Overseas Library Research Information Management Services: Practices and Implications: Postprint

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Abstract

[Purpose/Significance] Library participation in institutional research information management constitutes a potential service model. This study systematically examines the connotations and extensions of research information management, analyzes relevant theories concerning library involvement in research information management, aiming to provide reference for libraries' participation in institutional research information management. [Method/Process] Employing literature review, comparative analysis, and typical case analysis methods, this research analyzes the significance and applications of research information management, examines the advantages of library participation in research information management and its implications for libraries, interprets the role of libraries in research information management, and introduces practices of selected foreign libraries in participating in their institution's research information management. [Result/Conclusion] The construction of institutional research information management systems necessitates efficient integration of research information dispersed across different departments and systems within and outside research institutions, representing a systematic project requiring cross-departmental collaboration. When domestic university libraries participate in the construction of institutional research information management systems, they should leverage their expertise in information management, communicate the essence and philosophy of research information management to all stakeholders, and construct a diversified data application and service system based on the research information management system.

Full Text

Preamble

Research Information Management Services in Foreign Libraries: Practice and Implications

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Abstract

[**Purpose/Significance**] Participating in institutional research information management represents a potential service model for libraries. This paper examines the connotations and extensions of research information management, analyzes relevant theories concerning library involvement in research information management, and aims to provide reference for libraries participating in institutional research information management. [**Method/Process**] Using literature review, comparative analysis, and case study methods, this study analyzes the significance and applications of research information management, examines the advantages of library participation and its meaning for libraries, interprets the role of libraries in research information management, and introduces practices of foreign libraries participating in their institutions' research information management. [**Result/Conclusion**] Constructing an institutional research information management system requires efficient integration of research information dispersed across different departments and systems within and outside research institutions, representing a systematic project requiring cross-departmental collaboration. When participating in the construction of institutional research information management systems, domestic university libraries should leverage their information management expertise to convey the essence and philosophy of research information management to stakeholders, and build diversified data application and service systems based on research information management platforms.

Keywords: foreign libraries; research information management; practice; implications
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1. Introduction

Advances in data collection, storage, networking, and management technologies have triggered a paradigm shift toward data-intensive science, fundamentally changing research methodologies worldwide. One increasingly important trend across all aspects of research activities is the management of research information. In recent years, with the rapid evolution of the research ecosystem, an increasing number of research institutions have begun implementing Research Information Management (RIM). Developed countries in Europe and North America have conducted more systematic research and implementation

on RIM, particularly accelerated by national initiatives aimed at measuring the impact of state-funded scientific research, such as the UK's Research Excellence Framework (REF) assessment and Australia's Excellence in Research for Australia (ERA) evaluation. In Europe, research information management systems are commonly referred to as "Current Research Information Systems" (CRIS). University libraries in developed countries, with their rich information management expertise, are increasingly participating in their institutions' RIM practices. Research information management is becoming an integral part of scholarly communication practices in which many foreign university libraries collaborate closely with their institutions and other stakeholders.

In contrast, systematic research on RIM in China remains limited, with existing reports focusing primarily on informatization construction and system design. Most domestic university research information management systems are built and maintained by institutional research management or academic affairs departments. Due to weak technical capacity and lack of professional information management experience, these systems typically exhibit partial RIM features, are dispersed across multiple platforms or even departments, lack unified standards, suffer from low information sharing and integration levels, rely heavily on manual data entry, feature poor data timeliness, and emphasize statistical functions over analytical and deep-mining services, with limited external openness. Domestic university libraries' participation in institutional RIM system construction and services remains in its infancy, primarily through building institutional repositories and scholar databases with partial RIM features, often working in isolation without collaboration with other institutional research information management departments or integration with other systems, resulting in incomplete research information disclosure.

This paper systematically examines research information and RIM to reveal the nature of institutional research information management. By analyzing the relationship between libraries and institutional RIM and presenting case studies, it aims to provide reference for domestic libraries to participate in and guide their institutions' research information management.

