



Conceptual Approaches and the European Context of Institutionalizing the Role of Data Stewards in Ukrainian Universities

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Abstract

The growing importance of research data management and open science practices has led to the emergence of the data steward as a key professional role within research institutions. This paper explores the conceptual approaches to defining and institutionalizing the role of data stewards in Ukrainian universities, with particular attention to the European context. The study analyzes relevant policy frameworks, institutional strategies, and best practices that shape data stewardship across Europe, highlighting their implications for Ukraine. Through a comparative and document-based analysis, the paper identifies key components of the data steward's role, including responsibilities in data governance, support for researchers, and compliance with open science standards. The findings reveal existing gaps in the Ukrainian higher education system, particularly in terms of formal role recognition, training, and institutional integration. At the same time, the European experience provides a valuable reference for developing sustainable models of data stewardship. The paper concludes by outlining potential pathways for the institutionalization of data steward roles in Ukrainian universities, emphasizing the need for alignment with international standards and national research priorities.

1 Introduction

Effective research data management (RDM) has become an indispensable element of contemporary scientific practice. With the continual expansion in the volume, diversity, and complexity of data produced across disciplines, the demand for structured frameworks to guide data

storage, documentation, sharing, and long-term accessibility has intensified. These needs are particularly acute in the Ukrainian research sector, where systemic reforms and a growing orientation toward integration with the European Research Area (ERA) necessitate substantial changes in the organization of research support services.

Despite growing recognition of the importance of data governance, institutional readiness for RDM across Ukrainian universities remains limited. Most institutions lack formal strategies or dedicated personnel for implementing RDM procedures aligned with international standards. Institutional repositories are often insufficiently developed, and there is a notable gap in specialist expertise required to support researchers in adhering to the FAIR principles ensuring that data are findable, accessible, interoperable, and reusable. Furthermore, the capacity to develop Data Management Plans (DMPs), now a routine requirement for participation in European funding programmes such as Horizon Europe, remains underdeveloped.

In response to similar challenges, universities across Europe have introduced a new professional role designed to strengthen institutional capacities in RDM: the data steward.

Data stewards operate within academic departments, research offices, or library services, where they provide targeted support for drafting and updating DMPs, selecting suitable repositories, applying metadata standards, and navigating data licensing and sharing protocols. They also offer guidance on managing sensitive or personal data in accordance with national and international legal frameworks. The role thus demands a hybrid skill set: an understanding of research methodologies, digital competencies, knowledge of data ethics and governance, and the ability to communicate effectively across disciplinary and administrative boundaries.

European initiatives such as the European Open Science Cloud (EOSC), FAIRsFAIR, and the Research Data Alliance (RDA) have contributed to defining a professional framework for data stewardship. For example, the EOSC-Pillar project differentiates between various data-related roles: data curators, engineers, managers, and stewards each fulfilling distinct functions along the technical-policy continuum. Within this schema, the data steward is seen as a key facilitator of responsible research practices, supporting compliance with funder requirements and fostering a culture of openness and reproducibility.

For Ukraine, institutionalizing this role would represent a strategic investment in the country's scientific future. As an associated member of Horizon Europe and an active participant in aligning national policy with European open science principles, Ukraine stands to benefit significantly from the introduction of data stewards. Doing so would enhance institutional readiness for international collaboration, improve research quality and transparency, and facilitate compliance with evolving data governance requirements. In a broader sense, it would also contribute to the modernization of Ukrainian science and its alignment with global standards of research excellence.

This article aims to articulate the rationale for establishing the data steward role within Ukrainian higher education institutions. Drawing on best practices from European universities and insights from ongoing policy developments, it outlines the core responsibilities, competencies, and institutional benefits of this role. In doing so, it seeks to offer a foundation for informed discussion and practical implementation in the Ukrainian research landscape.

2 Methodology

This study employs a qualitative research design aimed at exploring the conceptual foundations and institutional practices related to the role of data stewards in Ukrainian universities within a broader European context.

The research is based on a combination of document analysis and comparative approach. First, relevant policy documents, strategic frameworks, and guidelines at both European and national levels

were examined. These include materials related to research data management, open science policies, and institutional governance structures. The analysis focused on identifying key principles, role definitions, and implementation mechanisms associated with data stewardship.

