open Science Cloud (EOSC) | GAP Analysis – UNIBL

Indicator	Description	Result
Policy Commitment	Signed EOSC Declaration	Green
International Collaboration	Involvement in the EOSC Association	Yellow
Infrastructure Access	Institutional access to the requisite infrastructure	Green
Infrastructure Development	Provided search and discovery service	Red

UNIBL has made a commitment to this OS pillar by signing the EOSC Declaration in 2020 and being an observer in the EOSC Association.

⁶³ International Network of Open Science & Scholarship Communities, “Open Science Community Starter Kit,” 2020, <https://inosc-starter-kit.netlify.app/>.

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The University has established a repository which is regulated by three rulebooks focused on doctoral dissertations⁶⁴, master theses⁶⁵ and scientific outputs, data and metadata⁶⁶, and is complementary with the EOSC.

At the moment, UNIBL does not have a search and discovery service for research data, which is a limitation regarding the OS infrastructure.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 129 The European Open Science Cloud (EOSC) | Roadmap for Successful Implementation – UNIBL

Indicator	Recommendations
International Collaboration	Evaluate the benefits of full membership in the EOSC Association and outline the necessary steps to move from a current observer status to a full member.
Infrastructure Development	Develop a search and discovery service which is harmonized with the needs of UNIBL. Utilize user-friendly interface design to make advanced search options easy to use.

The following section evaluates OS practices related to the Next-Generation Metrics pillar, identifying key gaps.

⁶⁴ Univerzitet u Banjoj Luci, "Pravilnik o Sadržaju, Izgledu i Digitalnom Repozitorijumu Doktorskih Disertacija/Doktorskih Umjetničkih Radova Na Univerzitetu u Banjoj Luci," 2022.

⁶⁵ Univerzitet u Banjoj Luci, "Pravilnik o Sadržaju, Izgledu i Digitalnom Repozitorijumu Master/Magistarskih Radova Na Univerzitetu u Banjoj Luci," 2017.

⁶⁶ Univerzitet u Banjoj luci, "Pravilnik o Digitalnom Repozitorijumu Univerziteta u Banjoj Luci," 2024.

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Table 130 Next-Generation Metrics | GAP Analysis – UNIBL

Indicator	Description	Result
HR	New forms of research evaluation	
Guidance	Guidance for research administrators and academics on good and bad practices	
Training	Training for junior researchers, particularly early-stage doctoral researchers	
DORA	Signing DORA and implementing DORA recommendations	
ARRA	Signing ARRA and implementing ARRA Principles	

UNIBL has not yet incorporated new forms of research evaluation into its internal processes for promotion, reward, and research evaluation, and it currently lacks a formal guide or set of guidelines regarding the use of traditional bibliometrics and the development of new metrics.

The University lacks a structured approach to training early career researchers, particularly doctoral students, on the responsible use of metrics. It currently depends on the will, awareness, and knowledge of individual professors who decide to transfer the knowledge to their students.

There are gaps regarding the signing of the San Francisco Declaration on Research Assessment (DORA) and the Agreement on Reforming Research Assessment (ARRA), which also delays the implementation of their principles.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 131 Next-Generation Metrics | Roadmap for Successful Implementation – UNIBL

Indicator	Recommendations
HR	Conduct an assessment of the current research evaluation practices to identify areas where new forms of evaluation could be integrated. Next, integrate new forms of research evaluation in internal processes for promotion/reward and research evaluation itself. Extend the existing evaluation frameworks to include OS practices (e.g., public engagement, and collaborative efforts).
Guidance	Initiate the development of comprehensive guidelines for research administrators and academics that cover traditional bibliometrics and the development and implementation of new metrics related to research assessment.
Training	Develop formal and structured training programs that focus on the Next-Generation Metrics and are tailored to junior researchers.
DORA	Formalize the adoption of DORA by joining the signatories, and initiate the implementation of DORA recommendations across the HEI.
ARRA	Formalize the adoption of ARRA by joining the signatories, and initiate the implementation of ARRA Principles across the HEI.

The following section evaluates OS practices related to the Mutual Learning / Collaboration pillar, identifying key gaps.

Table 132 Mutual Learning / Collaboration | GAP Analysis – UNIBL

Indicator	Description	Result
Stakeholders	Collaboration with external stakeholders	

UNIBL, as a public university, is in coordination and cooperation related to all educational/scientific/infrastructural areas with the Ministry of Scientific and Technological Development and Higher Education in the Republic of Srpska. The management of the University (Rector's team) and officials from the Department of Science are involved in these activities. Furthermore, UNIBL is actively participating in various Horizon projects related to OS practices, including the BEAMING project, which is a way of liaising with external stakeholders. Nonetheless, the University lacks a concerted approach with more diverse stakeholders across the quadruple helix.

The following roadmap outlines actionable recommendations to address the identified gaps.




Table 133 Mutual Learning / Collaboration | Roadmap for Successful Implementation – UNIBL

Indicator	Recommendations
Stakeholders	Build on the existent project-based collaboration established through the projects in which UNIBL is currently participating (e.g., NI4OS, BEAMING, etc.). Broaden these efforts to form strategic partnerships focused on different OS pillars. Focus on the collaboration with diverse stakeholders across the quadruple helix (government, academia, industry and community), including the local actors.

The following section evaluates OS practices related to the Future of Scholarly Communication and Publishing pillar, identifying key gaps.

Table 134 Future of Scholarly Communication and Publishing | GAP Analysis – UNIBL

Indicator	Description	Result
Plan S	State of the implementation of Plan S	Red
Preprints Advocacy	Advocating for the share of research manuscripts as preprints	Red
Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	Yellow
ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	Green
University Press	The existence of the university press and its engagement with Open Access	Red
Open Access Support	Support to researchers to make their research publications available in Open Access	Red
FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	Yellow
FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	Yellow
FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	Yellow
FAIR Data/Information	Information about the data archived and published by own research community	Yellow
FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	Red
FAIR Data/Assessment	Including research data in the researcher assessment	Green

	methodology and research metrics	
Open Access Publishing	Harmonisation with Open Access standards	
Support	Support provided to researchers in research data management, FAIR data and data sharing	

UNIBL does not currently implement the Plan S principles and does not officially advocate for the sharing of research manuscripts as preprints. This form of advocacy is based on the individual knowledge and values that certain professors pass on to their students. There is no official University document or guidelines that will advise/advocate this activity across the HEI.

The HEI supports new forms of scholarly publishing from third parties, which are dedicated to OA approaches declaratively, through recommendations.

UNIBL actively advocates for the use of author identifier systems such as ORCID across the organization.

The University does not have a university press, and it does not provide support for OA publishing.

UNIBL has not yet included FAIR principles in its research data policy or strategy and has not yet established a dedicated service to provide data stewardship to its researchers.

The HEI does not yet provide access to an infrastructure storage and publication of research data and does not gather information about the data archived and published by its research community. Nonetheless, it actively recommends and promotes FAIR principles (e.g. promoting Zenodo).

UNIBL does not publish metadata about research data generated or obtained within its research community which can inhibit the discoverability and usability of research data. On the other hand, the

University recognizes research data as a valuable output in research assessments.

HEI publishes numerous scientific journals complementary to OA principles.

The university has three Rulebooks regulating the OA repositories of doctoral dissertations, master theses and scientific publications of UNIBL employees.

Finally, UNIBL currently does not offer any specific support for research data management, FAIR principles, or data sharing.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 135 Future of Scholarly Communication and Publishing / Roadmap for Successful Implementation – UNIBL

Indicator	Recommendations
Plan S	Conduct an internal review to determine the level of harmonization of current UNIBL OS practices and initiatives to Plan S. Next, develop and adopt policies, and guidelines or update articles in existing documents to align with Plan S.
Preprints Advocacy	Initiate advocacy for the sharing of research manuscripts as preprints through a concise advocacy campaign.
Scholarly Publishing from Third Parties	Identify and evaluate suitable third-party OA initiatives (e.g., OpenEdition and Knowledge Unlatched), initiate collaborations, and develop more formalized support structures (e.g., financial support schemes, administrative assistance, etc.).
University Press	Consider establishing a university press by conducting a feasibility study to assess the potential benefits and challenges.

Open Access Support

Conduct a needs assessment to identify key areas where support is most needed for researchers in terms of engaging in OA publishing. Next, focus on identified key areas and establish basic support structures. Consider integrating support mechanisms such as training for researchers (including doctoral candidates), institutional website(s) on Open Access to research publications, developing open research strategy and vision, linkages to career evaluation and promotion within the institution, facilitating administrative reporting of publications in projects, funding for publishing in Open Access journals (APCs), guidelines providing clarification of legal issues related to linking, sharing and re-using Open Access content, establishment of specific services (e.g. helpdesks) for researchers, and legal support.

FAIR Data/Policy Integration

Ensure that the next strategy which will soon supersede the existing one, includes FAIR principles, including policies and guidelines for managing, storing, and sharing research data and metadata.

FAIR Data/Stewardship

Assess the specific needs for data stewardship services at UNIBL, then plan and initiate the establishment of a dedicated service to provide data stewardship to researchers.

FAIR Data/Infrastructure

Consider expanding the existing repository to include access to research data or establishing a dedicated data repository. Alternatively, explore strategic partnerships with other organisations that offer data repository services.

FAIR Data/Information

Build on the infrastructure of the existing repository to include gathering and managing information about the research data generated by researchers (e.g., datasets, code, etc.).

FAIR Data/Metadata Publishing

Establish and implement standardized metadata frameworks for all research data generated or obtained at the University level. Furthermore, adjust the existing policies to enable publishing and providing free access to metadata. Finally, upgrade the existing repository to support the storage and publication of metadata alongside research data.

Support

Conduct a needs assessment to identify key areas where support is most needed for researchers in terms of research data management, FAIR principles, or data sharing. Next, focus on identified key areas and establish basic support structures. Consider integrating support mechanisms such as training for researchers (including doctoral candidates), institutional website(s) on research data management, planning stewardship and sharing of FAIR outputs, finding and reusing data from existing sources, using or developing FAIR research tools/services, preparing and documenting data/code to make outputs FAIR, publishing FAIR outputs on own or recommended repositories, recognising, citing and acknowledging contributions, developing open research strategy and vision, complying with legal and ethical requirements, FAIR principles, funding for implementing FAIR principles, and finding (other) sources of training and advice on FAIR data.

The following section evaluates OS practices related to the Rewards, Incentives, and Recognition pillar, identifying key gaps.

Table 136 Rewards, Incentives, and Recognition | GAP Analysis – UNIBL

Indicator	Description	Result
Open Science Incentives	Incentives for researchers developing Open Science activities	Red
Academic assessment	Open Science elements as part of academic assessment	Red
HR	Open Science dimensions in HR and career frameworks	Red
Recognition and Rewards	Recognising and rewarding Open Science practices	Red
Policy Transparency	Open and easily accessible policies on researcher evaluation	Green

UNIBL does not currently provide any incentives for researchers to engage in OS activities.

Academic assessment at UNIBL is currently performed based on requirements of the Law on Higher Education which does not contain OS criteria.⁶⁷

Furthermore, the University does not integrate OS practices as an explicit element in its HR and career frameworks and does not have a system in place to assess how individuals, teams, or units integrate OS into their daily practices. Therefore, they cannot be rewarded.

UNIBL makes its policies on researcher evaluation openly accessible through its official website including all rules books, recommendations and guidance documents.

The following roadmap outlines actionable recommendations to address the identified gaps.

⁶⁷ Službeni glasnik Republike Srpske br. 67/20, "Zakon o Visokom Obrazovanju," 2020.

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Table 137 Rewards, Incentives, and Recognition | Roadmap for Successful Implementation – UNIBL

Indicator	Recommendations
Open Science Incentives	<p>Establish incentive programs tailored to UNIBL’s researchers. Ensure that HEI provides incentives for researchers developing OS activities (e.g., financial rewards, research grants, recognition awards, project participation opportunities, career evaluation incentives, etc.).</p>
Academic assessment	<p>Explore ways to incorporate additional OS elements to UNIBL’s academic assessment frameworks beyond the Law on Higher Education. Consider missing OS elements such as OA publishing of research articles in OA journals (via payment of APCs), OA books, OA archival or special collections, preprints, Depositing of data in a repository, research data management plans, data sharing, open research protocols, open source research software and code, open education, open evaluation, open collaborative tools, Cco-creation platforms, transdisciplinary research platforms, co-design of research projects, Citizen Science, crowdsource practices, and science outreach and communication.</p>
HR	<p>Develop OS-focused HR Policies or review and revise existing HR policies to explicitly integrate OS criteria regarding recruitment, performance evaluations, and career advancements. Clearly define how engagement in OS activities influences these processes.</p>
Recognition and Rewards	<p>Develop and establish assessment frameworks which contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).</p>

The following section evaluates OS practices related to the Research Integrity pillar, identifying key gaps.

Table 138 Research Integrity | GAP Analysis – UNIBL

Indicator	Description	Result
Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	Red
ALLEA Code	Harmonisation with ALLEA Code	Red
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Green
Training and Accreditation	Training and accreditation on research integrity pertaining to Open Science	Red

UNIBL currently does not have a research integrity code or policy that specifically embraces OS principles, and does not currently adhere to the ALLEA Code.

The University signed the Declaration of Commitment to the European Researchers Charter and the Code of Conduct for Recruitment of Researchers on January 30th, 2013, as the first institution in Bosnia and Herzegovina who join this European initiative.

The European Committee awarded the University in Banja Luka with an HR Excellence in Research, thus making the University the first scientific-research institution in Bosnia and Herzegovina to bear this sign.

Currently, UNIBL does not provide regular training or accreditation programs on research integrity that incorporate OS principles, which may inhibit researchers from fully understanding and integrating ethical OS standards into their daily practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 139 Research Integrity | Roadmap for Successful Implementation – UNIBL

Indicator	Recommendations
Research Integrity Code/Policy	Initiate the development of a research integrity code that integrates OS principles, and includes aspects such as data sharing, OA publishing, etc.
ALLEA Code	Adopt the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers, and align institutional policies and practices accordingly.
Training and Accreditation	Develop and Implement regular training and accreditation programs on research integrity related to OS. Ethical, legal, and social aspects of research should be covered.

The following section evaluates OS practices related to the Education and Skills pillar, identifying key gaps.

Table 140 Education and Skills | GAP Analysis – UNIBL

Indicator	Description	Result
Training	Skill training in Open Science	
Audience	Mandatory Open Science skills training for staff, researchers, and students	
Rewards and Incentives	Rewarding and incentivising Open Science skills development	
Tailored Skill Training	Open Science skill training specifically tailored to groups of staff/students	

The University does not provide skill training that covers all OS pillars, which is a gap in providing the support necessary for researchers to fully

engage with OS practices. The second and fourth indicators are, therefore, absent as well.