2. Research Information Management

2.1 Related Research on RIM

Descriptions of Research Information Management (RIM) exhibit regional characteristics. European institutions have long referred to it as Current Research Information Systems (CRIS). As early as 1991, European research management administrators began sharing practices and standards in this field, establishing the international organization euroCRIS in 2011 and developing the CERIF standard for research information. In North America, terms such as Research Profiling System (RPS), Research Network System (RNS), Researcher Profile System, Faculty Activity Reporting (FAR) are more common. OCLC defines RIM as the aggregation, management, and utilization of information about in-

stitutional research activities. OCLC Vice President L. Dempsey particularly emphasizes that RIM does not refer to computerized management of research activities, but rather comprehensive management of information generated by all elements throughout the complete research lifecycle (researchers, research outputs, institutions, funding, facilities, etc.) to achieve seamless data exchange in institutional research decision-making. RIM is neither a social network platform nor research data management.

Many institutions are actively building their own research information management systems, such as Norway's CRIStin—the world's first RIM system organized by Norway's Ministry of Education and Research, which records all academic publications by Norwegian researchers; and institution-level systems like Duke University's Scholars@Duke and University of Minnesota's Experts@Minnesota.

2.2 Significance and Application of RIM

M. Dora and H. Kumar argue that opening research information to the public can enhance the visibility of institutions and researchers. C. Lynch points out that RIM provides tremendous opportunities to improve the speed and effectiveness of academic research, especially when research information is creatively discovered, reorganized, and reused. N. Misheck believes RIM ensures compliance with expectations of most research funding agencies regarding research information data. OCLC suggests RIM enables institutions to collect research information data from different departments and combine it with external information to provide richer perspectives on research activities for institutions and their units.

Applications of RIM vary significantly across countries, regions, and institutions based on specific needs (Figure 2). The United States primarily uses RIM systems for managing scholar profiles, storing institutional research outputs, and analyzing annual research progress. The EU, UK, and Australia use them for external research assessment and research output storage management, while Canada mainly uses them for grants and awards management.

OCLC summarizes the main significance and applications of RIM as follows:

1. **Grants and Awards Management:** (1) Providing information on external funding opportunities; (2) Matching potential external funders with internal research teams and activities; (3) Managing grant contracts and communications, including contract signing, progress coordination, feedback, and reporting; (4) Awards management and research output award identification.

2. **Institutional Research Output Storage and Management:** (1) Collecting, integrating, and storing research activity metadata from various internal and external data sources through institutional systems, campus awards management systems, and teaching management systems for reuse

in multiple ways. Increasingly, institutions view RIM systems as primary "data warehouses." (2) Making researchers' and institutions' academic outputs more discoverable, accessible, and citable, helping enhance academic reputation.

3. **Researcher Profile Creation, Maintenance, and Publication:** (1) Collecting personal and academic information from various internal and external systems to form academic profiles that can be updated, managed, and published through institutional portals or other channels; (2) Generating annual academic progress reports to support promotion, tenure, and annual review activities; (3) Facilitating discovery of scholars within and outside the institution to increase visibility and collaboration opportunities.
4. **Research Analysis and Reporting:** RIM can flexibly reorganize underlying bibliographic and other data, integrate researcher activity data, and create real-time visual analysis reports to support various specific needs and decision-making for institutions, individual researchers, and other stakeholders. Institutions can use RIM to aggregate information about their research footprint for evaluation, benchmarking, and research tracking.
5. **Supporting Open Access:** With increasing requirements from funding agencies and government policies for open access to funded research outputs, RIM supports open access to research information resources and integrates and manages research information while meeting open access policy requirements.
6. **Data Reuse and Interoperability:** Different departments and researchers within an institution can reuse RIM system data, enabling one-time input with multiple reuses to increase convenience and save time on duplicate data entry.

2.3 Mainstream RIM Platforms

Research Information Management Systems are the implementation platforms for RIM. As knowledge management systems in the research ecosystem, they collect and integrate research information metadata from HR systems, funding management systems, patent information systems, commercial databases, institutional repositories, student information systems, campus awards management systems, and teaching management systems for readjustment and reuse. Current mainstream development platforms include commercial platforms, open-source platforms, and self-developed systems.

Commercial platforms include Elsevier's Pure, Clarivate's Converis, and Symplectic Elements, which offer powerful functions in publications, grants, and awards management. Pure is a highly versatile centralized system that can aggregate data from different institutional sources to build institutional reports,

conduct performance evaluations, manage researcher profiles, enable peer discovery of institutional research networks and expertise, and reduce administrative burdens on researchers, faculty, and staff while helping institutions develop strategic decisions comprehensively and in real time. Clarivate's Converis is a fully configurable RIM system that manages the entire research lifecycle from proposal to final publication and application, and can build institutional academic profiles based on Clarivate's Web of Science database. Symplectic Elements features strong data integration capabilities, enabling automatic integration of data from different internal and external sources and particularly revealing research collaboration networks within and outside institutions.

