



# Research Integrity and Open Science

Conference hosted by the French Office for Research Integrity (Office français de l'intégrité scientifique)

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## SUMMARY OF DISCUSSIONS

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## I. BACKGROUND AND OBJECTIVES

Scientific research is currently developing extremely rapidly worldwide, as reflected by the positioning of new players such as China, the proliferation of different research fields, and the huge increase in the number of scientific publications. In this context, the emergence of open science on the one hand, and the need to reinforce research integrity on the other, are two major trends towards increasing society's confidence in science by promoting values such as transparency and honesty. However, although knowledge is frequently recognised as a "common good", opening up access – to both publications and research data – has not yet been adopted or even simply accepted, by all stakeholders in public research. Moreover, certain recent fraud "scandals" show that there may be a strong temptation for some researchers – fortunately a very small minority – to take liberties with scientific rigour, or even with simple honesty.

A first conference was organised in Paris on 4 April 2019 by the French Office for Research Integrity (OFIS), in partnership with the French Committee for Open Science (CoSO), with the aim of sharing analyses and experiences concerning the relationship between research integrity and open science. Such reflection is indeed important: these two objectives for science could intuitively be assumed to lead towards the same outcome: that of responsible research based on the trust of all stakeholders. After all, transparency could reasonably be considered an effective weapon against misconduct. However, this does not appear to have been confirmed by any serious studies. On the contrary, the headlong rush towards opening up access to research results, data and codes in journals or on open access platforms poses risks that could raise concerns: on the one hand, of unfairness between teams with very dissimilar resources, and on the other hand, of certain researchers being tempted to use unreliable channels to disseminate their results (dubious scientific journals, manipulation of results, plagiarism, etc.).

Beyond simple evidence, understanding the relationship between open science and research integrity is a difficult task. The diversity of scientific fields, the heterogeneity of research topics, methods and practices, and the variability of evaluation in different fields complicate the emergence of general rules. This conference therefore set out in a more modest way to ask the 120 attendees to share their experiences, reflections and sometimes differing points of view,

with the hope of deriving a certain number of implementable concrete actions from them, both for individual researchers – regardless of their level of experience – and for research institutions. Video footage and transcriptions of the debates are available on the Hcéres website (see <https://www.hceres.fr/fr/actualites/retour-en-images-sur-le-colloque-integrite-scientifique-et-science-ouverte> to access the recording of the different presentations). The present summary of the discussions is not intended as an exhaustive report on these highly productive presentations and discussions. Its main purpose is to highlight a few major ideas concerning the interactions between open science and research integrity, and their supposed mutual reinforcement, in addition to the risks that one may pose to the other.

The term "open science" can be interpreted in different ways: on the one hand, it means granting open access to scientific publications, research data and codes, and on the other hand, it implies opening up the scientific process, and openness to society. This second aspect in particular includes participatory sciences<sup>1</sup> as a practice involving society in the work of scientists (this is a topic in its own right that should be covered in a future OFIS conference and therefore has not been addressed here). Opening up science brings into play a number of values specific to the research community, such as transparency, the need to cooperate, and the acceptance of criticism. Research integrity, for its part, is one of the fundamental values of science, guaranteeing its universality. According to the European Code of Conduct for Researchers, it implies respect, trust, honesty, responsibility and reliability. It is part of a scientific approach that is independent of any dogma, free from any influence and respectful of stakeholders, but the attention paid to it focuses all too often on the negative aspects: questionable practices, misconduct, falsifications, or plagiarism, which sometimes make the headlines. One of the major objectives of this conference was to identify best practices that can enable the open science approach to strengthen research integrity and vice versa, as well as to promote the dissemination of these best practices via different channels, including doctoral training.

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<sup>1</sup> Houllier F. & Merilhou-Goudard, J.B. (2016). Citizen science in France. Situation analysis, good practices & recommendations. 28pp. DOI: 10.15454/1.485957310264701E12

## II. RESEARCH INTEGRITY AND OPEN ACCESS TO RESEARCH PUBLICATIONS

The global movement towards open access to scientific publications, while still facing copyright issues and the virtual monopoly of certain publishers, is radically transforming the centuries-old mechanisms underlying the dissemination of knowledge by reducing the financial and geographical barriers to users of research outcomes, and by promoting transparency within the scientific community.