UNIBL currently does not provide rewards or incentives to staff and students with regard to OS skills development which is a gap that may inhibit motivation and therefore lower participation rates.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 141 Education and Skills | Roadmap for Successful Implementation – UNIBL

Indicator	Recommendations
Training	<p>Develop an extensive, exhaustive and structured OS skills training program that covers all OS pillars.</p>
Audience	<p>Ensure that the future established OS skills training program has mandatory participation for certain stakeholders according to their roles in developing OS practices at UNIBL (staff, students, etc.). Also, consider making participation mandatory during the onboarding phase for new staff members.</p>
Rewards and Incentives	<p>Develop and implement a program that specifically rewards, and incentivises staff and students with regard to OS skills development. Take into consideration integrating things like certificates and various forms of public acknowledgement. Also, consider integrating participation in OS skill training into the performance evaluation frameworks and career advancement processes.</p>
Tailored Skill Training	<p>Ensure that the future established OS skills training program is tailored specifically to the needs of diverse stakeholders across the HEI. This can be done by assessing the training needs of different groups of stakeholders early in the development process.</p>

The following section evaluates OS practices related to the Citizen Science pillar, identifying key gaps.

Table 142 Citizen Science | GAP Analysis – UNIBL

Indicator	Description	Result
Citizen Science Policy	Documents that guide Citizen Science	Red
Single Point of Contact	Single point of contact for Citizen Science	Red
Assessment	Assessing Citizen Science contributions and adapting research evaluation and reputation systems accordingly	Red
ECSA Principles	ECSA principles implementation support	Red
Support and Training	Support and training for researchers in Citizen Science	Yellow

At the moment, UNIBL lacks documents that guide Citizen Science activities across the University, which represents a strategic gap.

The lack of a single point of contact for Citizen Science indicates a structural and organisational gap needed to effectively support and expand Citizen Science initiatives.

Citizen Science contributions are currently not being assessed and the formal research evaluation or reputation systems are not adapted accordingly.

UNIBL does not widely, strategically and formally support the implementation of the ECSA 10 Principles of Citizen Science, which is a gap in adopting widely recognized best practices in Citizen Science.

The University currently does not offer structured support or formalized training for researchers in Citizen Science. However, UNIBL respondents

report that they are developing an initiative, which is an integral part of a particular project proposal, where researchers advocate for the adoption of Citizen Science and for a multi-stakeholder approach as valuable practices at the institution. Another aim is to ensure that they recognize the importance of engaging citizens and collaborating with multiple stakeholders, including policymakers and local communities, throughout the research process. If the project is approved, this initiative would bring in experienced experts to transfer knowledge and best practices in Citizen Science to UNIBL researchers. This approach has the potential to build capacity and foster a collaborative culture that aligns with modern trends in research and societal engagement. The following roadmap outlines actionable recommendations to address the identified gaps.

Table 143 Citizen Science | Roadmap for Successful Implementation – UNIBL

<i>Indicator</i>	<i>Recommendations</i>
Citizen Science Policy	Develop a document that guides Citizen Science at UNIBL. Ensure that it aligns with the University’s OS frameworks and engagement goals. This document should define Citizen Science principles, address ethical considerations (e.g., data privacy, recognition of citizen scientists, etc.), and provide clear guidelines or policies related to the main elements of Citizen Science and relevant processes.
Single Point of Contact	Establish a dedicated Citizen Science point of contact (e.g., Citizen Science officer, participatory research engagement officer, etc.), to coordinate efforts across departments, provide tailored support for Citizen Science projects, communicate across the Institute and advocate for the integration of Citizen Science elements into institutional policies.
Assessment	Develop concise assessment criteria for Citizen Science contributions, and modify the current research evaluation frameworks to consider Citizen Science contributions. This

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ECSA Principles

can include recognizing various outputs such as Citizen Science datasets, community reports, etc.

Familiarize internal stakeholders with ECSA 10 Principles. Next, engage in the formal recognition of the ECSA 10 Principles at the University level, adapt the necessary strategic documents accordingly and enable their effective implementation.

Support and Training

Establish dedicated support mechanisms for Citizen Science at the institutional level (e.g., helpdesk, online resources, mentorship programs, etc.). Develop specific Citizen Science training programs in deficient areas, in accordance with researchers' needs, which cover important subjects such as designing Citizen Science projects, community engagement mechanisms, and ethical considerations. If applicable, integrate Citizen Science training into the existing and broader researcher development programs. In addition, focus efforts on ensuring the mentioned project proposal is approved. If the project is approved, ensure thorough implementation and build on new partnerships in order to receive extra benefits in this context.

5.9 Ss. Cyril And Methodius University In Skopje (UKIM)

Ss. Cyril and Methodius University in Skopje (UKIM), established in 1949, is currently the highest-ranking HEI in North Macedonia, which operates through 23 Faculties, 5 Scientific Institutes, 4 Associate Member Public Scientific Institutions, 1 Associate Member that is another HEI and 7 Associate Members that are other organizations.⁶⁸

UKIM's 3,100 teaching and scientific and associate members, as well as administrative personnel, support 28,400 students in the first cycle, 1100 students in the second cycle, and 1071 students in the third cycle of studies.⁶⁹

The HEI offers 207 undergraduate programmes, 338 master's programmes, and 79 doctoral programmes.⁷⁰

In terms of OS development, it is important to note that UKIM is a member of the OpenAire network.

GAP Analysis and Roadmaps for Successful Implementation

The following section evaluates OS practices related to the Cultural Change/Leadership pillar, identifying key gaps.

⁶⁸ Ss. Cyril and Methodius University in Skopje, "Strategic Plan of Ss. Cyril And Methodius University in Skopje 2024 - 2029," 2024.

⁶⁹ Ibid.

⁷⁰ Ss. Cyril and Methodius University in Skopje, "International Students Guide," 2024.

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Table 144 Cultural Change/Leadership | GAP Analysis – UKIM

Indicator	Description	Result
Open Science Policy	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science	Green
Senior manager	Appointed senior manager for Open Science	Yellow
Programme of Cultural Change	Developed programme of cultural change	Yellow
Communication	Developed communication strategy	Red
Community	Established Open Science Community	Red

The University’s main strategic document, the Strategic Plan of Ss. Cyril And Methodius University in Skopje 2024 – 2029, contains strategic activity 2.1.3 which directly addresses OS with a focus on interdisciplinary activities and OA.⁷¹ Furthermore, UKIM has adopted an Open Science Policy in March 2022 with an aim to create, define and promote OS.⁷² It is based on relevant institutional, national and EU documents, and it addresses all OS pillars. In addition, the University is one of the signatories of the National Open Science Cloud Initiative Declaration aiming to develop a national strategy for OS, open services and infrastructure. At the moment, UKIM is in the process of analysing the research priorities at the different University units to define further the University strategies, policies and scientific priorities.

The HEI has an individual as an OS ambassador, who was the initiator for signing the Berlin Declaration for Open Access and is delegated as

⁷¹ Ss. Cyril and Methodius University in Skopje, “Strategic Plan of Ss. Cyril And Methodius University in Skopje 2024 – 2029,” 2024.

⁷² Ss. Cyril and Methodius University in Skopje, “Open Science Policy at the Ss. Cyril and Methodius University in Skopje,” 2022.

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a representative of UKIM in OpenAIRE-AMKE and a Macedonian representative in the Research Infrastructure for Open Access in Western Balkan. Although this position overlaps with the scope of work of a senior manager for OS, this position is not explicit and its role is not systematic.

UKIM is harmonized with the national policy on OS and all OS-related activities that are focused on cultural change but it does not have an explicit programme of cultural change.

All OS information is available at UKIM’s official website including the research infrastructure with laboratories, e-library, scientific capacities, research projects, open science databases, policies, strategic memberships as well as informative data. Nonetheless, UKIM did not develop communication strategies which would actively improve the familiarity of certain target groups with OS practices.

While UKIM is a signatory of the National Initiative for Open Science in the Cloud and is a strategic partner in various international initiatives, it does not have an established OS Community and it is not currently participating in one.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 145 Cultural Change/Leadership | Roadmap for Successful Implementation – UKIM

Indicator	Reccomendations
Senior manager	Identify and appoint a senior manager for OS either aside from the informal role of an OS ambassador or fused with the existing role.
Programme of Cultural Change	Develop a comprehensive programme of cultural change for creating the environment for the implementation of OS practices harmonized with the national policy on OS. Identify key actors and enablers

of OS in your HEI, set specific goals, and define an impact-measuring framework.

Communication

Analyse your stakeholders (e.g., students, administrative staff, etc.), test multiple communication methods/channels, monitor results, tailor and adjust them, and iterate in order to achieve the best results. Next, develop a comprehensive and targeted communication strategy, which will enable all institutional stakeholders to become familiar with OS practices. Use diverse communication channels, tools and platforms tailored to reaching different stakeholders.

Community

Build on existing partnerships within current initiatives and consider developing a local or regional OS community. Consult the guidelines created by the International Network of Open Science & Scholarship Communities.⁷³

The following section evaluates OS practices related to the European Open Science Cloud (EOSC) pillar, identifying key gaps.

Table 146 The European Open Science Cloud (EOSC) | GAP Analysis – UKIM

Indicator	Description	Result
Policy Commitment	Signed EOSC Declaration	Red
International Collaboration	Involvement in the EOSC Association	Green
Infrastructure Access	Institutional access to the requisite infrastructure	Green
Infrastructure Development	Provided search and discovery service	Red

⁷³ International Network of Open Science & Scholarship Communities, “Open Science Community Starter Kit,” 2020, <https://inosc-starter-kit.netlify.app/>.

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UKIM did not sign the EOSC Declaration, but is a member of the EOSC Association. In addition, the University is a founder of the National Open Science Cloud Initiative.

UKIM has an established data repository⁷⁴ and provides access to other repositories as well⁷⁵.

The HEI does not have an established search and discovery service.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 147 The European Open Science Cloud (EOSC) | Roadmap for Successful Implementation – UKIM

Indicator	Recommendations
Policy Commitment	Consider formally signing the EOSC Declaration, and move towards adhering to the principles of the EOSC.
Infrastructure Development	Develop a search and discovery service, equipped with advanced search options and metadata standards to ensure easy navigation and accessibility. Integration with global research networks, including the EOSC, should be considered in the future as a next step.

The following section evaluates OS practices related to the Next-Generation Metrics pillar, identifying key gaps.

⁷⁴ Ss. Cyril and Methodius University in Skopje, “Repository of UKIM,” accessed January 28, 2025, <https://repository.ukim.mk/>.

⁷⁵ Ss. Cyril and Methodius University in Skopje, “Open Science | Bibliographic Indexed Databases,” June 15, 2021, <https://ukim.edu.mk/en/otvorena-nauka-na-ukim/bibliografski-indeksirani-bazi/>.

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Table 148 Next-Generation Metrics | GAP Analysis – UKIM

Indicator	Description	Result
HR	New forms of research evaluation	Red
Guidance	Guidance for research administrators and academics on good and bad practices	Green
Training	Training for junior researchers, particularly early-stage doctoral researchers	Red
DORA	Signing DORA and implementing DORA recommendations	Red
ARRA	Signing ARRA and implementing ARRA Principles	Green

UKIM currently has a general evaluation of research activities for the promotion of the professors/researchers in accordance with the Internal Rulebook for Promotion in higher titles. In addition, some University units have introduced internal reports for evaluating teachers' performance during the academic year which should become official for evaluating the individual research performance. However, these processes do not explicitly contain new forms of research evaluation.

The HEI has started an initiative for presenting the good and bad practices in the use of traditional bibliometrics and in the development of new metrics and provided guidelines through organizing separate workshops with the particular University units.

the School for Doctoral Studies at the University, through which the PhD studies are organized, puts attention on informing all PhD candidates on the responsible use of metrics. Nonetheless, structured training on the responsible use of metrics is currently lacking.

DORA was signed by some of the individuals at the University, but the University as an organization has not signed it yet.

UKIM has signed the ARRA and started implementing ARRA Principles.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 149 Next-Generation Metrics | Roadmap for Successful Implementation – UKIM

Indicator	Reccomendations
HR	Integrate new forms of research evaluation in internal processes for promotion/reward and research evaluation itself. Extend the existing evaluation frameworks to include OS practices (e.g., public engagement, and collaborative efforts).
Training	Develop formal and structured training programs that focus on the Next-Generation Metrics and tailored to junior researchers.
DORA	Formalize the adoption of DORA by joining the signatories at the University level, and initiate the implementation of DORA recommendations across the institution.

The following section evaluates OS practices related to the Mutual Learning / Collaboration pillar, identifying key gaps.

Table 150 Mutual Learning / Collaboration | GAP Analysis – UKIM

Indicator	Description	Result
Stakeholders	Collaboration with external stakeholders	

UKIM collaborates with other stakeholders through participation in the National Open Science Cloud Initiative. The University is also a strategic

partner in various international initiatives such as EURAXESS HRS4R, CoARA, UN SDSN, OpenAIRE, and EOSC. Nonetheless, the HEI currently does not have a developed concerted approach with all diverse stakeholders across the quadruple helix.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 151 Mutual Learning / Collaboration | Roadmap for Successful Implementation – UKIM

Indicator	Recommendations
Stakeholders	Build on the existing project-based collaboration established through the projects and initiatives in which UKIM is currently participating (e.g., OpenAIRE). Broaden these efforts to form strategic partnerships focused on different OS pillars. Furthermore, establish and improve the collaboration with diverse stakeholders across the quadruple helix (government, academia, industry and community), including the local actors.

The following section evaluates OS practices related to the Future of Scholarly Communication and Publishing pillar, identifying key gaps.

Table 152 Future of Scholarly Communication and Publishing | GAP Analysis – UKIM

Indicator	Description	Result
Plan S	State of the implementation of Plan S	Yellow
Preprints Advocacy	Advocating for the share of research manuscripts as preprints	Red

Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	Green
ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	Green
University Press	The existence of the university press and its engagement with Open Access	Green
Open Access Support	Support to researchers to make their research publications available in Open Access	Yellow
FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	Green
FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	Red
FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	Red
FAIR Data/Information	Information about the data archived and published by own research community	Red
FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	Red
FAIR Data/Assessment	Including research data in the researcher assessment methodology and research metrics	Green
Open Access Publishing	Harmonisation with Open Access standards	Green
Support	Support provided to researchers in research data management, FAIR data and data sharing	Yellow

UKIM has expressed their commitment to the Plan S principles through their official website as well as in practice (e.g., all papers published by the University researchers must be uploaded to the University repository which is OA). However, the HEI does not explicitly cover all Plan S principles exhaustively.

The HEI does not currently advocate the share of research manuscripts as preprints.

UKIM supports new forms of scholarly publishing from third parties, and advocates for regular use of research identifiers such as ORCID, Research Gate, and Google Scholar.

The HEI has a University Press, and it publishes 48 scientific journals annually (some indexed on Web of Science, Scopus, etc.) including other University press documents, such as the Univerziteti Glasnik and Bilten. UKIM's University Press uses the diamond OA model.

The University provides substantial support for OA publishing, covering aspects such as institutional website(s) on OA to research publications, developing an open research strategy and vision, linkages to career evaluation and promotion within the institution, and funding for publishing in OA journals (APCs). However, there is some room for improvement in terms of possible broadening of the current support mechanisms.

FAIR principles are defined in the OS Policy document.⁷⁶

HEI has not yet established a dedicated service to provide data stewardship to its researchers.

UKIM provides access to infrastructure storage related to scientific outputs regarding publications, and it is currently in the process of mapping out the entire research infrastructure at the University, as part

⁷⁶ Ss. Cyril and Methodius University in Skopje, "Open Science Policy at the Ss. Cyril and Methodius University in Skopje," 2022.

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of the OS activities, to make it available for the different University units but also to make it available regionally and internationally. Nonetheless, access to infrastructure storage related to the publication of research data is currently lacking, and the HEI currently does not gather information about the data archived and published by its research community. Furthermore, UKIM does not publish all metadata about research data generated or obtained within its research community but does include research data as a valuable output in research assessments.