Open-source platforms mainly include Profiles (Harvard Catalyst Profiles), VIVO (http://www.vivoweb.org/), BibApp (http://bibapp.org/), and DSpace-CRIS, among which Profiles and VIVO excel at revealing research networks and collaboration. According to OCLC's "Research Information Management Systems: Preliminary Findings from an International Library Survey (2018)," which surveyed global institutions implementing RIM systems, 30% use Elsevier's Pure system, 28% developed their own systems, and 12% use Symplectic Elements (Figure 3).

3. Libraries and Research Information Management

On October 26, 2014, OCLC Vice President L. Dempsey published a blog post titled "Research Information Management Systems? A New Service Category," positioning RIM systems as a potential new service category for libraries. Dempsey argued that the emergence and development of RIM systems provide important opportunities for libraries to further engage in users' research processes.

Libraries have natural advantages in participating in institutional RIM. First, information management is one of libraries' professional strengths. Through long-term experience in building and managing digital resources such as databases and institutional repositories, libraries have accumulated rich practical experience. Libraries can leverage their strengths in information acquisition, verification, indexing, and standardization to efficiently integrate research information data dispersed across multiple departments and systems through cross-departmental collaboration, meeting more personalized needs through statistical analysis and deep mining while improving work efficiency. Second, libraries have gradually become important components of the academic ecosystem and trusted partners for faculty through long-term service practices. Libraries can use these advantages to guide faculty participation in RIM system construction, helping them better manage and control their academic outputs and increase their influence.

Research information management provides libraries with new opportunities to participate in and promote institutional research processes. Libraries should and must seize this development opportunity, fulfill RIM responsibilities, and

integrate into users' research processes.

3.1 Significance of Library Participation in RIM

3.1.1 Building Bridges for Interaction with Researchers The digital technology revolution has transformed the relationship between libraries and researchers, with many researchers no longer using physical libraries but instead using virtual libraries in invisible ways. Lack of contact with researchers may lead to gaps between their needs and library services, causing libraries to miss many opportunities. This makes it increasingly difficult for libraries to reposition themselves and leverage new opportunities to address researchers' changing information needs and behaviors. Participation in RIM provides libraries with channels to reconnect with researchers. In the process of participating in RIM, libraries must work closely with academic departments, collaborate with researchers to accurately track their research outputs, and assume the role of training and supporting researchers to ensure successful RIM implementation. This further strengthens librarians' understanding of the evolving research environment and helps them identify new opportunities to provide more valuable services. Through RIM participation, libraries bridge the gap with researchers and build good interactive relationships.

3.1.2 Innovating Service Models and Enhancing Library Image The survival and development of research libraries depend on their ability to become part of their institution's knowledge creation process. In the digital environment, the nature and mode of institutional scientific research have changed significantly, and libraries' role in supporting research must also change. To address this, libraries should reshape their service nature, play an increasingly important role in managing institutional research outputs, and strive to become a necessary part of their institution's knowledge creation process. RIM provides such an opportunity. By participating in institutional RIM, libraries preserve and discover their institution's knowledge outputs and expand their reach to support the institution's mission, goals, and vision. While numerous studies indicate that libraries are the most ideal partners and potentially the ideal hub for institutional RIM, in reality libraries are often not recognized as key partners. If libraries do not actively participate and provide these services, they will further weaken their image as important partners in the research process. Therefore, libraries should actively participate in institutional RIM to further realize their core values and vision, become active participants in their institution's knowledge creation system rather than isolated entities, and ultimately ensure support from institutional decision-makers, improve researcher satisfaction, and win institutional recognition.

