Ethical Dimensions of Research Information Management: A New Challenge for Information Professionals

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Abstract: The evaluation and monitoring of research performance is one major challenge of research management. Research information management (RIM) systems are designed to assess this performance and to contribute to the steady improvement of research. Based on former studies on RIM systems, a recent exploratory survey on ethical aspects of current research information systems and expert interviews with members of euroCRIS, the International Organisation for Research Information, this chapter provides an overview of ethical dimensions of RIM, together with original empirical evidence on how RIM systems represent ethical aspects of research projects and how their development, implementation and functioning should comply with usual ethical standards of scientific research. Special attention is paid to the role of academic librarians in RIM, in particular regarding the quality of bibliographic records, the standards of data and the management of institutional repositories, data repositories and other open archives.

Keywords: Research information management; Research – Information services; Research ethics; Research methods

A New Application of Professional Ethics

Ethics is a practical science. The topic is treated theoretically, but primarily serves to apply knowledge gained and less to gain knowledge. The ethical point of view is not a new topic for librarians. As the International Federation of Library Associations and Institutions (IFLA) Code of Ethics for Librarians and Other Information Professionals [hereinafter IFLA Code of Ethics] says it in its preamble: "Librarianship is, in its very essence, an ethical activity embodying a value-rich approach to professional work with information" (IFLA 2012). Based on the concept of human rights, particularly as expressed in the United Nations Universal Declaration of Human Rights (United Nations n.d.), the IFLA Code of Ethics proclaims six core principles to provide:

> …a set of suggestions on the conduct of professionals… Librarians and information workers … reject the denial and restriction of access to information and ideas most particularly through censorship; …promote inclusion and the eradication of discrimination [through the provision of] equitable services for everyone; … respect personal privacy and the protection of personal data; … support and participate in transparency; …provide …support for the principles of open access, open source, and open licenses; …are strictly committed to neutrality and an unbiased stance regarding collection, access and service ; ,,,[and] oppose discrimination in any aspect of employment (IFLA n.d.).

The IFLA Code of Ethics applies to the work environment of librarians and to their professional conduct. In the field of academic librarianship, the code applies to their relationships with students, faculty, scientists and other staff ,and to the configuration and usage of library systems, digital platforms, and institutional repositories, especially regarding privacy and the protection of personal data. Other ethical principles are at play when it comes to developing new library services, to defining acquisition policies or to managing library holdings and collections.

Information professionals have promoted the need for ethics and integrity. Nevertheless, academic librarians have been less involved in research ethics as advisors, reviewers,

members of ethics committees or trainers, except perhaps for one particular issue, plagiarism. Research ethics, most often, is taken care of by experienced senior scientists and legal experts, because of the high risks and stakes. But there is a domain which may become a new ethical challenge for academic librarians and other information professionals working in the sector of higher education and research The emerging area is research information management (RIM).

RIM refers to the aggregation, curation, and utilization of information about research and the metadata on research projects and activities, including information about scientists, institutions, publications, patents, and outputs (Bryant et al. 2017). The main objective of RIM is to produce useful insights and knowledge for the monitoring and assessment of the research activity of scientific institutions, infrastructures and human resources.

Academic librarians are already part of the game. Handling metadata on scientific authors and publications along with their institutional affiliations is part of regular day-to-day activity in the environment of catalogues, databases, and institutional repositories. Metadata contributes to the monitoring and assessment of research activity through the production of performance indicators based on scientometrics and, more recently, altmetrics. However, RIM raises new ethical issues, especially in the environment of open science (Schöpfel, Azeroual, and Jungbauer-Gans 2020). What does this mean for academic librarians? How can librarians contribute to dealing with the new challenges?