The HEI publishes scientific journals all available through the OA framework.

Finally, UKIM provides multiple types of support regarding research data management, FAIR data and data sharing. This includes institutional website(s) on research data management, developing open research strategy and vision, complying with legal and ethical requirements, FAIR principles, and finding (other) sources of training and advice on FAIR data. Nevertheless, this support could be extended.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 153 Future of Scholarly Communication and Publishing | Roadmap for Successful Implementation – UKIM

Indicator	Reccomendations
Plan S	Conduct an internal review to determine the level of harmonization of current OS practices at UKIM and initiatives related to Plan S. Next, develop and adopt policies, and guidelines or update articles in existing documents to align with Plan S.
Preprints Advocacy	Initiate advocacy for the sharing of research manuscripts as preprints through a concise advocacy campaign.

Open Access Support

Consider broadening the types of support that UKIM provides to researchers to make their research publications available in OA. Consider training for researchers (including doctoral candidates), facilitating administrative reporting of publications in projects, guidelines providing clarification of legal issues related to linking, sharing and re-using OA content, the establishment of specific services (e.g. helpdesks) for researchers, and legal support.

FAIR Data/Stewardship

Assess the specific needs for data stewardship services at UKIM, then plan and initiate the establishment of a dedicated service to provide data stewardship to researchers.

FAIR Data/Infrastructure

Expand the existing repository to include access to research data or consider establishing a dedicated data repository. Alternatively, explore partnerships with other organisations that offer data repository services.

FAIR Data/Information

Expand the current repository to include gathering and managing information about the research data generated by the researcher (e.g., datasets, code, etc.).

FAIR Data/Metadata Publishing

Establish and implement standardized metadata frameworks for all research data generated or obtained at the University level. Furthermore, create a metadata publishing policy to enable publishing and providing free access to metadata. Develop a solution for publishing and providing free access to metadata with regard to FAIR principles. Explore integrating systems and solutions such as CRIS or PURE.

Support

Expand the support that UKIM provides to researchers in the area of research data management, FAIR data and data sharing. Consider incorporating training for researchers (including doctoral candidates), planning stewardship and sharing of FAIR outputs,

finding and reusing data from existing sources, using or developing FAIR research tools/services, preparing and documenting data/code to make outputs FAIR, publishing FAIR outputs on own or recommended repositories, recognising, citing and acknowledging contributions, and funding for implementing FAIR principles.

The following section evaluates OS practices related to the Rewards, Incentives, and Recognition pillar, identifying key gaps.

Table 154 Rewards, Incentives, and Recognition | GAP Analysis – UKIM

Indicator	Description	Result
Open Science Incentives	Incentives for researchers developing Open Science activities	Red
Academic assessment	Open Science elements as part of academic assessment	Red
HR	Open Science dimensions in HR and career frameworks	Red
Recognition and Rewards	Recognising and rewarding Open Science practices	Red
Policy Transparency	Open and easily accessible policies on researcher evaluation	Green

UKIM awards the best scientist in each scientific area/field, but currently, there are no specific incentives in place that are directly related to OS practices.

Depositing of research articles in a repository and OA books is currently part of the HEI’s approach to academic assessment. This could be expanded to include more OS elements.

At the moment, the University does not sufficiently integrate OS practices as an explicit element in its HR and career frameworks and does not officially assess the extent to which individuals, teams or units integrate OS into their daily practice, so they are currently not recognized and awarded in this manner.

The HEI makes its policies on researcher evaluation openly accessible, and all evaluations are announced in the University Bulletin (Bilten).

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 155 Rewards, Incentives, and Recognition | Roadmap to Successful Implementation – UKIM

Indicator	Reccomendations
Open Science Incentives	Establish incentive programs tailored to UKIM’s researchers. Ensure that HEI provides incentives for researchers developing OS activities (e.g., financial rewards, research grants, recognition awards, project participation opportunities, career evaluation incentives, etc.).
Academic assessment	Explore ways to incorporate additional OS elements to UKIM’s academic assessment frameworks. Consider OS elements such as OA publishing of research articles in OA journals (via payment of APCs), OA archival or special collections, preprints, Depositing of data in a repository, research data management plans, data sharing, open research protocols, open source research software and code, open education, open evaluation, open collaborative tools, Cco-creation platforms, transdisciplinary research platforms, co-design of research projects, Citizen Science, crowdsource practices, and science outreach and communication.
HR	Develop OS-focused HR Policies or review and revise existing HR policies to explicitly integrate OS criteria regarding recruitment, performance evaluations, and career

advancements. Clearly define how engagement in OS activities influences these processes.

Recognition and Rewards

Develop and establish assessment frameworks which contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).

The following section evaluates OS practices related to the Research Integrity pillar, identifying key gaps.

Table 156 Research Integrity | GAP Analysis – UKIM

Indicator	Description	Result
Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	Green
ALLEA Code	Harmonisation with ALLEA Code	Green
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Green
Training and Accreditation	Training and accreditation on research integrity pertaining to Open Science	Yellow

The University’s research integrity code/policy is a part of the wider OS policy and it embraces OS principles.⁷⁷

⁷⁷ Ss. Cyril and Methodius University in Skopje, “Open Science Policy at the Ss. Cyril and Methodius University in Skopje,” 2022.

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Furthermore, the HEI is adhering to the ALLEA Code⁷⁸ and has adopted of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers⁷⁹, with the integration of OS principles.

UKIM organizes one training per year in research integrity, with a focus on OS. Nonetheless, it is not ensured that all researchers are included.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 157 Research Integrity | Roadmap for Successful Implementation – UKIM

Indicator	Reccomendations
Training and Accreditation	Ensure that all researchers at UKIM receive accredited annual training on research integrity and OS, covering ethical, legal, and social implications, with participation monitored.

The following section evaluates OS practices related to the Education and Skills pillar, identifying key gaps.

Table 158 Education and Skills | GAP Analysis – UKIM

Indicator	Description	Result
Training	Skill training in Open Science	Green
Audience	Mandatory Open Science skills training for staff, researchers, and students	Red

⁷⁸ Ibid.

⁷⁹ Ss. Cyril and Methodius University in Skopje, “Declarations of Endorsement of European Charter for Researchers and on a Code of Conduct for the Recruitment of Researchers,” December 1, 2024.

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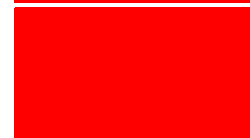
Rewards and Incentives

Rewarding and incentivising
Open Science skills development



Tailored Skill Training

Open Science skill training
specifically tailored to groups of
staff/students



UKIM organizes one training per year specifically in OS considering all of the eight pillars, which is not mandatory. This is a gap which might inhibit wider adoption of OS practices.

HEI, at this moment, does not offer rewards, and incentives to staff and students with regard to OS skills development, that is, for the participation in OS training.

UKIM does provide OS skills training but it is not specifically tailored to different groups within the institution.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 159 Education and Skills | Roadmap for Successful Implementation – UKIM

Indicator	Reccomendations
Audience	Consider revising the OS skills training framework to make participation mandatory. Explore the options regarding which categories of staff and students could this be applied to, for which OS elements or at which career development stage. For example, consider making participation mandatory during the onboarding phase for new staff members.
Rewards and Incentives	Develop and implement a program that specifically rewards, and incentivises staff and students with regard to OS skills development. Take into consideration integrating specific elements such as certificates and various forms of public acknowledgement. Also, consider integrating participation in

Tailored Skill Training

OS skill training into the performance evaluation frameworks and career advancement processes.

Adjust OS training to be tailored to specific groups (e.g., early career researchers, students, etc.), ensuring relevance to their needs.

The following section evaluates OS practices related to the Citizen Science pillar, identifying key gaps.

Table 160 Citizen Science | GAP Analysis – UKIM

Indicator	Description	Result
Citizen Science Policy	Documents that guide Citizen Science	Red
Single Point of Contact	Single point of contact for Citizen Science	Red
Assessment	Assessing Citizen Science contributions and adapting research evaluation and reputation systems accordingly	Red
ECSA Principles	ECSA principles implementation support	Green
Support and Training	Support and training for researchers in Citizen Science	Red

UKIM lacks specific documents that guide Citizen Science and related activities. This gap may inhibit the effectiveness and scalability of Citizen Science initiatives.

Furthermore, the University lacks a single point of contact for Citizen Science as an information hotspot, and as a point for overseeing and supporting Citizen Science activities across the institution.

Citizen Science contributions are currently not being assessed and the formal research evaluation or reputation systems are not adapted accordingly. This can inhibit recognition and incentivization for researchers who engage in Citizen Science activities.

UKIM supports the implementation of the ECSA 10 principles.

At the moment, HEI does not provide support and training for researchers in regard to Citizen Science which may limit the capacity of researchers to conduct effective and ethical Citizen Science projects.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 161 Citizen Science | Roadmap for Successful Implementation – UKIM

Indicator	Reccomendations
Citizen Science Policy	Develop a document that guides Citizen Science at UKIM, and which aligns with your OS frameworks and engagement goals. This document should define Citizen Science principles, address ethical considerations (e.g., data privacy, recognition of citizen scientists, etc.), and provide clear guidelines or policies related to the main elements of Citizen Science and relevant processes.
Single Point of Contact	Establish a single point of contact for Citizen Science by integrating a dedicated role or office into existing research support structures (e.g., Citizen Science officer, participatory research engagement officer, etc.), to coordinate efforts across departments, provide tailored support for Citizen Science projects, communicate across the University and advocate for the integration of Citizen Science elements into institutional policies.
Assessment	Develop specific criteria for assessing the value of Citizen Science contributions, and modify the current research evaluation frameworks to consider Citizen Science

Support and Training

contributions. This can include recognizing various outputs such as Citizen Science datasets, community reports, etc.

Establish dedicated support mechanisms for Citizen Science at the institutional level (e.g., helpdesk, online resources, mentorship programs, etc.). Develop specific Citizen Science training programs in deficient areas, in accordance with researchers' needs, which cover important subjects such as designing Citizen Science projects, community engagement mechanisms, and ethical considerations. If applicable, integrate Citizen Science training into the existing and broader researcher development programs.

5.10 Agricultural University of Tirana (AUT)

The Agricultural University of Tirana (AUT) is the oldest university in Albania, founded in 1951.⁸⁰ Today, it has 23 departments, offers 75 study programs, hosts around 15.000 students, employs around 300 academic staff members, and owns a distinctive University campus for teaching and scientific research, the laboratory infrastructure, and the Experimental Didactic Farm (FDE) as a centre for the transfer of contemporary technologies to agricultural specialists, companies, and farmers.⁸¹

GAP Analysis and Roadmaps for Successful Implementation

The following section evaluates OS practices related to the Cultural Change/Leadership pillar, identifying key gaps.

Table 162 Cultural Change/Leadership | GAP Analysis – AUT

Indicator	Description	Result
Open Science Policy	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science	Yellow
Senior manager	Appointed senior manager for Open Science	Red

⁸⁰ Universiteti Bujqësor i Tiranës, “Official Web Site,” accessed January 30, 2025, <https://www.ubt.edu.al/>.

⁸¹ Ibid.

Programme of Cultural Change

Developed programme of cultural change



Communication

Developed communication strategy



Community

Established Open Science Community



AUT does not have specific documents for OS. However, OS principles have been recognized and sanctioned in the University Statute.⁸²

So far, no senior manager has been appointed to lead OS development at the HEI.

Furthermore, AUT did not develop a programme of cultural change and does not have established communication strategies to enable a university-wide familiarity and commitment to OS practices.

AUT does not have an established Open Science Community, and it currently is not connected to one.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 163 Cultural Change/Leadership | Roadmap for Successful Implementation – AUT

Indicator	Recommendations
Open Science Policy	Develop a comprehensive OS policy that aligns with the AUT’s strategic goals and OS articles from the University Statute. This policy should cover aspects across all OS pillars.
Senior manager	Identify and appoint a senior manager for OS. This role should have clear responsibilities and competencies

⁸² Universiteti Bujqësor i Tiranës, “Statuti i Universitetit Të Bujqësor Të Tiranës,” 2021.

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for developing and implementing OS policies and practices across all eight pillars.

Programme of Cultural Change

Develop a comprehensive programme of cultural change for creating the environment for the implementation of OS practices. Identify key actors and enablers of OS in your HEI, set specific goals, and define an impact-measuring framework.

Communication

Analyse your stakeholders (e.g., students, administrative staff, etc.), test multiple communication methods/channels, monitor results, tailor and adjust them, and iterate in order to achieve the best results. Next, develop a comprehensive and targeted communication strategy, which will enable all institutional stakeholders to become familiar with OS practices. Use diverse communication channels, tools and platforms tailored to reaching different stakeholders.

Community

Build on existing partnerships within current Horizon projects such as BEAMING to join an existing OS Community on a regional level and consider developing a local OS community. Consult the guidelines created by the International Network of Open Science & Scholarship Communities.⁸³

The following section evaluates OS practices related to the European Open Science Cloud (EOSC) pillar, identifying key gaps.

⁸³ International Network of Open Science & Scholarship Communities, "Open Science Community Starter Kit," 2020, <https://inosc-starter-kit.netlify.app/>.

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Table 164 The European Open Science Cloud (EOSC) | GAP Analysis – AUT

Indicator	Description	Result
Policy Commitment	Signed EOSC Declaration	
International Collaboration	Involvement in the EOSC Association	
Infrastructure Access	Institutional access to the requisite infrastructure	
Infrastructure Development	Provided search and discovery service	

AUT did not sign the EOSC Declaration and it is currently not involved in the EOSC Association, thus lacking the formal commitment to this OS pillar.

At the moment AUT does not have an established data repository or access to a 3rd party repository which can interact with the EOSC. Currently, each Department preserves the research data of the research done by the Department members or Master and Doctoral students.

The HEI currently does not have a search and discovery service for research data, which is a limitation regarding the OS infrastructure.

The following roadmap outlines actionable recommendations to address the identified gaps.




Table 165 The European Open Science Cloud (EOSC) | Roadmap for Successful Implementation – AUT

Indicator	Recommendations
Policy Commitment	Assess the benefits and requirements related to joining the EOSC. Formalize the commitment to the EOSC initiative by signing the EOSC Declaration. Systematically align AUT’s policies to comply with the requirements and standards of the EOSC.
International Collaboration	Enable and advocate for active participation of the institutional stakeholders in EOSC events that are open for non-members. Subsequently, initiate the process of joining the EOSC Association.
Infrastructure Access	Explore options for establishing a centralized data repository at AUT, or partnering with an existing third-party repository that is compatible with the EOSC.
Infrastructure Development	Develop a search and discovery service which is harmonized with the needs of AUT. Use a user-friendly interface design as a search and discovery service containing advanced search options.

The following section evaluates OS practices related to the Next-Generation Metrics pillar, identifying key gaps.

Table 166 Next-Generation Metrics | GAP Analysis – AUT

Indicator	Description	Result
HR	New forms of research evaluation	
Guidance	Guidance for research administrators and academics on good and bad practices	

Training	Training for junior researchers, particularly early-stage doctoral researchers	
DORA	Signing DORA and implementing DORA recommendations	
ARRA	Signing ARRA and implementing ARRA Principles	

At the moment, research is evaluated based on the publications realized by each researcher. The Impact Factor journals play an important role in the evaluation of the research for the promotion of the researchers but this is not the only criterion for promotion. However, these additional criteria are not explicitly detailed and New forms of research evaluation are not fully and formally integrated into the evaluation process.