3.1.3 RIM Provides a Pathway for Library Research Support Services Research support services refer to library services that support researchers' activities at different stages of their research lifecycle. Researchers operate in an ever-changing research environment, and libraries' role in supporting research

must also change. SPARC Europe Program Officer V. Proudman analyzed research support service trends in 40 academic libraries in the US, Canada, Australia, and Europe in 2016, finding that "managing information, integrating institutional archiving and RIM systems" is one of the development trends. Currently, research institutions face requirements from local governments or funding agencies for scientific research evaluation, and increasingly need to measure and enhance their research impact and benchmark against international standards. Both research evaluation and benchmarking require large amounts of accurate research information data. By participating in RIM system construction, libraries integrate various entities throughout the research lifecycle (researchers, research outputs, project funding, etc.) from different departments, achieving synchronized integration and one-time data input with multiple reuses. This reduces additional administrative burdens on researchers, allowing them to focus more on teaching and research; establishes academic profiles for institutions and researchers; enhances visibility and broader impact of research activities; and supports institutional or national-level research and funding evaluations and benchmarking management. Additionally, RIM can provide support for research policies, open access, and project funding throughout the researcher lifecycle.

3.1.4 Achieving 1+1>2 Through IR+RIM Institutional Repositories (IR) are platforms for effectively managing research institutions' intellectual assets, outputs, and capabilities. However, for a long time, IRs have only provided simple publication storage services, lacked research management functions, and had insufficient connection and collaboration with research management systems, leading to isolated IR construction and constrained value realization. Moreover, except for institutions with mandatory deposit policies, most researchers have little incentive to submit their academic outputs to IRs, resulting in limited core user adoption for many IRs. Compared with IRs, researchers show greater interest in RIM systems, which are more important to them. Most European countries have conducted interoperability research between IR and RIM, developing corresponding platforms that use RIM to support IR resources and services, automatically importing different types of metadata such as bibliographic data and funding information from RIM to IR to achieve automatic harvesting and timely updates of research information data. Evidence shows that adding RIM to IR also increases researcher interest in IR. Through IR+RIM, open scholarship, open data, and open science can be better supported.

3.2 The Role of Libraries in RIM

Libraries can participate in and support institutional RIM at many levels. According to OCLC's "Research Information Management Systems: Preliminary Findings from an International Library Survey (2018)," among 381 surveyed libraries in 48 countries, 172 libraries participated in and supported institutional RIM in various ways. The survey shows libraries' primary roles in supporting RIM activities (Figure 4): in open access, copyright, and deposit, 129 libraries

took primary roles and 14 supporting roles; in metadata input, 73 primary and 44 supporting; in metadata verification, 92 primary and 12 supporting; in training and support, 70 primary and 36 supporting; in research data management, 84 primary and 16 supporting; in proposing, initiating, or promoting adoption, 37 primary and 47 supporting.

Regarding libraries' roles and participation pathways in institutional RIM, OCLC provides the following framework:

1. **Leveraging and Mining Libraries' Publication and Scholarly Expertise:** (1) Librarians have rich experience managing bibliographic data, which helps optimize and ensure the quality and completeness of reusable research information data for internal and external evaluation reports. (2) Librarians are experts in publication indexing and large-scale metadata collection and storage. They can provide information on coverage and accessibility of disciplinary content resources and make recommendations on collecting and acquiring content from different sources. (3) Since many RIM system vendors are publishers, libraries can leverage long-established relationships with publishers to participate in institutional RIM. (4) Libraries can advise on metadata availability, print resource accessibility, and related intellectual property rights in RIM systems. (5) Librarians must understand trends in publishing and knowledge discovery highly relevant to RIM. (6) Librarians can help RIM stakeholders understand challenges in bibliographic data disambiguation and deduplication, and resources for managing these challenges, such as current and emerging standards and Persistent Identifiers (PIDs). (7) Librarians promote and support adoption and integration of author identifiers like ORCID to improve metadata quality and attribution.

2. **Supporting Discovery, Access, and Scholarly Reputation:** Institutions and libraries should consider how to use RIM to increase the value and impact of research information. For example: (1) Using research information to augment campus directory services to facilitate faster knowledge sharing within and outside the institution. (2) Building institutional scholar repositories can improve visibility and discoverability of the institution's scholars for regional and international collaborators, funders, and social media, and help prospective undergraduate, graduate, and postdoctoral researchers find research opportunities and mentors. (3) Institutions and researchers often need to address open access requirements from local, funding, or government bodies, and libraries are active open access advocates. Whether managing local research outputs through standalone IRs or local RIM systems, libraries are important partners in supporting collection, dissemination, preservation, and open access of local research outputs. (4) Researchers and institutions are often interested in impact metrics, and libraries can provide expertise in traditional bibliometrics and emerging or alternative metrics that offer information on article views, downloads, and social and news media attention.