Second, a comparative analysis was conducted to assess how the role of data stewards is conceptualized and institutionalized in selected European countries. This allowed for the identification of common patterns, best practices, and structural differences that may inform the Ukrainian context. The study incorporates elements of case-oriented analysis by reviewing existing practices in Ukrainian higher education institutions. Publicly available information, institutional reports, and project descriptions were analyzed to evaluate the current stage of development and integration of data stewardship roles.

The findings were synthesized through a thematic analysis, enabling the identification of key challenges, opportunities, and directions for further institutionalization. This approach ensures a structured interpretation of the data while maintaining sensitivity to contextual differences between national and institutional settings.

3 Literature review

The emergence of the data steward profession is closely linked to the evolving landscape of open science and the increasing complexity of research data management. Since the 2010s, higher education and research institutions particularly in Europe and the United States have recognized the need to systematically address data preservation, documentation, and sharing. Initiatives such as the European Open Science Cloud (EOSC) and the Research Data Alliance (RDA) have played a pivotal role in shaping international standards and guidelines for research data stewardship.

A key conceptual framework underpinning data stewardship is the FAIR Guiding Principles ensuring that scientific data are Findable, Accessible, Interoperable, and Reusable (Wilkinson et al., 2016). These principles serve as the foundation for numerous studies exploring data lifecycle management, infrastructure development, and metadata interoperability. Tools such as the Data Stewardship Wizard (Pergl et al., 2019) have been developed to facilitate planning and collaboration between researchers, data stewards, and institutional support units. Additionally, there is growing attention to the educational dimension of data stewardship, with scholars highlighting the need to train future professionals in both technical and ethical competencies (Wilder-James et al., 2013; Wildgaard & Rantasaari, 2022; Wendelborn et al., 2023).

The research also emphasizes the evolving institutional role of the data steward. Data stewards are increasingly embedded within faculties, departments, and centralized research support services, where they contribute to data management planning, policy development, and compliance with funders' mandates (Fitsilis et al., 2024). Their responsibilities include overseeing data documentation, supporting metadata standards, and facilitating integration of data into national and international infrastructures. Academic libraries have become key institutional actors in this domain, taking on new responsibilities in research data services (Tenopir et al., 2014; Walek, 2019).

International best practices further illustrate the institutionalization of data stewardship. The Netherlands is widely regarded as a leader in this field, particularly through the Data Stewardship program at TU Delft, where dedicated stewards are assigned to every faculty (Rousi et al., 2024). In the United Kingdom, the UK Data Service and initiatives led by Jisc support data stewardship efforts across the academic sector. In the United States, data management is often coordinated through university libraries and research offices, with examples such as Harvard Dataverse and MIT's data initiatives serving as key reference points. Australia's establishment of the Australian Research Data Commons (ARDC) reflects a national-level commitment to coherent and collaborative research data management.

Open science principles form a crucial component of the data steward's mandate. Open data policies and practices not only enhance access to scientific outputs but also promote transparency, reproducibility, and broader reuse of research findings (Piwowar et al., 2018; Lawal, 2010). Within this context, data stewards act as facilitators of openness, ensuring that data are shared responsibly and aligned with open access mandates.

Finally, the literature acknowledges the importance of ethical data stewardship. Ensuring the privacy of research participants, adhering to legal requirements, and managing sensitive data are key responsibilities of data stewards. Ethical frameworks and institutional policies are essential in guiding responsible data practices (Leslie et al., 2024). This includes embedding ethical review processes in data management plans and developing standards that address the social implications of data reuse and sharing.

These studies provide a comprehensive understanding of the multifaceted role of data stewards in the contemporary research ecosystem. They also highlight the need for institutional support, policy alignment, and continuous professional development to ensure effective implementation of data stewardship across disciplines and research environments.

4 Results

4.1 Policy frameworks in Europe

One of the most advanced and widely cited models can be found in the Netherlands, a recognized leader in open science within Europe. Dutch universities, particularly Delft University of Technology (TU Delft), have institutionalized data stewardship through a faculty-embedded model. Each faculty at TU Delft has a dedicated data steward who works directly with research groups and departments. This model, known as the embedding approach, ensures that data stewards possess disciplinary familiarity and are able to provide highly contextualized support tailored to the specific needs of researchers within engineering, architecture, computer science, or other fields. Rather than functioning as part of a centralized service unit, they are fully integrated into the research ecosystem of their respective faculties, enhancing trust and collaboration with academic staff.

