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Advancing Ireland's Open Repository Landscape: A Strategic Roadmap

Funders

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Executive Summary

Advancing Ireland's Open Repository Landscape: A Strategic Roadmap is a comprehensive analysis of the current state, challenges, and potential of scholarly communication open repositories in Ireland. This report develops insights from data collected through interviews, surveys, self-assessment validation tools, stakeholder conversations, existing national work done to date, and broader international initiatives and best practices. It describes findings and proposes recommendations to advance open repositories, open access, and repository-related open infrastructures. Key findings indicate significant progress in promoting open access, with most open repositories demonstrating compliance with Plan S requirements and offering open licenses for content. However, challenges persist, including issues with metadata quality, resource limitations, and sustainability concerns. Despite these challenges, stakeholders are firmly committed to addressing these issues and driving positive change in the landscape. The report outlines a draft roadmap for 2025-2030 and beyond, focusing on strategic priorities such as strengthening repository infrastructure, enhancing metadata quality, promoting open mandates, embracing emerging technologies, capacity building and training, and fostering collaborative partnerships.
These initiatives aim to ensure the continued evolution of Ireland's open repository ecosystem towards greater openness, inclusivity, and sustainability. Looking beyond 2030, the report envisions a future where Ireland emerges as a global leader in open scholarly communication, leveraging innovative technologies and collaborative partnerships to drive positive change and foster a more significant impact for researchers, institutions, and society. Advancing Ireland's Open Repository Landscape: A Strategic Roadmap highlights the importance of ongoing collaboration, innovation, and strategic planning in shaping Ireland's open access and repository development future. By embracing these principles and working collectively towards common goals, Ireland can position itself at the forefront of open scholarly communication, driven by effective open repositories that enable a platform for positive change and innovation.

> "Ireland can position itself at the forefront of open scholarly communication, driven by effective open repositories that enable a platform for positive change and innovation.

[1] *National Action Plan for Open Research* (2022) https://doi.org/10.7486/DRI.ff36jz222; *National Open Research Landscape Report* (2021) https://doi.org/10.7486/DRI.5q485c938; *Coordinated Support for Open Access Repositories* (2021) https://doi.org/10.7486/DRI.j960fq90j; *National Open Access Monitoring* (2021) https://doi.org/10.7486/DRI.j673dv060; *National Framework on the Transition to an Open Research Environment* (2019) https://doi.org/10.7486/DRI.0287dj04d; *Research Information Management Recommended Roadmap* (2018) https://doi.org/10.7486/DRI.zs26b075c

Contents

Introduction

This report provides a comprehensive analysis of the current landscape of open repositories in Ireland, specifically focusing on funding, sustainability, challenges, recommendations, future trends, and the role of open repositories in Irish research and scholarship. We use the term 'open repositories' deliberately to include open access, preservation, and as a broader platform for open content, infrastructure, and innovation. We examine international best practices while assessing sustainability challenges such as underfunding and technical constraints. Recommendations are provided to enhance repository effectiveness and visibility while assessing future trends and the evolving role of open access in Irish research. By combining international best practices and engaging with stakeholders locally, nationally and internationally, the report aims to inform strategic decision-making and advance open access initiatives in Ireland, fostering collaboration and innovation within the scholarly community. Previous collective national work[1] on the issues and role of open repositories highlighted the critical challenge for open repositories as a) staff capacity and bringing all repositories up to a minimum level to support evolving open access requirements, b) the need to agree on a national standard for quality metadata, and c) to standardise metadata in line with international initiatives. In addition, this report proposes that repositories must have a clear purpose in an evolving open access landscape. The main aim is to enable the transformation of scholarly communications, providing a technical and community solution for research output that is more research-centric, community-governed, and responsive to diverse needs across the globe. This report is intended for stakeholders involved in open research, digital research, academic publishing, and repository management within Irish institutions, including researchers, repository managers, funding bodies, policymakers, and institutional leaders. It aims to inform strategic decision-making, policy development, and resource allocation to support advancing open access initiatives in Ireland. While every effort has been made to ensure the accuracy and comprehensiveness of the information presented in this report, it is important to acknowledge certain limitations. These include the subjective nature of the qualitative data gathered, potential biases in survey responses, and the dynamic nature of the open access landscape, which may impact the generalisability of findings.

Significance

An open access repository or open repository is a digital platform maintained by an institution or Research Performing Organisation (RPO) to collect, store, organise, and disseminate scholarly outputs produced by its academics, researchers, or students. These repositories commit to providing unrestricted open access (Green OA) to scholarly content, removing financial, legal, and technical barriers. Open repositories are essential platforms for democratising access to scholarly outputs (mainly research), fostering innovation, and advancing scholarly communication.

In the 1990s, internet connectivity grew, empowering RPOs to reclaim control over their published research outputs through open repositories. These repositories serve as archives, preserving and publishing institutional research outputs, including journal articles, data, books, conference items, and grey literature like reports and other unpublished material. Unlike subscription-based products that provide access to information, open repositories offer unrestricted access to anyone with an internet connection, aligning with the open access principles advocated by initiatives such as the Budapest Open Access Initiative[2] and mandates like Plan S.[3] Moreover, open repositories facilitate inclusivity across disciplines by hosting diverse scholarly materials.

They enhance the visibility and impact of research by making outputs readily available and contributing to reforming scholarly communication, fostering innovation within the publishing landscape. While their metadata records may vary in quality, open repositories generally adhere to standard formats, making them easily indexable by web search engines.

Additionally, studies have shown that making research outputs available through open repositories enhances their impact,[4] thereby elevating institutional visibility, prestige, and public value. Open repositories safeguard the future accessibility of open access content, mitigating the risk of losing access to research outputs due to funding or legal constraints. However, sustainable resourcing is imperative to ensure the preservation and longevity of these repositories.[5]

"Studies have shown that making research outputs available through open repositories enhances their impact, thereby elevating institutional visibility, prestige, and public value."

[2] Budapest Open Access Initiative (2002) https://www.budapestopenaccessinitiative.org/read/
[3] Plan S (2018) https://www.coalition-s.org/why-plan-s/
[4] Huang, CK., Neylon, C., Montgomery, L. *et al.* 'Open access research outputs receive more diverse citations.' *Scientometrics* 129, 825–845 (2024). https://doi.org/10.1007/s11192-023-04894-0
[5] 'The digital scholarly record is at risk' (2024) https://blogs.lse.ac.uk/impactofsocialsciences/2024/02/13/the-digital-scholarly-record-is-at-risk/

Open Access Policy

International and national policies are crucial in promoting open access and shaping the research landscape towards greater openness and inclusivity. Global organisations like UNESCO,[6] the EU Council,[7] and cOAlition S[8] advocate for open access to scientific information and focus on key enabling principles such as Persistent Identifiers (PIDs) and interoperable metadata. Plan S, a flagship initiative of cOAlition S, aims to mandate the open availability of state-funded research outputs. Additionally, more recent initiatives from cOAlition S, like *Towards Responsible Publishing*,[9] seek to foster a community-based scholarly communications system aligned with modern research needs. "*Towards Responsible Publishing*" also affirms that scholars should be able to publish their work where and when they choose and that the scholarly community themselves controls the means of scholarly-led communication and states:

> *"Research is a social endeavour that produces and scrutinises research results to create trusted knowledge for the benefit of society. Because this social process of dissemination and discourse thrives on the largest possible participation and knowledge exchange, research funding and performing organisations promote the concept of "open science": research and society are best served if research results are shared openly and as early as possible."*

In Ireland, initiatives like the National Open Research Forum (NORF)[10] and funders such as Science Foundation Ireland (SFI) (soon to be amalgamated as *Taighde Éireann - Research Ireland*)[11] endorse open access principles and aim to strengthen Ireland's network of open repositories, aligning with international best practices and initiatives. In Europe, the European Commission mandates Member States to implement clear policies for open access to scientific publications and research data.

Horizon Europe encourages and rewards good open access practice for publications and data management, highlighting the importance of open repositories in open practice, preservation, and dissemination of research outputs. Across the globe, various regions exhibit diverse approaches towards fostering open access and promoting open practice. In the United States, federal mandates show the significance of open accessibility to federally funded research. Latin American and Caribbean nations have emerged as front-runners, showcasing their commitment through policy declarations and tangible initiatives,[12] positioning themselves as pioneers in open access policy formulation and infrastructure development. In Southeast Asia, while there is evident support for open access, the absence of comprehensive national policies remains challenging, highlighting the necessity to diminish reliance on traditional publication metrics and advocate for open science principles. Meanwhile, despite regional frameworks like LIBSENSE[13] in Africa, the continent encounters obstacles in establishing national open access policies and repositories, primarily due to resource limitations and expertise gaps. Nonetheless, initiatives like Open Research Africa and AfricaOSH are actively tackling these hurdles, along with thematic international platforms such as OpenASFA,[14] striving to foster a culture of open practice across the continent.

Collective and national policies play a crucial role in advocating a change in culture for open access. Policy is a recognised and powerful tool to shape an inclusive research landscape to enhance availability. A broader and robust policy approach is also vital in encouraging the further development and use of open infrastructures, workflows, and repositories.

