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The Role of University Repositories in the Formation of Open Science Infrastructure and Strategy at the Institutional Level: Domestic and Foreign Experience (Using the Example of Lithuania)

Objective. The article is devoted to determining the place of university repositories in the open science ecosystem, which form the research infrastructure at the institutional level. **Methods.** The article uses research methods such as: analysis, synthesis, comparison and generalization. **Results**. The landscape of open research services, the authors of which are leading European developers, is considered. The European experience of implementing innovative systems that meet the FAIR principles is presented. The infrastructure of open science in Lithuania is rapidly improving in accordance with EU requirements and adopted regulatory provisions at the institutional level. An extensive network of electronic resources of open access to scientific metadata at Mykolas Romeris University is presented, and at the institutional level the repository occupies an important place. One of the important links in promoting open access at the institutional level is the academic library. Liaison librarians carry out advisory, informational and explanatory work, in particular on the issues of archiving scientific works to the university repository among scientists and researchers, and who are empowered with such powers in accordance with the adopted open science policy at Mykolas Romeris University. In Ukraine, which is a candidate for membership in the European Union, the active implementation of open access systems in accordance with UNESCO requirements and EU Directives is becoming an urgent requirement. **Conclusions.** University repositories in Ukraine need: updating software and hardware, modernizing technical facilities, and improving experience with the modern systems. These steps towards open science at the institutional level require funding.

Keywords: open science ecosystem, university repositories; the landscape of open research services in the European Union; open science at the institutional level in Ukraine; Lithuanian open science infrastructure; the role of academic libraries

Introduction

The ecosystem of open science and open access continues to develop, due to powerful international organizations and teams that improve the infrastructure of scientific communication of open data according to the FAIR principle (Ghent University, n.d.). Among the leading international projects of the European community that modernize their tools and services, are: OI4RRA (Open Infrastructures for Responsible Research Assessment) (Provost, 2025; https://ni4os.eu/; https://graspos.eu/), OpenAIRE (https://www.openaire.eu/), ROR (Airtable, n.d.), EOSC (European Open Science Cloud) (O'Neill, 2025; https://eosc-portal.eu/), Open Research Europe (ORE) (https://open-research-europe.ec.europa.eu/), Registry of Open Access Repositories (ROAR) (https://roar.eprints.org/), Directory of Open Access Repositories (OpenDOAR) (https://opendoar.ac.uk/), Registry of Open Access Repository Mandates and Policies (ROARMAP) (https://roarmap.eprints.org/), Generalist Repository Ecosystem Initiative (GREI) (The GREI Community, 2025), Global Research Infrastructure (GRI) (https://www.globalreporting.org/standards), MyResearchFolio (Xenou, 2025), COAR (https://coar-repositories.org/) etc.

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The infrastructure for hosting scientific research in open access as part of the open science (Kulyk, 2024) ecosystem needs further development both at the international (OpenAIRE, n.d.b; OpenAIRE, n.d.c; Habermann & Jones, 2024; Association of European Research Libraries (LIBER), 2025; LIBER, n.d.; Shearer et al., 2025; COAR, 2025; National Institutes of Health, n.d.; The GREI Community, 2025) and national levels. Among the pressing issues is the integration of most open repositories (University of Galway, n.d.; Joy et al., 2025; Brennan, Kiely, & Sanchidrián, 2024) (including institutional ones) into international open data systems (Aurora, n.d.; https://aurora-universities.eu/).

Taking into account previous scientific research by Ukrainian scientists (Luhovyi et al., 2023; Svistunov, Perkonos, Reznichenko, Subotin, & Tverdokhlib, 2022; Lubchych, 2023; Borozdykh, 2023; Drach, Petroie, & Borodiienko, 2024), we can identify international open research data systems that help shape open science infrastructures and strategies at the national and institutional levels. The objective of this scientific study is to show the role of university repositories in shaping the open access landscape in Ukraine and European countries, in particular Lithuania, using example of the open science policy experience at Mykolas Romeris University.

Methods

The research on this topic used scientific methods such as: analysis, synthesis, comparison and generalization. The analysis method reviewed international and domestic scientific services that form the infrastructure of open science. The synthesis allowed combining international and domestic experience of the ecosystem of open access to metadata of scientific information. The comparison and generalization method determined the role of university repositories in the formation of the infrastructure and strategy of open science at the institutional level, taking into account domestic and foreign experience.

