ExLibris®
a ProQuest Company

The Research Services Platform

A new paradigm for maximizing visibility, efficiency, and compliance of research activities

Adi Alter, Director Product Management, Ex Libris
Eddie Neuwirth, Director Product Management, Ex Libris

Research is the lifeblood of academic institutions, and a vital part of the institutional goal of driving academic excellence. Given this reality, one would expect the research lifecycle – from obtaining grants, to curating research data, to keeping track of this data, and finally to disseminating and publishing in peer-reviewed journals – to be an organized, efficient and coherent process. Yet, in too many cases, that expectation is, to put it generously, unmet.

Many in academia recognize the need for integrated, data-driven, and scalable research services in support of institutional and faculty goals. Such systematic, unified data management across the institution and throughout the research journey would eliminate duplication of effort and reduce the burden on individual stakeholders.

This paper aims to inspire a conversation around the need for, and direction of, a new, comprehensive approach to research data services, specifically focusing on the need for better management of research objects throughout the research process. We invite readers to share their views and comments, in order to advance the discussion and help identify the right path forward in making this shift a reality.

Types of Research Objects

Research objects usually include four often-interrelated elements:

- **Publications:** Journal articles, pre-prints, books and anthologies, conference proceedings, author-accepted manuscripts, electronic theses and dissertations (ETDs), and more. These outputs are increasingly diverse in nature, and may be intended for restricted, partial or public dissemination.

- **Creative Work:** Audiovisuals, media installations, texts, musical compositions, and other creative efforts. These outputs are diverse in nature, and may have unique restrictions on visibility and access rights.

- **Research Data:** Raw research information, datasets, statistical and computational analyses, tables and spreadsheets, as well as images and audio and video recordings. These constitute the input, or evidence, for the development of scientific theories or the advancement of knowledge contributed by research institutions. This data, too, may be subject to specific regulations and policies.

- **Processes: Code,** software, electronic lab notebooks (ELNs), database search algorithms, online research methods, and the like used for handling research data and publications. At a university, this also includes interface software between academic libraries and their patrons, and links with other institutions of higher learning.

These research objects, or at least most of them, may either be in their final state or still active ("in-process"); that is, still being collected, organized or adopted.

Managing Research Objects

In order to manage research objects and ensure visibility into all related information, there are essential functions that must be accounted for:

- **Data and metadata management:** managing raw research data, pre-publication material, data analytics, and reporting. Applications or systems fulfilling this function may also provide information from across departments, institutions, groups and individuals regarding research activity and interests, as well as facilitating compliance with internal or external mandates.

- **Data repository:** storing and providing access to research objects, including finalized publications by researchers, in an accessible format, deposited according to defined requirements. The repository must generally support the different policies that relate to data access, as well as comply with the regulations regarding openness and reuse of funded research.

- **Data exposure:** providing visibility into research outputs and ensuring discoverability of all relevant information, including the wide scope of data that is part of the research process.

- **Scholarly profiles management:** collecting data about in-house researchers' publications in external sources (for example in subscription journals and databases), maintaining up-to-date expertise profiles, and alerting researchers of changes. These profiles can be published to showcase the university's research accomplishments, for internal reporting or assessment purposes, to provide data required for external use (such as by grant agencies), or for networking through an institutional research portal or other venue.

Today, these functions are managed through various systems, such as Current Research Information Systems (CRIS), Institutional Repositories, Research Data Repositories, and Research Administration Systems. The problem is that these are siloed solutions, creating multiple challenges to an integrated research management approach.

The Challenges to Integrated Management of Research Objects

Typically, research management functions are spread across several administrative and academic departments, as well as across third-party repositories. This results in varying constellations of institutional stakeholders most directly involved in each function. While the Research Information System may be of interest to the administration responsible for grant funding or faculty retention and recruitment, for example, the effectiveness of the research data management system will likely be of primary interest to the library and other researchers. Similarly, the library has little direct interest in fundraising for research projects, but may play the key role in managing institutional repositories.data, too, may be subject to specific regulations and policies.

Yet, there is a natural overlap of such complementary institutional interests, and the advance of technology provides an opportunity for greater harmonization of the research process.

Nevertheless, several challenges to a systemic integration of research output and data management remain. These are:

- **Siloed systems:** At many institutions, these functions are completely siloed, while at others they partially overlap. This leads to informational and workflow disconnects in some cases and unnecessarily duplicated efforts in others.

- **Different systems and data models:** Departments and faculties, even in the same university, often handle data differently and use different systems for information management. This inconsistency affects the ability to manage data, and render it available to internal and external users. While the use of multiple systems might be inevitable, better coordination can be achieved.

- **Variable data and information quality:** There are great variations in the quality and completeness of information maintained in different systems. For research purposes, poor metadata and a lack of robustness (identifiers for establishing relationships among datasets, for example) are the most common problems encountered in data-based integrations. This can result in data being inaccessible.

