

## OPEN SCIENCE: NEW MODELS OF SCIENTIFIC COMMUNICATION AND RESEARCH EVALUATION

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### Abstract

Open Science is a topic of remarkable importance, currently debated at national and international level, which challenges current scientific communication and research evaluation. In the Open Science context scholarly communities (sciences, social sciences, humanities) as well as research performing organizations (universities and research centers), conference of rectors, national evaluation agencies cultural and scientific associations, professors, young researchers, publishers and university library systems, are all involved. The problems concerning Open Science and the evaluation criteria of scientific research are many, complex and in constant evolution.

### Keywords

Open Science, Open Access, Scientific communication, Research evaluation, Workshop

### 1. Introduction<sup>1</sup>

Open Science is a topic of remarkable importance, currently debated at national and international level, which challenges current scientific communication and research evaluation. It involves all disciplines, sciences, social sciences and humanities, various actors and Institutions, Universities abroad and in Italy, just to cite a few: the Conference of Rectors of Italian Universities (CRUI)<sup>2</sup>, the National Research Evaluation Agency (ANVUR)<sup>3</sup>, academic and scientific associations, professors and young researchers, publishers and university library systems.

The latter play an active role in promoting and disseminating open access to scientific literature, and in finding solutions to issues related to human and financial resources.

In the nineties many initiatives emerged in academic libraries aiming to share and facilitate access to electronic resources at national level and

to promote and implement Open Access principles.

Since then, Consortia, interuniversity collaboration initiatives, national information systems, among them SINM (National Information System for Mathematics) have been set up as well as Open Access electronic publishing projects have been launched to promote immediate dissemination of research results and knowledge. It is worth mentioning, among several initiatives in Italy: the ESE-Salento University Publishing System, the CASPUR-CIBER Publishing- Eco sustainable Publications, the working groups to draft National guidelines on various issues related to Open Access and also declarations in support of Open Access such as the Messina Declaration promoted and fostered by CRUI.

At the University of Salento I experienced this evolution in my long working life as Director of “Coordinamento SIBA”<sup>4</sup>, director of Telematic Information System for Research and Education

<sup>1</sup> This article contains the introductory presentation of the Workshop “Scienza Aperta: nuovi modelli di comunicazione scientifica e valutazione della ricerca - Open Science: new models of scientific communication and research evaluation” held at Cavallino (Lecce, Italy), at the premises of CEIT-University of Salento, on January 30<sup>th</sup> 2019 (see: <http://www.ceit-otranto.it/index.php/workshop/375-scienza-aperta>).

<sup>2</sup> CRUI (Conferenza dei Rettori delle Università Italiane) - Conference of Italian University Rectors).

<sup>3</sup> ANVUR (Agenzia Nazionale di Valutazione del sistema Universitario e della Ricerca) - Italian National Agency for the Evaluation of Universities and Research Institute.

<sup>4</sup> Coordinamento SIBA (Servizi Informatici Bibliotecari d’Ateneo) coordinates the University Library IT services.

and as Rector's Delegate at CRUI and CASPUR<sup>5</sup>.

## 2. *Open access electronic publishing and new models of scientific communication*

Towards the end of the nineties, the Library System of the University of Salento, at the time one of the most technologically advanced and leading library systems at national and international level, launched the electronic publishing project, ESE-Salento University Publishing System.

Its main objective has been to publish educational and scientific material in open access, to put into practice the principles of Open Access and Open Science, to introduce and promote new models of scientific communication.

The principles of free dissemination of scientific knowledge without barriers, sharing of knowledge and scientific research development in open access have been fostered and supported by the University of Salento, especially by professors Carlo Sempi and Mauro Biliotti, both mathematicians, and by professor Donato Valli, literary scholar and former Rector of this University; the latter, in spite of his attachment to the smell and tactile sensation of paper, published a monograph in electronic format and in open access on the ESE platform to further foster and encourage the development of Open Access also in the humanities.