Research Ethics in the Context of Open Science

"Doing good science in a good manner" is perhaps the simplest way to describe the fundamental ethical values of research (DuBois and Antes 2018). This broad and universal approach to science requires the definition and the acceptance of common standards of excellence and some general rules like, among others, the management of conflicts of interest, the protection of human participants and animal subjects, the honest reporting of findings and the proper citation of sources. More general terms are used to describe good scientific conduct, such as personal integrity, rigour, honesty, objectivity, respect, carefulness, trust and accountability. On the other dark side of research ethics, there are various examples of scientific misconduct, often described in terms of proscribed undesirable behaviour such as falsifying research data, not properly disclosing conflicts of interest, biased reporting of results, inappropriately assigning authorship credit, plagiarism, and lack of respect for human subject requirements (Martinson, Anderson, and De Vries 2005).

Scientific misconduct is frequently labelled a violation of good scientific practice associated with the behaviour of particular individuals and deemed a personal responsibility of researchers. The focus is on the individual scientist. However, open science unfolds new perspectives, shifting the focus from the individual scientist to the environment, to the research process, the work conditions, the infrastructures, the legal and administrative rules, in short, to the ecosystem of science. The basic idea is that changing the rules and the tools will change individual behaviour and improve scientific performance.

Open science has been defined in various ways. Some definitions are broad and inclusive; others are narrow and specific; and some are more useful than others. Some definitions are simple, for example, the open knowledge definition "means the freedom to use, reuse, and redistribute without restrictions beyond a requirement for attribution and share-alike right" (Molloy 2011) or "efforts to make the scientific process more open and inclusive for all relevant actors" (Dai, Shin, and Smith 2018, 5). The European Commission defined open science as "the transformation, opening up and democratisation of science, research and innovation", with three objectives: making science more efficient, transparent and

interdisciplinary, changing the interaction between science and society, and enabling broader societal impact and innovation (Ramjoué 2015, 169).

As an umbrella term, open science denotes, above all, open access to publications and data sharing, and also includes open-source software, open peer review, citizen science and open educational resources. Each aspect of open science has its own rules, procedures, environments, technologies, and values. Nevertheless, the open science movement as a whole affirms and encourages some common, fundamental ethical principles, such as transparency and integrity, openness, inclusiveness, removing barriers, and the freedom to use research results (Rentier 2019). Beyond its political, technological and economic purposes, the open science movement explicitly highlights and reinforces research ethics. The improvement of transparency, integrity, openness and sharing has become a goal of research policy in its own right. As a goal of policy, the procedures for ensuring ethical research call for follow-up and monitoring. Does the public investment in open science attain the objectives set? How efficient are new research policies? How effective are changes in rules and procedures and new infrastructures in ensuring open science and improved research outcomes?

Monitoring of open science has until recently focussed mainly on open access to journal articles, and less on sharing of research data. There are international initiatives and projects to promote transparency and integrity in science and scientific publishing, and to disseminate best practices and increase efficiency and effectiveness in science. The mission of the Center for Scientific Integrity, the parent organisation of Retraction Watch "is to promote transparency and integrity in science and scientific publishing, and to disseminate best practices and increase efficiency in science" (n.d.). The Center for Open Science sponsors various projects and transparency initiatives (Center for Open Science n.d.). There is no systematic assessment on a larger scale of research integrity, transparency and other ethical principles. One reason is probably that there are no common and shared indicators in the field of ethical principles and that, at least for the moment, RIM usually measures key performance in terms of publications, data, patents, citations and awards, while ethical principles and scientific misconduct remain out of scope. Without assessment of related metrics, there is no way to provide reliable data for the monitoring of open science policy in the field of research ethics.

Deeply committed to the principles of freedom of information and open access, academic librarians and other information professionals working in higher education and research institutions and organisations are among the most active stakeholders of the open science movement. Many articles, books, communications, posters, conferences, and training events illustrate significant professional engagement by librarians and information workers in support of open access to scientific results. Librarians and information workers are becoming heavily involved in research data management, data sharing and the administration of data repositories. How do librarians and information workers contribute to the improvement of ethical standards and in particular, to the monitoring of ethical principles? How can they identify misinformation and false research and help prevent its distribution and sharing? How can librarians and information workers help prevent misuse of research information and the activities of researchers from becoming malinformation which causes harm to others?