[6] *UNESCO* 'Recommendation on Open Science' (2023) https://www.unesco.org/en/open-science/about
[7] 'EU Council conclusions' (2023) https://data.consilium.europa.eu/doc/document/ST-9616-2023-INIT/en/pdf
[8] *Making full and immediate Open Access a reality* (2021) https://www.coalition-s.org/
[9] *Towards Responsible Publishing* (2023) https://www.coalition-s.org/towards-responsible-publishing/
[10] National Open Research Forum (NORF) https://www.norf.ie
[11] Science Foundation Ireland (SFI) https://www.sfi.ie
[12] Minniti, S., Santoro, V. & Belli, S. 'Mapping the development of Open Access in Latin America and Caribbean countries. An analysis of Web of Science Core Collection and SciELO Citation Index' (2005–2017). *Scientometrics* 117, 1905–1930 (2018). https://doi.org/10.1007/s11192-018-2950-0
[13] LIBSENSE https://libsense.ren.africa
[14] Castillo, D. J., Vicary, T., Kalentsits, M., Soomai, S. S., & MacDonald, B. H. (2023). 'Ensuring equitable access to ocean and coastal information to advance knowledge and inform decision-making: The global Aquatic Sciences and Fisheries Abstracts.' *Ocean & Coastal Management*, 231, 106399. https://doi.org/10.1016/j.ocecoaman.2022.106399)

Background

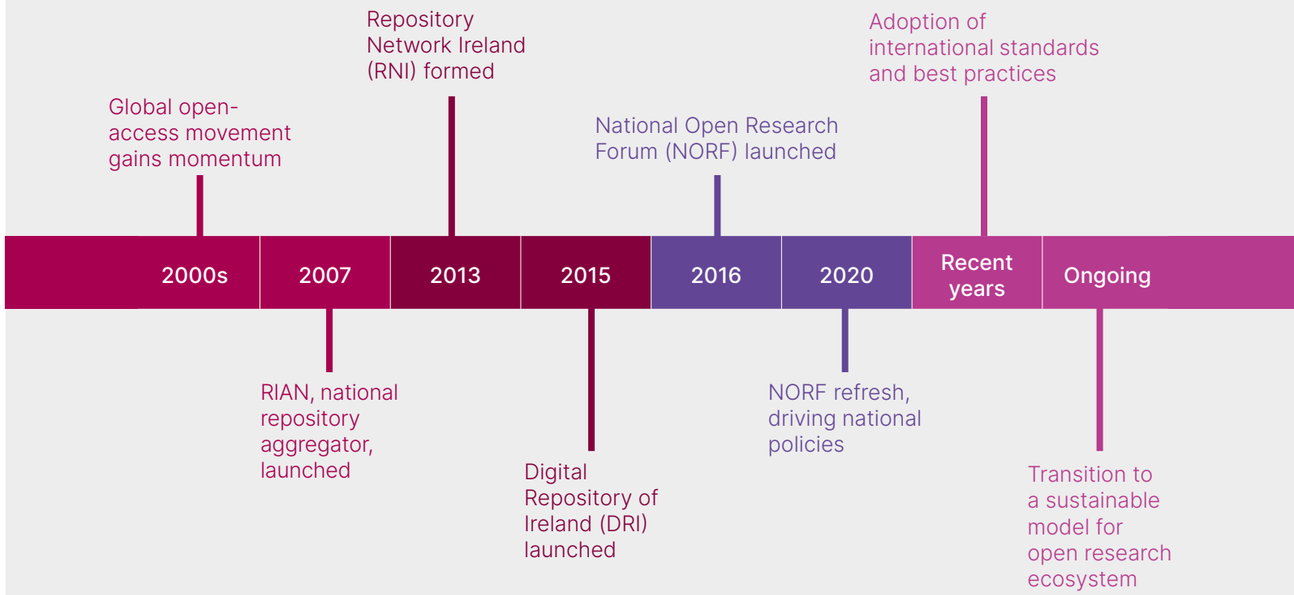
Ireland's landscape and history of open repositories show the commitment to developing and sustaining open research infrastructures, from early initiatives to tackling more profound challenges to building sustainable national open research infrastructures. The journey towards creating a more equitable and sustainable scholarly publishing landscape is still in progress. As the landscape of open repositories in Ireland continues to evolve, we draw inspiration from its history, the lessons learned, and emerging international best practices to advance the cause of open research in the global scholarly community.

The origins of open repositories in Ireland can be traced back to the early 2000s when the global open access movement gained momentum. Irish universities and research institutions recognised the importance of making research outputs freely accessible to the public by breaking down barriers to information and encouraging broader collaboration. The Research Multi-institution Repository (RIAN) was the national repository aggregator from 2007 to 2021. RIAN played a crucial role in aggregating content from various heterogeneous repositories and helped enable a sense of community among open access adopters. Its focus on metadata standards, advocacy of Green OA, and support for repository managers in achieving compliance with global content aggregators contributed to developing the Irish open access ecosystem. Between 2007 and 2009, the number of Irish open repositories registered with OpenDOAR doubled to ten, signalling the strong commitment of the then seven Irish university libraries to open access. The evolution of open repositories in Ireland extended to the formation of the Repository Network Ireland (RNI) in 2013. RNI aimed to broaden the Irish open access repository network to encompass smaller repositories and establish a practitioner-driven network of best practices. In 2015, the launch of the Digital Repository of Ireland (DRI)[15] marked another significant milestone. The DRI sits alongside existing institutional and open repositories and serves as a national repository for smaller institutions. Several Irish institutions, including the DRI and University College Dublin's Digital Library, embraced international standards, such as the CoreTrustSeal for Data Repositories, reinforcing Ireland's commitment to maintaining the highest quality and integrity of research data. Ireland has proven innovative in embracing cultural heritage and data repositories that act as access portals providing preservation while connecting to European Research Infrastructures.

More recently, NORF was launched in 2016 under the auspices of the Higher Education Authority (HEA) in Ireland, reflecting the collaborative efforts of various stakeholders, including universities, funding agencies, and government bodies. After a refresh in 2020, NORF has been instrumental in driving national policies and strategies to support open research, aligning with broader European and international initiatives. Most importantly, NORF has facilitated dialogue and collaboration among stakeholders, raising awareness about the benefits of open research and providing practical guidance and support to researchers and institutions. In recent years, NORF and national stakeholders have led the development of a national approach towards open research, mainly by initiating a new work that adopts a standards-based approach and aims to transition to a sustainable model for Ireland's open research ecosystem. In the open repository domain, NORF work[16] has driven an approach to ensure the interoperability of open repositories conforms to international best practices, thereby aiming to position Irish open research for global visibility and discoverability while providing standardised performance indicators.

[15] Digital Repository of Ireland (DRI) https://dri.ie
[16] *National Framework on the Transition to an Open Research Environment* https://repository.dri.ie/catalog/0287dj04d; *National Action Plan for Open Research* 2022-2030 https://norf.ie/national-action-plan/

Background & context of open access repositories in Ireland



- Early initiatives
- Development of the ecosystem
- National Policies and Collaboration
- Towards Sustainable Open Research

Future Repositories

The global scholarly publishing landscape is undergoing significant transformation. Traditional publishing models are facing increasing scrutiny due to issues of accessibility, affordability, and the prevalence of commercial interests. The move towards open access and open research practices has gained momentum worldwide. However, challenges persist. Many universities and institutions face financial and technical constraints and rely heavily on commercial publishers for infrastructure and distribution.

The discourse on the transformation of scholarly publishing is converging towards a strategic imperative that advocates for the principles of open research. This approach envisions a robust, globally interconnected open repository infrastructure at the heart of a next-generation scholarly communication ecosystem. The ultimate aim is to grant researchers unprecedented access to the complete body of research work, thereby fostering innovation, equity, and diversity within open publishing. Achieving the goal of relying on national or institutionally provided open infrastructures demands careful planning and resource allocation. With their advanced capabilities, next-generation or open repositories have emerged as potential solutions to challenges.[17] They serve as essential components in reshaping scholarly communication. Their features encompass open access, data curation, preservation, peer review, interoperability, and user-friendly interfaces, making them versatile tools for modern academic needs.

By 2030, Ireland aims to deliver a sustainable and inclusive environment to achieve 100% open access to research publications. 100% open access will be achieved by a suite of measures described in the National Action Plan for Open Research[18] designed to nurture varied open publishing ecosystem initiatives, offering Irish researchers a spectrum of quality options for open publishing. A coherent, convenient, and robust network of open repositories that are interoperable with local systems and international infrastructures will enhance the visibility and accessibility of Irish research on both a local and international scale. Through benchmarking and implementing a transparent national open access monitoring mechanism, Ireland aims to position itself as a leader in the global arena in terms of realising 100% open access.

Within the strategic context, the current landscape presents significant opportunities, particularly with research funders recognising the essential role of open repositories in providing equitable access to research. Nevertheless, a notable challenge lies in the misalignment among Irish open repositories, which impedes the efficient functioning and representation of research outputs and the national network. Addressing this alignment issue is crucial for optimising the effectiveness of the national strategy towards achieving its open access goals.

A related development is the increased awareness and use of non-commercial open tools and infrastructures by libraries, research professionals, and institutions. Open research performance tools are increasingly recommended, and recently, significant institutions have transitioned from proprietary data sources to open ones. In February 2024, the new Leiden Ranking Open Edition[19] moved to use data from OpenAlex,[20] a fully open data source of the research ecosystem. Specifically for open repositories, the Confederation of Open Access Repositories (COAR)[21] is an international association that brings together individual repositories and repository networks with an aim to build capacity, align policies and practices, provide international interoperability standards, and act as a best practice global voice for the repository community. For example, the COAR Notify[22] project develops an open protocol for decentralised, interoperable notifications across scholarly open repositories to streamline sharing updates and new content. Notify also focuses on global interoperability using a decentralisation model of open infrastructures, efficiency, openness, and community engagement to enhance scholarly communication, ensuring a more integrated, transparent, and accessible ecosystem. COAR advocates using controlled vocabularies to improve metadata in open repositories for interoperability.[23] This approach ensures consistent, efficient discovery and use of scholarly materials, supporting a unified scholarly communication ecosystem. Also, COAR's Next Generation Repositories initiative[24] aims to transform repositories into more dynamic, web-centric platforms focused on a more connected, open, and innovative scholarly communication infrastructure.

Adopting international collaborations and knowledge exchange is crucial to successful engagement with like-minded institutions. Likewise, international partnerships can lead to developing shared standards and best practices and further adopting open repositories. Furthermore, keeping abreast of technological advancements is vital. Integrating modern technology, tools, and standards into open repository infrastructure helps to streamline data management, drive innovation and use, enhance discoverability, and ensure the integrity of scholarly outputs.

In Europe, OpenAIRE[25] is a European infrastructure supporting open science and open access policies. It aims to advance open science through services facilitating the discovery, access, reuse, and attribution of research outcomes. OpenAIRE provides a service catalogue supporting research activities, policy-making, and infrastructure development for open science, including publishing aids, data management, and monitoring tools. It plays a key role in integrating European research with the global community, promoting the European Open Science Cloud (EOSC)[26] , and contributing to policy development and implementation across EU member states. For open repositories, the OpenAIRE guidelines provide a framework for repository managers to enhance interoperability and integration with the OpenAIRE infrastructure, covering literature, data archives, CRIS systems, software repositories, and other research products. These guidelines offer detailed instructions for exposing metadata via the OAI-PMH protocol, focusing on access rights, funding information, and connections between publications, datasets, and software. The guidelines support open access compliance, particularly with European funding requirements, and facilitate participation in the wider OpenAIRE network.