- **Poor sustainability:** There is currently a lack of tools available to sustain any complex integrations over time. This is primarily because of the disruptions inevitably caused by uneven upgrades and updates across systems or homegrown solutions.

- **Inconsistent and manual workflows:** Research processes are inconsistent across administrative and academic departments, and they are often very dependent on manual intervention. In addition, sometimes data required for a given workflow has to be drawn from external systems, particularly those related to funding opportunities and publications.

The Impact

A university's research outputs and data need to be visible to receive public or professional recognition, which is a measure of the university's impact on a particular field of study. For researchers, visibility can impact the entire arc of their career; while for universities, visibility is integral to their brand, competitive ranking, and, no less important, fundraising.

While the visibility of journal publications is important, it is no longer the sole factor that influences a researcher's reputation. Research output has expanded beyond journal publications to include presentations, slides, and data sets; and the impact of scholarly output is felt in non-traditional venues, such as blogs, social media, and

government policy. The exposure of research output and data through these channels can influence a researcher's tenure track and overall standing.

The problem is that the above-mentioned integration challenges make it difficult to ensure complete and consistent capture of diverse institutional and individual research activity and outputs. Moreover, the dissemination of captured research outcomes is more limited than it could be. As a result, it is also hard to know if the dissemination methods used are effective and where the research is having an impact.

Such weaknesses in both internal and external visibility make analysis and tracking tasks extremely challenging, if not impossible. This, in turn, creates uncertainty regarding compliance issues related to openness, the protection of proprietary information, and the use of externally funded research. Adherence is further complicated by the differences between the security requirements of research outputs and internal data management, as well as the need to maintain access to specialized, institutional, aggregated, and external resources.

The Research Services Platform: A New Approach

Given the challenges faced by research universities, a new paradigm for truly integrated research data management is clearly needed, to ensure data coherency, enhance visibility and increase compliance.

A Research Services Platform is a holistic concept based around practical workflows, which span multiple research activity domains. These day-to-day workflows incorporate several interrelated capabilities and features, including:

- Unified repositories of research objects, including automated capture and manual deposits
- Simplified processes for metadata curation and enrichment
- A variety of dissemination channels for easy discovery and accessibility
- Workflows for ensuring compliance with research mandates and policies
- Automated publication updates to scholarly profiles
- Reporting and analytics to assess the impact of research output
- Open integrations and interoperability with the research and academic ecosystem

As a comprehensive method of organizing the research journey, the Research Data Platform aggregates data from multiple systems, making metadata more consistent as it does so. Where relevant, enriched data can be fed back to the source generating the original dataset to improve future research outputs.

Inherent to the centralized research data management paradigm is greater visibility into research and scholarly activities, which creates a more analytics-driven system. This allows for interactive repositories in which data and outputs can be easily cross-referenced, as well as comprehensive reporting for research grant managers.

In addition, early indications of research progress can be more effectively leveraged to adjust project planning down the line.

Organizational compliance with regulatory and institutional requirements is also easier to track due to the strong visibility of the Research Data Services approach, creating an automated data management hub. The result is greater adherence to research mandates, policies and relevant legislation.

A more unified approach to research data services will also result in reducing the number of siloed workflows and point solutions throughout the process, lowering the university's total cost of operations and creating greater uniformity.

For greater sustainability, adaptiveness and scalability, such an integrated platform solution would benefit greatly from a collaborative, cloud-based infrastructure. On-premises solutions, while potentially effective for a time, eventually require more significant investments of time and money to maintain, tailor and upgrade.

The strategic and mission-focused transformation of the research data services paradigm is expected to ultimately lower institutional costs and increases benefits – while ensuring libraries, research administrators, and researchers themselves have the best tools available at their disposal.

Libraries at the Heart of Academic Research

Libraries already provide a measure of centralized coherence in the key role they play supporting academic research. Many academic libraries already have plans or are in the process of increasing their involvement in supporting research output and improving research data management. They bring together the staff, skills, and expertise needed for data curation, resource management, content dissemination, and related activities. Provided with the right infrastructure, we believe that libraries are well positioned to drive the transition to a more comprehensive research data management approach.

Ideally, this would mean maintaining processes that work well, leveraging researcher familiarity with library functions and repositories, and incorporating new solutions to create coherent, streamlined workflows. In not forcing researchers to radically change the way they currently operate, the Research Services Platform remains essentially transparent and fits seamlessly into day-to-day activities.

An inherent benefit a more comprehensive approach is increased collaboration between the library and the research office, leveraging a shared view and workflows around research publication, data, and related activities. For libraries, this constitutes an opportunity to strengthen their position at the heart of academic research.

Esploro, the Ex Libris Research Services Platform, is currently being developed in partnership with five leading academic institutions – the University of Iowa, Lancaster University, the University of Miami, the University of Oklahoma, and the University of Sheffield. This collaboration will help define the platform scope and capabilities, to create a solution that will increase the impact of academic research. Read more about Ex Libris Esploro in this overview.

About Ex Libris