A small exploratory survey of RIM experts was conducted by the authors of this chapter and is reported on later in the chapter. A majority of experts think that open science will increase the need for ethical assessment. The question remains. What is the role of information professionals in contributing to ethical assessment of research? Because of their ethical values, information professionals already play their part as collection managers, members of research teams and authors, as professional trainers and colleagues. RIM and the administration and exploitation of research information systems can provide them with a new field of action.

What is Research Information Management?

Universities and research institutions are facing the challenge of building up and establishing professional RIM systems with databases and federated information systems. In this chapter, RIM is understood to be CRIS (Current Research Information System). CRIS is the term receiving widespread use in European countries, while RIM is used in the US. "CRIS is a database or other information system to store, manage and exchange contextual metadata for the research activity funded by a research funder or conducted at a research-performing organisation (or aggregation thereof)" (Wikipedia 2022a). The focus of RIM is the support of scientists in managing the research information that has been collected. At the same time, the establishment of a university-wide RIM system will maintain and increase the attractiveness and competitiveness of the university. In addition, research information systems are gaining in significance. Scientific institutions are experiencing increasing demands from sponsors on research reporting and scientists themselves are anxious to make their research more easily accessible to the scientific community, available publicly, interoperable and recyclable.

Research information includes all metadata that arise in connection with research activities, such as information about publications, third-party funds, project data and people involved. Since this information is often stored in several systems, RIM is required to bundle the information in a structured manner, simplify the creation of reports and enable value-added services as well as support the exchange of data and the networking of research information from different sources. Another value-added service can be a publication list, for example, which can be transferred to various applications and guarantee the researcher a certain mobility of the data. "The CRIS provides a single portal bringing corporate and academic research activity together, reducing duplicate data entry, increasing data quality, identifying authority sources of information and recording complex relationships between researchers, projects, outputs and impacts" (Clements and Proven 2015, Abstract). Relevant research information in a RIM database includes data on:

- People, with name, job title, affiliation and skills
- Organisations and research facilities, with name, type, and location
- Projects, with name, duration, funding, and programme details, and
- Outputs comprising publications, research data, and patents.

Research information is not to be confused with research data or output. With the help of RIM, the entire research process in scientific institutions can be supported and the research context can be documented. RIM should, for example, be able to link particular projects with funding and research results and enable evaluation and assessment within an institution as well as comparison with other institutions. In addition, RIM can be used to manage research projects, results, resources and funding. RIM offers the possibility of structured recording of information about an institution's research performance. Modern developments in standardisation, interoperability and evaluation options are characteristic of RIM. Many standards or data models for RIM specify which data is to be recorded in which format (Azeroual and Herbig 2020). The result is simplified and more effective research reporting because data is captured only once and not multiple times.

Academic libraries are convenient places for RIM, and academic librarians are becoming more involved in RIM projects, but in a different way from their involvement with institutional repositories and digital libraries. Librarians are less involved in the development and administration of research information systems, but more engaged with issues of standardisation, data maintenance, and the connections to catalogues and repositories, playing a role that can be described as a metadata manager. Librarians are key to the success of any

RIM project, making a special contribution to guaranteeing the reliability of information on publication, data, scientists and organisations (Schöpfel and Azeroual 2021). When a library catalogue or an institutional repository is defined as a data provider and connected to a RIM system, poor quality of the original library or repository data will produce misinformation for RIM and reduce its value, trustworthiness and acceptance.