The AUT has approved “Regulations for Conduct with Integrity in Scientific Research and Academic Promotion” which regulates the good and bad practices. Furthermore, at the University level, AUT has a Directory for “Research and Academic Promotion”, under whose umbrella the Ethics Council of the University also operates.⁸⁴ Each Faculty has its own “Ethics Council”. The operation of the “Ethic Councils” at the University or Faculty level is regulated by a separate Regulation.

AUT provides focused support for early career researchers, including specific courses on academic writing and research. Young researchers are also informed about all research and ethics regulations. However, Next-Generation Metrics are not being explicitly and extensively targeted.

The HEI has not formally signed DORA but utilizes all of its principles in the research evaluation for career promotion.

⁸⁴ Universiteti Bujqësor i Tiranës, “Drejtoria e Shkencës Dhe Promovimit Akademik,” accessed December 26, 2024, <https://www.ubt.edu.al/dr-shkence-promo-akademik>.

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AUT did not sign the Agreement on Reforming Research Assessment (ARRA).

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 167 Next-Generation Metrics | Roadmap for Successful Implementation – AUT

Indicator	Recommendations
HR	Explore, test and implement new forms of research evaluation (alternative metrics) and develop new evaluation criteria tailored to the HEI's idiosyncrasies. Include a broader range of qualitative indicators (e.g., interdisciplinary work) and initiate the transition from inappropriate uses of traditional metrics such as Journal Impact Factor (JIF) and h-index.
Training	Further enhance support by integrating comprehensive training on iNext-Generation Metrics usage directly into the current training programs.
DORA	Formalize the adoption of DORA by joining the signatories.
ARRA	Formalize the adoption of ARRA by joining the signatories, and initiate the implementation of ARRA Principles across the HEI.

The following section evaluates OS practices related to the Mutual Learning / Collaboration pillar, identifying key gaps.

Table 168 Mutual Learning / Collaboration | GAP Analysis – AUT

Indicator	Description	Result
Stakeholders	Collaboration with external stakeholders	

AUT explicitly acknowledges the importance of OS and aims to implement more good practices related to this pillar in the near future. However, currently, only the Directorate of Science and Research is involved in some collaborative activities which are not regular.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 169 Mutual Learning / Collaboration | Roadmap for Successful Implementation – AUT

Indicator	Recommendations
Stakeholders	Formalize and intensify existing irregular collaborative activities. Build on the existent project-based collaboration established through projects such as BEAMING, and broaden these efforts to form strategic partnerships focused on different OS pillars. Focus on the collaboration with diverse stakeholders across the quadruple helix (government, academia, industry and community), including the local actors.

The following section evaluates OS practices related to the Future of Scholarly Communication and Publishing pillar, identifying key gaps.

Table 170 Future of Scholarly Communication and Publishing | GAP Analysis – AUT

Indicator	Description	Result
Plan S	State of the implementation of Plan S	Green
Preprints Advocacy	Advocating for the share of research manuscripts as preprints	Red

Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	Red
ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	Red
University Press	The existence of the university press and its engagement with Open Access	Red
Open Access Support	Support to researchers to make their research publications available in Open Access	Yellow
FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	Green
FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	Red
FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	Yellow
FAIR Data/Information	Information about the data archived and published by own research community	Green
FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	Yellow
FAIR Data/Assessment	Including research data in the researcher assessment methodology and research metrics	Green
Open Access Publishing	Harmonisation with Open Access standards	Green
Support	Support provided to researchers in research data management, FAIR data and data sharing	Red

AUT applies Plan S primarily through its journal.

The HEI currently does not advocate for the sharing of research manuscripts as preprints. Nonetheless, AUT has a regulation that makes it obligatory that all the research realised at the University is published online.

AUT currently does not support third-party scholarly publishing platforms dedicated to OA and does not advocate the use of ORCID. It publishes two journals where third-party researchers can be published as well.

Although AUT publishes two scientific journals, it does not have an established University Press.

Various forms of support for OA publishing are being provided by AUT. This includes training for researchers (including doctoral candidates), institutional website(s) on Open Access to research publications, and linkages to career evaluation and promotion within the institution.

FAIR principles are included in the “Regulations for Conduct with Integrity in Scientific Research and Academic Promotion”, based on the Albanian Law for Higher Education and Research

At the moment AUT has no specific and dedicated service to provide data stewardship to researchers and does not provide a centralized infrastructure for the storage and publication of research data. This is handled by individual departments.

AUT gathers information about the data archived and published by its research community.

AUT does not publish metadata about research data generated or obtained within its research community, which can inhibit the discoverability and usability of research data, but they are working on it currently and it will be fulfilled in the near future.

The University recognizes research data as a valuable output in research assessments.

AUT publishes two scientific journals, “The Albanian Journal for Agricultural Sciences” and “Journal of Economy and Agribusiness”, both of which operate under an OA model.⁸⁵

The HEI provides foundational support in the areas of training for researchers (including doctoral candidates) and planning stewardship and sharing of FAIR outputs. However, it lacks broader support mechanisms.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 171 Future of Scholarly Communication and Publishing | Roadmap for Successful Implementation – AUT

Indicator	Recommendations
Preprints Advocacy	Initiate advocacy for the sharing of research manuscripts as preprints through a concise advocacy campaign. Establish collaboration with existing preprint platforms.
Scholarly Publishing from Third Parties	Identify suitable third-party OA initiatives (e.g., OpenEdition and Knowledge Unlatched) and develop certain support structures (e.g., financial support schemes, administrative assistance, etc.).
ORCID Advocacy	Integrate ORCID into digital platforms used for academic publishing and grant submissions. Initiate advocacy for ORCID.
University Press	Consider establishing a university press by conducting a feasibility study to assess the potential benefits and challenges.

⁸⁵ “Botimet Shkencore,” Universiteti Bujqësor i Tiranës, accessed December 26, 2024, <https://www.ubt.edu.al/botime-shkencore>.

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Open Access Support

Consider increasing the types of support your HEI provides to researchers to make their research publications available in OA. This includes developing an open research strategy and vision, facilitating administrative reporting of publications in projects, funding for publishing in Open Access journals (APCs), guidelines providing clarification of legal issues related to linking, sharing and re-using Open Access content, establishment of specific services (e.g. helpdesks) for researchers, and legal support.

FAIR Data/Stewardship

Assess the specific needs for data stewardship services at AUT, then plan and initiate the establishment of a dedicated service to provide data stewardship to researchers.

FAIR Data/Infrastructure

Consider establishing a centralized repository to include access to research data or establishing a dedicated data repository. Alternatively, explore strategic partnerships with other organisations that offer data repository services.

FAIR Data/Metadata Publishing

Establish and implement standardized metadata frameworks for all research data generated or obtained at the University level. Furthermore, adjust the existing policies to enable publishing and providing free access to metadata. Finally, upgrade the existing repository to support the storage and publication of metadata alongside research data.

Support

Conduct a needs assessment to identify key areas where support is most needed for researchers in terms of research data management, FAIR principles, or data sharing. Next, focus on identified key areas and establish basic support structures. Consider integrating support mechanisms such as institutional website(s) on research data management, finding and reusing data from existing sources, using or developing FAIR research

tools/services, preparing and documenting data/code to make outputs FAIR, publishing FAIR outputs on their own or recommended repositories, recognising, citing and acknowledging contributions, developing open research strategy and vision, complying with legal and ethical requirements, FAIR principles, funding for implementing FAIR principles, and finding (other) sources of training and advice on FAIR data.

The following section evaluates OS practices related to the Rewards, Incentives, and Recognition pillar, identifying key gaps.

Table 172 Rewards, Incentives, and Recognition | GAP Analysis – AUT

Indicator	Description	Result
Open Science Incentives	Incentives for researchers developing Open Science activities	Yellow
Academic assessment	Open Science elements as part of academic assessment	Yellow
HR	Open Science dimensions in HR and career frameworks	Red
Recognition and Rewards	Recognising and rewarding Open Science practices	Red
Policy Transparency	Open and easily accessible policies on researcher evaluation	Yellow

AUT provides incentives for researchers developing OS practices such as incentives for research publications in OA journals which are supported through projects or by funds provided by researchers themselves.

The University integrates several OS elements into its academic assessment framework including depositing of research articles in a repository, OA publishing of research articles in Open Access journals (via payment of APCs), research data management plans, open education, and open evaluation. However, there are gaps regarding other key OA elements which are not of the University’s approach to academic assessment.

There is an absence of integration of OS principles into HR and career frameworks at AUT, which indicates a gap in aligning HR policies with OS best practices. Regulatory framework on the national level, the Law for Higher Education and Research and the Council of Minister Decree on Academic Promotion do not provide explicit OA elements.

The University does not have a system in place to assess how individuals, teams, or units integrate OS into their daily practices. Therefore, they cannot be adequately rewarded.

At the moment, research is evaluated in each department by a commission of at least three members. The results are discussed in open meetings organised at the faculty level as well.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 173 Rewards, Incentives, and Recognition | Roadmap for Successful Implementation – AUT

Indicator	Recommendations
Open Science Incentives	Expand the pool of OS practices that AUT Incentives beyond research publications in OA journals.
Academic assessment	Incorporate additional OS elements into AUT’s academic assessment frameworks. Consider missing OS elements such as OA books, OA archival or special collections, preprints, depositing of data in a repository, data sharing, open research protocols, open source research software and code, open collaborative tools, co-creation platforms,

transdisciplinary research platforms, co-design of research projects, Citizen science, crowdsource practices, and science outreach and communication.

HR

Develop OS-focused HR Policies or review and revise existing HR policies to explicitly integrate OS criteria regarding recruitment, performance evaluations, and career advancements. Clearly define how engagement in OS activities influences these processes.

Recognition and Rewards

Develop and establish assessment frameworks which contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).

Policy Transparency

Develop and establish assessment frameworks which contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).

The following section evaluates OS practices related to the Research Integrity pillar, identifying key gaps.

Table 174 Research Integrity | GAP Analysis – AUT

Indicator	Description	Result
Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	Green
ALLEA Code	Harmonisation with ALLEA Code	Green
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Red
Training and Accreditation	Training and accreditation on research integrity pertaining to Open Science	Yellow

AUT has a research integrity code/policy which embraces the principles of OS.

The document “University Regulation on Conduct with Integrity in Scientific Research and Academic Promotion” is drafted based on the Minister Council Decree for Ethics in Research. Both documents embrace the provisions of the ALLEA Code.

The University did not adopt the European Charter for Researchers/The Code of Conduct for Recruitment of Researchers and its recruitment frameworks currently do not entail OS principles. Currently, the only recruitment criteria are related to the experience and number of publications in the relevant fields of teaching.

Finally, AUT does not provide regular training or accreditation programs on research integrity that incorporate OS principles at this moment. Nonetheless, trainings on research integrity are offered for young researchers.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 175 Research Integrity | Roadmap for Successful Implementation – AUT

Indicator	Recommendations
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adopt the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers, and align institutional policies and practices accordingly.
Training and Accreditation	Develop and Implement regular training and accreditation programs on research integrity related to OS. Ethical, legal, and social aspects of research should be covered.

The following section evaluates OS practices related to the Education and Skills pillar, identifying key gaps.

Table 176 Education and Skills | GAP Analysis – AUT

<i>Indicator</i>	<i>Description</i>	<i>Result</i>
Training	Skill training in Open Science	
Audience	Mandatory Open Science skills training for staff, researchers, and students	
Rewards and Incentives	Rewarding and incentivising Open Science skills development	
Tailored Skill Training	Open Science skill training specifically tailored to groups of staff/students	

The University does not provide skill training that covers all OS pillars, which is a gap in providing the support necessary for researchers to fully engage with OS practices. The second and fourth indicators are, therefore, absent as well.

AUT currently does not provide rewards or incentives to staff and students with regard to OS skills development which is a gap that may inhibit motivation and therefore lower participation rates.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 177 Education and Skills | Roadmap for Successful Analysis – AUT

Indicator	Recommendations
Training	<p>Develop an extensive, exhaustive and structured OS skills training program that covers all OS pillars.</p>
Audience	<p>Ensure that the future established OS skills training program has mandatory participation for certain stakeholders according to their roles in developing OS practices at AUT (staff, students, etc.). Also, consider making participation mandatory during the onboarding phase for new staff members.</p>
Rewards and Incentives	<p>Develop and implement a program that specifically rewards, and incentivises staff and students with regard to OS skills development. Take into consideration integrating things like certificates and various forms of public acknowledgement. Also, consider integrating participation in OS skill training into the performance evaluation frameworks and career advancement processes.</p>
Tailored Skill Training	<p>Ensure that the future established OS skills training program is tailored specifically to the needs of diverse stakeholders across the HEI. This can be done by assessing the training needs of different groups of stakeholders early in the development process.</p>

The following section evaluates OS practices related to the Citizen Science pillar, identifying key gaps.

Table 178 Citizen Science | GAP Analysis – AUT

Indicator	Description	Result
Citizen Science Policy	Documents that guide Citizen Science	
Single Point of Contact	Single point of contact for Citizen Science	
Assessment	Assessing Citizen Science contributions and adapting research evaluation and reputation systems accordingly	
ECSA Principles	ECSA principles implementation support	
Support and Training	Support and training for researchers in Citizen Science	

AUT has no specific documents related to Citizen Science, which is a strategic gap.

Furthermore, the University currently lacks a single point of contact for Citizen Science as an information hotspot, and as a point for overseeing and supporting Citizen Science activities across the HEI.

Citizen Science contributions are currently not being assessed and the formal research evaluation or reputation systems are not adapted accordingly. This can inhibit recognition and incentivization for researchers who engage in Citizen Science activities.

AUT does not implement the ECSA 10 Principles of Citizen Science, which may inhibit the effectiveness of existing Citizen Science efforts and the University's ability to engage with the community.

HEI currently does not provide support and training for researchers in regard to Citizen Science which may limit the capacity of researchers to conduct effective and ethical Citizen Science projects.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 179 Citizen Science | Roadmap for Successful Implementation – AUT

Indicator	Recommendations
Citizen Science Policy	Develop a document that guides Citizen Science at AUT, and which aligns with your OS frameworks and engagement goals. This document should define Citizen Science principles, address ethical considerations (e.g., data privacy, recognition of citizen scientists, etc.), and provide clear guidelines or policies related to the main elements of Citizen Science and relevant processes.
Single Point of Contact	Establish a single point of contact for Citizen Science by integrating a dedicated role or office into existing research support structures (e.g., Citizen Science officer, participatory research engagement officer, etc.), to coordinate efforts across departments, provide tailored support for Citizen Science projects, communicate across the University and advocate for the integration of Citizen Science elements into institutional policies.
Assessment	Develop specific criteria for assessing the value of Citizen Science contributions, and modify the current research evaluation frameworks to consider Citizen Science contributions. This can include recognizing various outputs such as Citizen Science datasets, community reports, etc.
ECSA Principles	Ensure the formal recognition of the ECSA 10 Principles at the institutional level, adapt the necessary strategic documents accordingly and enable their effective implementation.
Support and Training	Establish dedicated support mechanisms for Citizen Science at the institutional level (e.g., helpdesk, online resources, mentorship programs, etc.). Develop specific Citizen Science training programs in deficient areas, in accordance with researchers' needs, which cover important subjects such as designing Citizen Science projects, community engagement mechanisms, and ethical considerations. If applicable, integrate Citizen Science training into the existing and broader researcher development programs.

