# Everything You Need to Know about

# Open Access

### • enago academy Learn. Share. Discuss. Publish.

Dear Reader,

Since the 1970s, the open access (OA) movement has continuously evolved and changed the dynamics of the traditional publishing models and enabled easy dissemination of information to the academic community. In its traditional form, OA publishing has not only helped increase the visibility and impact of research but also facilitated quicker dissemination of knowledge to the academic community. Through this e-book, we intend to educate early-stage researchers and students about the benefits of open access publishing and the how the landscape of academic publishing has evolved in the last two decades for researchers. We have attempted to compile some of the essential information related to the milestones of the open access movement and its benefits; an overview of the OA publishing market; a brief introduction to open data, repositories, and journals; and copyright licensing for OA publications.

Towards the end, you will also find a list of authentic e-resources. It would be our pleasure to help you with your publishing requirements. Please make it a point to visit enago.com/academy for further help. We have posted 900+ original articles on this knowledge e-platform.

Happy Reading!

Regards,

#### The Enago Academy Team

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Mobile App: https://www.enago.com/academy/mobile-app/





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# **OPEN ACCESS**

### An Introduction to Open Access

To advance innovations and collaborations in research, it is imperative that information and ideas are exchanged across all levels within the industry and academic community. With the advent of internet and emergence of digital storage, the access to the information has significantly improved.

Open access (OA) refers to the digital online content (journal articles, reviews, conference proceedings, or monographs) that is free from paywall (subscription and/or licensing fees) and permission (copyright and/or licensing agreements) barriers. Since 1970s, OA movement has been instrumental in quick and easy dissemination of the scholarly information.

The increasing relevance of open access journals is related to the steep rise in the cost of traditional journals, developments in technology and the desire for easier access and a wider audience for the scholarly work. According to the Association of Research Libraries (ARL), this "serials pricing crisis" led to an average price increase of 315% from 1989 to 2003. While technological advances facilitated the 'access' component of OA, much of the momentum in the mid-2000's came from a period of punitively high increases in subscription fees -Increases that far outpaced the budgets for the libraries purchasing those subscriptions [1]. The OA approach is complementary to traditional publishing. It utilizes both new technological developments and their wide proliferation to ease the publication process for authors, and the availability of research material to society in general.

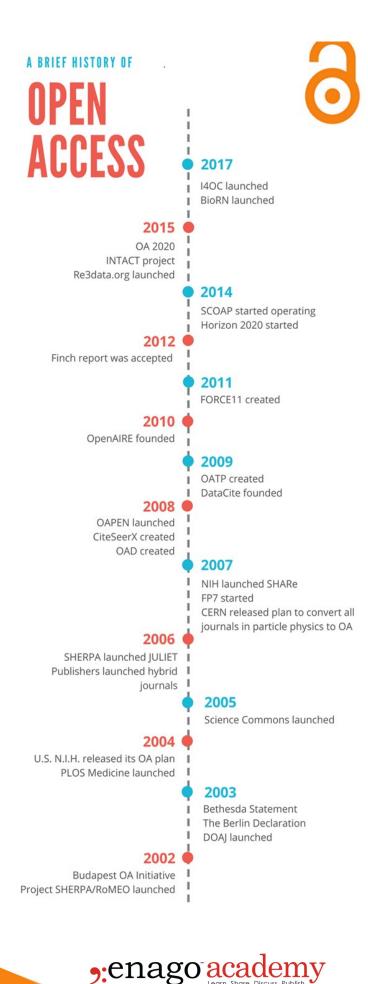
Various initiatives and policies from research organizations, government bodies and funding associations have been the key drivers of this movement. Below are few milestones that have shaped the current OA landscape [2,3].



### **OPEN ACCESS**

Open access (OA) refers to the digital online content (journal articles, reviews, conference proceedings, or monographs) that is free from paywall and permission barriers.





Open access movement dates back to 1971, when Michael Hart launched Project Gutenberg. Soon after, free online peer-review journals, *Electronic Journal of Communication and Bryn Mawr Classical Review* were launched in 1990.

In the following year, arXiv, an electronic preprints repository came into existence. Additionally, launch of SciELO and CiteSeer in 1997 further supported the growth of OA.

# WHAT ARE THE DIFFERENT TYPES OF OA?

### **Open Access Types**

There are mainly two types of OA models-'Green' and 'Gold'. However, variants exist in these two categories depending on how and when they content is made open for public dissemination.

#### GOLD

OUTLET

Final publisher version of the articles is made open

#### FEES

APC may apply

#### ACCESSIBILITY

Article becomes OA without any embargo period

#### VARIANTS

**Hybrid:** Final publisher version of the articles in a subscriptionbased journal are made OA immediately after APC or offsetting agreement

**APC:** Final publisher version of the articles are made OA after APC; no subscription model

**No-APC:** Final version of the articles published in fully openaccess journals which do not charge an APC

#### GREEN

#### OUTLET

Authors self-archive articles (not final version) in an institutional or subject repository

#### FEES

No fees/charges are applicable

#### ACCESSIBILITY

Article can be subject to embargo period by publisher

#### VARIANTS

**Pre-print:** Author's copy of the article before peer-review

**Post-print:** Author's copy of the article after peer-review and before formatting by publisher

Apart from the variants discussed in the above table, OA can be

- Short-term (contents are freely available for a certain time period, six months to a year and after that period, it is accessible only to the subscribers)
- Selected (selected content is made freely accessible and full content is accessible only to the subscribers)
- Partial (content is selectively available for few sections only e.g. research article and not review paper) [4]

Additionally, publishers can apply Creative Commons (CC) licenses in gold or hybrid OA models

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### WHAT ARE OA PUBLISHING BUSINESS MODELS?