Libraries can emphasise the added value of their services in the collection of publications in RIM. Libraries must publicise their services and provide training so that their services are understood, and the corresponding resources and databases must be available. Rebecca Bryant from OCLC recognised the status of libraries as partners in institutional RIM because they have a high level of expertise in metadata, standards, open access, research data management and identifiers, and are able to support the goals of RIM. Yet, academic libraries will seldom assume primary responsibility for RIM. They are part of the team. RIM is more than metadata management and systems are usually managed by information technology or research management departments within academic institutions (Bryant et al. 2017).

However, the specialised knowledge and value of libraries should not be forgotten. Bundling the strengths of various actors can contribute to the success of RIM in an institution. The OCLC report observed that:

> RIM intersects with many aspects of traditional library services in discovery, acquisition, dissemination, and analysis of scholarly activities, and does so through the nexus with institutional data systems, faculty workflows, and institutional partners… RIM adoption offers libraries new opportunities to support institutional and researcher goals (Bryant et al. 2017, 5).

RIM brings additional added value through increased user-friendliness, minimisation of manual entries, correction functions, standardised exports in reference management programs, integration of services on campus, automatic checking of secondary open access publications and the publication of regular papers or preprints in institutional repositories directly from RIM. In the area of publication support, aautomatic checking of authorisation for secondary publication via Sherpa Romeo provides added value. Sherpa Romeo is an "online resource that aggregates and analyses publisher open access policies from around the world and provides summaries of publisher copyright and open access archiving policies on a journal-by-journal basis" (Jisc n.d.).

Research Ethics in Research Information Management

Research ethics has already been discussed in the context of open science earlier in this chapter. Ethical questions are important in all phases of the research process, from planning through implementation to publication, and must be considered throughout any project. Ethical obligations do not exist only at the beginning of a project, but affect the entire life-cycle, for example, publication, patent, employee and third-party project data, among others. There are particular ethical issues in qualitative research, where a personal relationship is entered into between researcher and investigator (Miethe 2010).

The way researchers work has changed and increasing volumes of data and information are being generated, usually in digital formats, for storage and management. The data and the information generated constitute the basis of knowledge growth and future research processes and are linked to other data. Professional RIM is becoming increasingly important. Due to the increased social importance of research processes and outcomes, questions of research ethics have become more relevant in RIM. Ethical guidelines must be observed, especially when collecting research information and data to avoid misinformation, and as already noted, misuse of the data and malinformation must be prevented.

When disseminating and publishing research information, care must be taken to ensure that data protection and ethical issues are considered. Care must be taken to ensure that damage does not arise from improper use of data. Sensitive personal and medical data must be accessible to third parties only under particularly strict security requirements. Researchers must adequately secure research data and keep it for an appropriate period of time. If there are understandable reasons not to save research data, the researchers should explain them. Research ethical principles, standards and regulations are intended to ensure that damage can be avoided while at the same time guaranteeing freedom of research. As Weyns (2020) noted, there is a growing consensus that new ethical principles are required with the advent of information systems that make autonomous decisions.