5.11 University of Novi Sad, Faculty of Agriculture (UNSFA)

The Faculty of Agriculture of the University of Novi Sad, established in 1954, is indulged in intensive cooperation with the economic sector, but also in the continuous education of both experts in agriculture and the general public, and possesses experimental fields with a total area of 100 ha.⁸⁶

According to the QS World University Ranking by subject in the field of Agriculture and Forestry, UNSFA is ranked between 201 and 250, and according to the Shanghai University Ranking by subject (in the field of Veterinary Medicine), it is ranked between 200 and 300.⁸⁷

GAP Analysis and Roadmaps for Successful Implementation

The following section evaluates OS practices related to the Cultural Change/Leadership pillar, identifying key gaps.

Table 180 Cultural Change/Leadership | GAP Analysis – UNSFA

Indicator	Description	Result
Open Science Policy	Strategic document related to Open Science and/or particular	

⁸⁶ Poljoprivredni fakultet u Novom Sadu, "Official Web Page," accessed January 29, 2025, <http://polj.uns.ac.rs/en>.

⁸⁷ Marko Cincović and Branislava Belić, "Rangiranje Univerziteta, Naučno-Istraživački i Nastavni Rad u Polju Veterinarske Medicine," *Letopis Naučnih Radova / Annals Of Agronomy* 42, No 2, 58–69 (2018).

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	documents related to various aspects of Open Science	
Senior manager	Appointed senior manager for Open Science	
Programme of Cultural Change	Developed programme of cultural change	
Communication	Developed communication strategy	
Community	Established Open Science Community	

UNSFA has a rulebook on OS as a strategic document covering various OS aspects.⁸⁸

At the moment, no senior manager is appointed to lead OS development.

Furthermore, UNSFA has not yet developed a programme of cultural change which is important for the practical implementation of OS principles.

UNSFA does not have an established communication strategy to promote OS across the University which is needed for enabling a university-wide commitment to OS practices.

Finally, the HEI is actively engaged with the Open Science Community Serbia, with three delegated members.

The following roadmap outlines actionable recommendations to address the identified gaps.

⁸⁸ Univerzitet u Novom Sadu, "Pravilnik o Otvorenoj Nauci," 2019.

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Table 181 Cultural Change/Leadership | Roadmap for Successful Implementation – UNSFA

Indicator	Recommendations
Open Science Policy	Expand the Scope of the existing rulebook on OS by developing additional policies that cover missing OS pillars and elements (e.g., Citizen Science). Align OS policies with international best practices, and regularly update them to reflect the latest developments in the global OS movement, but also take into consideration local idiosyncracies and inputs from local stakeholders (e.g., researchers, students, etc.).
Senior manager	Identify and appoint a senior manager for OS. This role should have clear responsibilities and competencies for developing and implementing OS policies and practices across all eight pillars.
Programme of Cultural Change	Develop a comprehensive programme of cultural change for creating the environment for the implementation of OS practices. Identify key actors and enablers of OS in your HEI, set specific goals, and define an impact-measuring framework.
Communication	Analyse your stakeholders (e.g., students, administrative staff, etc.), test multiple communication methods/channels, monitor results, tailor and adjust them, and iterate in order to achieve the best results. Next, develop a comprehensive and targeted communication strategy, which will enable all institutional stakeholders to become familiar with OS practices. Use diverse communication channels, tools and platforms tailored to reaching different stakeholders.

The following section evaluates OS practices related to the European Open Science Cloud (EOSC) pillar, identifying key gaps.

Table 182 The European Open Science Cloud (EOSC) | GAP Analysis – UNSFA

Indicator	Description	Result
Policy Commitment	Signed EOSC Declaration	Red
International Collaboration	Involvement in the EOSC Association	Red
Infrastructure Access	Institutional access to the requisite infrastructure	Green
Infrastructure Development	Provided search and discovery service	Red

UNSFA did not sign the EOSC Declaration and it is not involved in the EOSC Association, thus lacking the formal commitment to this OS pillar.

On the other hand, HEI has established a data repository, the University of Novi Sad Repository⁸⁹ which uses DSpace-CRIS, and is engaged with the national eScience portal⁹⁰.

There is an established UNSFA Community in Zenodo, and all the books which were published by UNSFA are available online in the Zenodo repository.⁹¹

UNSFA currently does not have a search and discovery service for research data, which is a limitation regarding the OS infrastructure.

The following roadmap outlines actionable recommendations to address the identified gaps.

⁸⁹ University of Novi Sad, “University of Novi Sad Repository,” accessed November 30, 2024, <https://open.uns.ac.rs/>.

⁹⁰ Ministry of Science, Technological Development and Innovation of the Republic of Serbia, “eNauka Portal,” 2023, <https://enauka.gov.rs/>.

⁹¹ Univerzitet u Novom Sadu, “Zenodo Community,” accessed November 30, 2024, <https://zenodo.org/communities/unspf/about>.

Table 183 The European Open Science Cloud (EOSC) | Roadmap for Successful Implementation – UNSFA

Indicator	Recommendations
Policy Commitment	Assess the benefits and requirements related to joining the EOSC. Formalize the commitment to the EOSC initiative by signing the EOSC Declaration. Systematically align UNSFA’s policies to comply with the requirements and standards of the EOSC.
International Collaboration	Enable and advocate for active participation of the institutional stakeholders in EOSC events that are open for non-members. Subsequently, initiate the process of joining the EOSC Association.
Infrastructure Development	Develop a search and discovery service which is harmonized with the needs of UNSFA. Use a user-friendly interface design as a search and discovery service containing advanced search options.

The following section evaluates OS practices related to the Next-Generation Metrics pillar, identifying key gaps.

Table 184 Next-Generation Metrics | GAP Analysis – UNSFA

Indicator	Description	Result
HR	New forms of research evaluation	Yellow
Guidance	Guidance for research administrators and academics on good and bad practices	Red
Training	Training for junior researchers, particularly early-stage doctoral researchers	Red
DORA	Signing DORA and implementing DORA recommendations	Red

ARRA

Signing ARRA and implementing
ARRA Principles



UNSFAs included aspects of research evaluation in its internal processes for promotion and reward such as annually rewarding the “Book of the Year,” “International Project of the Year,” “National Project of the Year,” and “Researcher with the Highest Impact Factor of the Year.” Although this approach acknowledges a variety of scholarly contributions, the emphasis is still on traditional metrics like impact factors.

The HEI currently lacks a formal guide or set of guidelines regarding the use of traditional bibliometrics and the development of new metrics.

The University lacks a structured approach to training early career researchers, particularly doctoral students, on the responsible use of metrics.

There are gaps regarding the signing of the San Francisco Declaration on Research Assessment (DORA) and the Agreement on Reforming Research Assessment (ARRA), which also delays the implementation of their principles.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 185 Next-Generation Metrics | Roadmap for Successful Implementation – UNSFA

<i>Indicator</i>	<i>Recommendations</i>
HR	Conduct an assessment of the current research evaluation practices to identify areas where they can be expanded and new forms of evaluation could be integrated. Next, integrate new forms of research evaluation in internal processes for promotion/reward and research evaluation itself. Extend the existing evaluation frameworks to include OS practices (e.g., public engagement, and collaborative efforts).

- Guidance** Initiate the development of comprehensive guidelines for research administrators and academics that cover traditional bibliometrics and the development and implementation of new metrics related to research assessment.
- Training** Develop formal and structured training programs that focus on the Next-Generation Metrics and are tailored to junior researchers.
- DORA** Formalize the adoption of DORA by joining the signatories, and initiate the implementation of DORA recommendations across the HEI.
- ARRA** Formalize the adoption of ARRA by joining the signatories, and initiate the implementation of ARRA Principles across the HEI.

The following section evaluates OS practices related to the Mutual Learning / Collaboration pillar, identifying key gaps.

Table 186 Mutual Learning / Collaboration – UNSFA

Indicator	Description	Result
Stakeholders	Collaboration with external stakeholders	

UNSFA, as a public university, is in coordination and cooperation with the Ministry of Science, Technological Development and Innovation of the Republic of Serbia. Furthermore, UNSFA is actively participating in various Horizon projects related to OS practices, including the BEAMING project, which is a way of liaising with external stakeholders. Nonetheless, the University lacks a concerted approach with more diverse stakeholders across the quadruple helix.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 187 Mutual Learning / Collaboration | Roadmap for Successful Implementation – UNSFA

Indicator	Recommendations
Stakeholders	Build on the existent project-based collaboration established through the projects in which UNSFA is currently participating (e.g., BEAMING). Broaden these efforts to form strategic partnerships focused on different OS pillars. Focus on the collaboration with diverse stakeholders across the quadruple helix (government, academia, industry and community), including the local actors.

The following section evaluates OS practices related to the Future of Scholarly Communication and Publishing pillar, identifying key gaps.

Table 188 Future of Scholarly Communication and Publishing | GAP Analysis – UNSFA

Indicator	Description	Result
Plan S	State of the implementation of Plan S	Red
Preprints Advocacy	Advocating for the share of research manuscripts as preprints	Yellow
Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	Green
ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	Green
University Press	The existence of the university press and its engagement with Open Access	Red

Open Access Support	Support to researchers to make their research publications available in Open Access	Yellow
FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	Red
FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	Red
FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	Green
FAIR Data/Information	Information about the data archived and published by own research community	Green
FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	Red
FAIR Data/Assessment	Including research data in the researcher assessment methodology and research metrics	Green
Open Access Publishing	Harmonisation with Open Access standards	Green
Support	Support provided to researchers in research data management, FAIR data and data sharing	Yellow

UNSFA does not currently implement the Plan S principles and does not officially advocate for the sharing of research manuscripts as preprints. There are individual examples of initiated sharing, and projects involving preprints sharing in the preparation phase.

Furthermore, UNSFA is supporting new forms of scholarly publishing from third parties which have an OA approach, and advocates for the use of ORCID.

The University does not have a university press. Nonetheless, it provides various forms of support to facilitate OA publishing. This includes training for researchers (including doctoral candidates), developing an open research strategy and vision, facilitating administrative reporting of publications in projects, and funding for publishing in Open Access journals (APCs). In addition, UNSFA respondents report that the Faculty Management have a strong intention to establish systemic support for OA publishing.

At this point, UNSFA does not have a research data policy or strategy in place which limits its ability to ensure that the data generated by the researchers are managed according to best practices, that is, the FAIR principles. However, UNSFA respondents report that awareness is rising on FAIR data principles and they are being implemented through project activities and training.

The HEI currently lacks a dedicated service to provide data stewardship to its researchers, which presents a gap in supporting effective research data management practices.

Furthermore, UNSFA provides access to an infrastructure storage and publication of research data and gathers information about the data archived and published by its research community.

The University does not currently publish all metadata about research data generated or obtained within its research community.

UNSFA published scientific journals using the Diamond model.

Finally, the University provides various forms of support in the area of research data management, FAIR data and data sharing, including training for researchers (including doctoral candidates), using or developing FAIR research tools/services, and finding (other) sources of training and advice on FAIR data.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 189 Future of Scholarly Communication and Publishing / Roadmap for Successful Implementation – UNSFA

Indicator	Recommendations
Plan S	Conduct an internal review to determine the level of harmonization of current UNSFA OS practices and initiatives to Plan S. Next, develop and adopt policies, and guidelines or update articles in existing documents to align with Plan S.
Preprints Advocacy	Enhance advocacy for the sharing of research manuscripts as preprints through a clear advocacy campaign.
University Press	Consider establishing a university press by conducting a feasibility study to assess the potential benefits and challenges.
Open Access Support	Consider broadening the forms of support that UNSFA provides to researchers to make their research publications available in OA. This includes institutional website(s) on OA to research publications, linkages to career evaluation and promotion within the institution, guidelines providing clarification of legal issues related to linking, sharing and re-using OA content, establishment of specific services (e.g. helpdesks) for researchers, and legal support.
FAIR Data/Policy Integration	Initiate the development of a research data policy or strategy which will include FAIR principles. This document should contain policies and guidelines for managing, storing, and sharing research data and metadata.
FAIR Data/Stewardship	Assess the specific needs for data stewardship services at UNSFA, then plan and initiate the establishment of a dedicated service to provide data stewardship to researchers.

FAIR
Data/Metadata
Publishing

Establish and implement standardized metadata frameworks for all research data generated or obtained at the University level. Furthermore, create a metadata publishing policy to enable publishing and providing free access to metadata. Develop a solution for publishing and providing free access to metadata with regard to FAIR principles. Explore integrating systems and solutions such as CRIS or PURE.

Support

Expand the support that UNSFA provides to researchers in the area of research data management, FAIR data and data sharing. Consider incorporating institutional website(s) on research data management, planning stewardship and sharing of FAIR outputs, finding and reusing data from existing sources, preparing and documenting data/code to make outputs FAIR, publishing FAIR outputs on own or recommended repositories, recognising, citing and acknowledging contributions, developing open research strategy and vision, complying with legal and ethical requirements, FAIR principles, and funding for implementing FAIR principles.

The following section evaluates OS practices related to the Rewards, Incentives, and Recognition pillar, identifying key gaps.

Table 190 Rewards, Incentives, and Recognition | GAP Analysis – UNSFA

Indicator	Description	Result
Open Science Incentives	Incentives for researchers developing Open Science activities	
Academic assessment	Open Science elements as part of academic assessment	

HR	Open Science dimensions in HR and career frameworks	
Recognition and Rewards	Recognising and rewarding Open Science practices	
Policy Transparency	Open and easily accessible policies on researcher evaluation	

UNSFA currently provides annual awards that recognize various academic achievements. However, these incentives predominantly reward traditional practices such as publication impact factor. There are no specific incentives in place that are directly related to OS practices.

The University integrates several OS elements into its academic assessment framework. This includes aspects such as OA books, OA design of research projects, Citizen Science, and science outreach and communication.

OS is not currently explicitly integrated as a criterion in recruitment, performance evaluation, or career advancement policies.

HEI currently does not assess the extent to which OS is integrated into the daily practices of individuals, teams, or units, and therefore did not develop complementary mechanisms for recognition and rewards.

UNSFA currently does not make its researcher evaluation policies openly and easily accessible.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 191 Rewards, Incentives, and Recognition | Roadmap for Successful Implementation – UNSFA

Indicator	Recommendations
Open Science Incentives	Establish incentive programs tailored to UNSFA’s researchers. Ensure that HEI provides incentives for researchers developing OS activities (e.g., financial rewards, research grants, recognition awards, project participation opportunities, career evaluation incentives, etc.).
Academic assessment	Revise academic assessment frameworks and incorporate additional OS elements. The missing elements include depositing of research articles in a repository, OA publishing of research articles in OA journals (via payment of APCs), OA archival or special collections, preprints, depositing of data in a repository, research data management plans, data sharing, open research protocols, open source research software and code, open education, open evaluation, open collaborative tools, co-creation platforms, transdisciplinary research platforms, and crowdsource practices.
HR	Review and revise HR policies to explicitly integrate OS criteria regarding recruitment, performance evaluations, and career advancements. Clearly define how engagement in OS activities influences these processes.
Recognition and Rewards	Develop and establish mechanisms which contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).
Policy Transparency	Ensure that the researcher evaluation policies are easily accessible to all stakeholders, ideally through the University's official website, and available in multiple formats.