In this way, open access to scientific publications, i.e. access for all at any time via the Internet, appears to be a means of reinforcing integrity. It enables everyone to evaluate the quality of the published results without delay, assess the authors' reasoning, verify certain proofs such as photographs or diagrams and use them to deduce the relevance of the results, judge the originality and rigour of the scientific approach used or, on the contrary, detect errors or shortcomings. It also facilitates the immediate verification of source citations, and should greatly reduce the incidence of plagiarism. Opening up access to data is a means of reproducing and even enhancing scientific analyses, or even generating new ones. In brief, openness should boost the fluidity of exchanges between teams, reduce the duplication of work, and limit the theft of ideas.

However, although open access to publications is not the only cause, there are concerns about the potentially negative consequences of open science leading to an increase in the number of poor-quality articles and journals. Indeed, the main channel for open-access publications are journals offering unrestricted and immediate access to online articles in return for the payment of APCs (Article Publication Charges) to authors or their institutions. APCs can be very high for the most prestigious journals, and since better-endowed teams gain easier access to this channel than others, there is a risk of a two-tier research sector developing. Moreover, the proliferation of journals of poor or even abysmal quality (known as "predatory" journals), offering very low publishing costs, will continue to accelerate, making it increasingly difficult to control the quality of published works, and to prevent poor practices. The procedures for evaluating researchers are thus likely to become more complex and less secure, especially as they are still too frequently based on a quantitative analysis of publications. It should also be noted that open access does not make certain types of research misconduct (plagiarism with complete rewriting or translation, incorrect lists of authors, etc.) any easier to detect than in conventional publications.

However, the trend towards openness and transparency can be expected to generate a positive movement towards peer reviews of publications. Consequently, the disclosure of open peer reviews containing the reviewers' assessments, which are still too often kept confidential by publishers, seems likely to improve the quality of reports and initiate fruitful exchanges with the authors. Ultimately, this development should be beneficial to both the quality of the published science and its compliance with the principles of integrity. Moreover, giving readers open access to these reports, which contain expert analyses that can enrich the subject matter of the article, is likely to increase the confidence in scientific publications. It should be noted that the open science movement is accompanied by innovative editorial models on the Internet, such as Epi-journals and the "Peer Community In" project, in which researchers are given direct responsibility for the qualification processes, thus loosening the publishing companies' hold over scientists.

## III. RESEARCH INTEGRITY AND OPENNESS OF RESEARCH DATA

Opening up access to research data raises even more complex issues than for publications. On the one hand, the legal status of the data produced in a public institution is different from that of publications: the former are a public good while the latter are "works" whose ownership belongs to their author. On the other hand, the form, production, use, conservation, cost, reuse and confidentiality of the data are highly dependent on the scientific field concerned. Consequently, the nature of research data differs according to whether the research is experimental, observational, theoretical or involves numerical simulations. For example, the question of reproducibility makes sense in the case of experimentation or simulation, but it makes no sense in theoretical research, and depends on the field in observational research. Therefore, opening up access to data can only help to improve integrity in certain types of research. However, this approach has helped put the spotlight on classic cases of error or fraud (deliberate falsification of data to mislead competitors, falsification of data to reinforce a line of reasoning, etc.): this observation alone could justify the benefits of openness!

Opening up access to data raises major questions about their quality, correction, access and use. It requires the documentation of their production (equipment, observation tools, simulation algorithms and associated specifications), their conservation and preservation, their means of access, etc. All these steps have costs and are prerequisites for building trust and integrity. In this regard, under certain

conditions, the controlled opening of access to research data is a guarantee of quality and integrity.

Conversely, in light of the new risks to integrity that open science, and particularly open data, can pose, it must also be stressed that now more than ever, it is essential to issue even stronger calls for responsibility on the part of all researchers. Indeed, the ease of access to certain results may lead actors outside the research sector, or even ill-intentioned individuals or companies, to use the data in question in an inappropriate or criminal manner, without even mentioning the unethical and illegal retrieval of personal data. The application of the FAIR ("Findable, Accessible, Interoperable, Reusable") principle and the "Open when possible, closed when necessary" motto, do indeed raise one of the major questions concerning the openness of data: to what extent can open access to a dataset be granted without breaching security, confidentiality or integrity?