In Spring 2021, an exploratory survey was conducted with sixteen experts in the field of RIM to gain insights into ethical issues. Most of the experts were system providers; others were project managers or system administrators. Most were working in the academic sector. The purpose was to learn more about how the experts thought about and dealt with research ethics in the field of RIM. One question was about the relevance of ethical principles. The experts were asked to identify which of the principles of research ethics, such as human subject protection or respect for intellectual property, they considered the most important and relevant. A closed list containing fourteen principles was provided; the results are shown in Figure 1.
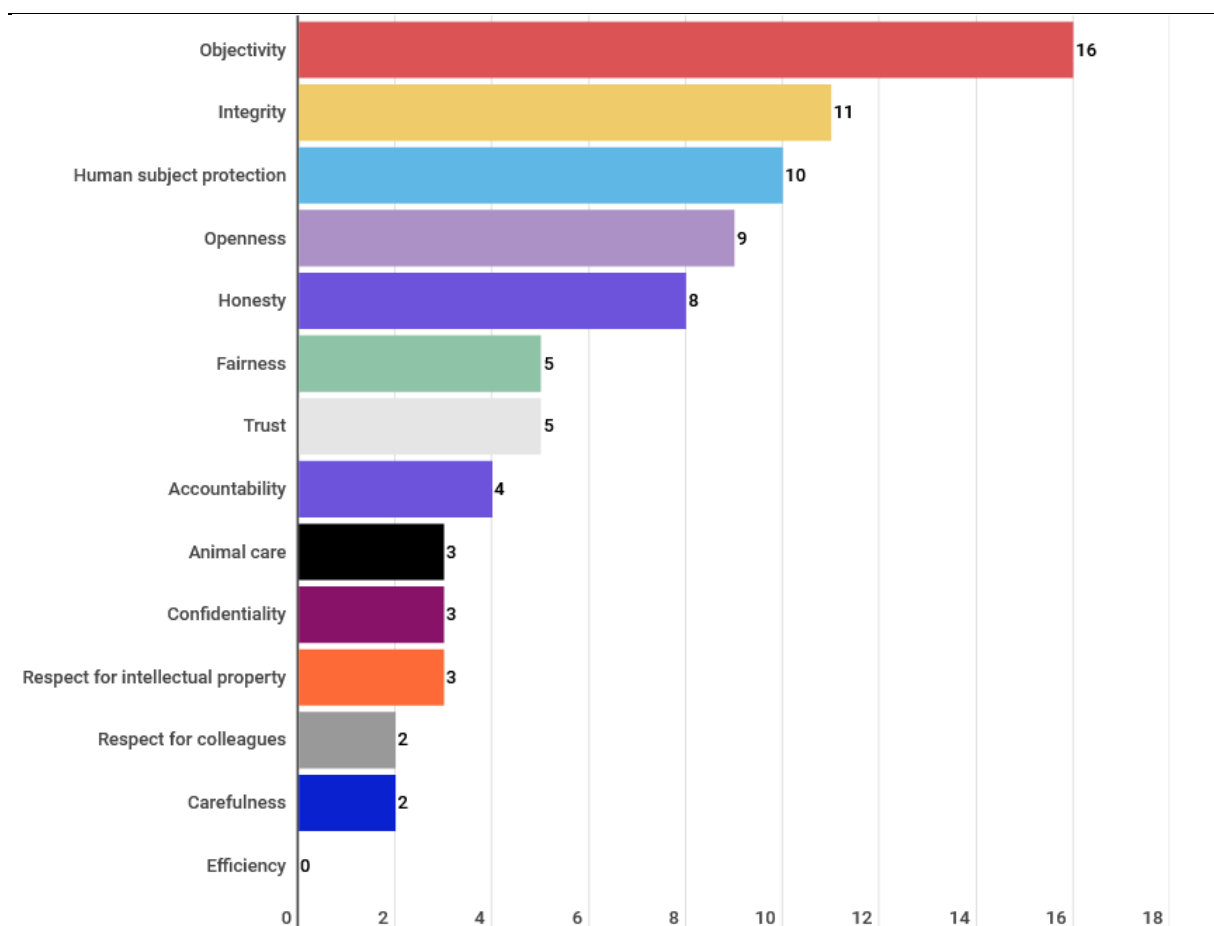

Figure 1. Ethical principles for scientific research

The results indicated that objectivity was considered the most relevant principle of research ethics by all sixteen in the survey, followed by integrity, human subject protection, openness and honesty. Fairness, trust, animal care or simply carefulness were deemed less relevant.

Another question related to individual misconduct. The experts considered four unethical behaviours as particularly harmful for research: falsifying or cooking research data, plagiarism, omitting observations, and failing to present data.