Results and Discussion

Grant projects of scientists from Ukrainian universities (National Research Foundation of Ukraine (NRFU), n.d.; https://caelum.ut.ee/), with the support of the Ministry of Education and Science of Ukraine, contribute to the formation of an open science ecosystem at the national (Ministry of Education and Science of Ukraine, n.d.; Ministry of Education and Science of Ukraine, 2025a; National Repository of Academic Texts, 2025; Ministry of Education and Science of Ukraine, 2025b; Verkhovna Rada Ukrainy, 2023; UNESCO, 2025b) and institutional levels (Ivan Franko National University of Lviv, 2024; Oles Honchar Dnipro National University, n.d.; Uzhhorod National University, 2023).

Within the framework of the Open4UA grant project (EIFL, n.d.), leading scientists from Ukrainian universities:

1) Stated that the aforementioned Recommendations (clause 9 of part II) understand open science infrastructure as virtual or physical RI (Research Infrastructure) of general use (including basic scientific equipment and toolkits; knowledge-based resources such as collections of journals and open access platforms, archives, open bibliographic and scientometric systems; open infrastructure for computing and data processing, open laboratories, digital services that allow identifying scientific objects and managing data; open stands for testing innovative products; museums, science parks, research workshops, etc. The document also notes that “open science infrastructure objects are most often created by the collective efforts of communities and are of paramount importance for its long-term sustainability, as a result of which they should operate on

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a non-commercial basis and, to the greatest extent possible, ensure general, permanent and unrestricted access" (Luchenko et al., 2025, p. 58). The text of the draft Law of Ukraine "On Amendments to Certain Legislative Acts on the Implementation of the Concept of Open Science" is proposed (Luchenko et al., 2025, p. 73). In paragraph 2 of point 8 of the draft Law of Ukraine "On Amendments to Certain Laws of Ukraine on the Implementation of Open Science Principles" it is stipulated that scientific institutions and higher education institutions are obliged to: a) develop and implement institutional open access policies; b) provide the necessary infrastructure and support for the implementation of open access; c) take into account compliance with open access requirements when assessing the scientific activities of employees.

2) It is proposed to include in the University's open science infrastructure: a) the University's institutional repository - to provide unhindered access to scientific results, academic texts created by University researchers; b) the University's institutional data repository - to provide unhindered access to research data; c) the publishing platform of scientific periodicals - for the functioning of open access journals that provide free online access to the results of scientific research; d) the University's publishing platform - for publishing educational and scientific publications in open access; e) open scientometric platforms for monitoring and evaluating scientific activity; f) server capacities for storing and archiving scientific results, research data, open educational resources and tools for securely managing confidential research data; g) open software for conducting scientific activity; open laboratories. Individual elements of the University's open science infrastructure are implemented and supported both by the University itself and in cooperation with other organizations. Elements of the digital infrastructure of open science should be based, in particular, on open source software. These elements can be supported both from the state budget of Ukraine, managed by the University, and from sources not prohibited by the legislation of Ukraine, including special grant projects for the development of open science and the allocation of a target percentage for the development of open science infrastructure from each funded grant project (Vasyliev et al., 2025, p. 71).

Scientific Data Portal of Ukraine: UNESCO will support the creation of a centralized data portal that will contribute to achieving the goal of comprehensive digitalization in accordance with the Strategic Plan of the Ministry of Education and Science of Ukraine until 2027. Managed by the Junior Academy of Sciences of Ukraine (JAS) or another institution, this portal will integrate information from scientific participants nationwide, monitor war-related damages, and map sector needs. The clear mechanism and methodology of transmitting the information to the Ukraine Science Data Portal will be defined and the potential contributors of all levels will be informed and trained to use it. Built on the JAS platform and integrating other information systems, it will enhance them by adding necessary modules and content supporting the development of the National Electronic Scientific Information System (URIS) as well as modernization of the National Repository of Academic Texts (NRAT). The portal will provide real-time data to support the International Coordination Task Force, the Ukrainian Scientific Forum, and the Legal & Policy Task Force, strengthening Ukraine's science ecosystem and aiding recovery efforts (UNESCO, 2025b, p. 12).

The experience of Lithuanian university repositories shows their significant role in the open science ecosystem at the institutional level.

It is worth considering the trends of the formation of an open science and open access infrastructure in Lithuania, for example, at Mykolas Romeris University (MRU). The Lithuanian Academic Electronic Library Information System (hereinafter referred to as eLABa) is a national Lithuanian academic electronic library, which stores and makes publicly accessible scientific and study documents and/or their metadata. eLABa consists of: a) eLABa administrators' scientific

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and study document metadata base; b) eLABa user database; c) Lithuanian electronic theses and dissertations database (ETD); d) Lithuanian science (art) and study publications database (PDB); i) electronic object repository; f) statistics database; g) document printout database; h) eLABa administrative database. Lithuanian Virtual Library (LVB), created by automating libraries, unifies search and access to electronic information sources and virtual services. The innovative architecture of eLABa allows participation in the international European and worldwide OA projects, such as NDLTD, DRIVER, DART-Europe, PEER, OpenAIRE (https://www.elaba.lt/elaba-portal/pradzia).