The following section evaluates OS practices related to the Research Integrity pillar, identifying key gaps.

Table 192 Research Integrity | GAP Analysis – UNSFA

Indicator	Description	Result
Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	Red
ALLEA Code	Harmonisation with ALLEA Code	Red
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Yellow
Training and Accreditation	Training and accreditation on research integrity pertaining to Open Science	Red

UNSFA currently does not have a research integrity code or policy that specifically embraces OS principles, and does not currently adhere to the ALLEA Code.

The University signed the Declaration of Commitment to the European Researchers Charter and the Code of Conduct for Recruitment of Researchers, but it has not been adopted yet.

Currently, UNSFA does not provide regular training or accreditation programs on research integrity that incorporate OS principles, which may inhibit researchers from fully understanding and integrating ethical OS standards into their daily practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 193 Research Integrity | Roadmap for Successful Implementation – UNSFA

Indicator	Recommendations
Research Integrity Code/Policy	Initiate the development of a research integrity code that integrates OS principles, and includes aspects such as data sharing, OA publishing, etc.
ALLEA Code	Adopt the ALLEA Code, and align institutional policies and practices accordingly.
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adopt the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers, and align institutional policies and practices accordingly.
Training and Accreditation	Develop and Implement regular training and accreditation programs on research integrity related to OS. Ethical, legal, and social aspects of research should be covered.

The following section evaluates OS practices related to the Education and Skills pillar, identifying key gaps.

Table 194 Education and Skills | GAP Analysis – UNSFA

Indicator	Description	Result
Training	Skill training in Open Science	
Audience	Mandatory Open Science skills training for staff, researchers, and students	
Rewards and Incentives	Rewarding and incentivising Open Science skills development	

Tailored Skill Training

Open Science skill training specifically tailored to groups of staff/students



There is an absence of skill training that covers all OS pillars, which is a gap in providing the support necessary for researchers to fully engage with OS practices.

At the moment, OS training is mandatory for PhD students as a part of the curriculum. The course name is “Methods in Scientific Research”.

UNSFA currently does not provide rewards or incentives to staff and students with regard to OS skills development which is a gap that may inhibit motivation and therefore lower participation rates.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 195 Education and Skills | Roadmap for Successful Implementation – UNSFA

Indicator	Recommendations
Training	Develop an extensive, exhaustive and structured OS skills training program that covers all OS pillars.
Audience	Ensure that the future established OS skills training program has mandatory participation for certain stakeholders according to their roles in developing OS practices at UNSFA (staff, students, etc.). Also, consider making participation mandatory during the onboarding phase for new staff members.
Rewards and Incentives	Develop and implement a program that specifically rewards, and incentivises staff and students with regard to OS skills development. Take into consideration integrating things like certificates and various forms of public acknowledgement. Also, consider integrating participation in OS skill training into

the performance evaluation frameworks and career advancement processes.

Tailored Skill Training

Ensure that the future established OS skills training program is tailored specifically to the needs of diverse stakeholders across the University. This can be done by assessing the training needs of different groups of stakeholders early in the development process.

The following section evaluates OS practices related to the Citizen Science pillar, identifying key gaps.

Table 196 Citizen Science | GAP Analysis – UNSFA

Indicator	Description	Result
Citizen Science Policy	Documents that guide Citizen Science	Red
Single Point of Contact	Single point of contact for Citizen Science	Green
Assessment	Assessing Citizen Science contributions and adapting research evaluation and reputation systems accordingly	Red
ECSA Principles	ECSA principles implementation support	Green
Support and Training	Support and training for researchers in Citizen Science	Red

Regarding the Citizen Science OS pillar, UNSFA lacks specific documents that guide related activities. This presents a gap in the strategic sense, potentially limiting the effectiveness and scalability of Citizen Science initiatives.

There is a centralized point for Citizen Science at UNSFA.

Furthermore, Citizen Science contributions are currently not being assessed and the formal research evaluation or reputation systems are not adapted accordingly, which may limit recognition and incentivization for researchers who engage in Open Science activities.

UNSFA supports the implementation of the ECSA 10 principles.

Currently, UNSFA does not provide support and training for researchers in Citizen Science.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 197 Citizen Science | Roadmap for Successful Implementation – UNSFA

Indicator	Recommendations
Citizen Science Policy	Develop a document that guides Citizen Science at UNSFA, and which aligns with your OS frameworks and engagement goals. This document should define Citizen Science principles, address ethical considerations (e.g., data privacy, recognition of citizen scientists, etc.), and provide clear guidelines or policies related to the main elements of Citizen Science and relevant processes.
Assessment	Develop specific criteria for assessing the value of Citizen Science contributions, and modify the current research evaluation frameworks to consider Citizen Science contributions. This can include recognizing various outputs such as Citizen Science datasets, community reports, etc.
Support and Training	Establish dedicated support mechanisms for Citizen Science at the institutional level (e.g., helpdesk, online resources, mentorship programs, etc.). Develop specific Citizen Science training programs in deficient areas, in accordance with researchers' needs, which cover important subjects such as designing Citizen Science projects, community engagement

mechanisms, and ethical considerations. If applicable, integrate Citizen Science training into the existing and broader researcher development programs.

5.12 University of Pannonia (UP)

the University of Pannonia (UP) has headquarters in Veszprém, Hungary, with a presence in Kőszeg, Nagykanizsa, Zalaegerszeg, and Ajka. UP contains 4 faculties, has 5 doctoral schools, hosts more than 5000 students, has over 800 market cooperation partners, and participates in over 100 research and R&D projects.⁹²

Furthermore, the University hosts over 6000 University Citizens, and 7% of the total students are international students who come from 70 different countries.⁹³

UP values a multidisciplinary approach and covers fields of humanities, economics, information technologies, education, and social and natural sciences, together with professional and research activities beyond the University curriculum.⁹⁴

GAP Analysis and Roadmaps for Successful Implementation

The following section evaluates OS practices related to the Cultural Change/Leadership pillar, identifying key gaps.

⁹² University of Pannonia, "Together Towards Sustainability," 2024.

⁹³ University of Pannonia, "Official Website," Pannon Egyetem - International, June 3, 2022, <https://international.uni-pannon.hu/>.

⁹⁴ Ibid.

Table 198 Cultural Change/Leadership | GAP Analysis – UP

Indicator	Description	Result
Open Science Policy	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science	Red
Senior manager	Appointed senior manager for Open Science	Red
Programme of Cultural Change	Developed programme of cultural change	Red
Communication	Developed communication strategy	Yellow
Community	Established Open Science Community	Red

UP currently does not have documents that guide researchers with regard to OS, which is a significant strategic gap, and no senior manager is appointed to lead OS development.

Furthermore, UP has not yet developed a programme of cultural change which is important for the practical implementation of OS principles.

At the moment, UP does not have established communication strategies to promote OS across the University which is needed for enabling a university-wide commitment to OS practices. This is currently in process.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 199 Cultural Change/Leadership | Roadmap for Successful Implementation – UP

Indicator	Reccomendations
Open Science Policy	Develop a comprehensive OS policy that aligns with the UP’s strategic goals. This policy should cover aspects across all OS pillars.
Senior manager	Identify and appoint a senior manager for OS. This role should have clear responsibilities and competencies for developing and implementing OS policies and practices across all eight pillars.
Programme of Cultural Change	Develop a comprehensive programme of cultural change for creating the environment for the implementation of OS practices. Identify key actors and enablers of OS in your HEI, set specific goals, and define an impact-measuring framework.
Communication	Finnish the development of a communication strategy. Ensure that the stakeholder analysis is done (e.g., students, administrative staff, etc.), test multiple communication methods/channels, monitor results, tailor and adjust them, and iterate in order to achieve the best results. Ensure that the developed communication strategy enables all institutional stakeholders to become familiar with OS practices. Use diverse communication channels, tools and platforms tailored to reaching different stakeholders.
Community	Build on existing partnerships within current Horizon projects and consider developing a local or regional OS community. Consult the guidelines created by the International Network of Open Science & Scholarship Communities. ⁹⁵

⁹⁵ International Network of Open Science & Scholarship Communities, “Open Science Community Starter Kit,” 2020, <https://inosc-starter-kit.netlify.app/>.

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The following section evaluates OS practices related to the European Open Science Cloud (EOSC) pillar, identifying key gaps.

Table 200 The European Open Science Cloud (EOSC) | GAP Analysis – UP

Indicator	Description	Result
Policy Commitment	Signed EOSC Declaration	Red
International Collaboration	Involvement in the EOSC Association	Red
Infrastructure Access	Institutional access to the requisite infrastructure	Yellow
Infrastructure Development	Provided search and discovery service	Red

UP has not yet signed the EOSC Declaration, and it is not involved in the EOSC Association, thus lacking the formal commitment to this OS pillar.

The HEI has a data repository, but it is solely for internal purposes.

At the moment, UP does not have a search and discovery service for research data, which is a limitation regarding the OS infrastructure.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 201 The European Open Science Cloud (EOSC) | Roadmap for Successful Implementation – UP

Indicator	Reccomendations
Policy Commitment	Assess the benefits and requirements related to joining the EOSC. Formalize the commitment to the EOSC initiative by signing the EOSC Declaration. Systematically align UP's

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policies to comply with the requirements and standards of the EOSC.

International Collaboration

Enable and advocate for active participation of the UP's stakeholders in EOSC events that are open for non-members. Subsequently, initiate the process of joining the EOSC Association.

Infrastructure Access

Upgrade the data repository and ensure that it is compatible with EOSC.

Infrastructure Development

Develop a search and discovery service which is harmonized with the needs of the University. Utilize user-friendly interface design to make advanced search options easy to use.

The following section evaluates OS practices related to the Next-Generation Metrics pillar, identifying key gaps.

Table 202 Next-Generation Metrics | GAP Analysis – UP

Indicator	Description	Result
HR	New forms of research evaluation	Green
Guidance	Guidance for research administrators and academics on good and bad practices	Green
Training	Training for junior researchers, particularly early-stage doctoral researchers	Red
DORA	Signing DORA and implementing DORA recommendations	Red
ARRA	Signing ARRA and implementing ARRA Principles	Green

UP has embedded new forms of research evaluation in its internal processes for promotion/reward and research evaluation through the requirements of a yearly bonus system. This refers to the actual expectations based on the current status of the employer and the expectations of the national accreditation institution.

The University has developed guidance for research administrators and academics on good and bad practices in the use of traditional bibliometrics and in the development of new metrics specifically through internal training.

On the other hand, the HEI currently does not provide training for early career researchers on the responsible use of research metrics.

Finally, while UP has not signed the San Francisco Declaration on Research Assessment (DORA) specifically, the signing of the Agreement on Reforming Research Assessment (ARRA) indicates a commitment to reforming research assessment practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 203 Next-Generation Metrics | Roadmap for Successful Implementation – UP

Indicator	Reccomendations
Training	Create specialized training programs for junior researchers, particularly early-stage doctoral researchers, enabling them to learn about the use, implications, and limitations of traditional and Next-Generation Metrics. Alternatively, integrate this type of training into existing programs.
DORA	Formalize the adoption of DORA by joining the signatories, and initiate the implementation of DORA recommendations across the HEI.

The following section evaluates OS practices related to the Mutual Learning / Collaboration pillar, identifying key gaps.

Table 204 Mutual Learning / Collaboration | GAP Analysis – UP

Indicator	Description	Result
Stakeholders	Collaboration with external stakeholders	

UP’s active participation in the BEAMING project shows a form of liaising with external stakeholders in the field of OS but does not indicate a comprehensive or concerted approach as the engagement can be characterised as project-specific rather than institution-wide and systematic. Nonetheless, this presents great opportunities for networking and establishing long-term cooperation.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 205 Mutual Learning / Collaboration | Roadmap for Successful Implementation – UP

Indicator	Reccomendations
Stakeholders	Build on the existent project-based collaboration established through the projects in which UP is currently participating such as the BEAMING project. Broaden these efforts to form strategic partnerships focused on different OS pillars. Furthermore, consider establishing collaboration with diverse stakeholders across the quadruple helix (government, academia, industry and community), including the local actors, in the OS context.

The following section evaluates OS practices related to the Future of Scholarly Communication and Publishing pillar, identifying key gaps.

Table 206 Future of Scholarly Communication and Publishing | GAP Analysis – UP

Indicator	Description	Result
Plan S	State of the implementation of Plan S	Red
Preprints Advocacy	Advocating for the share of research manuscripts as preprints	Red
Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	Yellow
ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	Green
University Press	The existence of the university press and its engagement with Open Access	Yellow
Open Access Support	Support to researchers to make their research publications available in Open Access	Red
FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	Red
FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	Red
FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	Yellow
FAIR Data/Information	Information about the data archived and published by own research community	Red

FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	Red
FAIR Data/Assessment	Including research data in the researcher assessment methodology and research metrics	Red
Open Access Publishing	Harmonisation with Open Access standards	Yellow
Support	Support provided to researchers in research data management, FAIR data and data sharing	Red

At the moment, UP is not implementing the Plan S principles and is not officially advocating for the sharing of research manuscripts as preprints.

The HEI supports new forms of scholarly publishing from third parties, which are dedicated to OA approaches declaratively or selectively through particular projects.

UP actively advocates for the use of author identifier systems such as ORCID across the institution.

The HEI has an established University press, but it is not engaged with OA.

The University does not currently provide support for OA publishing, does not have a research data policy or strategy that includes FAIR principles and does not operate a data stewardship service.

The HEI has an infrastructure storage which is not exhaustive in terms of the open data and FAIR data. This is in the process.

The HEI does not gather information about the data archived and published by its research community, does not publish all metadata, and does not recognize research data as a valuable output in research assessments.

The University publishes scientific journals (e.g., Pannon Management Review), but it is not OA.

HEI currently does not provide sufficient support in the area of research data management, FAIR data and data sharing.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 207 Future of Scholarly Communication and Publishing / Roadmap for Successful Implementation – UP

Indicator	Recommendations
Plan S	Conduct an internal review to determine the level of harmonization of current UP OS practices and initiatives to Plan S. Next, develop and adopt policies, and guidelines or update articles in existing documents to align with Plan S.
Preprints Advocacy	Initiate advocacy for the sharing of research manuscripts as preprints through a concise advocacy campaign.
Scholarly Publishing from Third Parties	Consider moving a step further from the project-based support in this context. Identify and evaluate suitable third-party OA initiatives (e.g., OpenEdition and Knowledge Unlatched), initiate collaborations, and develop more formalized support structures (e.g., financial support schemes, administrative assistance, etc.).
University Press	Improve the OS aspects of the University press by implementing a complementary OA model.
Open Access Support	Conduct a needs assessment to identify key areas where support is most needed for researchers in terms of engaging in OA publishing. Next, focus on identified key areas and establish basic support structures. Consider integrating support

mechanisms such as training for researchers (including doctoral candidates), institutional website(s) on Open Access to research publications, developing open research strategy and vision, linkages to career evaluation and promotion within the institution, facilitating administrative reporting of publications in projects, funding for publishing in Open Access journals (APCs), guidelines providing clarification of legal issues related to linking, sharing and re-using Open Access content, establishment of specific services (e.g. helpdesks) for researchers, and legal support.