> "The current landscape presents significant opportunities, particularly with research funders recognising the essential role of open repositories in providing equitable access to research".

[17] Bolíni, A., Knoth, P., Perakakis, P., Rodrigues, E., Shearer, K., Van de Sompel, & Walk, P. (2017). 'Next Generation Repositories: Behaviours and Technical Recommendations of the COAR Next Generation Repositories Working Group' (2017) (Version 2). *Zenodo*. https://doi.org/10.5281/zenodo.8077381
[18] *National Action Plan for Open Research* (2022-2030) https://norf.ie/national-action-plan/
[19] Leiden Ranking Open Edition https://open.leidenranking.com
[20] OpenAlex https://openalex.org
[21] COAR https://www.coar-repositories.org
[22] COAR Notify Initiative https://www.coar-repositories.org/notify/
[23] COAR Metadata and Vocabularies https://www.coar-repositories.org/news-updates/what-we-do/controlled-vocabularies/
[24] COAR Next Generation Repositories https://www.coar-repositories.org/news-updates/what-we-do/next-generation-repositories/
[25] OpenAIRE https://www.openaire.eu/
[26] EOSC https://eosc.eu

National Strategic Framework

This landscape report is a deliverable of the two-year National Open Access Repositories Project,[27] funded by the 2022 NORF Open Research Fund,[28] and is one of six projects to enhance open research in Ireland. Dr Cillian Joy, Head of Open and Digital Research at the University of Galway Library, leads the project, with Dr Christopher Loughnane as Project Manager. The project involves 12 institutional and organisational partners throughout Ireland. Deliverables published include an Inventory of Irish Repositories[29] and a December 2023 report, *"Advancing Open Repositories in Ireland: A Survey and Strategic Recommendations for National Progress"*.[30] This initiative and an additional 13 projects in 2023 build on NORF's preparatory work. *The National Open Research Landscape Report* (2021)[31] notes progress in open access for Irish research publications through repository-based and publisher-mediated open access since 2015, estimating national open access levels at 47-54%. Key initiatives supporting this growth include IReL transformative agreements, implementing Plan S, expanding HRB's Open Research platform, and supporting local and international open access efforts. Regarding institutional repositories, the 2021 landscape report states:

> *... a key challenge will be addressing staff capacity and bringing all repositories up to a minimum level to support evolving OA requirements, to agree a national standard for quality metadata, and standardise metadata in line with international initiatives (2021).*

The report identifies key challenges for institutional repositories, including enhancing staff capacity and standardising repositories to meet evolving open access requirements. This involves establishing a national standard for quality metadata and aligning metadata with international initiatives.

There is also a need for further analysis to define open access baselines and targets, including criteria for national open access monitoring. Other challenges include gaps in institutional support for rights retention, the need for legal expertise, equity in open access publishing funding, diverse publishing practices across disciplines, and the development of preservation policies and infrastructure.

NORF National Action Plan for Open Research 2022-2030

The NORF *National Action Plan for Open Research 2022-2030*[32] outlines Ireland's transition strategy to open research, grounded in domestic and international guidelines. The plan was developed through a comprehensive analysis of the open research landscape, aiming to enhance support for open research and align with Ireland's Research and Innovation Strategy. It emphasises a collaborative approach, with responsibilities shared across the research system.

The plan focuses on three themes: establishing a culture of open research, achieving 100% open access to research publications, and enabling FAIR management and sharing of research data. It sets out to embed open research practices, ensure open access to publications, and support the FAIR principles by 2030. Theme 2, aiming for 100% open access to research publications, is crucial for disseminating knowledge and enhancing the visibility of Irish research. It advocates for various open access options, author rights, and a network of interoperable repositories.

This project and report operate under both direct and contextual alignment with these goals and actions, including the above National Framework principles.

> "The national Open Research plan aims to cultivate open research practices, achieve 100% open access to research publications, and support FAIR data management by 2030. It highlights the importance of complete open access for enhancing the visibility and dissemination of Irish research through diverse open access methods, author rights, and a unified network of interoperable repositories."

[27] National Open Access Repositories https://www.universityofgalway.ie/openrepositories/
[28] Open Access Repository Assessment and Alignment https://norf.ie/open-access-repository-assessment-and-alignment/
[29] Inventory of Irish Open Access Repositories https://www.universityofgalway.ie/openrepositories/inventory/
[30] 'Advancing Open Repositories in Ireland: A Survey and Strategic Recommendations for National Progress' https://zenodo.org/records/10390626
[31] *National Open Research Landscape Report (2022)*. National Open Research Forum. Digital Repository of Ireland https://doi.org/10.7486/DRI.5q485c938
[32] *National Action Plan for Open Research* (2022-2030) https://norf.ie/national-action-plan/

Methodology

This project employed several mixed methodological approaches to gather and assess relevant quantitative and qualitative data to help align the Irish open repository network with international best practices. A comprehensive desk review of the history and policies of Irish repositories was undertaken, including an examination of previous NORF and other national reports and related work to provide context for subsequent actions. From the onset, collaborating with the other NORF-funded projects was viewed as essential to coordinating mutually beneficial efforts. The project actively engaged with stakeholders running NORF-funded projects and initiatives, such as the National Open Access Monitor project (the 'Monitor').[33] The central focus of this collaboration was the critical interaction concerning repository-related challenges, specifically addressing shortcomings in PIDs and metadata. Through collaborative efforts, the project team aimed to consolidate collective expertise and coordinate efforts to enhance our comprehension of the Irish open access landscape. This approach was designed to facilitate the customisation of strategies to meet specific requirements effectively.

Data collection started with an in-depth desk research phase, including analysing international tools, standards, and policies pertinent to Irish open repositories to build a robust national and international knowledge foundation, ensuring our work aligned with established international benchmarks and practices. The project actively engaged with stakeholders to identify international best practices through unstructured interviews with, for example, OpenAIRE, Rioxx, OpenDOAR, and COAR, allowing the project to proactively align strategies with globally recognised standards, particularly within the European open research context. Simultaneously, the team audited Irish open repositories, involving multifaceted assessments incorporating surveys, self-assessments, and a series of repository manager and repository strategist interviews, providing qualitative depth to the data. The aim was to provide a holistic view of Irish open repositories and the international context while also situating repository advancement within the European framework. These empirical data are a crucial component for informed decision-making.

The Project Board also conducted a SWOT analysis specific to Irish repositories. The analysis comprehensively evaluated the local landscape's key strengths, weaknesses, opportunities, and threats. During the data analysis phase, the project team analysed the collected data to look for patterns, trends, and potential areas of improvement, including a gap analysis to pinpoint areas where efforts need to be intensified. The quantitative data and high-level analysis added to a comprehensive understanding of the challenges faced by Irish repositories.

"Through collaborative efforts, the project team aimed to consolidate collective expertise and coordinate efforts to enhance our comprehension of the Irish open research landscape".

[33] National Open Access Monitor https://irel.ie/oamonitor/

Interviews

Eight interviews were conducted in August 2023 with repository managers overseeing academic and governmental repositories across Ireland. Five further interviews with repository strategists followed in September 2023. The semi-structured interviews with repository managers covered a range of issues related not only to technical questions around metadata but also to determine what issues most affect Irish open repositories, what barriers to greater metadata compliance they face, and what other issues affect repositories' daily running and strategic development. Interviewees represent various governmental and educational research institutions strategically distributed across Ireland. The selection process involved choosing individuals from 30 registered repositories, ensuring a varied and comprehensive perspective. These individuals, identified as Subject Matter Experts (SMEs), possess technical metadata specialisation, repository expertise, and extensive institutional knowledge.

Each interviewee group brings a unique set of professional functions and roles that increase the usefulness of the data. Repository managers working on repository metadata issues provide valuable insights into current metadata practices and policy deficiencies. Those responsible for repository strategy can contribute a broader perspective, shedding light on issues and trends affecting institutional repositories at the policy, institutional, and national levels. This dual approach ensures a comprehensive understanding of the details of Irish open repositories and overarching trends. The selection of SMEs, based on their expertise and relevance to the research questions, ensures that the study benefits from insights offered by some of the most knowledgeable and qualified individuals in the open research field, specifically focusing on institutional repository standards and strategies.

Interview Process

While the primary focus of the interviews was on metadata issues, interviewees were encouraged to discuss any aspects of their role or institutional environment. This inclusive approach, covering both successful practices and challenges faced, aims to guide the project towards a national metadata roadmap rooted in a community-driven perspective. For repository managers, a set of 21 questions (found here), grouped into themes such as metadata generation, compliance, support, barriers, training, and individual roles, facilitated a comprehensive exploration. Repository strategist questions followed similar themes but sought a broader outlook to gather strategic institutional insights on metadata standards, international guidelines, and potential issues related to local requirements and compliance. These interviews were designed to help the project understand how to best align current repository working practices with internationally established metadata best practices and so enable open scholarly infrastructure. With participants, we explored how to build a sustainable community around standards by creating a set of community guides and how this will be communicated to their institutional administration. We also discussed the applicability of metadata guidelines such as OpenAIRE and Rioxx and to understand the advantages and disadvantages of each. The interviews were conducted and recorded over Microsoft Teams with automatic transcription, and all interview data was corrected and anonymised for further analysis.

Findings & Discussion

Irish open repositories face a range of challenges. A significant issue is establishing a sustainable funding model, which is crucial for addressing limited resources negatively affecting staffing, maintenance, upgrades, and overall sustainability. Technical operations, including software upgrades and metadata curation, pose notable challenges, affecting efficiency and management due to staffing and resource constraints that hinder development and maintenance. This situation highlights concerns about underfunding and the scarcity of skilled personnel. Additionally, repositories struggle with visibility and outreach, which are vital for content recruitment and user engagement, and ensuring metadata quality and compliance with international standards, which require consistency, completeness, and significant effort. The uniqueness of some repository platforms introduces complexities in system upgrades, metadata mapping, and integration. Moreover, cultural and strategic challenges necessitate enhanced coordination and alignment with institutional priorities, amplifying the multifaceted difficulties faced by Irish open repositories.