#### **IV. RESEARCH INTEGRITY AND OPENNESS OF RESEARCH ACTIVITIES**

Beyond opening up access to publications and data, it is legitimate to question the openness of research activities as a whole, including their objectives, methods, errors, failures, weaknesses and successes. To put it simply, one could liken this to opening up access to a laboratory notebook! In this very broad vision of openness, respect for integrity would be guaranteed insofar as all of the researcher's actions and decisions would be "traceable" and therefore verifiable. The multiple forms of open dissemination of results on the Internet (e.g. open archives) could publicise often overlooked work such as studies with negative results, or reproductions of experiments or surveys setting out to confirm the reproducibility of published results. Researcher evaluations could thus take account of all their activities and significantly broaden the narrow judgement criteria, which currently focus mainly on their list of publications. The emphasis placed on this list often tempts researchers to publish their work too quickly, or even to adopt dubious practices. Is such a goal of traceability realistic, or even useful, and can we accept the price to be paid in terms of procedural red tape and added time constraints, to the detriment of inventiveness and spontaneity?

#### **V. FROM ANALYSIS TO ACTION**

While it is necessary to keep analysing and reflecting upon the interactions between open science and research integrity, there is an urgent need to step up the efforts to raise awareness and transform practices in pursuit of virtuous openness and greater integrity – imperatives that were stressed repeatedly throughout the conference.

##### *Training initiatives*

A growing number of French doctoral training programmes include a module on research integrity, in accordance with the 2016 Order on Doctoral Studies. The same cannot be said for open science. It is important to bridge this gap quickly, by interlinking these two issues, if possible.

##### *Raising awareness among senior researchers*

By unanimous agreement, one of the key points for improvement in terms of openness and integrity lies in the ability of senior researchers to modify their practices relating to the signature and openness of publications, data traceability, respect for doctoral students' work, etc. It is therefore essential to start raising their awareness of these issues at the laboratory and research institution level.

##### *Evaluation of research*

Improving the evaluation methods should have a major impact. Indeed, the quality and fairness of the evaluation of researchers and research projects are prerequisites for the proper development of scientific activity. The misuse of approximate or biased evaluation metrics can lead to behaviours that seek to optimise the indications provided by these "measuring instruments" and thus take liberties with reality and integrity. In particular, regarding the impact factor of journals, the San Francisco Declaration <https://sfdora.org> explains that this indicator was devised by librarians to determine which journals to acquire, and that is not an appropriate indication of the quality of researchers, teams, projects or research. Opening up science must be accompanied by a radical change in evaluation methods, on the one hand, by prioritising the quality of publications and their originality rather than their quantity, and on the other hand, by taking all of the researchers' activities into consideration, including their efforts to open up all their results and data, to disseminate their research methodology, and to ensure the reproducibility of their research.

Reinforcing research integrity and open science requires research institutions to implement clear and specific policies. Installing Research Integrity Officers in all institutions is a step in the right direction, as is the adoption of policies to promote open science and create institutional archives in many institutions, but also at the national level through the HAL Open Archive in particular. In France, several advances have been made thanks to the "Corvol Report" (2016), the creation of the French Office for Research Integrity (2017), and the "Act for a Digital Republic" (2015). For open

science, the creation of the national HAL archive more than fifteen years ago was a first step, while the more recent of CoSO and the National Plan for Open Science are major instruments designed to promote a global approach to the issue. Throughout Europe, many similar measures are being implemented with a view to developing the openness of science. However, several discussions during the conferences revolved around the following question: what balance should be advocated between a standardising approach based on a set of rules, such as a code of ethics, and a "normality of membership" based on the collective adoption of best practices? This uncertainty concerns the reinforcement of both research integrity and open science.

## VI. IN CONCLUSION

Research integrity and the openness of science are two fundamental values of scientific research. They are once again becoming topical issues under the combined impacts of digital technology and globalisation. The relative novelty of these two issues made it difficult to confine the discussions at the conference solely to the interaction between them: the speakers displayed a natural tendency to return to one or the other. However, the highly productive presentations and discussions clearly showed the need for further investigation. Without doubt, opening up science can provide tools to improve confidence in research and the integrity of the scientific process. However, if implemented without precautions, it can also facilitate misconduct.

On the basis of this first conference, several courses of action were defined. Firstly, the need for further analytical work on the interactions between open science and research integrity was stressed, in particular by distinguishing between practices in different scientific fields. Then came a reiteration of the urgent need to increase the awareness, in all categories of researchers, of the integrity requirements that apply to them personally but also to their colleagues and students, especially in the new context established by open science. Finally, there were strong recommendations to increase the emphasis on research integrity in doctoral training programmes and extend it to open science.



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