FAIR Data/Policy Integration

Initiate the development of a research data policy or strategy which will include FAIR principles. This document should contain policies and guidelines for managing, storing, and sharing research data and metadata.

FAIR Data/Stewardship

Assess the specific needs for data stewardship services at UP, then plan and initiate the establishment of a dedicated service to provide data stewardship to researchers.

FAIR Data/Infrastructure

Consider expanding the existing repository to include access to research data in accordance with all FAIR principles, or establishing a dedicated data repository. Alternatively, explore strategic partnerships with other organisations that offer data repository services.

FAIR Data/Information

Build on the infrastructure of the existing repository to include gathering and managing information about the research data generated by the researcher (e.g., datasets, code, etc.).

FAIR Data/Metadata Publishing

Establish and implement a standardized metadata framework for all research data generated or obtained at the University level. Furthermore, create a metadata publishing policy to enable publishing and providing free access to metadata. Finally,

FAIR Data/Assessment

upgrade UP's repository to support the storage and publication of metadata.

Integrate the recognition of research data as a valuable output for research assessments in the existing assessment framework. It is important to regulate how data contributions are measured and evaluated.

Open Access Publishing

First, promote OA publishing by encouraging researchers to submit their work to reputable OA journals, provide guidance on selecting suitable OA platforms, but avoiding predatory journals, and support APC costs. Next, consider and explore partnerships with existing publishers to co-publish or improve OA support for UP's researchers. Finally, consider using one of the OA models for the UP's scientific journal.

Support

Conduct a needs assessment to identify key areas where support is most needed for researchers in terms of research data management, FAIR principles, or data sharing. Next, focus on identified key areas and establish basic support structures. Consider integrating support mechanisms such as training for researchers (including doctoral candidates), planning stewardship and sharing of FAIR outputs, finding and reusing data from existing sources, using or developing FAIR research tools/services, preparing and documenting data/code to make outputs FAIR, publishing FAIR outputs on own or recommended repositories, recognising, citing and acknowledging contributions, developing open research strategy and vision, complying with legal and ethical requirements, FAIR principles, funding for implementing FAIR principles, and finding (other) sources of training and advice on FAIR data.

The following section evaluates OS practices related to the Rewards, Incentives, and Recognition pillar, identifying key gaps.

Table 208 Rewards, Incentives, and Recognition | GAP Analysis – UP

Indicator	Description	Result
Open Science Incentives	Incentives for researchers developing Open Science activities	Yellow
Academic assessment	Open Science elements as part of academic assessment	Red
HR	Open Science dimensions in HR and career frameworks	Red
Recognition and Rewards	Recognising and rewarding Open Science practices	Red
Policy Transparency	Open and easily accessible policies on researcher evaluation	Red

UP does not currently provide any incentives for researchers to engage in OS activities. This is in the process.

Academic assessment at UP currently follows the accepted academic research rules by the Hungarian Academy of Science and includes elements such as the quality of the articles, class hours, and participation in schooling events. It is not currently harmonized with pertinent OS criteria.

Furthermore, the University does not integrate OS practices as an explicit element in its HR and career frameworks and does not have a system in place to assess how individuals, teams, or units integrate OS into their daily practices. Therefore, they are not rewarded.

At the moment, UP does not make its policies on researcher evaluation openly and easily accessible.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 209 Rewards, Incentives, and Recognition | Roadmap for Successful Implementation – UP

Indicator	Recommendations
Open Science Incentives	<p>Finish the development of incentive programs tailored to UP’s researchers. Ensure that HEI provides incentives for researchers developing OS activities (e.g., financial rewards, research grants, recognition awards, project participation opportunities, career evaluation incentives, etc.).</p>
Academic assessment	<p>Explore ways to incorporate OS elements into UP’s academic assessment frameworks. Consider OS elements such as depositing of research articles in a repository, OA publishing of research articles in OA journals (via payment of APCs), OA books, OA archival or special collections, preprints, depositing of data in a repository, research data management plans, data sharing, open research protocols, open source research software and code, open education, open evaluation, open collaborative tools, co-creation platforms, transdisciplinary research platforms, co-design of research projects, Citizen Science, crowdsourcing practices, and science outreach and communication.</p>
HR	<p>Develop OS-focused HR policies or review and revise existing HR policies to explicitly integrate OS criteria regarding recruitment, performance evaluations, and career advancements. Clearly define how engagement in OS activities influences these processes.</p>
Recognition and Rewards	<p>Develop and establish assessment frameworks which contain clear criteria for recognising and rewarding OS practices (e.g., as part of annual reviews, through monthly/quarterly/yearly OA compliance reports, etc.).</p>

Policy
Transparency

Ensure that the researcher evaluation policies are easily accessible to all stakeholders, ideally through the University's official website, and available in multiple formats.

The following section evaluates OS practices related to the Research Integrity pillar, identifying key gaps.

Table 210 Research Integrity | GAP Analysis – UP

Indicator	Description	Result
Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	
ALLEA Code	Harmonisation with ALLEA Code	
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	
Training and Accreditation	Training and accreditation on research integrity pertaining to Open Science	

UP currently does not have a research integrity code or policy that specifically embraces OS principles, does not currently adhere to the ALLEA Code, and has not yet adopted the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers.

The University does not provide regular training or accreditation programs on research integrity that incorporate OS principles at this moment. This is a gap which can inhibit researchers from fully understanding and integrating ethical OS standards into their daily practices.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 211 Research Integrity | Roadmap for Successful Implementation – UP

Indicator	Recommendations
Research Integrity Code/Policy	Initiate the development of a research integrity code that integrates OS principles, and includes aspects such as data sharing, OA publishing, etc.
ALLEA Code	Adopt the ALLEA Code, and align institutional policies and practices accordingly.
European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adopt the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers, and align institutional policies and practices accordingly.
Training and Accreditation	Develop and Implement regular training and accreditation programs on research integrity related to OS. Ethical, legal, and social aspects of research should be covered.

The following section evaluates OS practices related to the Education and Skills pillar, identifying key gaps.

Table 212 Education and Skills | GAP Analysis – UP

Indicator	Description	Result
Training	Skill training in Open Science	Yellow
Audience	Mandatory Open Science skills training for staff, researchers, and students	Red

Rewards and Incentives

Rewarding and incentivising
Open Science skills development



Tailored Skill Training

Open Science skill training
specifically tailored to groups of
staff/students



The University currently does not provide skill training that covers all OS pillars. This is in the process. Therefore, the second and fourth indicators are not fulfilled as well.

UP currently does not provide rewards or incentives to staff and students with regard to OS skills development which is a gap that may inhibit motivation and therefore lower participation rates.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 213 Education and Skills | Roadmap for Successful Implementation – UP

Indicator	Recommendations
Training	Develop an extensive, exhaustive and structured OS skills training program that covers all OS pillars.
Audience	Ensure that the future established OS skills training program has mandatory participation for certain stakeholders according to their roles in developing OS practices at UP (staff, students, etc.). Also, consider making participation mandatory during the onboarding phase for new staff members.
Rewards and Incentives	Develop and implement a program that specifically rewards, and incentivises staff and students with regard to OS skills development. Take into consideration integrating things like certificates and various forms of public acknowledgement. Also, consider integrating participation in OS skill training into

the performance evaluation frameworks and career advancement processes.

Tailored Skill Training

Ensure that the future established OS skills training program is tailored specifically to the needs of diverse stakeholders across the HEI. This can be done by assessing the training needs of different groups of stakeholders early in the development process.

The following section evaluates OS practices related to the Citizen Science pillar, identifying key gaps.

Table 214 Citizen Science | GAP Analysis – UP

Indicator	Description	Result
Citizen Science Policy	Documents that guide Citizen Science	Red
Single Point of Contact	Single point of contact for Citizen Science	Green
Assessment	Assessing Citizen Science contributions and adapting research evaluation and reputation systems accordingly	Red
ECSA Principles	ECSA principles implementation support	Red
Support and Training	Support and training for researchers in Citizen Science	Red

At the moment, UP lacks documents that guide Citizen Science activities across the University, which represents a strategic gap.

The University has an established single point of contact for Citizen Science.

Citizen Science contributions are currently not being assessed and the formal research evaluation or reputation systems are not adapted accordingly, which may limit recognition and incentivization for researchers who engage in Open Science activities.

UP does not widely, strategically and formally support the implementation of the ECSA 10 Principles of Citizen Science.

Finally, UP does not offer ongoing support and training for researchers in regard to Citizen Science, potentially limiting the capacity of researchers to engage effectively with the public and to conduct Citizen Science projects that follow high scientific and ethical standards.

The following roadmap outlines actionable recommendations to address the identified gaps.

Table 215 Citizen Science | Roadmap for Successful Implementation – UP

Indicator	Reccomendations
Citizen Science Policy	Develop a document that guides Citizen Science at UP, and which aligns with your OS frameworks and engagement goals. This document should define Citizen Science principles, address ethical considerations (e.g., data privacy, recognition of citizen scientists, etc.), and provide clear guidelines or policies related to the main elements of Citizen Science and relevant processes.
Assessment	Develop concise assessment criteria for Citizen Science contributions, and modify the current research evaluation frameworks to consider Citizen Science contributions. This can include recognizing various outputs such as Citizen Science datasets, community reports, etc.
ECSA Principles	Ensure the formal recognition of the ECSA 10 Principles at the institutional level, adapt the necessary strategic documents accordingly and enable their effective implementation.

Support and Training

Establish dedicated support mechanisms for Citizen Science at the institutional level (e.g., helpdesk, online resources, mentorship programs, etc.). Develop specific Citizen Science training programs in deficient areas, in accordance with researchers' needs, which cover important subjects such as designing Citizen Science projects, community engagement mechanisms, and ethical considerations. If applicable, integrate Citizen Science training into the existing and broader researcher development programs.

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7 Annex I Table of Indicators

Category	Indicator	Description	Target Value	Literature
Cultural Change/Leadership	Open Science Policy	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science	Strategic document related to Open Science and/or particular documents related to various aspects of Open Science exist and they are exhaustive (cover all pillars of Open Science).	Pathos 2023, EUA - Open Science Survey 2021, AVOTT 2024, TORCH 2022
Cultural Change/Leadership	Senior manager	Appointed senior manager for Open Science	HEI/RI has appointed a senior manager to lead Open Science approaches across all eight pillars of the Open Science identified by the European Commission	LERU 2018, TORCH 2022
Cultural Change/Leadership	Programme of Cultural Change	Developed programme of cultural change	HEI/RI has developed a programme of cultural change, which is necessary to support the changes in principle and practice which Open Science brings	LERU 2018, TORCH 2022
Cultural Change/Leadership	Communication	Developed communication strategy	HEI/RI has developed a communication strategy, which enables the whole university body to become familiar with Open Science practices	LERU 2018, TORCH 2022

Cultural Change/Leadership	Community	Established Open Science Community	HEI/RI has founded or is connected to an active Open Science Community to communicate the purpose and practical implementations of the underlying principles	TORCH 2022
The European Open Science Cloud (EOSC)	Policy Commitment	Signed EOSC Declaration	HEI/RI has signed the EOSC Declaration as a statement of commitment at a local level	LERU 2018
The European Open Science Cloud (EOSC)	International Collaboration	Involvement in the EOSC Association	HEI/RI is involved in the EOSC Association	TORCH 2022
The European Open Science Cloud (EOSC)	Infrastructure Access	Institutional access to the requisite infrastructure	HEI/RI has ensured institutional access to the requisite infrastructure, such as a locally-managed data repository where research data is available for sharing and reuse, or ensured that researchers understand where third-party storage solutions are available, which can themselves be part of the EOSC	LERU 2018, TORCH 2022
The European Open Science Cloud (EOSC)	Infrastructure Development	Provided search and discovery service	HEI/RI has provided a search and discovery service, enabling users to	LERU 2018, TORCH 2022

			find what research data is available and where it is located.	
Next-Generation Metrics	HR	New forms of research evaluation	HEI/RI has embedded new forms of research evaluation in internal processes for promotion/reward and research evaluation itself	LERU 2018, TORCH 2022
Next-Generation Metrics	Guidance	Guidance for research administrators and academics on good and bad practices	HEI/RI has constructed guidance for research administrators and academics on good and bad practices in the use of traditional bibliometrics and in the development of new metrics, and that they work with the scientific community in this endeavour	LERU 2018, TORCH 2022
Next-Generation Metrics	Training	Training for junior researchers, particularly early-stage doctoral researchers	HEI/RI has provided training to junior researchers, particularly early-stage doctoral researchers, enabling them to embrace the change of culture and practice which the responsible use of metrics brings	LERU 2018, TORCH 2022
Next-Generation Metrics	DORA	Signing DORA and implementing DORA recommendations	HEI/RI has joined the signatories of DORA and started with the	TORCH 2022

		implementation of DORA recommendations		
Next-Generation Metrics	ARRA	Signing ARRA and implementing ARRA Principles	HEI/RI has joined the signatories of ARRA and started with the implementation of ARRA Principles	EU Commission 2022
Mutual Learning / Collaboration	Stakeholders	Collaboration with external stakeholders	HEI/RI has a concerted approach with external stakeholders in the area of Open Science	EUA - Open Science Survey 2021, AVOTT 2024
The Future of Scholarly Communication and Publishing	Plan S	State of the implementation of Plan S	HEI/RI is taking steps to harmonise with the Plan S	EUA - Open Science Survey 2021, TORCH 2022
The Future of Scholarly Communication and Publishing	Preprints Advocacy	Advocating for the share of research manuscripts as preprints	HEI/RI actively advocates for the share of research manuscripts as preprints	TORCH 2022
The Future of Scholarly Communication and Publishing	Scholarly Publishing from Third Parties	Support for the new forms of scholarly publishing from third parties dedicated to Open Access approaches	HEI/RI supports new forms of scholarly publishing from third parties dedicated to Open Access approaches.	TORCH 2022

The Future of Scholarly Communication and Publishing	ORCID Advocacy	Advocating the use of author identifier systems such as ORCID	HEI/RI actively advocates the use of author identifier systems such as ORCID	LERU 2018, TORCH 2022
The Future of Scholarly Communication and Publishing	University Press	The existence of the university press and its engagement with Open Access	HEI/RI has a university press and it is actively engaged with Open Access	TORCH 2021
The Future of Scholarly Communication and Publishing	Open Access Support	Support to researchers to make their research publications available in Open Access	HEI/RI provides multiple forms of support to researchers to make their research publications available in open access (both through repositories and open access publishing)	EUA - Open Science Survey 2021, TORCH 2021
The Future of Scholarly Communication and Publishing	FAIR Data/Policy Integration	FAIR principles as a part of research data policy or strategy	HEI's/RI's research data policy or strategy includes FAIR principles	TORCH 2022
The Future of Scholarly Communication and Publishing	FAIR Data/Stewardship	Dedicated service to provide data stewardship to researchers	HEI/RI has established services for data stewardship	LERU 2018, TORCH 2022