3. **User Training and Support:** Librarians have long supported researchers through discovery and access to research materials and training. Supporting researchers and other users in RIM systems extends existing library services and aligns with libraries' missions to serve students, scholars, and institutions. (1) Many libraries take leadership roles in RIM training and support, providing training, manuals, and individual guidance for researchers and others using RIM infrastructure. (2) Librarians train researchers on importing publication data from publication indexes and reference management tools, linking their academic profiles to unique identifiers like ORCID, and using and understanding scholarly impact metrics. (3) RIM training can connect with other library services supporting the researcher lifecycle. (4) Library user training and support can also extend to helping researchers comply with and implement relevant policies, such as government open access policies or academic evaluation policies and procedures.

4. **Institutional Scholarly Record Management:** Libraries have always been managers of scholarly records. In today's rapidly changing digital environment, libraries must be more collaborative and operate at scale in managing evolving scholarly records. (1) Libraries play an increasingly visible role in managing institutional scholarly records, seeking to improve discoverability of institutional outputs and share them through networks. (2) Different stakeholders have different needs and goals for RIM, including compliance, review, reporting, and strategic decision support. Libraries may be the only stakeholders concerned about whether these scholarly outputs can be found and used in the future and responsible for preserving institutional scholarly outputs. (3) Institutional research output data is typically stored in libraries. To make institutional research more widely accessible and used, libraries are natural partners for campus integration when implementing RIM systems with other institutional systems.

4. Case Studies of Foreign Libraries' Participation in RIM

This section examines RIM practices at Virginia Tech and the University of St Andrews. Their RIM systems and libraries' roles share common characteristics: (1) Institutional RIM systems integrate and consolidate research information data from multiple departments and systems, truly achieving one-time collection with multiple reuses; (2) Although libraries are collaborative partners in system construction, they play very important roles; (3) Both use mainstream commercial platforms (Symplectic Elements and Elsevier Pure); (4) Both achieve effective integration between RIM systems and institutional repositories, realizing 1+1>2 through IR+RIM. These practices offer important lessons for domestic university libraries.

4.1 Virginia Tech's RIM Practice

Virginia Tech's RIM practice features integration of multiple research information systems centered on the Electronic Faculty Activity Reporting System (EFARS) through the Symplectic Elements system. Virginia Tech's RIM ecosystem 主要包括 EFARS, the institutional repository VTechWorks, the scholar profile system CollabVT, and the research data repository VTechData, with EFARS as the core. The ecosystem integrates EFARS with VTechWorks and CollabVT through Symplectic Elements and the open-source VIVO application, with future integration planned with VTechData (Figure 5). This integration achieves one-time collection with multiple reuses, significantly reducing the burden of research information management and maintenance for administrators and faculty.

A second feature is the integration between EFARS and VTechWorks, providing faculty with convenient methods to manage their personal research information data. Faculty can quickly and easily deposit their research outputs into VTechWorks through EFARS internal workflows for open access, without separate external submission processes. This encourages faculty participation in open access and greatly improves VTechWorks service efficiency. EFARS also seamlessly links with CollabVT, which serves as both a scholar profile system and a publicly searchable database of Virginia Tech research. Applying EFARS research information data to CollabVT makes more Virginia Tech and scholar academic outputs discoverable and citable, promotes research collaboration, expands research impact, and enhances academic influence.

Virginia Tech's RIM ecosystem construction is a cross-departmental collaborative project. The Provost's Office leads the initiative and, together with the University Libraries, are initiators and leaders of the core EFARS system. Other participating units include the Vice President for Research and Innovation, IT department, HR department, Sponsored Programs Office, and faculty. The University Libraries play crucial roles in managing various RIM applications, maintaining research information data, integrating VTechWorks and CollabVT, operating VTechData, promoting EFARS, maintaining Elements, importing data from Web of Science and other external sources, and providing user training and content development.

4.2 University of St Andrews' RIM Practice

The University of St Andrews' RIM system Pure is built on the Elsevier Pure platform. Its key feature is achieving one-time input with multiple reuses through integration of multiple internal and external research information systems. Pure integrates the university's HR system, project funding management system, institutional repository, student information system, faculty activity system, and external data sources like Scopus (Figure 6). Pure supports automatic harvesting of research information, impact data, and research activities from third-party sources like Scopus and Web of Science, while also allowing

manual input or system-compatible file imports. Pure serves as the single authoritative data source for St Andrews' research publication metadata, accessible to administrators, researchers, and external funders. Pure provides data to public portals showcasing university research, improving visibility and impact of St Andrews and its researchers. It also supplies data for researcher personal webpages and creates dynamically updated CVs when scholars add new content. By linking with the institutional repository, Pure supports open access requirements, automatically sending full-text records to the repository when verified by the open access team. Pure also provides specialized reporting to support funder requirements and UK REF assessments, truly achieving one-time input with multiple reuses and minimizing burdens on administrators and researchers.