Additionally, repository managers need training and professional development in critical areas such as metadata compliance, technical operations, and adherence to best practices. To navigate these challenges, proposed recommendations encompass the development of a sustainable funding model, enhancement of technical operations, resolution of staffing and resource constraints, amplification of visibility and outreach efforts, assurance of metadata quality and compliance, provision of targeted training and professional development opportunities, promotion of cultural and strategic alignment within institutions, facilitation of platform integration and standardisation, support for national collaboration efforts, and advocacy for increased institutional support. The successful implementation of these recommendations holds the potential to improve the efficiency, sustainability, and overall impact of Irish open repositories, thereby fortifying the scholarly communication ecosystem in Ireland.

Challenges

- Funding and Resources
- Technical Challenges
- Metadata Quality
- System Integration
- Strategic Alignment

Recommendations

- Develop sustainable funding.
- Enhance operations and maintenance.
- Boost outreach and content recruitment.
- Improve quality and compliance.
- Offer professional development in key areas.
- Align repository initiatives with institutional goals.
- Encourage national collaboration and seek institutional support.

Survey

The 2023 spring survey of open repositories in Ireland, which included educational, governmental, and research institutions, was designed to evaluate the provision and management of these repositories against key performance indicators, thus offering insight into the current landscape. This evaluation revealed both strengths and areas needing improvement. A critical issue identified was the need for improved metadata practices alignment to meet Ireland's open research ambitions, with a notable delay in creating a coordinated national infrastructure compared to European standards. Despite efforts to adhere to international standards like OpenAIRE and Plan S, metadata practices across repositories remain fragmented, highlighting the urgent need for national collaboration. Positive steps were noted in adopting open licences and the widespread use of PIDs, though further work on standardisation and integration is necessary.

The survey highlighted significant staffing and resource allocation disparities, showing the need for additional dedicated personnel. A heavy reliance on external hosting providers by most repositories indicates challenges in technical sustainability and a dependency on commercial platforms, raising concerns about the ability of these repositories to maintain open access standards consistently. These findings resonate with the 2021 National Open Research Landscape Report,[34] pinpointing similar gaps and challenges within the national open repository network. Recommendations from the survey include the promotion of collaborative initiatives, improvement of training, standardisation of metadata, alignment with national practices, and regular assessments to bolster Ireland's open repository networks. The report stresses the importance of a shared national infrastructure and the necessity for advocacy to overcome these obstacles, aiming to enhance collaboration across the academic and research sectors.

Educational institutions were the majority of respondents as they house the most repositories, but the high proportional involvement of governmental and research institutions highlights the comprehensive cross-sector engagement of Ireland's repository landscape. The varied commitment to OpenAIRE compliance among repositories suggests a need for more uniform practices nationwide. DSpace is identified as the primary platform used, with 76% of institutions depending on external technical support, underscoring the importance of collaboration with specialised commercial services for sustainability. Staffing and technical support disparities highlight the difficulties in fully embracing open research goals. Although deposit policies and the assignment of persistent identifiers are widespread, exhibiting diverse content types and languages, the lack of preservation policies of some repositories indicates the necessity for strategies ensuring long-term content accessibility. Despite a general optimism regarding sustainability, ongoing concerns about visibility, funding, skilled staff availability, and technical operations persist. Solutions proposed include the development of shared infrastructures, strengthened advocacy, enhanced coordination, specialised training, and forming a technical support community of practice, all aimed at addressing the current challenges and improving the effectiveness and sustainability of Ireland's open repository networks.

[34] *National Open Research Landscape Report* (2021) https://repository.dri.ie/catalog/5q485c938

In summary, the main findings of the survey are:

1. The survey indicates a standardised approach to address metadata and support challenges at the repository level. This strategic focus prioritises practical solutions without requiring extensive new technical infrastructure.

2. Concerns over repository visibility and staffing show the need for greater training and metadata compliance coordination. Urgency is highlighted in addressing critical aspects of repository provision and management through national coordination.

3. Metadata alignment conforming to international standards is identified as critical for supporting open research goals. Fragmented metadata efforts hinder national coordination and monitoring of open research progress.

4. Staff shortages in repositories highlight the need for trained, connected, and dedicated personnel. This indicates a requirement for concerted efforts to ensure efficient repository management at a national level.

5. The survey reveals diversity in efforts and resources among educational, governmental, and research institutions, showcasing varying levels of sustainability and support for repositories.

Recommendations include collaborative initiatives, training programmes, standardised metadata adoption, and regular assessments. These measures are the initial steps toward advancing Irish open repositories to strengthen and align the network with international best practices. The findings highlight trends and concerns, providing insights for shaping the future of open repositories in Ireland. Commitment to collaborative initiatives, training programmes, and standardised practices will address challenges and contribute to advancing and harmonising the Irish open repository network.

Irish Open Repository Network

Information on open repositories in Ireland primarily derives from two primary sources: 1) open repository inventory and a 2) survey conducted by this project in its initial phase, detailed in the report *Advancing Open Repositories in Ireland: A Survey and Strategic Recommendations for National Progress*.[35] Data shows that Ireland's open repositories exhibit diversity in purpose, history, institutional affiliation, and geographical distribution across the island. This was an all-island survey of Ireland, with 93% of respondents from the Republic and the remaining 7% in Northern Ireland. Among these, 69% are affiliated with educational institutions, 24% with governmental bodies, and 7% with research institutions, highlighting the widespread integration of open repositories within Ireland's educational sector and the notable participation of governmental entities in disseminating open research. Government establishments with openly accessible repositories include Teagasc, the Marine Institute, the Health Research Board, the Health Service Executive, Tusla Child and Family Agency, and the Agri-Food and Biosciences Institute in Belfast. Educational participants span a broad spectrum of tertiary institutions, from traditional to modern technological universities, and specialised colleges and institutes like the Royal College of Surgeons and Dublin Business School. The DRI also serves as a national digital archive for humanities, cultural heritage, and social sciences data, serving various stakeholders, including higher education institutions, cultural heritage organisations, government agencies, and local councils. Furthermore, a significant portion of repositories (79%) are registered with OpenDOAR, and 34% are additionally registered with national-level registries such as Re3Data, FAIRsharing, and OpenAIRE, with some respondents engaged in national-level services or networks like the Technological University Network (TU-NET) portal,[36] aimed at providing a research portal for Ireland's Technological University sector.

[35] Loughnane, C., & Joy, C. (2023). 'Advancing Open Repositories in Ireland: A Survey and Strategic Recommendations for National Progress'. *Zenodo* https://doi.org/10.5281/zenodo.10390626

[36] TUNet https://tunet.openaire.eu

Content

Irish repositories host diverse content, including text, datasets, images, interactive resources, and learning materials. While less common, materials such as design materials, cartographic materials, patents, software, and sound items are also present. The size of repositories varies significantly, ranging from hundreds to approximately 700,000 items, reflecting their broad scope and impact within Ireland's academic and research community. Most repositories use text as their content type, followed by datasets and images. English is the dominant language for repository metadata and content, with Irish as the second most prevalent language. Submission processes for new content vary, with persons associated with the institution being the most common content source. Meanwhile, repositories often integrate with institutional systems such as Current Research Information Systems (CRIS) for seamless deposits. Most repositories prefer mediated deposit workflows, showing a commitment to a robust quality control mechanism. Data quality is an issue where staff must often intervene to improve the metadata quality of submissions. This manual interjection is a challenge for repositories already stretched with limited resources. In addition, there is a need for more proactive preservation policies, as only a minority of repositories have implemented such policies. The lack of policy related to preservation highlights the importance of developing cohesive strategies to safeguard digital content and ensure long-term accessibility to scholarly materials.

Repository Infrastructure and Technology

Repositories are hosted both locally and by commercial platform providers. 24% of repositories are hosted locally by their respective institutions, with the remaining 22 (76%) relying on external hosting providers. Both locally and externally hosted repositories use commercial and open-source platforms such as DSpace, ePrints, Figshare, Knowvation, datAdore, Digital Commons, and Pure. DSpace is the most widely used platform, hosting 14 out of 29 repositories (48%). The significant prevalence of external hosting (76%) suggests a dependence on specialised commercial services, possibly due to constraints on in-house technical expertise or similar resource constraints. The popularity of DSpace reinforces its reputation as a dependable platform for open repositories. Many platforms have undergone extensive customisation to meet local needs, highlighting risks to standardisation and alignment. A few repositories are certified by CoreTrustSeal; however, certification is generally not an immediate goal. Eleven (38%) repositories underwent platform updates in 2023, three in 2022, and two between 2020 and 2021. Six respondents were uncertain about the last platform update date, and two said their platforms had not been updated since 2019. There is a general commitment to regular updates, as indicated by 38% planning updates in 2023 and another 38% performing updates in 2023, reflecting a continuous effort to enhance repository functionality, ensure metadata compliance, and facilitate development. However, a few platforms have not been updated since 2019, showing the need for additional support and maintenance within the repository landscape.

For metadata schemas used by repositories, 93% use Dublin Core, 21% also use DataCite, while other mentioned schemas included VRA Core, EAD, MARCXML, and MODS, showcasing repository flexibility in accommodating diverse data types. The prevalence of Dublin Core reflects its widespread adoption in metadata standardisation. While some repositories comply with specific versions of OpenAIRE guidelines, others are assessing compliance or transitioning to new systems. There is a commitment to align with standards for broad standardisation. Specifically, for OpenAIRE Guidelines compliance, 48% of respondents claimed compliance with some version, with the majority aligning with OpenAIRE version 1, 2, or 3. The data also revealed variations in compliance status, with 24% unsure, 24% not compliant, and a few complying with specific data, CRIS, or software guidelines. The repository audit in the following sections outlines the result of self-assessments using the OpenAIRE validator and Plan S tool from JISC combined with data from OpenAIRE open access monitoring reporting highlighting metadata gaps in Irish repositories.

48% compliance with OpenAIRE

38% planning immediate Updates

93% use Dublin Core

21% use DataCite

SWOT Analysis

Addressing weaknesses, leveraging opportunities, and mitigating threats is essential for sustained success, demanding urgent attention to resourcing, integration, and strategic planning. Irish open repositories exhibit strengths and opportunities within scholarly communication but require urgent attention to weaknesses and threats. Resourcing, integration, and metadata consistency need immediate focus, alongside a strategic emphasis on national direction and investment. Embracing convergence opportunities, aligning with international standards, and considering diverse open repository purposes are pivotal for sustained success. Despite a robust foundation with clear values, national alliances, academic buy-in, and a vibrant community, operational weaknesses such as insufficient personnel, siloing, metadata inconsistencies, and divergent software must be addressed promptly. Improvement opportunities include aligning practices with European developments, common standards, and strengthening national approaches. Threats such as a narrow focus on Green OA, the proliferation of proprietary CRIS without the foundational ethos of open repositories, and the absence of a national digital preservation strategy require careful navigation.