Importantly, the Dutch model is not limited to institutional implementation. A national network of data stewards coordinated through associations such as the Association of Universities in the Netherlands (VSNU) and the Netherlands eScience Center enables knowledge exchange, co-development of best practices, and contributes to policy design. This network also supports national recognition of excellence in data management through initiatives such as the Dutch Data Prize, which rewards outstanding data reuse and stewardship efforts in research.

Finland represents a contrasting but equally effective model, centered around a centralized national coordination mechanism. The Finnish CSC – IT Center for Science serves as the national operator for digital research services, offering a coherent, scalable infrastructure for research data storage, data management planning, and open data dissemination. CSC provides not only technical services but also education and training programs aimed at strengthening RDM capacity at universities. Regular webinars, hands-on workshops, certification pathways, and consultancy services offered by CSC facilitate institutional uptake of data stewardship even in resource-constrained environments. The Finnish model demonstrates how centralized coordination, when well-resourced and strategically aligned, can ensure a high level of standardization and accessibility across the higher education sector.

In Germany, the approach to data stewardship is more hybrid. Several layers of activity operate simultaneously from institutional efforts at individual universities to national-level coordination via large-scale initiatives such as the National Research Data Infrastructure (Nationale

Forschungsdateninfrastruktur, NFDI). Within prominent research organizations such as the Helmholtz Association, data stewards are embedded in digital research clusters where their responsibilities include facilitating cross-disciplinary collaboration, ensuring data interoperability, and supporting the integration of research and industry data spaces.

An example of Germany's strategic integration is the FAIR Data Spaces project, which links scientific data repositories with industrial platforms under the broader European Gaia-X initiative. In this context, data stewards act not only as academic support professionals, but also as key agents in the development of interoperable and cross-sectoral data environments. The NFDI initiative, funded by the Federal Ministry of Education and Research, further supports this professionalization by establishing qualification frameworks, standard operating procedures, and dedicated funding lines for data stewardship within thematic consortia across all scientific disciplines.

Despite differences in organizational structure decentralized in the Netherlands, centralized in Finland, and hybrid in Germany all three countries share several defining features in the development of data stewardship. Government support and ministerial-level commitment to open science provide a solid foundation for institutional action. Moreover, data steward roles are formally integrated into university staffing structures, often financed through a combination of core budgets and project-based funding. Continuous professional development, including formal training, FAIR data schools, and role-specific certification, ensures that data stewards maintain the evolving competencies needed to guide researchers in a dynamic digital research landscape.

Data stewards play a pivotal role in enabling research teams to meet the increasingly complex requirements of data management planning, particularly under frameworks such as Horizon Europe. They assist researchers in drafting DMPs that articulate clear strategies for data collection, documentation, storage, dissemination, and archiving, ensuring alignment with the FAIR principles and the formal expectations of the European Commission. This support is not merely administrative; it contributes directly to enhancing the quality, reproducibility, and long-term impact of research outputs.

A key part of their work involves guiding researchers in the creation and application of high-quality metadata. This includes advising on metadata schemas such as Dublin Core, DataCite, or the Data Documentation Initiative (DDI), as well as on file formats that guarantee long-term accessibility and reuse (csv, .xml, .json). They also provide expertise in selecting appropriate repositories whether institutional, disciplinary, or integrated within the European Open Science Cloud (EOSC) and navigating licensing models, data anonymization procedures, and ethical considerations regarding personal data.

Beyond individual research support, data stewards often play a strategic role in shaping institutional open science policies. They contribute to the development of internal regulations governing open access to publications and data, help align institutional practices with international standards, and provide training for academic staff on data licensing, copyright, and responsible data sharing. In doing so, they act as a bridge between high-level policy commitments and everyday research practices, making open science actionable at the institutional level.

4.2 Data stewardship in Ukraine

In Ukraine, however, institutional readiness for implementing effective research data management remains low. Universities often lack structured RDM policies, qualified personnel, and digital infrastructure. As a result, research outputs are stored in fragmented, unsystematic ways, which hinders data reuse and long-term preservation. In contrast to the European context, where data stewards have become embedded elements of the research ecosystem, the role in Ukraine is still emergent and undefined.