The principles and behaviours highlighted should be given priority for monitoring and follow-up in RIM, but to date this has not been the case. At the time of the survey, few RIM systems handled information about ethical issues, and most of the experts considered that the systems were not well prepared for the area. One reason is that the usual data models focus on performance indicators and metrics of research output. Information about ethical issues generally is not part of the usual key performance indicators. While there may be a common understanding of relevant ethical principles and scientific misconduct, up to now there has been no agreed list of relevant indicators corresponding to those principles and misbehaviours. More discussion between RIM experts and ethics committees is needed to progress the matter, paying particular attention to the value and the reliability of the data and information.

Research ethics, especially individual misconduct, is a critical and sensitive issue that requires, perhaps even more than research output, trustworthy and sustainable RIM. In the open science environment, professionals and scientists highlight the importance of the FAIR principles in data quality. FAIR stands for Findable, Accessible, Interoperable and Reusable (Mons et al. 2020; Wilkinson et al. 2016). FAIR principles focus on properties of data that enable increased data exchange and remove ethical questions, power differences and historical contexts. The Global Indigenous Data Alliance (GIDA) has set up the CARE principles for handling indigenous research data as an important supplement to the FAIR principles (GIDA n.d.). CARE stands for Collective Benefit, Authority to Control, Responsibility and Ethics (Carroll et al. 2020). As already noted, the future use of research data can have negative consequences, which the researcher must prevent by taking appropriate measures. The CARE principles expand the ethical responsibility of harm prevention to include the obligation to align the use of data to explicitly positive effects. Similar, appropriate principles should be developed for research data and RIM.

The administration, backup, storage and sustainable provision of research information must be conducted according to recognised standards and meet high requirements. The Common European Research Information Format (CERIF) was developed with the support of the European Commission as a standard for research information to support information interchange within CRIS (Eurocris n.d.) and is recommended for use in the European Union (EU) (Jeffery et al. 2014). It is a model for the organisation and exchange of research information on conceptual, logical and physical levels. The data model includes organisations, projects, funding and other components of the research process and connections to it. The linked data model is used for interoperability between different research information systems. CERIF is used as a model for homogeneous access to heterogeneous data systems through defining data exchange formats. The ultimate goal of CERIF is to provide interoperability between the electronic infrastructure and the research data and to promote integration and exchange through standardisation. The challenge for CERIF is the extension of the data model to include relevant data in an ethical appropriate and responsible way.

Information professionals in charge of publication and research data management produce or at least manage some of the data and play a significant role in guaranteeing the quality of information about retractions, ethical reviews or plagiarism. The previously mentioned IFLA Code of Ethics and the commitment of information professionals to ethical principles and values, places them in a privileged position to raise awareness of the need for appropriate handling of data and indicators to ensure ethical use. In addition to data economy, ethics, and the effective retrieval and processing of information using standards, the curation of research

information is of great importance. "Data curation is the organization and integration of data collected from various sources. It involves annotation, publication and presentation of the data such that the value of the data is maintained over time, and the data remains available for reuse and preservation" (Wikipedia 2022b). The curating of data is an adjusted process in which new knowledge is generated from different internal and external sources based on coordinated, normalised databases such as research data management to ensure data quality. Data curators not only collect and manage data, but, where possible, establish tried and tested procedures for managing the data and often present the data in a visual format such as a diagram, dashboard or report (Azeroual 2021). To optimise the processes, uniform quality criteria must be used for both the source data and the metadata, commencing as early as possible in the data processing life-cycle, to save costs and enable precise data analysis.

Towards Good Infraethics

Infraethics is a term which has emerged to refer to ethical infrastructure (Floridi 2013), "the formal and informal means by which society regulates the use of power by both public and private institutions to ensure it serves the common good" (The Ethics Centre n.d.). "Every infraethics may be dual-use only in principle: in fact, if it is a good infraethics, it means that it is oriented towards facilitating the occurrence of what is morally good. At its best, an infraethics is the grease that lubricates the moral mechanism in the right way and successfully" (Floridi 2017, 392). RIM systems can be considered as a special kind of ethical infrastructure or enabler of infraethics (Schöpfel, Azeroual, and Jungbauer-Gans 2020).

A sustainable data governance strategy or a data quality framework ensures compliance with quality, security and processing standards for research data in institutions and libraries. It contains guidelines and procedures for handling data, provides orientation for employees, reduces the risks for institutions and libraries and supports the transformation to a data-oriented culture. With established data governance, high data quality can be achieved, and the potential of research data can be exploited. Data quality also plays a major role in the acceptance of RIM among system users (Azeroual et al. 2020). The goals of introducing a system include process optimisation and automation as well as faster access to information and improved information quality. If expectations are not met due to poor data quality, the dissatisfaction generated can be projected onto the system. The consequence can be that RIM is not accepted by users or not trusted. Users may work to build a parallel database, which in turn leads to further deterioration in the data quality.

The link between data quality and system acceptance is all the more obvious and important when it comes to sensitive data. As producers and providers of data for the system, information professionals must be careful when dealing with ethical issues related to sensitive data, because of its potential harm to persons and organisations. Figure 1 provides the feedback from experts in the exploratory survey on the most important ethical principle in RIM. The experts surveyed were also asked about the next priority for the people developing, implementing or managing the systems. The results are contained in Figure 2.

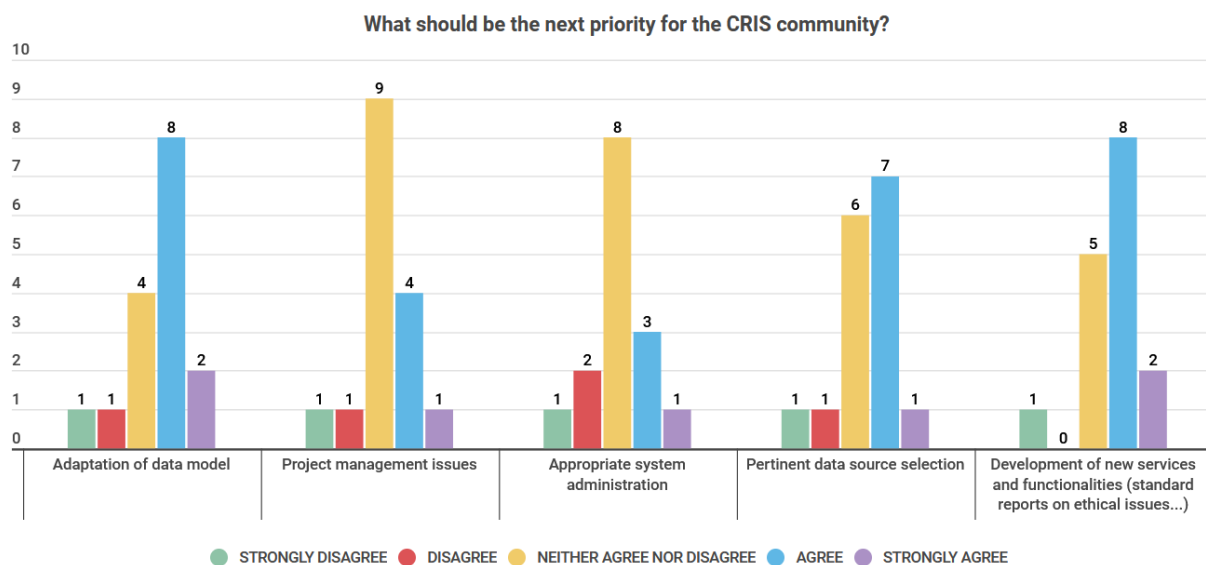**What should be the next priority for the CRIS community?**

Figure 2. Next priorities for research information management systems

The top priorities on which a total of ten people strongly agreed or agreed were adaptation of data models and the development of new services and functionalities. The survey respondents next identified pertinent data source selection as one of the main future priorities with eight people strongly agreeing or agreeing. Pertinent data source selection requires common agreement on what should be measured, the metrics, and how, the assessment strategies to be used. Some potential metrics are based on publications mentioning ethical review and retraction; others are based on the work of ethics committees examining the number and content of reviews; still others focus on job profiles reviewing expertise and skills. Some metrics can be assessed through scientometric assessment, via databases, platforms or repositories, while others require organisational monitoring. Up to now, there has been no common agreement on metrics, which remains a challenge. Any future discussion must be aware of the importance of the quality and the reliability of data and data sources. Misinformation, unreliable data, incomplete or erroneous information on ethical issues or misconduct must be avoided, because of the risks to persons and organisations. Data sources must be carefully selected and kept under permanent and continuous quality control.

The challenges of metrics and assessment include other dimensions, usage and exploitation. RIM systems are decision tools. Their purpose is not only to monitor research performance of individuals and organisations but also help make informed decisions about institutional strategies, project funding, recruitment, career advancement and salary. As already stated, poor metadata quality in library catalogues, databases and institutional repositories can constitute misinformation and be harmful for people and organisations. But there are risks and potential scientific misconduct when good data about people and organisational becomes malinformation and is used to harm people. What is the impact of figures on retractions? Who has access to data on falsifying research results or plagiarism? How much time will, and should data be stored in the system? How does the system protect the data rights of people involved, especially the rights to access and erasure, and to be forgotten?

There are legal issues, especially in the member states of the EU with its specific rules and laws on data privacy embedded in the General Data Protection Regulations (GDPR) (EU n.d.). Academic librarians produce and handle data that will be exploited by RIM and they have a moral ethical responsibility for the quality of the data. The IFLA Code of Ethics states in Point 5, Neutrality, Personal Integrity and Professional Skills: "Librarians and other information workers define and publish their policies for selection, organisation,

preservation, provision, and dissemination of information" and "aim at the highest standards of service quality" (IFLA 2012). This ethical commitment and the requirement for transparency in Point 3 of the Code, Privacy, Secrecy and Transparency, should guide academic librarians when they are part of a project or administration team. They may not be in charge of the RIM system, but as stakeholders, they have a role to play in assuring the ethical compliance of RIM. RIM systems can constitute good infraethics or bad infraethics, depending on the quality and the handling and use of the underlying data. The contribution of academic librarians is important to avoid misinformation and to limit the risk of malinformation.

The Potential Role of Information Professionals

In a world of increasing information disorder and fake news, information professionals and in particular academic librarians have a role to play, not only because of their professional skills, job profiles and missions but also because of their values and their global and universal commitment to basic ethical principles, including the commitment to privacy, service quality and transparency.

All involved in data handling must take responsibility in relation to their specific roles. Data providers, for instance, should "evaluate the consequences of disseminating specific types of data, in terms of potential infringement of privacy laws, the replicability and reliability of the datasets at hand, and the wider implications of data sharing for local communities" (Leonelli 2016, 7). It is obvious that the general requirements of data science ethics apply to the specific case of data-intensive research information systems, and to their development, management and usage. RIM may not be the first priority of academic librarians. They have other priorities, and even if members of project teams that prepare, implement and run such systems, librarians do not often lead the projects. But even so, their specific knowledge of metadata, their professional practice of ensuring appropriate curation, privacy and quality of data, and their commitment to ethical principles establish them as essential players in RIM on three levels. Information professionals:

- Guarantee and guard the quality of metadata of people, organisations and research products provided by catalogues, databases and institutional repositories
- Raise awareness of privacy issues and ensure the protection of personal data provided by the library-based systems, and
- Are aware and take care of the potential misuse of data associated with people, organisations and research products, not only in relation to misinformation and erroneous data but also malinformation and misuse of valid data.

RIM may not be the first priority of academic librarians. Yet, RIM systems are essential for academic institutions. Academic librarians must be aware of the challenges and the risks and play their roles in contributing to limiting misinformation and malinformation. In so doing, they will ensure that RIM systems become good infraethics.

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