Strengths and Weaknesses

Irish open repositories exhibit several vital strengths, providing a solid foundation for promoting open research. The commitment to clear values aligned with the open research agenda and well-established national alliances showcases a proactive approach to collaboration at the national and international levels. Additionally, academic buy-in highlights the recognition and support for the significance of open research in scholarly communications, research support, and career progression. The presence of an enthusiastic grassroots community further reinforces a bottom-up approach to promoting best practices while being representative of Irish RPOs, which solidifies the repositories' integral role within the national scholarly communications landscape.

Despite these strengths, Irish open repositories face specific weaknesses that demand immediate attention. Insufficient personnel resourcing raises operational risks and vulnerability to downtimes, highlighting the need for enhanced support. Siloing within institutions, inconsistencies in metadata and divergences in repository software versions indicate a lack of integration and strategic development. Furthermore, a dearth of national direction and investment challenges overall progress, emphasising the importance of addressing these operational shortcomings.

Opportunities and Threats

Opportunities for improvement and advancement are evident, offering a pathway to strengthen the repositories' impact. Aligning practices with European developments presents the prospect of simplifying future system integrations, while convergence with standard practices could facilitate the creation of a unified repository infrastructure. By strengthening national approaches through shared practices, repositories can enhance their participation in monitoring systems and engage practitioners in a diverse and heterogeneous Irish Higher Education Institution (HEI) sector. Additionally, aligning with international standards allows more accessible data collection and facilitates national comparisons.

However, potential threats must be carefully navigated to ensure the sustained success of Irish open repositories. The risk of centralisation without a nuanced understanding of the diverse purposes of Irish repositories may lead to reduced buy-in and the loss of local identities. A narrow focus on Green OA might limit the realisation of the broader potential of repositories, hindering their ability to disseminate knowledge in various forms to different audiences. The incursion of proprietary CRIS from publishing entities threatens institutional values, potentially favouring external agendas over local policies and processes. The absence of a national digital preservation system also poses a severe risk to data integrity. Moreover, failing to plan for the relationship between Artificial Intelligence (AI) and repositories may result in missed opportunities for leveraging emerging technologies.

Interviews: Repository Manager

In a series of interviews with eight repository managers, a comprehensive exploration took place around the challenges and priorities within the repository management community. The interviews provide valuable insights into the diverse landscape of repository management. Interviews with repository managers unveiled a complex repository working landscape, highlighting many commonalities and differences in their experiences. A universal theme across all interviews was the presence of challenges related to metadata quality, compliance, and management. Issues encompassed concerns about consistency, completeness, and adherence to standards, with recurring problems in metadata editing, mapping, and compliance with standards such as OpenAIRE primarily, while also including Rioxx in the UK research context. Advocacy for Green OA practices, whereby an article or other research output is 'self-archived' in an open repository, was a shared priority among interviewees, reflecting a commitment to supporting researchers in complying with OA mandates from funders and the principles of Green OA publishing. Repository managers strongly feel compliance with international guidelines, particularly OpenAIRE, is crucial for repository reliability, accessibility, and interoperability.

Almost every interviewee expressed a need for community networks, forums, or roundtable discussions among repository managers. The importance of collaboration, information sharing, and transparent governance structures for community guidelines and best practices was evident. Technical challenges were prevalent and often tied to the specific repository platform in use, with issues such as system updates, cyber-attacks, platform functionality limitations, and challenges during platform migrations or upgrades highlighted. Differences emerged in platform-specific challenges, with each interviewee discussing unique obstacles associated with their chosen repository platform.

Financial challenges and difficulties securing funds for upgrades varied across institutions, affecting technical upgrades and enhancements in some cases and ongoing operations in others. Repository managers also had diverse responsibilities beyond managing repositories, influencing their ability to focus on metadata compliance. The lack of clear role definitions for repository managers varied across interviews. Instances of communication gaps between repository teams and other departments within institutions, such as research services, led to challenges in staying informed about developments. Varied challenges with technical integrations, especially during platform migrations or upgrades, and dependency on external providers for platform updates and integrations also presented hurdles. Despite these differences, repository managers' desire for collaboration, knowledge-sharing, and a supportive professional community network emerged as a standard and crucial need. These insights serve as a valuable foundation for future initiatives and collaborative efforts within the repository management community and technical open research ecosystem, acknowledging the need for tailored, community-focused solutions while recognising the diversity of contexts and platforms. The repository landscape is complex and dynamic, requiring continuous adaptation and collaboration within the community. Establishing a supportive community network for repository managers would facilitate knowledge-sharing and problem-solving, ensuring the resilience and effectiveness of repository management practices in the face of evolving challenges.

Overall Repository Manager Insights

1. The environment for repository management is markedly varied, with a wide range of platforms in use. Institutions face distinct challenges and operate within unique contexts, reflecting the **diversity of approaches to repository management.**

2. The difficulties encountered in repository management are often specific to the chosen platform, the level of funding available, and the nature of institutional support structures. This specificity underscores the **need for tailored approaches** to address these challenges.

3. Across the community, there is a unanimous recognition of the **need for collaboration, knowledge exchange**, and the formation of a supportive community among repository managers. This indicates a widespread acknowledgement of the benefits of collaborative efforts.

4. The feedback recurrently points to technical hurdles, budgetary limitations, and the necessity for system enhancements. These issues highlight the **need for technical and financial strategies** to bolster effective repository management.

5. The consistent focus on advocating for Green OA and support for metadata compliance illustrates the ongoing commitment to advancing open access initiatives. This shared focus heightens the **role of advocacy in promoting open research practices.**

Collectively, these insights show the complexities and nuances of managing open repositories, pointing towards the imperative for strategic, collaborative, and resource-sensitive approaches to enhance open and digital research.

Interviews: Repository Strategists

Five repository strategist interviews were also conducted, with interviewees identified as information professionals responsible for strategic oversight of their institutional repositories, often line-managing repository managers. Repository strategist interviews provided a comprehensive view of strategic considerations around repository management and the broader publishing landscape, including the need for bibliodiversity as a bulwark against for-profit publishing, with repositories acting as a necessary alternative essential for increasing open access outputs. Trust issues with publishers and the repository's pivotal role in independently preserving research emerged as consistent themes. Transformative agreements and the preservation of bibliodiversity were collective concerns. Challenges related to the intricacies of repository software were a shared concern among interviewees, with issues in metadata standards and interoperability being significant themes. However, interviewees believed repositories played a diverse role as critical open research infrastructure driven by a culture of research integrity. International guidelines, such as OpenAIRE, held a crucial position in discussions. Interviewees stressed the importance of compliance with these guidelines for ensuring interoperability and efficient sharing of research outputs. All interviewees expressed challenges in metadata standardisation. The collective acknowledgement of challenges in accommodating diverse research outputs within standardised metadata was also a recurring theme.

Resource needs and collaborative support emerged as shared priorities. The need for resources was apparent, particularly personnel well-versed in open science and with the requisite technical skills and knowledge. Interviewees believed that having a dedicated team for effective repository management is critical. The concept of a national platform for repositories, a searchable and interconnected national platform potentially organised by research teams rather than individual institutions, was also considered positively. Various barriers impeding repository improvement were consistently identified. Funding constraints, time limitations, training needs, and cultural/strategic challenges surfaced as common concerns shared by interviewees. Daily operational concerns were a universal issue where interviewees expressed apprehensions about running repositories, encompassing technical issues, funding constraints, staff skills, and the essential need for support.

Staying informed about current developments in repositories and metadata was stressed as key in their strategic positions. Networking, committee participation, literature review, and conference attendance were shared practices among interviewees. Worries about a lack of strategic guidance from higher levels were also voiced, with interviewees expressing reservations about decisions made without a comprehensive understanding of the roles and values of repositories. Some voiced concern that institutional decisions focused on rankings and prestige, with institutions often following these metrics without critically assessing their relevance or usefulness. There was an explicit mention of a lack of understanding and vision for open science at the top of organisations and national decision-making levels. The focus on business success rather than the values of open science was a concern of some interviewees. Technical challenges, such as system updates and limitations in platform functionality, were prevalent themes. However, these challenges were often intertwined with the specific repository platform. Overall, compliance with international guidelines, particularly OpenAIRE, was viewed as crucial, again highlighting its importance for meeting funder requirements, relying on quality FAIR data, and maintaining trust.

While there was much agreement across interviews, some differences were observed in specific areas. Platform-specific challenges varied, with each institution grappling with unique obstacles associated with their chosen repository platform and their own institutional history and operating procedures. Budget issues were apparent, affecting the ability to secure repository upgrade funds and overall development efforts. Repository strategists acknowledge platform-specific challenges unique to each repository and actively work towards assisting managers in managing technical issues and integration complexities associated with different platforms.

Overall Repository Strategists Insights

1. Recognition of the **pivotal role of repositories** in preserving diverse scholarly outputs and offering a trusted and viable alternative to commercial publishing routes

2. Agreement on **the importance of addressing software challenges, fostering collaboration, and securing resources** for effective repository management in open research.

3. The **potential of national repository platforms** to enhance research accessibility and discoverability, alongside the necessity of overcoming barriers such as funding constraints, cultural challenges, and governance to repository improvement.

Collectively, these insights show the complexities and nuances of managing open repositories, pointing towards the imperative for strategic, collaborative, and resource-sensitive approaches to enhance open and digital research.

Analysis of Interviews

The priorities of repository managers centre on immediate challenges in repository management, while strategists focus on overseeing and addressing these challenges for smooth operations and repository development. Strategists prioritise strategic alignment, resource allocation, performance metrics, leadership and team development, risk management, governance and compliance, communication and reporting, innovation and best practices, stakeholder engagement, and capacity building. Common priorities include metadata challenges, advocacy for Green OA, and a desire for community networks, with differences revolving around strategic oversight and resource management. Role-specific challenges highlight differences arising from the specific roles of repository managers and varied institutional contexts. This introduces challenges beyond core repository management tasks, affecting metadata compliance and alignment. Communication gaps and integration challenges further exacerbate these issues, necessitating reliance on informal and insufficient external networks for information sharing.