The ESE platform was presented for the first time along with the electronic version of two scholarly journals "Note di Matematica" and "Thalassia Salentina" at the Conference "SINM 2000" on the National Information System for Mathematics (SINM).<sup>6</sup>

SINM, whom I have had the honour to coordinate up to 2010, has been a project carried out since the early nineties, by the Italian mathematics libraries with the aim of developing and sharing archives, bibliographic resources and text materials in mathematics and related fields, such as physical sciences, computer science and biotechnology with the least possible waste of technical and financial resources and in compliance with national and international rules and standards (Valzano. 2000)<sup>7</sup>.

During the conference various issues related to electronic scientific publications were covered in depth for the first time in Italy, such as information technology, communication protocols and standards, formats to access and disseminate electronically materials, long term preservation of digital resources, Impact Factor.

After so many years these topics are still currently debated at national and international level.

Among other presentations it is worth mentioning the contribution by the mathematician Alessandro Figà-Talamanca, also well known outside the mathematicians community, on "Impact Factor and research evaluation and development of scholarly publishing" (Figà-Talamanca, 2000).

His well argued and stringent criticism of Impact Factor in relation to research evaluation, was published in the SINM 2000 proceedings and is available online on the CEIT website<sup>8</sup>.

In the following years the ESE System was further developed, enriched with new open access electronic publications, adjusted to new technological developments and new international standards, and was endowed with a new platform based on the open source software OJS (Open Journal Systems), one of the most adopted solution nationally and internationally to publish and manage open access electronic journals.

All publications accessible on the ESE platform are subject to quality control by scientific committees and reviewers; they have an e-ISSN or e-ISBN code, a DOI code for each article, a Code of Ethics and do not charge authors the costs of processing and publishing articles.

The journals (currently 24 titles) are indexed in national and international indexes and databases; some of them also in WOS and SCOPUS, others are ranked by ANVUR as Class A scientific journals.

The University of Salento, like other Italian universities, explicitly stated its support to Open Access movement by including a clause in the Statute approved at the end of 2011.

<sup>5</sup> CASPUR (Consorzio interuniversitario per le Applicazioni di Supercalcolo Per Università e Ricerca) - Interuniversity Consortium for Supercomputing for University and Research (1992-2013).

<sup>6</sup> SINM (Sistema Informativo Nazionale per la Matematica) - National Information System for Mathematics (See:

<http://www.ceit-ottranto.it/index.php/progetti/317-quarto-seminario-sinm>).

<sup>7</sup> See: <http://www.ceit-ottranto.it/index.php/progetti/318-quarto-seminario-sinm-2000-valzano>

<sup>8</sup> See: <http://www.ceit-ottranto.it/index.php/progetti/330-quarto-seminario-impact-factor-figatalamanca>.

The ESE-Salento University Publishing platform, launched in 1999, still represents a valid and well established solution for many researchers who want to publish research results, teaching materials, conference proceedings, monographs and journals in open access. It is reachable at <http://siba-ese.unisalento.it/>.

The CASPUR-CIBER Publishing - Eco-sustainable Publishing System<sup>9</sup> was established within the publishing project "Eco-sustainable Open Access Publications"<sup>10</sup>, launched in 2009 in partnership with CASPUR-CIBER (directed by Francesco Proietti), SIBA and other structures of the University of Salento, with the aim to develop an open access electronic publishing platform for the consortium universities affiliated to CASPUR or to CIBER<sup>11</sup>, and to foster preservation and restoration of the natural environment (Proietti & Valzano, 2011; Valzano, 2014).

A few Monographs and Proceedings and the journal SCIRES-IT (SCientific RESearch and Information Technology) are published, open access, on this System based on the open source software OJS (Open Journal Systems).