St Andrews' RIM system construction is also cross-departmental, led by the Research Policy Office with broad participation from the Library, HR, funding and finance departments, and researchers. The Library plays crucial roles including providing professional knowledge support to the Research Policy Office, technical linking between systems, data architecture design, expertise in bibliographic databases and open access, importing data from Scopus and other external sources, maintaining Pure, promotion and user training, and assisting researchers with data maintenance. Since 2016, over 40% of publication records in Pure have been created by the Library on behalf of scholars, demonstrating great trust and expanded communication channels between scholars and the Library.

5. Implications and Recommendations

5.1 Institutional RIM System Construction Requires Cross-Departmental Collaboration

Institutional RIM systems involve numerous stakeholders including research management, HR, academic affairs, IT, libraries, and scholars themselves, each with different expectations. Research management departments hope RIM systems can help with performance analysis, benchmarking, and funding management; HR departments want support for analyzing scholarly impact for promotion and evaluation; researchers want systems that minimize submission and maintenance costs while enhancing discovery of their outputs. To ensure sustainable development, systems must meet all stakeholders' needs. Therefore, from the outset, project teams with stakeholder participation must be established, with steering committees comprising institutional and departmental leaders when necessary. All parties must deeply participate in all stages from needs analysis to design, implementation, and optimization. As participants, libraries must recognize that institutional RIM system construction is a cross-departmental collaborative project that cannot succeed through libraries or any single department alone. Libraries must convey this philosophy to stakeholders and, while understanding their specific needs, use their information management expertise and RIM understanding to communicate system benefits and attract active participation.

5.2 Integrate Institutional Repositories with RIM Systems for Mutual Benefit

A key significance of institutional RIM system construction is integrating different departments and systems to achieve data sharing, one-time collection with multiple reuses, avoiding duplicate collection, improving efficiency, reducing burdens on researchers and administrators, enhancing data quality, and better understanding research relationships, outputs, and impacts to improve visibility and promote collaboration. Domestic libraries should leverage their established IR concepts and advantages to effectively integrate and seamlessly link institutional RIM systems with IRs. Using diverse research information data from RIM systems to support IRs enables automatic harvesting, deposit, and timely updates, further enhancing IR service capacity and efficiency. Through unified open RIM systems, more institutional research information can be opened, discovered, and cited through IRs, further enhancing institutional and scholar impact. IRs also serve as complementary platforms for RIM systems to showcase full-text research outputs and collect usage metrics, promoting reuse and sharing of research information.

5.3 Actively Guide Scholar Participation in RIM System Construction

For RIM system construction, scholar participation is key to success. Scholars must feel the system is built for them, not for library or departmental objectives, and certainly not for institutional business processes most scholars don't care about. Meeting scholars' needs and motivations should be the primary goal, which ultimately benefits their institutions. Scholars must also feel they have a stake in their academic profiles and that building and maintaining them is beneficial. Libraries have long provided teaching and research support services, establishing good partnerships and becoming trusted partners. Libraries should leverage these advantages to be advocates for scholars' interests, fully considering their value propositions, simplifying their workflows, and enhancing their scholarly impact through RIM system participation. Libraries must actively communicate the significance of RIM systems to scholars to secure their genuine participation.

5.4 Build Diversified Data Applications and Services for RIM

Institutional RIM system construction aims to integrate research information data from different departments and systems to support diverse application needs of different departments and individuals. Therefore, RIM systems should provide standard APIs for third-party data services. As participants, libraries should also leverage their expertise in data analysis and mining to conduct deep analysis of institutional research information data and provide strategic decision support for scholars and institutions. Through unified open RIM systems that efficiently integrate dispersed research information, achieving one-time collection with multiple reuses avoids duplicate collection, improves efficiency, reduces

burdens, enhances data quality, and enables better understanding of research relationships and impacts.

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Note: Figure translations are in progress. See original paper for figures.