> "Common priorities include metadata challenges, advocacy for Green OA, and a desire for community networks"

Common Challenges and Concerns

Consistent challenges include issues related to repository software, data quality, metadata standards, interoperability, and platform limitations. Barriers like funding constraints, training gaps, and cultural and strategic issues hinder effective repository functioning. Compliance with international guidelines, like OpenAIRE, is crucial for interoperability, data quality, and showing the value of open research and open publishing. The importance of resources, especially people with open research knowledge and experience, is universally recognised. The interviews demonstrate a clear collective vision about the expansive potential role of repositories beyond the coverage they provide now, including a greater focus on preservation and access to all scholarly output, including research data management and promoting Green OA with standardised metadata as a value asset. National conversations about repository usage are encouraged, with considerations for a national platform recognised as potentially beneficial. A notable concern is the lack of strategic guidance, highlighting the need for visionary leadership aligned with open research values.

Insights

The landscape of repository management across Ireland is multifaceted, influenced by specific platform choices and institutional contexts. Metadata quality and compliance remain primary concerns, requiring greater alignment with international standards. Currently, tailored solutions are needed to address platform-specific challenges, local requirements, and funding constraints. Establishing a supportive community network for repository managers would facilitate knowledge-sharing. Future initiatives should focus on collective solutions and a flexible, community-driven approach to address repository management challenges, especially for implementing these solutions while alleviating resourcing issues that hold back the advancement of the entire network.

Stakeholder Dialogues

Over several months, the project initiated dialogues with national and international stakeholders to seek expert advice on the strategic aspects of open repositories. Engaging with entities such as COAR, OpenDOAR, OpenAIRE, Rioxx, NORF, IReL, the National Open Access Monitor project, and leaders in national institutional research strategy and management, these conversations aimed to navigate the intricate landscape of open repositories. Insights from these engagements again show the necessity for collaborative solutions to address shared challenges, focusing on the hurdles and prospects of establishing and sustaining open repositories.

Concerns were raised regarding repository development and management's technical and community facets, highlighting the significance of global cooperation and sustainable practices. There was a consensus on the criticality of metadata quality, interoperability, and fostering an engaged community. The importance of aligning with international best practices and leveraging global repository networks to foster a more interconnected infrastructure was universally recognised. Sustainability emerged as a shared concern, with stakeholders agreeing on the need for models that support national infrastructure and comply with international standards. Clarification on the roles of repository managers, adherence to OpenAIRE guidelines for monitoring and assessment, and the benefits of centralised coordination, particularly in smaller nations like Ireland, were also highlighted as common grounds.

However, different viewpoints emerged, particularly regarding transformative agreements with publishers and the strategic choice between developing a national infrastructure and forming coalitions. The discussions also diverged on the potential of publishers to automate open access publication lists and the idea of a peer support network. Dialogue extended to the optimal approach for aligning with European infrastructures, such as the EOSC, and the challenges of monitoring Green OA due to metadata issues. Opinions varied on the significance of centralised coordination, the emerging obfuscation role of some CRIS, and enhancing connections between publishers, repositories, and intellectual outputs.

The stakeholder dialogues offered interesting and invaluable insights into the complex and evolving dynamics of open repositories, reflecting a broad range of approaches and perspectives on addressing the challenges and opportunities in the field.

Agreements

- There was unanimous recognition of the challenges related to technical and community aspects, highlighting the importance of metadata quality, interoperability, and active community participation.
- Stakeholders concurred on the significance of international collaboration, the imperative for sustainability, the need for clarity on the roles of repository managers, and strict compliance with OpenAIRE guidelines.
- The benefit of centralised coordination and expertise to forge unified strategies was acknowledged across the board.

Differences

- Opinions diverged on transformative agreements, the approach to infrastructure alignment, and Dialogue between centralised/national versus coalition-based strategies.
- There was a varied emphasis on the importance of centralised coordination, the role of the CRIS, and fostering better linkages between publishers, repositories, and their intellectual outputs.

Repository Audit of Compliance

Two instruments for self-evaluation were used to gauge the adherence of the open repository network to standards. The initial tool deployed was the Plan S Repository Self-Assessment Tool developed by JISC,[37] followed by the OpenAIRE Validator tool.[38] Repository managers were tasked with utilising these instruments and reporting their findings to the project team, providing valuable insights into compliance with Plan S and OpenAIRE guidelines and contributing quantitative data to the evaluation process.

The Plan S tool primarily probes repositories on their compliance with Plan S mandates. Many repositories that underwent self-assessment reported meeting five of the six essential Plan S criteria. The prevalent shortfall was identified in providing high-quality, article-level metadata in a standardised format, licensed under CC0, where compliance was less common. According to the repository survey, as previously discussed, the provision of high-quality metadata was reported at 69%, albeit with variations in completeness. The challenges in achieving high-quality metadata were mainly attributed to resource constraints, financial burdens, and policy restrictions. Moreover, the survey inquired about the diversity of licenses available, revealing that 97% offered at least one variant of Creative Commons licenses.

Survey data found that 48% of the repository network was compliant with OpenAIRE. Respondents indicated this level of adherence to one of its versions, predominantly versions 1, 2, or 3. The survey also uncovered discrepancies in compliance, with 24% uncertain of their status, 24% non-compliant, and a minority in alignment with specific guidelines for data, CRIS, or software. The assessment via the OpenAIRE validator pinpointed the primary metadata deficiencies as access rights, project or funder information, publication type, and licensing conditions.

A forthcoming report from the National Open Access Monitor[39] identified significant gaps in licensing within metadata fields crucial for classifying publications as open access, notably between Green OA publications with a license (8,483) and those without (72,042). Addressing this gap, they argue, could significantly impact the balance between Green and Gold OA publications in Ireland. However, this could be an issue with incorrect exposure of license fields via OAI-PMH configuration. The report found the need for Irish open repositories to automatically include licensing information, improve the provision of deposition dates, adhere to updated IT and repository standards, and align with Open Science mandates.

It is acknowledged that open access monitoring is vital for evaluating the impact of open access publications, tracking progress, identifying barriers, supporting evidence-based decision-making, and promoting transparency. With increasing requirements from Research Funding Organisations (RFOs) and RPOs for open access research outputs, measuring the success of these initiatives has become crucial. The *National Action Plan for Open Research* states that repositories play a key role by providing a zero-cost route to open access, supporting FAIR data, and enabling bibliodiversity. Again, despite adherence to international standards, the fragmented landscape of current repositories presents inconsistencies in metadata practice, impeding discoverability and open access monitoring. This challenge is mirrored across Europe,[40] requiring consistent and comprehensive metadata practices. In Ireland, the forthcoming National Open Access Monitor report highlights the critical role of repositories in delivering open access, focusing on the validity and accessibility of repository content.

Primary metadata deficiencies			
Access rights	Project or funder information	Publication type	Licensing conditions

[37] OpenAIRE Validator tool https://catalogue.openaire.eu/service/openaire.validator/overview
[38] Plan S Repository Self-Assessment Tool https://v2.sherpa.ac.uk/opendoar/policytool/
[39] National Open Access Monitor https://irel.ie/oamonitor/
[40] *Current State and Future Directions for Open Repositories in Europe* https://doi.org/10.5281/zenodo.10255559

Future Alignment, Funding, & Sustainability

Kitchin, Collins & Frost (2015)[41] highlight a significant challenge for open repositories:

> *The key challenge for OA repositories that are not wholly funded by the state is to generate a sustainable funding model that ensures that the repository is maintained and can continue to develop … at the same time as ensuring that the repository is free to access and retains the trust of its users. In other words, the challenge is to find a way to deliver core services with no or limited for-fee income.*

Most open repositories in Ireland depend on their hosting institutions for financial support. This reliance often results in limited resources, a concern echoed across the sector, affecting even government-funded repositories. Some research repositories benefit from direct governmental support and funding. NORF receives funding from the Department of Further and Higher Education, Research, Innovation and Science (DFHERIS) through the Higher Education Authority (HEA) and the Irish Research Council (IRC). This report's "Findings and Discussion" reveal widespread apprehension regarding underfunding, with significant implications for staffing, maintenance, upgrades, and overall sustainability. Most survey respondents expressed confidence in their repositories' sustainability over the next three years. However, during more in-depth discussions, a notable portion shared concerns over potential challenges and resource insufficiencies that could jeopardise long-term operations.

To move toward sustainable solutions, data collected suggests a collective willingness to transition to shared national or regional infrastructures and to focus on advocacy and enhanced coordination among repositories. Training and community-based technical support were also valued, indicating a broad consensus on the need for diverse strategies to bolster repositories' effective management and sustainability.

Addressing Sustainability

Publishing invariably incurs costs, even without direct charges to authors.[42] Transitioning to sustainable open publishing necessitates a departure from solely relying on Article Processing Charges (APCs)[43] or similar author-focused transactions. Wise and Estelle (2019)[44] outline several alternative models, including transformative agreements, cooperative funding, immediate open licensing, and cost reduction strategies.

Transformative funding models, such as those adopted by SCOAP3[45] and Subscribe to Open,[46] leverage existing library and consortium budgets to facilitate open access, bypassing traditional APCs and fostering financial sustainability. Cooperative models, exemplified by initiatives like Hrčak[47] and the Open Library for the Humanities,[48] establish partnerships between libraries and publishers to support open content. As already discussed, Green OA publishing facilitated by open repositories allows immediate sharing with an open licence but with sustainability concerns. Article transaction models, such as APC-funded OA, institutional prepay models, and submission payments, can support an open access transition strategy, particularly for well-funded authors. However, ethical concerns persist regarding quality, standards, and inequality, with pay-to-publish models potentially exacerbating academic disparities.[50] Open publishing platforms like Wellcome Open Research and Gates Open Research allow authors to publish original research openly, often funded through APCs or state subsidies. Examples include Emerald Open Research and Open Research Europe (ORE)[51], a Commission-backed platform for Horizon 2020, Horizon Europe, and EU framework program beneficiaries. ORE, facilitated by F1000, offers rapid publication, transparent peer review, and diverse article-level metrics to support responsible research evaluation without relying on traditional impact factors.