SCIRES-IT, e-ISSN 2239-4303, is an open-access journal providing an international forum for the exchange and sharing of know-how in the areas of Digitalization and Multimedia Technologies and Information & Communication Technology (ICT) in support of Cultural and environmental Heritage (CH) documentation, preservation and fruition. It publishes comprehensive reviews on specific fields, regular research papers and short communications in a timely fashion. The Journal aim is to encourage scientists to publish their experimental results and theoretical work in a comprehensive way (SCIRES-IT Manifesto, 2011).

It is a peer-reviewed journal, covered by various indexing and abstracting databases and available online on a semi-annual basis. It is indexed in Emerging sources Citation Index and in Scopus. Moreover, it is ranked by ANVUR (Italian National Agency for the Evaluation of the University and Research systems) as a "Class A" journal (Valzano & Cigola, 2018).

SCIRES-IT does not require authors to pay any APCs (Article submission or Processing Charges)

for submission or publication of articles, and it has no financial contribution. It is therefore a Journal fully aligned with the principles of open access, since its foundation (2011), in a linear, clear and precise way, supporting researchers and facilitating scientific research and dissemination of knowledge. Over all these years, SCIRES-IT has maintained its fundamental objectives and its policy, thus achieving excellent results in both national and international scientific fields.

It is an eco-sustainable open-access journal, which combines the main principles of the Berlin Declaration on Open Access with the aims of the International Convention on Biological Diversity, fostering scientific dissemination, biodiversity awareness, environment preservation, and sustainable use of natural resources.

In line with the publishing project "Eco-sustainable OA publications", each new issue of SCIRES-IT is accompanied by an environmental restoration activity (e.g. planting local ecotypes of native species) carried out in protected areas, in cooperation with CEIT and the Botanical Garden of the University of Salento.

Other initiatives and workshops have been organized in cooperation with CEIT, the Laboratory of Zoology and Marine Biology, the Department of Mathematics and Physics of the University of Salento, to improve knowledge, enhancement, management and preservation of natural and environmental resources.

Furthermore some study programs have been developed with the aim of carrying out restoration activities in the natural environment, thus enabling policies of improvement and cultural, economic and eco-sustainable development of the areas involved (Boero & Lucarella, 2018).

The journal SCIRES-IT, of which I am Founder and still Editor-in-Chief, was previously coedited by Francesco Proietti, later by Cristiana Bartolomei - University of Bologna and, recently by Michela Cigola - University of Cassino and Southern Lazio, is accessible at the new address <http://www.sciresit.it/>.

In the future we will continue our commitment to Open Science and to new models of scientific communication and research evaluation. Particular attention will be paid to cultural

<sup>9</sup> CASPUR-CIBER Publishing - Pubblicazioni ecosostenibili (see: <http://www.ceit-ottranto.it/index.php/editoria-elettronica/18-caspur-ciber-publishing-info>).

<sup>10</sup> Pubblicazioni Open Access ecosostenibili (see:

<http://www.ceit-ottranto.it/index.php/editoria-elettronica/104-pubblicazioni-oa-info>).

<sup>11</sup> CIBER (Comitato Interuniversitario Basi dati ed Editoria in Rete) is an Interuniversity Committee for Database and electronic-publishing, founded by CASPUR (1999-2013).

heritage enhancement, management and preservation and to natural and environmental resources and to eco-sustainable technological innovation.

### 3. *Open Access, Open Science and Research evaluation*

Over the last decade, Open Access has assumed greater importance in the scientific-academic world and in the library field nationally and internationally.

It has also developed as a response to the price increase of scientific journals subscriptions and the difficulties in accessing them due to lack of funds.

There is an increasing awareness that Open Access enables universities and libraries openly to access scientific results of researches funded by the same universities, without paying a second time through subscriptions to scientific journals.

Open access to research results favours the sharing of knowledge and therefore a faster advancement of knowledge, without barriers, all over the world. It protects the interest and rights of authors and scholars, ensures greater visibility and dissemination of their work, greater impact and greater circulation of ideas and increases the citational benefits.