Therefore, eLABa serves as a shared infrastructure that allows Lithuanian universities to store and manage various academic outputs, such as doctoral dissertations, theses, peer-reviewed journal articles, conference papers, research data, and other scholarly publications. These outputs are accessible both locally and through European and international platforms. The eLABa system is integrated with national research information systems and follows Lithuanian laws requiring open access to publicly funded research. It also follows international standards like the FAIR principles (Findable, Accessible, Interoperable, Reusable), which promote better data management and research transparency.

Notably, Mykolas Romeris University (MRU) actively participates in this national infrastructure. Due to MRU uses the eLABa module to manage its academic repository, allowing students, researchers, and faculty to store their research outputs following Open Access and institutional rules. Within this national framework, MRU has its own institutional repository, built on DSpace, which links to eLABa while also serving as a distinct portal for the university's academic community. This setup balances national standards with local identity. From 2013, Mykolas Romeris University (MRU) has been committed to advancing the ideals of open access. The university's rector has supported open science, emphasizing that "...the Open Science movement will progressively change traditionally closed scientific systems into ones that are more inclusive, accessible, efficient, and transparent" (Žalienė, 2022, p. 25). MRU's open access efforts aim to make the university's research freely available online. The university has an institutional open access policy and encourages its academic community to use open access. Also, depositing research outputs is part of the MRU academic process, supported by a policy that requires staff and doctoral candidates to archive their work in the repository, linking open access policy with research evaluation and career advancement. This approach is used to increase the visibility and impact of MRU's research, enhance citation rates, and provide access to research for the global community. To support this, the university has created guidelines on open access for researchers, holds regular seminars with experts, and provides training sessions to help researchers publish and share their work openly. Posters and leaflets are used to promote the benefits of open access.

In this way, the Lithuanian experience, with MRU as an example, provides a model for other countries reconciling national mandates with institutional independence. Since, repositories can be both standardized and experimental, both strategies of compliance and spaces of innovation, MRU has developed the role of liaison librarian within faculties. Liaison librarians at MRU's Faculty of Public Governance and Business, Faculty of Human and Social Studies, Faculty of Law, and others act as the first point of contact for researchers and doctoral students, building relationships between academic staff and the MRU library. The library's own structure supports this operational success. In addition, the Information Services and Training Group works with faculty departments to provide information literacy training, workshops on open science, and support for open educational resources. As well as, Library's Scientific Data Management Group not only manages publications in eLABa and the MRU repository, but also advises on scientometrics, research data policies, and open access governance.

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It is important to mention, the academic journals published by MRU are indexed in the Directory of Open Access Journals (DOAJ) (https://doaj.org/). As a result, all journals from MRU follow open access principles. Their content is freely available online: readers can read, download, copy, print, and search the content without permission from the publisher or authors. This aligns with the definition of open access in the Budapest Open Access Initiative (BOAI) (https://www.budapestopenaccessinitiative.org/). Open access journals published by MRU cover various areas of scientific research (MRU Research journals, n.d.).

Since 2022, MRU's electronic open access publications have been also available through the Martynas Mažvydas National Library of Lithuania (https://www.lnb.lt/en/about-library/main-information/about), raising their accessibility. In support of the broader open access movement, Mykolas Romeris University maintains active collaborations with key stakeholders in the field. The University is a member of several relevant organizations, including Crossref, the Lithuanian Association of Scientific Periodicals (LMPA) (https://serials.lt/en/about-lmpa/), and the Lithuanian Academic Publishers Association (LLA) (https://lla.lt/en/).

As of August 2025, MRU's institutional repository is integrated into the MRU CRIS, giving access to about 32,000 documents (https://cris.mruni.eu/cris/home). From 2021–2025, MRU academic staff published about 200 open access monographs, book chapters, textbooks, and teaching materials. In terms of journal articles, 617 open access articles were registered in Web of Science and/or Scopus. Additionally, 58 open access conference papers were indexed in Web of Science and/or Scopus. This does not include the huge number of other articles and conference contributions in international databases and published in international databases and peer-reviewed foreign journals with open access characteristics. According to the publication summary of Mykolas Romeris University, the number of open access publications increased steadily from 2021 to 2024, reaching 80.5% in 2024. The 2025 data currently shows 70.6% open access, but this is a preliminary figure, as the year is still ongoing and additional publications may be added (Mykolo Romerio Universitetas, 2025).