Nevertheless, there is a growing imperative to align Ukraine's research system with European standards. This is especially relevant for institutions seeking participation in Horizon Europe

programmes, integration into EOSC, and compliance with emerging national frameworks such as the Ukrainian Research Information System (URIS) and OpenAIRE-linked repositories. In this regard, data stewards could serve as key facilitators of institutional transformation. Their involvement would help ensure project-level alignment with international expectations concerning data openness, transparency, and traceability.

The need for data stewardship in Ukraine is also heightened by the gradual introduction of open access mandates for publicly funded research. As national policies move toward the implementation of FAIR-aligned practices, universities will require professionals who can not only advise researchers but also lead the development of institutional repositories and digital infrastructures. These infrastructures must be capable of supporting data lifecycle management at the level of faculties, research centers, and university libraries.

A phased approach to implementing data stewardship in Ukraine appears both necessary and feasible. One model could involve placing data stewards within academic libraries, which already play a role in supporting open access and information literacy. Another strategy might include establishing centralized Open Science Centers that combine functions related to RDM, research communication, and digital support services. Alternatively, a network of faculty-based coordinators could be created to link researchers with administrative and technical units, thereby facilitating cross-functional collaboration.

In all cases, the data steward becomes a key conduit between national and European policy objectives and the daily realities of academic research. By embedding this role within institutional structures, Ukrainian universities can begin to operationalize their commitments to open science and build the human capacity needed to meet the expectations of an interconnected, data-driven research environment.

4.3 The case of the Igor Sikorsky Kyiv Polytechnic Institute

A significant recent development in the Ukrainian research landscape is the institutional introduction of a dedicated data steward position at the H. I. Denysenko Scientific and Technical Library of Igor Sikorsky Kyiv Polytechnic Institute (KPI). Implemented in March 2025, this initiative constitutes the first formal attempt in Ukraine to integrate research data stewardship into the organizational structure of a higher education institution in a systematic and sustainable manner. The establishment of this role was facilitated by KPI's participation in the ERASMUS-EDU-2023-CBHE project Open4UA, which also supported the drafting of the university's internal Research Data Management (RDM) Policy.

Unlike sporadic or project-based initiatives, KPI's approach positions the data steward as a permanent institutional function, embedded within the library and operating in close collaboration with academic staff. The data steward provides tailored support for researchers across disciplines in areas such as data management planning, metadata creation, repository selection, data licensing, and compliance with the FAIR principles. This institutionalization marks a critical step forward in bridging the gap between emerging policy requirements and everyday research practices in Ukraine.

The significance of this development is twofold. First, it demonstrates the capacity of Ukrainian institutions to respond proactively to the evolving requirements of European research policy, including those set forth under Horizon Europe and the European Open Science Cloud (EOSC). Second, it highlights the strategic role that university libraries can play in operationalizing open science by transforming their traditional service functions into hubs of digital research support and capacity building.

KPI's implementation serves as a model for institutional transformation under constrained conditions. It illustrates how international cooperation mechanisms particularly capacity-building projects within the Erasmus+ framework can act as catalysts for embedding European-aligned research practices in national contexts. Moreover, the KPI experience has already informed policy-

level developments: the Director of the Denysenko Library is a member of the national working group established by the Ministry of Education and Science of Ukraine to define qualification standards for the emerging professional role of the Research Data Management Specialist. Drawing on empirical insights from KPI, the group has formulated proposals concerning the qualification profile, functional responsibilities, and core competencies required for this role.

In addition to institutional implementation, KPI has actively contributed to knowledge dissemination and professional development across the Ukrainian academic sector. A series of publicly available webinars has been developed as part of the Open4UA project, addressing key topics in RDM, including metadata standards, ethical data handling, and repository infrastructures. These resources provide a foundation for other institutions seeking to develop or scale similar support services and foster a shared understanding of good practices in data stewardship.

The KPI model exemplifies a broader epistemological shift within Ukrainian research culture: from viewing data as a supplementary byproduct of research to recognizing it as an autonomous, citable, and valuable scholarly output. By embedding data stewardship within the institutional ecosystem, KPI is contributing to the development of a new research paradigm in which data management is understood as integral to research quality, transparency, and reproducibility.