The Future of Scholarly Communication and Publishing	FAIR Data/Infrastructure	Access to an infrastructure storage and publication of research data	HEI/RI provides access to an infrastructure storage and publication of research data	LERU 2018, TORCH 2022
The Future of Scholarly Communication and Publishing	FAIR Data/Information	Information about the data archived and published by own research community	HEI/RI gathers information about the data archived and published by own research community	LERU 2018
The Future of Scholarly Communication and Publishing	FAIR Data/Metadata Publishing	Publishing metadata and ensuring free access to metadata	HEI/RI publishes metadata and provides free access to metadata.	LERU 2018, TORCH 2022
The Future of Scholarly Communication and Publishing	FAIR Data/Assessment	Including research data in the researcher assessment methodology and research metrics	HEI/RI includes research data in the researcher assessment methodology and research metrics	LERU 2018, TORCH 2022
The Future of Scholarly Communication and Publishing	Open Access Publishing	Harmonisation with Open Access standards	HEI's/RI's scientific journals comply with Open Access standards	TORCH 2022

The Future of Scholarly Communication and Publishing	Support	Support provided to researchers in research data management, FAIR data and data sharing	HEI/RI provides extensive support to researchers in the area of research data management, FAIR data and data sharing	EUA - Open Science Survey 2021
Rewards, Incentives, and Recognition	Open Science Incentives	Incentives for researchers developing Open Science activities	HEI/RI provides incentives for researchers developing Open Science activities	EUA - Open Science Survey 2021
Rewards, Incentives, and Recognition	Academic assessment	Open Science elements as part of academic assessment	HEI/RI has implemented all Open Science elements as part of its approach to academic assessment	EUA - Open Science Survey 2021, AVOTT 2024
Rewards, Incentives, and Recognition	HR	Open Science dimensions in HR and career frameworks	HEI/RI has integrated Open Science dimensions in their HR and career frameworks as an explicit element in recruitment, performance evaluation and career advancement policies, so that research and teaching staff are appropriately recognised and rewarded for practising Open Science	LERU 2018, EU Commission 2020, TORCH 2022
Rewards, Incentives, and Recognition	Recognition and Rewards	Recognising and rewarding Open Science practices	HEI/RI has developed mechanisms for recognising and rewarding Open	LERU 2018, TORCH 2022

			Science practices anchored in broad-based support	
Rewards, Incentives, and Recognition	Policy Transparency	Open and easily accessible policies on researcher evaluation	HEI/RI makes the policies on researcher evaluation open and easily accessible	LERU 2018, TORCH 2022
Research Integrity	Research Integrity Code/Policy	Research integrity code/policy embracing Open Science principles	HEI/RI has a research integrity code which embraces the principles of Open Science	LERU 2018, EU Commission 2020
Research Integrity	ALLEA Code	Harmonisation with ALLEA Code	HEI/RI abides by the European Code for Research Integrity (ALLEA Code) and the Open Science provisions it contains	LERU 2018
Research Integrity	European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	Adoption of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	HEI/RI has adopted research integrity principles of the European Charter for Researchers and the Code of Conduct for Recruitment of Researchers	TORCH 2022
Research Integrity	Training and Accreditation	Training and accreditation on research integrity	HEI/RI ensures that all researchers receive regular training and accreditation on research integrity pertaining to Open Science, including	EU Commission 2020

		pertaining to Open Science	the ethical, legal and social implications of their research practices	
Education and Skills	Training	Skill training in Open Science	HEI/RI offers skill training specifically in Open Science taking into account all eight pillars	LERU 2018, TORCH 2022
Education and Skills	Audience	Mandatory Open Science skills training for staff, researchers, and students	HEI/RI has Open Science skills training mandatory for staff, researchers, and students	LERU 2018
Education and Skills	Rewards and Incentives	Rewarding and incentivising Open Science skills development	HEI/RI rewards, and incentivises staff and students with regard to Open Science skills development	TORCH 2022
Education and Skills	Tailored Skill Training	Open Science skill training specifically tailored to groups of staff/students	HEI/RI has Open Science skill training specifically tailored to groups of staff/students	TORCH 2022
Citizen Science	Citizen Science Policy	Documents that guide Citizen Science	HEI/RI has one or more documents, separately or included in other documents, that guide Citizen Science	AVOTT 2024

Citizen science	Single Point of Contact	Single point of contact for Citizen Science	HEI/RI has, where viable, a single point of contact for Citizen Science within the organisation	LERU 2018, TORCH 2022
Citizen science	Assessment	Assessing Citizen Science contributions and adapting research evaluation and reputation systems accordingly	HEI/RI has developed ways of assessing Citizen Science contributions and has adapted research evaluation and reputation systems accordingly	LERU 2018, TORCH 2022
Citizen science	ECSA Principles	ECSA principles implementation support	HEI/RI supports the implementation of the European Citizen Science Association's principles	TORCH 2022
Citizen Science	Support and Training	Support and training for researchers in Citizen Science	HEI/RI offers support and training for researchers in Citizen Science	AVOTT 2024
Success Stories and Best Practices	Success stories and best practices	Success stories and best practices on Open Science	-	EUA - Open Science Survey 2021

8 Annex II Open Science Questionnaire

This questionnaire was developed through the BEAMING Project's Work Package 7 (Boosting Open Science practices), Task 7.2 Assessment of Open Science practices in EU and widening countries which aims to perform a comprehensive review of institutional research policies, procedures, and practices, with a particular focus on Open Science practices and a comparison with international best practices. The findings will be synthesised in a series of case studies, including roadmaps to successful implementation, which will all be summarised in the BEAMING Open Science Case Study Book (D7.1).

The structure of the questionnaire is essentially based on the 8 pillars of Open Science (sections 2–9), with an additional section that addresses some horizontal indicators that support the overall implementation of Open Science principles and practices (section 1).

10. Cultural Change/Leadership
11. The European Open Science Cloud (EOSC)
12. Next-generation Metrics
13. Mutual Learning/Collaboration
14. Future of Scholarly Communication and Publishing
15. Rewards, Incentives, and Recognition
16. Research Integrity
17. Education and Skills
18. Citizen Science

The questions are related to different aspects of Open Science practices which are being implemented in 12 targeted higher education institutions (HEIs) and research institutes (RIs), and have an aim to collect the information necessary for conducting GAP analyses.

Although most questions infer a yes/no type of answer, they are purposefully designed as open-ended. Therefore, **please elaborate on the answers** as much as possible, especially if the answer cannot fit into the simple yes/no dichotomy as we will use your elaboration as valuable input to deliver higher-quality recommendations).

The questionnaire's target groups are representatives of the engaged HEIs and RIs, primarily:

- **Institutional Leaders** (e.g., Rectors, Vice-Chancellors, Directors of Research Institutes, Heads of Departments).
- **Research Policy Makers** (e.g., Individuals responsible for developing and implementing research policies at the HEI/RI level).
- **Open Science Practitioners** (e.g., Open Science managers, Researchers actively involved in Open Science practices, and Open Science coordinators or officers).
- **IT and Library Services** (e.g., Heads of library services, and IT managers responsible for research data infrastructure).
- **Research Support Staff** (e.g., Research managers, grants officers and data stewards and repository managers).
- **Researchers involved in Open Science practices** (e.g., Early career researchers and senior researchers)

Answering the questions requires respondents' knowledge about their HEIs/RIs Open Science policies, procedures, and practices. Therefore, we encourage the Open Science Task Force members to analyse it and **disseminate it to as many target groups/individuals as needed to complete it.**

Please compile all the inputs and send back one consolidated version of the questionnaire with the background information filled in by all participating respondents.

Responses will be kept strictly anonymous and confidential. No personal identifying information will be associated with your responses in any reports or publications resulting from this interview.

This questionnaire is delivered on 24 October 2024 to the members of the BEAMING Open Science Task Force, where each consortium partner is represented. All partners from the relevant 12 HEIs/RIs are asked to disseminate and submit the compiled and completed questionnaire to the T7.2 leader (IRI) via email (sinisa.borota@iri.rs) by **7 November 2024**.

If you have any questions or require assistance with the questionnaire, please contact sinisa.borota@iri.rs.

Thank you very much for your participation!

Cultural change/ Leadership

Does your organisation have one or more documents that guide Open Science and research throughout your HE/RI?

Policy documents refer to all guidelines, policies, strategies, codes of conduct, recommendations, instructions, etc., that cover Open Science and research as a whole.

Please provide links to the documents which are openly published.

Has your HEI/RI appointed a senior manager to lead Open Science approaches across all eight pillars of Open Science?

Has your HEI/RI developed a programme of cultural change, which is necessary to support the changes in principle and practice that Open Science brings?

Does your HEI/RI have communication strategies which enable the whole university body to become familiar with Open Science practices?

Is there an Open Science Community your HEI/RI founded or is connected to, in order to boost the Open Science movement?

The European Open Science Cloud (EOSC)

Has your HEI/RI signed the EOSC Declaration as a statement of commitment to this pillar of Open Science?

Is your HEI/RI involved in the EOSC Association? Are you a member?

Has your HEI/RI established a data repository, or does it have access to a 3rd party repository/repositories which can interact with the EOSC?

Does your HEI/RI have a search and discovery service, enabling users to find what research data is available, and where it is located?

Next-Generation Metrics

Did your HEI/RI embed the new forms of research evaluation in its internal processes for promotion/reward and research evaluation? If yes, in which way?

Did your HEI/RI, via appropriate internal bodies, construct guidance for research administrators and academics on good and bad practices in the use of traditional bibliometrics and in the development of new metrics, working with the scientific community in this endeavour?

Did your HEI/RI give particular focus to early career researchers, particularly those embarking on a course of doctoral study, providing training to enable them to embrace the change of culture and practice that the responsible use of metrics brings?

Did your HEI/RI sign DORA and is it moving away from JIF/H-Indexes/#papers for research assessment?

Did your HEI/RI sign ARRA and did it start implementing ARRA Principles?

Mutual Learning / Collaboration

Does your HEI/RI have a concerted approach with other stakeholders in the area of Open Science (e.g. liaising with external organisations)?

Please elaborate and indicate, where appropriate, who at the institutional level is involved in these activities:

Future of Scholarly Communication and Publishing

Is your HEI/RI implementing the Plan S principles?

Does your HEI/RI advocate the share of research manuscripts as preprints?

Is your HEI/RI supporting new forms of scholarly publishing from third parties (e.g., OpenEdition and Knowledge Unlatched), which are dedicated to Open Access approaches?

Does your HEI/RI advocate the use of author identifier systems such as ORCID across the organisation?

Does your HEI/RI have a university press?

If yes, how engaged is it with Open Access?

What type of support does your HEI/RI provide to researchers to make their research publications available in Open Access (both through repositories and Open Access publishing)? (Tick all that apply)

- Training for researchers (including doctoral candidates)**
- Institutional website(s) on Open Access to research publications**
- Developing open research strategy and vision**
- Linkages to career evaluation and promotion within the institution**
- Facilitating administrative reporting of publications in projects**
- Funding for publishing in Open Access journals (APCs)**
- Guidelines providing clarification of legal issues related to linking, sharing and re-using Open Access content**
- Establishment of specific services (e.g. helpdesks) for researchers**
- Legal support**
- Other (please specify)**

Does your HEI/RI research data policy or strategy include FAIR principles?

Has your HEI/RI established a dedicated service to provide data stewardship to its researchers?

Does your HEI/RI provide access to an infrastructure storage and publication of research data?

If it does not, does your HEI/RI inform its researchers of available infrastructures that follow the FAIR principles?

Does your HEI/RI gather information about the data archived and published by its research community?

Does your HEI/RI publish all metadata about research data generated or obtained within its research community?

Does your HEI/RI include research data as a valuable output in research assessments?

Does your HEI/RI publish scientific journals?

If yes, how open they are and which OA model is in use (e.g., diamond, APC gold, hybrid)?

What type of support does your HEI/RI provide to researchers in the area of research data management, FAIR data and data sharing? (Tick all that apply)

- Training for researchers (including doctoral candidates)
- Institutional website(s) on research data management
- Planning stewardship and sharing of FAIR outputs
- Finding and reusing data from existing sources
- Using or developing FAIR research tools/services
- Preparing and documenting data/code to make outputs FAIR
- Publishing FAIR outputs on own or recommended repositories
- Recognising, citing and acknowledging contributions
- Developing open research strategy and vision
- Complying with legal and ethical requirements, FAIR principles
- Funding for implementing FAIR principles
- Finding (other) sources of training and advice on FAIR data
- Other (please specify)

Rewards, Incentives, and Recognition

Does your HEI/RI provide incentives for researchers developing Open Science activities (e.g. Open Access to research publications, data sharing, open review, citizen science, open education, etc.)?

If yes, please explain which ones:

Which of the following Open Science elements are part of your HEI/RI's approach to academic assessment? (Tick all that apply)

This may include your HEI/RI's assessment practices for career progression, performance evaluation of academic units and/or allocating funding within the institution.

- Depositing of research articles in a repository**
- Open access publishing of research articles in Open Access journals (via payment of APCs)**
- Open access books**
- Open access archival or special collections**
- Preprints**
- Depositing of data in a repository**
- Research data management plans**
- Data sharing**
- Open research protocols**
- Open source research software and code**
- Open education**
- Open evaluation**
- Open collaborative tools**

- Co-creation platforms**
- Transdisciplinary research platforms**
- Co-design of research projects**
- Citizen science**
- Crowdsource practices**
- Science outreach and communication**
- None of these elements are part of our approach to career assessment**

If none, please describe your institution's approach to academic assessment:

Does your HEI/RI integrate Open Science in its HR and career frameworks as an explicit element in recruitment, performance evaluation and career advancement policies?

Does your HEI/RI assess the extent to which individuals, teams or units integrate Open Science into their daily practice?

If yes, does it recognize and/or rewards them for this?

Does your HEI/RI make information about its policies on researcher evaluation open and easily accessible?

Research Integrity

Does your HEI/RI have a research integrity code/policy which embraces the principles of Open Science?

Does your HEI/RI abide by the European Code for Research Integrity (ALLEA Code) and the Open Science provisions it contains?

Did your HEI/RI adopt the European Charter for Researchers/The Code of Conduct for Recruitment of Researchers and does it entail Open Science principles?

Do all researchers in your HEI/RI receive regular training and accreditation on research integrity pertaining to Open Science, including the ethical, legal and social implications of their research practices?

Education and Skills

Does your HEI/RI offer skill training specifically in Open Science considering all of the eight pillars?

Is any Open Science skills training mandatory in your HEI/RI, and for which categories of staff/researchers/students?

Are any rewards and incentives offered to those who participate in Open Science training in your HEI/RI?

Is Open Science skills training in your HEI/RI specifically tailored to groups of staff/students? (i.e. early career researchers, disciplines, etc.)

Citizen Science

Does your HEI/RI have one or more documents, separately or included in other documents, that guide citizen science?

Documents guiding citizen science refer to all guidelines, policies, strategies, codes of conduct, recommendations, instructions, etc., that refer to citizen science. Citizen science can also be referred to as community science, crowd-sourced science, participatory science or volunteer monitoring.

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Is there a single point for citizen science within your HEI/RI?

Are citizen science contributions assessed in your HEI/RI, and research evaluation and reputation systems adapted accordingly?

Does your HEI/RI support the implementation of the ECSA 10 Principles of Citizen Science?

Does your HEI/RI offer support and training for researchers in citizen science?

Success Stories and Best Practices

Are there any success stories or best practices related to Open Science in your HEI/RI that you did not mention in the questionnaire, but you would like to share?

Background information

Higher education institution/research institute:

Name and surname:

Position:

Email address:

Name and surname:

Position:

Email address:

Name and surname:

Position:

Email address:

Date of completion: