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Research Information Systems and Ethics relating to Open Science

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Abstract

Current research information systems (CRIS) evaluate research performance and are intended to contribute to the continuous improvement of research. Based on former research on the ethical dimensions of CRIS, our paper presents the results of a survey with a small sample of representatives of ethics committees from different European countries on ethical aspects of CRIS. Ethics committees and experts are rarely associated with CRIS-related projects. However, their opinion on ethical indicators and the implementation and use of a CRIS is undoubtedly essential for the future development and management of these systems. Against this background, our purpose is to provide a deeper understanding of the ethical aspects in the field of research information management, to show how CRIS represent ethical dimensions of scientific research and to suggest some adjustment of their development, implementation and use.

Keywords: Current research information systems; CRIS; research information management; research ethics; research integrity; research infrastructures; ethics committees; infraethics.

1. The challenge of ethics

Research ethics, as a field of applied ethics, provides concepts and recommendations of "right" and "wrong" scientific practice, especially norms of conduct that distinguish between acceptable (responsible) and unacceptable scientific behavior. Many different research organizations and associations have adopted specific codes, rules and policies relating to research ethics, such as the Nuremberg Code of 1947, the 2010 Singapore Statement on Research Integrity

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(Resnik & Shamoo, 2011), the European Code of Conduct for Research Integrity (2017) or the recent National Science Foundation's Manual of "Conflicts of Interest and Standards of Ethical Conduct".

Due to the changing research environment "with new and complex technologies, increased pressure to publish, greater competition in grant applications, increased university-industry collaborative programs, and growth in international collaborations" but also to "highly publicized cases of misconduct" (Armond et al., 2021), academic interest in research ethics and research integrity is steadily increasing, above all in medical and health sciences. Main issues are falsification and fabrication of research data, informed consent, patient safety, plagiarism and conflict of interest.

Research ethics "is a matter of debate" (Corvol, 2017). Even when researchers agree that research ethics is important, they do not agree on a common meaning but rather adopt divergent meanings that reflect their priorities, which stem from their personal needs, professional demands, or roles in society. Broadly speaking, research ethics can be defined as "doing good science in a good manner" according to shared and accepted standards of excellence and in compliance with all the steps necessary to meet the rules of responsible research conduct (appropriate data storage, conflict of interest management, protection of human and animal participants, laboratory safety etc.) (DuBois & Antes, 2018).

Regarding new technologies and infrastructures, a growing body of research revealed essential and recurrent themes and dimensions of ethics, such as privacy, security, autonomy, justice, human dignity, control of technology and balance of power; some of these issues have been addressed through legal adjustments and new rules and obligations while "for other ethical issues (...) such as discrimination, autonomy, human dignity and unequal balance of power, the supervision is hardly organized" (Royakkers et al., 2018). In the field of big data and artificial intelligence, ethically-aligned technology has been defined as "that which is (a) beneficial to, and respectful of, people and the environment (beneficence); (b) robust and secure (non-maleficence); (c) respectful of human values (autonomy); (d) fair (justice); and (e) explainable, accountable and understandable (explicability)" (Morley et al., 2020).

Regarding artificial intelligence, Morley et al. (2021) observed "that a significant gap exists between the theory of AI ethics principles and the practical design of AI systems". Does the same observation apply to current research information systems (CRIS)? Do we need new tools and methods designed to help CRIS developers, engineers, and designers translate ethical principles into practice? In spite of the growing body of research on ethics in the field of technology, big data, artificial intelligence and so on, so far there are but few papers on ethics in the field of research information systems.

For CRIS, ethics is a double challenge: to contribute to the development of responsible research in the context of open science, and to be able to measure the practices and performances recommended by these rules of responsible conduct. In other words, CRIS must respect the regulatory framework and the good practices, principles and values of scientific communities (Diener & Crandall, 1978; Guillemin & Gillam, 2004). But, at the same time, and this is indeed the particularity of these systems, they must be able to represent the ethical dimension of research projects and researchers' practices in an appropriate way. From this perspective, then, this is a very special case, in the field of scientific research, of what has been described by Floridi (2017) as "ethical infrastructure" (infraethics). From a moral or ethical perspective, an infrastructure is not necessarily "good" per se. But an infrastructure such as a CRIS, doubly confronted by the ethical problematic, must be able to answer the question of its contribution to the development of an ethical science, both at the level of institutions and individuals, and this all the more so as the new paradigm of open science emphasizes integrity, transparency and openness of research (Düwell, 2019).

As a key element of the institutional research practice that needs to be monitored as per the research funders' requirements, research ethics data is currently being collected and has been collected for quite some time already via dedicated institutional research ethics systems. These range from Excel spreadsheets – probably the most widespread solution at the moment – to specific research ethics modules that may or may not interoperate with wider institutional research information management systems. Because this is a relatively new area of development, the design of these research ethics modules often relies on a collaboration between the institutions using them and the vendor providing the solution, like Edinburgh Napier University with Worktribe or King's College, London, with Infonetica. While

there is an increasing emphasis on the need to move on from Excel spreadsheets and for the various institutional systems to be able to exchange research information with each other, this is a domain where further discussions need to happen across institutions. These discussions will allow the links between research ethics systems and CRIS to be more closely examined and improved.

2. The case of research information management systems

The evaluation of research performance is one major challenge of research management. Research information management systems are designed to assess this performance and to contribute to the steady improvement of research. These systems, also called current research information systems (CRIS), have been described as software for "the aggregation, curation, and utilization of metadata about research activities" (Bryant et al., 2017), in order to produce useful and reliable knowledge about research and to support research institutions in the provision of funding information and reporting (de Castro, 2018). They aggregate and process information about projects, results, organizations, persons, infrastructures, equipment, facilities, etc., and they produce indicators and assessments for research management.

As part of their open science policies, authorities, institutions and funders highlight the importance of openness, transparency and integrity of research activities. Transparency, especially in the field of health research, and the necessary transformation of research assessment were two priorities of the Paris Open Science European Conference organized by the French EU Presidency in February 2022. Research should be as open, transparent and reproducible as possible, in order to avoid biased methods and results, data falsification and other, often individual misconduct. On top of this, an increasing number of research projects require an ethical review to guarantee the protection of human subjects and animals. Our literature overview and our survey with experts reveal that research information systems, via their data model and format, are able to represent at least partially these ethical aspects (Schöpfel et al., 2020); yet, so far, institutions most often seem not to make use of their research information system for the assessment of ethics as part of research performance.

At first glance, CRIS ethics can be interpreted as a series of technical problems but such an approach has its limits because of the risk and potential harmfulness of information about, for instance, individual misconduct, retractions or negative reviews from ethics committees. Also, the crucial issue of data quality (Azeroual et al., 2019 and 2020) is exacerbated by the risks associated with certain "ethical data", due to their consequences. In practical terms, this means that not only do we need to strengthen quality and integrity controls of such data at all levels (starting with the selection of sources), but it is also necessary to protect and control their security and accessibility.

Among the potential indicators, some measure the ethical performance within an institution, such as the existence of an ethics committee, the number of its members or the number of training courses in ethics. From an ethical but also a legal point of view, these indicators pose little or no problem, unlike other indicators that concern unethical behavior of a research team (project) or an individual researcher, such as retraction of an article, plagiarism or falsification of a graph. If you start recording information about misconduct, it potentially means preventing people from getting funding and affecting their careers.

In the opinion of the experts in the survey, a distinction should be made between these two levels of ethical performance, separating institutional indicators from individual indicators, and favoring the former without excluding the individual aspect. But when it comes to measuring ethical performance at the individual level, according to the responses, there are at least five points of attention:

- A careful and consensual (acceptable) choice of indicators.
- The selection of a reliable source of information (such as the Web of Science or Scopus databases for retractions).
- Compliance with the legal framework (GDPR), with secure and, if possible, anonymized processing.
- Strict control of access to this data.
- Strictly controlled use.

CRISs are generally capable of managing the constraints linked to personal data; however, in this specific case and because of what Burgess and Knox (2019) describes as the risk of a harmful use of information, this is not enough: other means must be found to make such a scenario not only acceptable but above all legal and ethical.

The new Spanish academic CRIS Hércules for instance has a complete module to manage all the activities the university and researchers have to do related to ethics (e.g. request for the biosecurity committee, animal experimentation, evaluation of the request, automation of the follow up activities according to the legal regulations…) which is able to generate statistics about requests that have been done, approved, etc.; however, it doesn't produce ethics indicators (Hernández Mora Martínez, 2022).

More generally spoken, and also in respect to the debate on technology ethics, attention must be paid to three different levels, i.e., the research & development of research information systems, the use of these systems, and their governance.

In an interdisciplinary approach (computer, library and information sciences), we asked ourselves the question of the ethical dimension of digital evaluation devices, to better distinguish "which actions are right which are wrong" or, in the terms of information ethics, "the good that can be accomplished with information, and all the ways it may be used to harm" (Burgess & Knox, 2019). After an initial analysis of the human factor and ethical issues related to the implementation of a CRIS project (Schöpfel, 2015) and based on an in-depth study of their quality and impact on user acceptance (cf. Azeroual et al., 2019 and 2020), we published a literature review on this topic (Schöpfel et al., 2020), and then conducted a survey of developers, project managers, and users: the results have been the subject of presentations and discussions with CRIS experts, notably in the context of euroCRIS (Schöpfel & Azeroual, 2021), and are under publication (Azeroual & Schöpfel, 2022; Schöpfel & Azeroual, 2022a, b).

The survey revealed a concern related to data transparency and access rights. There are two groups of problem areas. One concerns sensitive data, data loss, including intellectual property and personal data issues. And then there is the implementation side, which is much fuzzier - you can hurt people by implementing software incorrectly. Some respondents mentioned other issues, such as political surveillance (cooperation with China) or biased terminology (potentially harmful or offensive descriptors, prejudices, etc.).

The survey revealed also that ethics committees and experts are rarely associated with projects related to research information management. However, their opinion on ethical indicators and the implementation and use of a CRIS is undoubtedly essential for the future of these systems. This was the reason for another survey with a small group of ethics experts. Between February and April 2022, we conducted a survey on issues related to research information management with a small panel of representatives from ethics committees in Austria, Finland, France, Germany,

Switzerland, The Netherlands, the UK and Ukraine. The purpose was to gather some exploratory information for further discussion and investigation.

3. Methodology

Based on the results of our 2020 study, we created a 23-question questionnaire on the Surveymonkey platform, divided into six groups (Ethical Principles and Misconduct, Ethics and CRIS, Lobbying and Open Science, Data and Indicators, Other Perspectives, Personal Information). From the list of experts and authors of the euroCRIS directory and the conferences, we contacted a representative sample of 40 personalities (editors, project managers, administrators, and operators) from several European countries. The survey was opened between February 25th, 2021 and April 26th, 2021. A total of 18 of the 40 respondents contacted responded (45% response rate). The purpose of this first survey was to investigate CRIS experts' views on ethical requirements and to assess their attitudes towards ethical principles and scientific misconduct.

The second part of the survey took place between June 2nd and 11th, 2021. This time we contacted twelve experts from euroCRIS and partner organizations and seven responded positively to, recorded and validated the invitation to a virtual structured interview. The purpose of this second survey (follow-up) was to assess to what extent ethical issues are considered in the design, implementation and application of CRIS.

Between March 8th and 30th, 2022, the third part of the survey took place, which was conducted on research information management issues with a panel of 44 representatives from ethics committees from Austria, Finland, France, Germany, The Netherlands, Switzerland, the UK and Ukraine, mainly from the academic sector and from different disciplines. A total of nine experts responded (20%) to the online questionnaire with 17 questions (Surveymonkey). The purpose of the third survey was to investigate ethics experts' interest in research information management. This paper presents the results of the third survey.

4. Results

Most but not all respondents declare that they have been personally involved in creating or maintaining a research information system or a specific system module for recording ethics committee activity in their organization (Fig. 1).

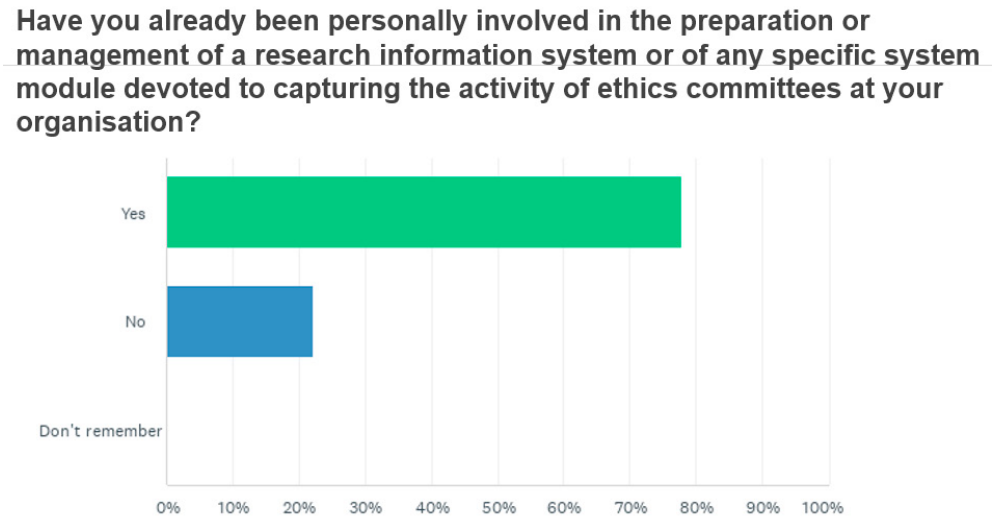

Fig.1: Personal involvement with CRIS of respondents.

Additionally, most but not all respondents remember that other ethics experts or ethics committees have been involved in research information management or in the design and/or implementation of such modules (Fig. 2).

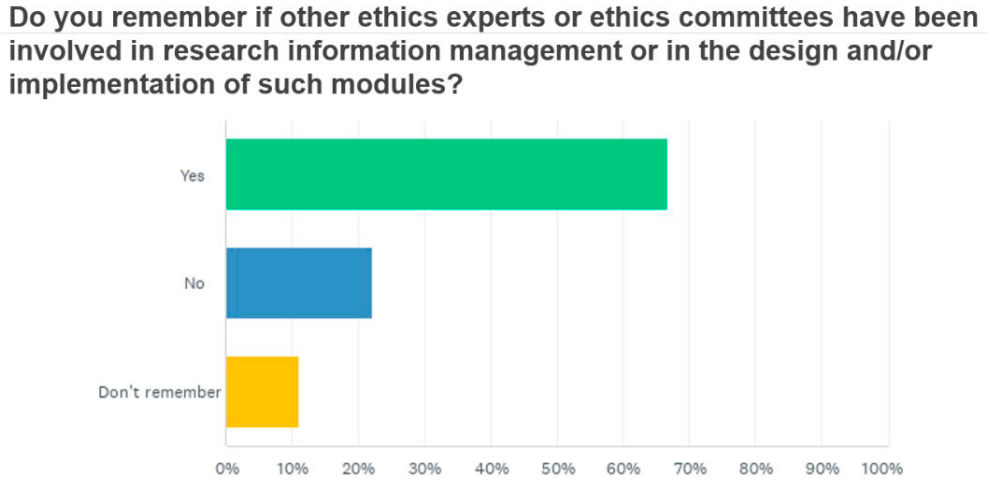

Fig. 2: Involvement from other ethics experts.

Based on this personal or observed experience and involvement with CRIS, all respondents without exception consider that CRIS are potentially useful for the work of ethics committees (Fig. 3).

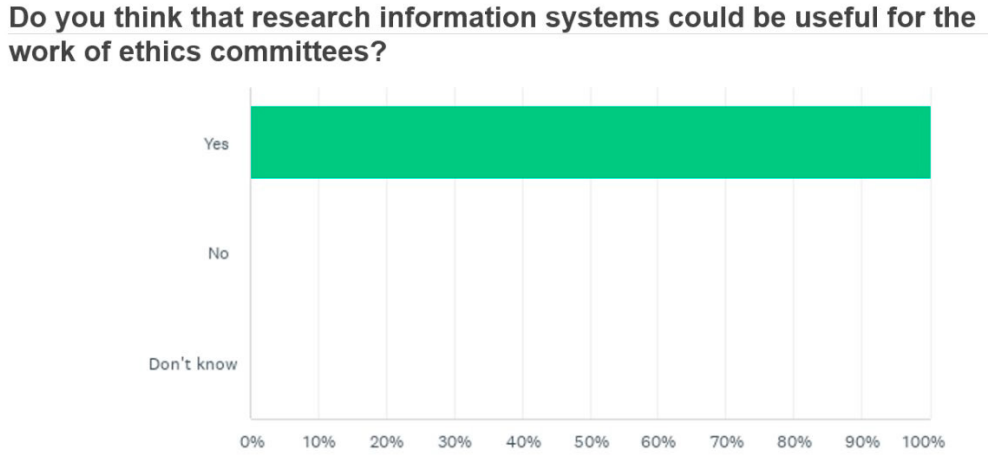

Fig.3: Perceived usefulness of CRIS for the work of ethics committees.

Consistent with these answers, most respondents think that ethics committees should be involved in the implementation and management of CRIS (Fig. 4). The reason for this is that research ethics in the context of CRIS has not been discussed much and is still relatively early. In addition, most CRIS do not yet have adequate ethical procedures or controls in place. Some systems are making initial attempts to capture or process ethics reviews. In most cases, however, this is an early stage.

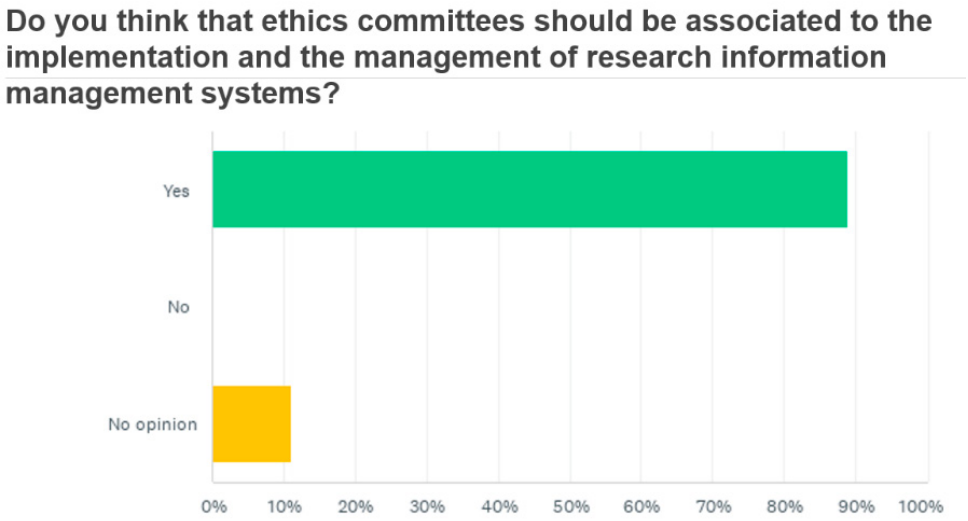

Fig. 4: Future association of ethics committees in CRIS implementation and management.

In a more concrete manner, another question focused on the relevance of ethical principles to CRIS. We asked the experts to tell us what would be the key issues for research information management systems from an ethical point of view. The question proposed a closed list of fourteen topics, ranging from data protection to quality; the results are shown below (Tab. 1).

Topic	**Nb resp**	**Topic**	**Nb resp**	**Topic**	**Nb resp**
Data protection	6	*Transparency*	3	*Reproducibility*	1
Integrity	6	*Reusability*	3	*Participation (citizen science)*	0
Privacy	5	*Acceptance of evaluation*	2	*System acceptance*	0
		Data sharing	2		
		Open access publishing	2	*Other*	1
		Quality	2		
		Security	2		

Tab. 1: Key issues from an ethical perspective for CRIS.

Following the responses, the ethics experts consider integrity and data protection as the most relevant principles for research information management systems, followed by privacy, reusability and transparency. Other topics like data sharing, open access publishing, security, quality, acceptance of evaluation or reproducibility appear less relevant in

their views, while participation or systems acceptance are not relevant at all, at least in this sample. One expert states that "*all of these (topics) have significant ethical dimensions, even if not surfaced as such in formal ethical review*".

Some of the experts but not all are aware of the San Francisco Declaration on Research Assessment (DORA) Initiative and/or of the 2021 initiative of the European Commission towards a reform of the research assessment system.

A last question was about the level of assessment - should ethics be assessed as part of the research performance for an organization, and if so, on the institutional level or on the individual level (Tab. 2)?

Response	**Nb of resp**
Yes, on the institutional level, as part of the research performance assessment of an institution (university, institute, laboratory, department…)	5
Yes, on the individual level, as part of the research performance assessment of an individual scientist	1
Both	3
No, it should not be assessed as part of the research performance	0

Tab. 2: Level of assessment.

All respondents think that ethics should effectively be assessed as part of the research performance. Most of them say this should be done on the institutional level: "*Processes for ethical review should be audited as part of ensuring that institutions are meeting responsibilities for assuring research integrity*". Only one expert says that ethics should only be assessed as an individual performance variable while three experts think that the assessment should be done on both levels, as part of the institutional performance as well as part of the individual performance. One expert comments that ethical performance should be assessed on both levels, "*individual first and institutional second, with as little control and bureaucracy as possible*".

Which kind of metrics would be appropriate for ethics assessment? Based on our former surveys, the questionnaire provided a list of 12 potential indicators, ranging from the number of experts in ethics to the number of retractions and the number of ethical expertise (reviews). All indicators have been approved by at least one or two respondents but only one indicator received a kind of consensus, i.e. the existence of a local ethics committee, followed by the number of training sessions. Perhaps the general opinion has best been expressed by the following comment: "*I don't believe that "numbers" are the right criteria. It is most the quality of the job that matters, e.g. how and to whom the training sessions are proposed, who gives them; do the ethics committees write reports that are available to everybody in the organization; are there seminars about scientific integrity; does the organization change things in order to favour scientific integrity (e.g., stop evaluating researchers with "numbers" of publications, reports, etc.)*".

We also asked if any of the indicators related to research ethics could be made visible to system users outside the ethics committees. Again, there is no consensus, and the responses vary from "*Yes, ethics guidance, policies, indicators should be available to staff and students" and "Yes, they should be made available to everyone in the organization" to a more restrictive "Not really, maybe the trainings (if any)*". A more balanced view on transparent reporting is expressed by the following respondent: "*Transparent reporting of the ethical review processes and the amount of actions actually undertaken as dictated by these processes - openly reported for any interested party (research funders, potential research participants etc.)*".

One respondent suggests that monitoring could be well supported by research information management systems: "*Monitoring and managing flows of work for ethical reviewers - this kind of work needs to be transparently recorded*

and acknowledged. Monitoring completion of ethical review for all research projects". Other experts think that CRIS could be helpful for the "*data collection for the investigation of suspicions of ethical violations*" or for data management plans, privacy or data security.

5. Discussion and Conclusion

The purpose of our latest survey was to gather some exploratory information for further discussion and investigation on ethics and CRIS. Even if the purpose was not a representative survey on opinions and attitudes of ethics experts regarding research information systems, the low response rate may be understood as an indicator that the gap between ethics and CRIS is still large enough. Obviously, the debate on ethics, transparency, integrity and the transformation of research evaluation has not really met up to date the discussion on the further development of research information management systems. But on the other side, all respondents are convinced of the potential usefulness of CRIS for their work, which is a strong indicator of the (potential) acceptance of these systems.

Let's assume it's just a matter of time that more ethics experts will become aware of the potential but also of the risks and the challenges related to these systems. Based on our literature overview and surveys, we'd suggest that the further research on ethics and CRIS should distinguish between three levels:

1. Research & development of CRIS (involvement of ethics committees from the beginning on; adaptation of the data model; respect of open science principles during all stages of the system development and implementation, above all transparency, openness, integrity and the transformation of research evaluation).

2. Use of CRIS (definition of use cases; involvement of all stakeholders; a clearly defined and transparent control and restriction of use; respect of privacy).

3. Governance of CRIS (respect of openness and transparency; respect of all communities; sustainability; risk assessment).

Applying recommendations on how to translate ethical principles into the practice of new and intelligent technological tools and methods (Morley et al. 2020) to the field of research information management, our proposal would be that a CRIS should be considered as ethical if and insofar it is

a. beneficial to, and respectful of, people and the environment;

b. robust and secure;

c. respectful of human values;

d. fair; and

e. explainable, accountable and understandable**.**

Further research should describe the meaning and impact of these principles for CRIS development and management.

In France, a decree obliges universities from 2021 to define a scientific integrity policy with all actors (including data officers, archivists, legal experts and ethics committees) and to provide a report every two years. According to the authorities, integrity is an integral part of open science but this "alliance of professions" is just at the very beginning of the process. Further work and discussion is required to define in an operational way and with practical use cases the application of these principles to the R&D, the use and the governance of CRIS. euroCRIS appears to be an appropriate forum for this work and discussion, as it brings together system developers and editors, project and system managers and users. However, our survey seems to indicate that the link with the ethics committees and experts is still

missing, and that further advocacy, networking and awareness is needed to reduce the gap between principles and practice.

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