In particular, in recent years, the economic crisis and the sharp reduction in funds available to universities and scientific research, the assignment of Impact Factor to a growing number of open access journals and the new research evaluation criteria have increased interest in Open Access publications.

However, many problems remain to be solved, other issues and problems concerning costs as well as the value and quality of scientific research arise. New challenges need to be faced. There is still a lack of knowledge of what Open Access actually is, and in particular of Open Science.

Open Access means open and barrier-free access to scientific knowledge.

Open Science extends the principle of Open Access to practices, methodologies and above all to research data; it is a cultural movement aimed at making every step of scientific research open to all citizens.

Research data must be quickly findable, accessible, possibly open, interoperable, reusable, and allow anyone to come to different conclusions about that data. Openness stimulates innovation, accelerates discovery, facilitates collaboration, interdisciplinarity, exchange of knowledge, access to education.

Free access to education and culture is one of the fundamental rights of humanity, guaranteed in 1948 by the UN Universal Declaration of Human Rights and present in most of the Constitutions of the European Union States, which refer directly or indirectly to culture, scientific research and the issue of its accessibility and participation.

Open Science has made many steps forward today, there are many scientific contents (software, publications, data) available free of charge and with reuse rights, that is, accompanied by open licenses.

In Italy, unfortunately, we are a bit behind compared to other countries. Often, when we talk about Open Access or Open Science, prejudices are raised such as the belief of poor quality of open access publications.

Many authors feel bound to publish in "prestigious" journals owned by major commercial publishers who dominate the scientific communication market (Springer-Nature, Wiley, Taylor & Francis and, in particular, Elsevier, which plays a predominant role), consequently research results (scientific publications) even those financed with public funds, become accessible only through expensive subscriptions, and the power of commercial information providers and citation databases increases.

Italy signed in December 2017, through the CRUI-CARE<sup>12</sup> consortium, a five-year contract with Elsevier (2018-2022) to access the publisher's electronic periodicals. The contract also includes an Open Access option, in addition to paying for subscriptions, an extra charge is contemplated to publish Open Access (in the same journals they subscribe to).

Therefore, it provides that universities pay once to access the electronic journals through subscriptions a second time every time an affiliated researcher decides to publish an article in Open Access in one of the subscribed journals (Pievatolo, 2019).

<sup>12</sup> CARE (Coordinamento per l'Accesso alle Risorse Elettroniche): Gruppo di Coordinamento per l'Accesso alle Risorse Elettroniche - Coordination Group to access

electronic resources, established by CRUI in 2006, within CRUI Library Committee.



For those wishing to have more information on the this issue, they can visit the AISA website, at <http://aisa.sp.unipi.it/Accesso-Aperto-ibrido-in-italia-solo-una-questione-di-nudge/>.

The universities (including the University of Salento), which pay a high price for this service, as it has already been said by others, should review CRUI-CARE mandate to negotiate on behalf of universities. They should give a precise mandate to CRUI-CARE (whose services are charged to Italian universities) to contract under different conditions, with greater transparency and involvement of all interested parties.

The same contract signed by CRUI had been proposed in Sweden, where it was refused and relations with Elsevier broke off, as communicated at the recent Berlin Conference by the President of the Swedish University Rectors' Conference (Galimberti, 2018). Other countries, including Germany, Hungary have also canceled and terminated the agreements with Elsevier.

The Open Science movement and the participants at Berlin 14 Conference on Open Access held on 3rd and 4th of December 2018, have firmly called for an end to the subscription system and an immediate transition to Open Access, in line with some principles stated by Plan S, an initiative to support publishing in open access of publicly funded scientific research, which is going to be presented in this Workshop.

It was also stated that the full implementation of Open Science and the quality in Science require a review of the current models of research evaluation and research incentives as they perversely push to increase the "countable" research products regardless of their quality.