Alternative revenue strategies, including advertising, crowdfunding, and freemium models, offer viable options for sustaining open access. There is a notable shift in discourse towards Diamond Open Access (DOA). DOA, advocating for a non-commercial, not-for-profit publishing ethos, enables material to be freely available to readers and authors without commercial reuse,[52] thereby representing a departure from traditional, commercially-driven publishing models. Despite the momentum gaining behind DOA as a feasible alternative, it faces significant challenges, primarily due to resource constraints.[53] Typically supported by academic institutions, libraries, or consortia, DOA aims to foster a more stable and equitable infrastructure for publishing. However, the financial sustainability of many DOA journals remains precarious, with operations often running at a break-even point or a loss, heavily dependent on volunteer efforts and external support for operations and development.[54]

Towards Responsible Publishing [55] by cOAlition S proposes a vision for a community-based scholarly communication system fit for open science in the 21st century. This system would empower scholars to share their research outputs and participate in new quality control mechanisms, ensuring rapid, transparent dissemination of high-quality scientific knowledge. Green OA and DOA models can lead to provide a future solution. By leveraging the strengths of both models, the community can move towards a more equitable, accessible, and sustainable scholarly communication ecosystem. However, achieving this vision requires concerted effort, strategic investment, and collaboration among all stakeholders in the scholarly publishing domain.

The collective aim is to ensure that open repositories and publishing platforms not only survive but thrive, enabling the unrestricted dissemination of knowledge while navigating the financial realities of the publishing domain.

"The collective aim is to ensure that open repositories and publishing platforms not only survive but thrive, enabling the unrestricted dissemination of knowledge while navigating the financial realities of the publishing domain".

[41] Kitchin, Rob and Collins, S. and Frost, D. (2015) 'Funding models for Open Access Repositories. Technical Report.' *Royal Irish Academy* https://mural.maynoothuniversity.ie/7104/
[42] Editorial: Open Access: No Closed Matter. (2023). European Journal of International Law, 34(3), 545–554. https://doi.org/10.1093/ejil/chad046
[43] Borrego, Á. (2023), 'Article processing charges for open access journal publishing: A review.' *Learned Publishing*, 36: 359-378. https://doi.org/10.1002/leap.1558
[44] Wise, A., & Estelle, L.. (2019). *Society Publishers Accelerating Open Access and Plan S – Final Project Report* (Version 1). https://doi.org/10.6084/m9.figshare.9805007.v1
[45] 'Sponsoring Consortium for Open Access Publishing in Particle Physics' https://scoap3.org/
[46] Subscribe to Open (S2O) https://subscribetoopencommunity.org/
[47] Portal of Croatian scientific and professional journals https://hrcak.srce.hr/
[48] Open Library of Humanities https://www.openlibhums.org/
[49] Björk, BC., Solomon, D. 'Open access versus subscription journals: a comparison of scientific impact.' *BMC Med* 10, 73 (2012). https://doi.org/10.1186/1741-7015-10-73
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Challenges & Recommendations

Irish open repositories face challenges and barriers, including significant issues needing urgent attention and coordinated action. Considering the data collected and findings, the following are key issues identified within the Irish open research community.

1. **Metadata quality and compliance** issues challenge Irish open repositories, as fragmented metadata efforts hinder national coordination and open research monitoring. Difficulty aligning with international standards impacts resource discovery and reuse. Inconsistent metadata practices restrict resource discoverability and OA monitoring, affecting interoperability and compliance with international guidelines.

2. **Staffing shortages and limited resources** significantly impact repository managers, hindering their access to necessary training in metadata compliance, technical operations, and best practices, thereby affecting repositories' effective operation and sustainability.

3. **Underfunding and resource constraints** challenge repositories' sustainability, maintenance, and staffing, with reliance on institutional funding raising concerns about long-term operations. Additionally, limited technical resources hinder the adoption of consistent metadata standards and the maintenance of quality metadata.

4. **Visibility issues and limited user engagement** challenge repositories. This lack of visibility impedes outreach and engagement efforts, while repositories face content recruitment challenges.

5. **Cultural, strategic, and inadequate national collaboration** challenges within the Irish open repository landscape highlight the critical need for enhanced coordination and alignment with institutional and national priorities to ensure the effective dissemination and management of research outputs.

The recommendations outlined are designed to address the identified challenges, aiming to enhance the functionality, sustainability, and impact of Irish open repositories. These directions are intended to guide strategic improvements and foster growth within the landscape, ensuring that repositories can effectively support open research and scholarship. The recommendations seek to resolve issues related to metadata quality, staffing, funding, visibility, and collaboration through targeted actions and a roadmap, thereby contributing to a more robust and cohesive open research infrastructure in Ireland.

1. **Developing a sustainable funding model** is essential for ensuring repositories' long-term viability and sustainability, highlighting the critical need for reliable financial support for staffing, maintenance, and upgrades.

2. **Enhancing technical operations and staffing**, alongside targeted professional development, addresses resource constraints and improves repository management. Regular performance assessments and benchmarking against European peers are crucial for ensuring alignment with international best practices and identifying areas for improvement.

3. **Standardising metadata quality** is crucial for improving research outputs' discoverability and interoperability. Adopting international standards and creating a national framework, particularly aligning with OpenAIRE versions 3.0 or 4.0, ensures compatibility and compliance with open research mandates.

4. **Fostering national collaboration** enhances repository effectiveness through shared resources and best practices. Establishing a community of practice among repository managers promotes knowledge sharing and collaboration while providing technical support and resources to address common challenges, supporting repository growth.

5. **Clearly defining the purpose of open repositories** is recommended to ensure that all stakeholders understand their role in supporting open access, enhancing discoverability, and facilitating the broader dissemination of research outputs, guiding strategic planning and resource allocation towards shared objectives in the open research landscape.

Tackling the identified challenges and enacting these recommendations will significantly advance Irish open repositories. Their effectiveness and sustainability will improve, and their practices will better align with international standards. Such advancements will markedly enhance the monitoring and accessibility of open research outputs and data. The subsequent section outlines future trends and provides an initial framework for developing Irish open repositories from 2025 to 2030. This framework is currently under development and will be refined through ongoing community engagement. It is designed to adapt based on feedback from the community to finalise the first version of the roadmap by April 2025.

Future Trends & Outlook

The landscape of open repository development in Ireland stands at a pivotal moment, influenced by evolving trends and technological progress that promise substantial changes. Recent dialogues in scholarly publishing indicate a positive shift towards open research principles, highlighting the critical role of a strong, globally integrated open repository infrastructure in reshaping scholarly communication. The focus is increasingly on models like Green OA and Diamond OA over traditional commercial alternatives. The future appears promising for open repositories and the broader scholarly publishing ecosystem, with expectations of significant shifts and innovations. Drawing from project insights, this section outlines the anticipated trends in open access and repository development in Ireland.

1. The Role of Open Access in the Future of Irish Research and Scholarship

Open access will remain vital in advancing Irish research and scholarship by promoting transparency, accessibility, and equity in scholarly communications. As more RFOs and RPOs mandate open access for funded research outputs, open repositories will become crucial for the free dissemination of research to maximise impact. The *National Action Plan for Open Research* 2022-2030 targets 100% open access for publicly funded research publications by 2030, emphasising the significant role of repositories. Open repositories are vital for distributing a range of scholarly outputs, including research data, supporting FAIR principles and bibliodiversity.

The success of Irish open repositories will depend on establishing a national framework for metadata standardisation, developing training programmes for repository managers, and fostering collaborative initiatives across institutions to improve effectiveness and sustainability. Collaboration at national and international levels will increase, focusing on collaboratively standardising metadata, sharing infrastructure, and funding open access initiatives. This collaboration will extend to partnerships with government, non-profit organisations, and industry, making the research ecosystem more inclusive and diverse. Moreover, discussions on the sustainability of the open access model will show the need for sustainable funding models that do not overburden authors or institutions. Additionally, the role of repositories in supporting social responsibility and equitable access to research will align with broader societal aims for inclusivity and accessibility.

2. Using AI/ML Openly on the Open Repository

Integrating AI and Machine Learning (ML) into open repositories is essential for driving commercial and academic research innovation. Specifically, AI/ML's role in creating knowledge graphs, for example, the OpenAIRE knowledge graph,[56] is paramount. These technologies, in conjunction with open access principles, significantly amplify the impact of research and innovation by facilitating the development of comprehensive, accessible knowledge frameworks. Such frameworks are critical for promoting collaboration, enhancing transparency, and accelerating scientific progress, thereby underpinning the broader objectives of open research. In addition to fostering innovation, AI/ML technologies substantially improve the discoverability, accessibility, and usability of research outputs. These technologies assist in ensuring that research information is efficiently indexed and retrieved by automating metadata tagging and refining search algorithms. This optimisation streamlines the search experience and supports more effective knowledge discovery through personalised recommendations. However, applying AI/ML to enhance these aspects faces challenges, particularly with content that is under commercial licenses. Open repositories, which offer barrier-free access to scholarly content, may encounter limitations due to copyright restrictions and licensing agreements from commercial entities. Institutions and repository managers must navigate these issues and engage with publishers to facilitate the application of AI/ML technologies on licensed content within open repositories, ensuring the continued advancement of open access objectives.

The benefits of open data for ML are evident. A 2023 European Data Portal publication, 'Open data and AI: A symbiotic relationship for progress,'[57] states:

> *Open data encompasses a broad range of subject areas. This variety of data widens the possible use cases for which AI systems can be developed, making new AI-driven products and services possible. These use cases can only be developed if the relevant data is available and easy-to-access. The free availability of diverse datasets as through open data, is essential to drive innovation and bring new economic opportunities. The hope is that innovative AI systems can then be used to help solve challenges facing society, creating socioeconomic value.*

SFI highlights AI's role in driving innovation and digital transformation, positioning Ireland as a research leader by enhancing data utilisation and creating new commercial opportunities through research.[58] AI is key in redefining job roles and automating tasks, aligning with Plan S objectives for open access to research and leveraging data for maximum reuse. Academic libraries and RPOs, with their open repositories, are pivotal in supporting AI-driven research through open data, providing essential skills in data management and enabling full-text data mining.[59] This approach aligns with Ireland's goal for 100% open access by 2030, enhancing repository use as research tools and addressing metadata challenges through AI/ML applications. Positive feedback from repository managers on AI's potential to improve metadata and facilitate access indicates the value of these advancements for open access and research efficiency. These developments should be encouraged nationally, with progress and lessons learned shared among the repository network while aligning with forthcoming EU law.