As Ukraine deepens its integration with the European Research Area, the experience of Igor Sikorsky Kyiv Polytechnic Institute offers a practical and scalable model for other universities seeking to operationalize open science and meet international expectations for data governance. The initiative underscores the critical importance of institutional commitment, international collaboration, and the professionalization of research support roles in building a resilient and future-oriented research infrastructure.

5 Conclusions

The formal integration of the data steward role into Ukrainian higher education and research institutions is not only a timely development, but also a strategic necessity as Ukraine deepens its integration with the European Research Area. As openness, transparency, and data reusability become core values in global research, the need for qualified professionals who can support and guide researchers in effective RDM becomes increasingly critical. Establishing this role will help Ukrainian institutions comply with Horizon Europe requirements, strengthen the quality of research proposals, and improve the long-term accessibility, visibility, and impact of scientific outputs.

In the short term, universities should begin by assessing their readiness to support data stewardship. This includes reviewing existing policies, digital infrastructure, human resources, and current open science practices. Particular attention should be paid to the day-to-day needs of research teams, who often require hands-on help with data planning, sharing, archiving, and documentation. Such assessments will help identify institutional strengths and weaknesses and guide the development of realistic, phased action plans for introducing RDM support.

Based on these findings, institutions should invest in pilot training programs for future data stewards. These should include not only technical topics but also training in research ethics, communication, and digital skills. University libraries, open science offices, and international partners such as OpenAIRE, EOSC, the Research Data Alliance (RDA), and the FAIRsFAIR project can serve as valuable collaborators in developing these programs and ensuring alignment with European best practices.

Developing and adopting formal institutional policies on open science and RDM is another essential step. These policies should define the responsibilities of data stewards, establish procedures for data management planning, and clarify requirements for data storage, sharing, and preservation. In particular, they should ensure that data stewards are involved from the early stages of research

planning, rather than being brought in at the end of projects. Early involvement allows for better alignment with project goals, funder requirements, and future data reuse.

One promising example of institutional innovation in Ukraine is the implementation of the data steward service at the H. I. Denysenko Scientific and Technical Library of Igor Sikorsky Kyiv Polytechnic Institute (KPI), launched in March 2025. This was the first structured effort to formally embed the data steward role within a Ukrainian university. Established through participation in the ERASMUS-funded Open4UA project, the initiative also resulted in the development of an institutional RDM Policy at KPI. The data steward provides researchers with individual consultations and training, helping them manage data throughout the research lifecycle. The KPI case demonstrates that Ukrainian institutions are capable of aligning with European research practices and leading national change. The experience has already contributed to policy development at the national level, including the design of professional standards for RDM specialists by a working group of the Ministry of Education and Science of Ukraine, which includes KPI's library leadership.

To ensure broader impact, Ukrainian universities should also seek active involvement in international projects and networks focused on open science and data stewardship. By joining cross-border initiatives, participating in working groups, and collaborating on infrastructure projects, institutions can access valuable knowledge, funding, and training resources. These partnerships also provide opportunities for benchmarking and aligning with European policies and standards.

At the national level, the sustainable implementation of data stewardship will require formal policy support and regulatory recognition. This may include amending current legislation on higher education and research to formally recognize data stewardship as a professional function, establishing national qualification frameworks, and creating funding mechanisms to support these roles. A national certification system for data stewards, combined with performance monitoring tools, would further strengthen the role and encourage the development of skilled professionals.

In the broader context of digital transformation and European integration, the development of data stewardship in Ukraine is essential for building trust in research, supporting institutional capacity, and enabling innovation. As Ukrainian institutions increasingly engage with programs such as Horizon Europe, the European Open Science Cloud (EOSC), and initiatives like the Ukrainian Research Information System (URIS) and OpenAIRE, data stewards will serve as key actors in ensuring interoperability, compliance, and responsible data handling.

The successful adoption of the data steward role in Ukraine represents more than a technical reform; it reflects a broader cultural shift in how research is conducted, supported, and shared. By embedding this role into institutional structures and aligning with European standards, Ukraine can foster a more open, competitive, and collaborative research environment, while giving Ukrainian researchers a stronger voice and presence in the international scientific community.

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