Table 1

MRU Publication Summary of Publications Available via Open Access

Years	Total publications	Publications available via open access	Percentage Open Access
2021	683	506	74.1%
2022	759	579	76.3%
2023	770	559	72.6%
2024	771	621	80.5%
2025	201	142	70.6% (in progress)

The University Library is also involved in the Lituanistika project—an international research database that collects and disseminates studies in the humanities and social sciences related to Lithuania's society, state, culture, language, and national identity (the code Lituanistika of project VP1-3.1-ŠMM-02-V-02-003).

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Conclusions

In conclusion, the Science Europe Working Group on Research Data prepared in 2019 the "Practical Guide to the International Alignment of Research Data Management" (Science Europe, 2019), in which it defined criteria for selecting reliable repositories. Developed by experts from Science Europe member organisations, this guide aimed to harmonise requirements for research data management (RDM) across research organisations. Originally published in 2019, it was updated in January 2021 to include recommendations to support the assessment of data management plans (DMPs) (Science Europe, 2021).

To form an open science infrastructure and strategy at the institutional level, it is necessary to: 1) consider the requirements for trusted (Conzett et al., 2022; Ševkušić, 2023; OpenAIRE, n.d.a) or certified repositories (Genova et al., 2021; SSHOC, n.d.; Kindling et al., 2022); 2) organize communication and cooperation with specialists in the national and international communities to resolve technical issues with software configuration; 3) determine priority steps for "protecting" data in case of emergencies due to technical or political reasons (Hedley, 2025); 4) migrate to DSpace-CRIS in collaboration with 4Science to improve compliance with FAIR principles, improve integration with global academic platforms and simplify workflows for researchers and with the help of special pipelines for seamless data import from platforms such as Web of Science, Scopus, OpenAlex and Zenodo (Rodrigues de Matos & Sicot, 2025); 5) configure data integration from the institutional repository to the National Repository (National Repository of Academic Texts, n.d.); 6) register the repository in international repositories registries: Registry of Open Access Repositories (ROAR), Directory of Open Access Repositories (OpenDOAR), Registry of Open Access Repositories Mandates and Policies (ROARMAP); 7) introduce competencies for library specialists to conduct consultations on placing various types of metadata in open access: articles, abstracts, conferences, dissertations, research data, results of grant projects, etc.

Successful experience in infrastructure operation MRU (Lithuania) combines a quantitative repository infrastructure (tens of thousands of records, with a high open-access percentage) with librarian faculty-level support. This turns open science into a strategic concept. The MRU Library example helps enrich the understanding of open science infrastructures in Lithuania. It shows that repositories succeed not only because of national systems like eLABa, but also because of institutional commitment to invest in its academic library, academic mediators, integrated publishing, and the active participation of faculties. In doing so, MRU exemplifies how academic infrastructure can become a living support for its community.

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Роль університетських репозитаріїв у формуванні на інституційному рівні інфраструктури та стратегії відкритої науки: вітчизняний та закордонний досвід (на прикладі Литви)

Мета. Стаття присвячена визначенню в екосистемі відкритої науки місця університетських репозитаріїв, що формують дослідницьку інфраструктуру на інституційному рівні. **Методика.** У статті використані такі методи дослідження, як аналіз, синтез, порівняння та узагальнення. **Результати.** Розглянуто ландшафт відкритих дослідницьких сервісів, авторами яких є провідні європейські розробники. Було представлено європейський досвід впровадження інноваційних систем, що відповідають принципам FAIR. Інфраструктура відкритої науки Литви швидко вдосконалюється відповідно до вимог ЄС та прийнятих на інституційному рівні нормативних положень. Представлена розгалужена мережа електронних ресурсів відкритого доступу до наукових метаданих в Університеті Міколаса Ромеріса, а на інституційному рівні важливе місце займає репозитарій. Однією з важливих ланок у просуванні відкритого доступу на інституційному рівні є академічна бібліотека. Бібліотекарі-контактори виконують консультативну, інформаційну та роз'яснювальну роботу серед науковців і дослідників, зокрема з питань архівування наукових робіт в університетському репозитарії. Такими повноваженнями співробітники бібліотеки наділені згідно з прийнятою політикою відкритої науки в Університеті Міколаса Ромеріса. В Україні, що є кандидатом на членство в Європейському Союзі, активне впровадження систем відкритого доступу відповідно до вимог UNESCO та Директив ЄС стає нагальною вимогою. **Висновки.** Університетським репозитаріям України потрібне оновлення програмного та апаратного забезпечення, модернізація технічних засобів та вдосконалення досвіду роботи з новітніми системами. Ці кроки до відкритої науки на інституційному рівні вимагають фінансування.

Ключові слова: екосистема відкритої науки; університетські репозитарії; ландшафт відкритих дослідницьких сервісів Європейського Союзу; відкрита наука на інституційному рівні в Україні; інфраструктура відкритої науки Литви; роль академічних бібліотек

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