3. Encouraging Growth in Author Accepted Manuscripts in Open Repositories

Efforts to promote the deposition of Author Accepted Manuscripts (AAM) into open repositories will offer an additional route for accessing scholarly content, complementing existing subscription-based models. Making AAMs available ensures immediate access to research findings, significantly broadening their dissemination and visibility within and beyond the academic community. However, encouraging authors to contribute their works to open repositories may present challenges, especially in fields traditionally aligned with subscription publishing models. To address these challenges, repository managers must develop strategies that incentivise author participation by highlighting the benefits of open access, facilitating manuscript submission, and ensuring compliance. Advising authors on rights retention is imperative, enabling them to maintain enough rights to share their work openly in line with open guidelines.

Open repositories will continue to serve as trusted platforms for hosting AAMs, offering researchers a straightforward way to share their findings openly. By focusing on interoperability and integration with existing institutional processes, these repositories will simplify the deposition process, helping authors to comply with open mandates and policies. Additionally, open repositories will improve AAMs' visibility, discoverability, and preservation, thereby increasing their scholarly impact and the overall trust in open repositories. The scope of repositories is set to expand beyond traditional research outputs like journal articles and datasets to include a broader range of digital artefacts such as more significant articles and data, software, multimedia, and grey literature. This expansion will enable a more comprehensive approach to capturing and disseminating research, enhancing its transparency and reproducibility.

[56] OpenAIRE Graph https://graph.openaire.eu/

[57] 'Open data and AI: A symbiotic relationship for progress' https://data.europa.eu/en/publications/datastories/open-data-and-ai-symbiotic-relationship-progress#:~:text=Open%20data%20and%20AI%20have,returning%20accurate%20and%20useful%20predictions.

[58] 'Artificial Intelligence (AI) Research in Ireland' https://www.sfi.ie/research-news/stories/ai/

[59] Uzwyshyn (2022) 'Steps Towards Building Library AI Infrastructures: Research Data Repositories, Scholarly Research Ecosystems and AI Scaffolding,' *87th IFLA World Library and Information Congress (WLIC);Satellite Meeting: Information Technology: New Horizons in Artificial Intelligence in Libraries:* https://repository.ifla.org/handle/123456789/2062

Future Trends and Outlook

Looking further into the future, the findings of this project also predict other trends and outlooks.

- **Integrating with the CRIS** will become more common, enhancing metadata management, interoperability, and the accuracy of open access monitoring. A more standardised approach to metadata and better alignment with CRIS will improve the reporting and evaluation of research outputs.

- **Collaboration and resource sharing** will be strengthened through initiatives and frameworks aimed at repository development. This approach will facilitate knowledge exchange, resource consolidation, and support within the repository manager community. Educational programmes, workshops, and conferences dedicated to repository management and open access will cultivate a culture of cooperation and innovation.

- **Innovative funding models** that extend beyond transformative agreements, such as cooperative funding models and direct investment in repository projects, will be explored by institutions, consortia, and, notably, the IReL consortium. These models play a pivotal role in ensuring the sustainability of open access repositories. The IReL consortium, alongside other stakeholders, will actively engage with international best practices and collaborate with funding bodies. This collaborative approach aims to develop funding strategies tailored to the requirements of the Irish research landscape, leveraging the consortium's collective expertise and resources to support the broader adoption and sustainability of open access initiatives.

- Adopting **new technologies and protocols**, including PIDs and machine-readable metadata, represents a strategic advancement in data security, provenance, and interoperability, significantly enhancing the reliability and longevity of repository content. This initiative is pivotal in addressing the challenges of digital preservation and accessibility in the evolving scholarly communication landscape.

- **Innovations in open infrastructure**, exemplified by initiatives like the COAR Notify project, are set to transform the landscape of scholarly communication by revolutionising how notifications about new research outputs are disseminated across repositories and systems. This approach embodies a paradigm shift towards creating a more interconnected and responsive open access ecosystem, embracing a globally decentralised yet nationally centralised model.

- The NORF 2023 project 'SCOIR' , centred on **rights retention**, marks a significant strategic initiative to empower authors to retain the rights essential for openly sharing their work. This initiative is a cornerstone in the broader agenda to augment the accessibility and impact of research outputs through open repositories. By prioritising rights retention, NORF addresses a critical aspect of the scholarly communication process, ensuring that researchers have the legal framework and support needed to disseminate their findings freely and widely.

[60] IRel https://irel.ie

Ireland's future open repository landscape is set for transformative growth. By leveraging technological advancements, enhancing collaborations, embracing open science and FAIR principles, focusing on sustainability and inclusivity, and expanding the functionality of repositories, Ireland is poised to play a role in the global movement towards an open, accessible, and equitable scholarly communication system. The journey forward will necessitate a united effort nationally, strategic funding, and a shared vision among all research ecosystem stakeholders, incorporating the latest in open infrastructure innovations and collective work.

Draft Roadmap
(2025-2030 & Beyond)

Based on the analysis, findings, and discussions around the progress, challenges, and strategic recommendations, a draft roadmap for 2025 to 2030 and beyond is proposed. This roadmap envisions a future where open research and repository development are central to Ireland's research and innovation ecosystem, ensuring that the nation remains at the forefront of global scholarly communication.

2024-2025
Complete Current Project Activities

- Build the community network.
- Community agreement on the overall direction, strategy, roadmap, and metadata alignment pathway.
- Pilot metadata improvement in two national open repositories.
- Document national open repository network onboarding approach.
- Review and evaluation of the project outcomes to assess the impact.
- Document successes and lessons learned, identifying effective strategies and pinpointing areas for improvement.
- Agree and finalise the roadmap for 2025-2030 and beyond.

2025-2027
Strengthening the Network

- Implement national standards for metadata quality to ensure the interoperability and accessibility of repository contents.
- Aim to align and strengthen all Irish open repositories to the same agreed standards.
- Prioritise enhancing repository infrastructure to accommodate increased data volumes and several data types and review/enable analytics capabilities.
- Develop and deliver training programmes for librarians, researchers, and administrators, focusing on open access principles, repository management, and emerging technologies.
- Consider national governance and sustainability for open repositories.

This draft roadmap is designed to be iterative and flexible, capable of adapting to the landscape of the open repository project as it progresses to border community engagement and an alignment of the network.

2029-2030
Evaluation and Planning

- Develop stronger and closer national coordination.
- Implement national governance to sustain and grow open repositories
- Focus on advocating for adopting open access policies at national and institutional levels, collaborating with funding bodies, institutions, and publishers to foster a culture of openness and transparency in scholarly communication.
- Conduct an impact assessment to measure the progress in open access and repository development relative to the roadmap and emerging international practice.
- Develop the subsequent phase of the roadmap, incorporating insights from the impact assessment, evolving trends, and stakeholder feedback.
- Foster collaborative partnerships by engaging with national and international stakeholders, including consortia like COAR and other global initiatives. This will involve actively seeking opportunities for innovation and being part of a global system, knowledge exchange and sharing best practices, resources, and expertise to bolster Ireland's open access and repository landscape.

Beyond 2030
Sustaining Leadership and Innovation

- Further develop sustainable funding models to underpin the continuous development of open repositories initiatives.
- Explore and integrate emerging technologies and innovation for open repositories and open publishing.
- Reaccess the landscape and international best practices to continue roadmap development.

Conclusion

Advancing Ireland's Open Repository Landscape: A Strategic Roadmap offers a detailed overview of the state, challenges, and future directions of scholarly communication in Ireland. The report delineates key findings and strategic recommendations to steer open repository development forward by drawing from survey data, self-assessment tools, and insights from global initiatives. Despite substantial progress, issues like metadata alignment, resource constraints, and sustainability remain. A commitment to overcoming these hurdles is evident among stakeholders, with recommendations for improvements such as automating licensing in metadata to enhance the Green OA landscape. A proposed roadmap for 2025-2030, extending beyond 2030, sets a course for advancing open repository infrastructure in Ireland. It highlights the need for collaborative efforts, embracing new technologies, and building capacities to improve repository infrastructures and metadata quality while adhering to open principles. Anticipating the future, the roadmap envisions a robust, transparent, and impactful scholarly communication system reinforced by ongoing investments in open repositories and alignment with international open access standards. The report focuses on the vital role of collaboration, innovation, and strategic foresight in cementing Ireland's position as a leader in open scholarly communication, poised to influence positive outcomes for the global research community.

Supplemental data

The Supplemental Data section complements the primary findings of the study, offering an extended dataset and detailed analyses that enrich the understanding of research outcomes. It encompasses data sets, detailed methodological procedures, and extended analyses, providing a comprehensive view of the research methodology and findings. This information is instrumental for replicating the study's experiments, facilitating further research, and ensuring transparency and openness. The data are hosted on a dedicated open-access repository, ensuring persistent availability and compliance with the principles of FAIR data management. Each dataset is accompanied by a DOI, metadata descriptions, and data curation notes for ongoing and future scholarly work. Including this supplemental data shows our commitment to contributing to a sustainable and equitable scholarly publishing landscape, promoting the dissemination of research findings in an open and accessible manner.
https://zenodo.org/communities/norf-open-repositories

Glossary & Acronyms

AAM	Author Accepted Manuscript
AI	Artificial Intelligence
APC	Article Processing Charge
CC	Creative Commons
cOAlition S	Consortium of national research agencies and funders
COAR	Confederation of Open Access Repositories
CRIS	Current Research Information Systems
DFHERIS	Department of Further and Higher Education, Research, Innovation and Science
Diamond OA	Diamond Open Access, published with no fees to author or reader
DOA	Diamond Open Access
DRI	Digital Repository Ireland
EOSC	European Open Science Cloud
FAIR	Findable, Accessible, Interoperable, Reusable
Gold OA	Published as OA on a publisher platform or journal
Green OA	Self-archived in an OA repository
HEA	Higher Education Authority
IRC	Irish Research Council
IReL	The consortium of Irish research libraries
ML	Machine Learning
Monitor	National Open Access Monitor, Ireland
NGR	Next Generation Repository
NORF	National Open Research Forum
OA	Open Access
OpenAIRE	Open Access Infrastructure for Research in Europe
OpenDOAR	Directory of Open Access Repositories
ORCID	Open Researcher and Contributor ID
PID	Persistent Identifier
Plan S	Initiative for open access publishing
RIAN	Research Multi-institution Repository
Rioxx	Research Outputs Metadata Schema
RFO	Research Funding Organisation
RPO	Research Performing Organisation
SFI	Science Foundation Ireland
TA	Transformative Agreement
TU-NET	Technological University Network