They affirm that the evaluation criteria, based on journals ranking, on Impact Factor, on H-Index, on number of publications and citations, encourage bad practices.

The competition for priority in discovery has been transformed into competition for better results according to some indicators (Baccini, 2019).

A scientific publication is used to enrich the curriculum in view of recruitment, promotion or funding.

The journal in which research findings are published, count more than findings, the container is more important than contents as it transfers prestige to an article, regardless of its content (Baccini, 2019).

The evaluation obsession takes over and every effort is made to publish articles of limited scientific value in journals with high impact. Impact Factor, number of articles and citations become the main objective, regardless of the reliability of citational databases.

The metrics of scientific evaluation generate various questionable behaviors: excessive increase of self-citations, publication of a single research in several articles adding names of other authors, heterogeneity of databases on Impact Factor which is primarily used to evaluate research.

According to the movement for Open Science and the recent Berlin Conference, it is necessary to review the rules for evaluating research, also to grant authors the real freedom to choose the publishing venue. Above all, it is necessary to create a collaborative network among Universities, Ministry and Research Centers for the development of technological platforms that support researchers and their institutions, and empower them with infrastructures, services but also policies, recommendations, studies, analyses, training courses, production of best practices.

I agree with most of these observations, but I would also like to add my personal opinion on research evaluation, which I believe, is shared by many researchers.

A friend of mine, a professor, says university professors differ from high school teachers because, in addition to teaching their subjects (as high school teachers do) they must also contribute to the development of knowledge in the subject area they teach.

This is achieved by doing research.

The higher salary of university professors is justified by their dual function.

Professors who do not do research should have a reduced salary.

Since a few years the Ministry has set up, through ANVUR, an evaluation system to assess the scientific production of professors and to evaluate university departments.

Evaluation is crucial, also to spot unproductivity.

If "what to evaluate" is important, "how to evaluate" is equally important then, the problem becomes thorny.

Each criteria is open to criticism and, once acquainted, can be "drugged" by those who are

evaluated, we have already said this, we could also add some other examples.

In some scientific sectors, members of the same research group or professors engaged in the same project or in large consortium sign almost all works produced by the group or consortium.

The works have hundreds of authors and come out by the hundreds every year, receiving hundreds of citations. It is legitimate to doubt that the authors always have a full knowledge of the works they have signed, despite having amazing rankings in their research evaluation.

All the criticisms addressed to "how to evaluate" are more or less well founded, but each criticism should be accompanied by proposals for improvement, indicating alternative "how to". Otherwise, the impression is that it is preferable not to be evaluated, waiting for a perfect evaluation system to be sorted out.

In short, "what" is absolutely right, "how" must be perfected.

I conclude my intervention with one last piece of news: on January 14<sup>th</sup>, the American President Donald Trump signed "The Open, Public, Electronic and Necessary (OPEN) Government Data Act", the law requiring all federal agency data, research data inclusive, to be published as open data. Eventually key parts of President Barack Obama's 2013 Memorandum on Open Data Policy

became law. It is a great achievement, thanks to the work of SPARC (Scholarly Publishing & Academic Resources Coalition) and other Open Access organizations.

SPARC is an initiative born in the United States to support access to scientific information, and to promote alternative strategies in the scientific publishing market.

We hope that this can also happen in Italy as soon as possible and the results achieved so far will not be hindered by other factors or economic interests.

It is easy to imagine the negative reaction of many American publishers, bound to their business model, and the subsequent indignant reactions of researchers.

The issues concerning Open Access and Open Science are many, complex and constantly evolving.

I take this opportunity to thank all those who, through the AIB-Cur mailing lists and, above all, through the OA-Italia mailing list keep us abreast with Open Access and Open Science issues in Italy and abroad.

I thank all speakers and participants for their contributions and, in particular, the President of ANVUR, prof. Paolo Miccoli, for the work done so far, for the improvements he will make and for his contribution to this Workshop.

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