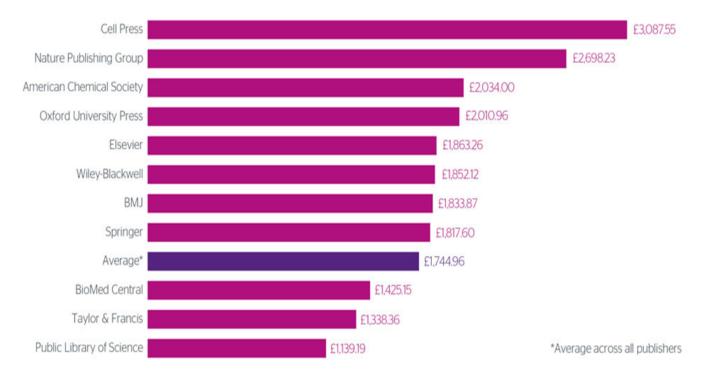
### **Article Processing Charges**

OA switches the revenue source from subscribers to the authors, who are willing to pay article processing fees (APFs) or article processing charges (APCs) to make their research freely accessible (OA). APC covers costs for following aspects:

- Editorial
- Technical
- Production
- Customer services
- Marketing (e.g. conference attendance)



As the stability of the OA model has grown, institutions have started to fund the APCs from a general budget line rather than expecting individual researchers to pick up the tab from individual project or even personal budgets. The actual amount of these fees varies considerably between journals from



Average APCs of Major Publishers (Shamash K. Article processing charges (APCs) and subscriptions [Internet]. 2016 [cited 20 July 2017]. Available from: https://www.jisc.ac.uk/reports/apcs-and-subscriptions)



Business models in OA can be of following types:

- 1. Open access journals
- 2. Open access repositories or archives-e.g. arXiv, PubMed Central, and SSRN
- Open access theses and dissertations-e.g. Networked Digital Library of Theses and Dissertations (NDLTD)
- 4. Open monographs-e.g. Directory of Open Access Books (DOAB)
- 5. Open conferences-e.g. PKP Open Conference Systems [4]





# **BENEFITS OF OA**

### Impact and Visibility

#### Access

Most journals and repositories do not impose access costs on the reader. Thus, price barriers are substantially lowered or removed entirely. The reach of the articles or materials increases.

#### Immediacy

The research results can be made immediately available to not just others within the academic community.

#### **Impact and Citations**

Articles tend to have a much bigger impact in the short-term compared to "subscription-only" work. The long-term impact has been found to be similar, with some studies showing a larger impact of openaccess articles [5].



#### Search Options

An article can typically be more easily located if it is in the open-access domain. In particular, OA facilitates searching within the article or recommending and sharing it with others.

#### Author and Institution Visibility

Open access journals increases authors visibility as opposed to subscription-only journals. Institutions can enhance their profile by participating in or hosting open-access publishing.

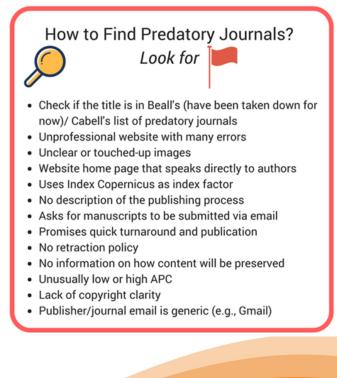
#### **Publishing Costs**

Since open-access publications are usually less expensive to produce and disseminate, both journals and publishers can benefit [5].



#### Modes of Availability

In the open-access model, research material need not be restricted to articles only, unlike traditional publishing. Any kind of digital content, including text, images, raw and processed data, audio/video and software can be part of a digital archive.



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# OA MARKET OVERVIEW

### Market Value and Projected Growth

Although market value for scholarly journals stands at \$10 billion, open access market accounts for \$500 million [6]. In addition, 50% of the articles published in the year 2013 were from top five publishers. The growth rate of OA market was estimated between 10% to 15% per annum in 2016



[6].

In terms of global share of number of articles, gold-APC, no-APC and hybrid account for 9.6%, 4.6%, and 2.4% respectively.

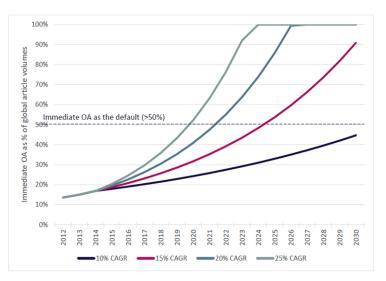
Gold-APC journals compete in a market that is not only small but also driven by the buyer preferences [6]. However, in subscription journal market, the situation almost remains unaffected by the prices and commercial publishers dominate the landscape. In addition, 'flipping' of traditional journals to full OA remains low. This is substantiated by the fact that profit margins for some commercial publishers remain as high as 30% [6].

# The growth of OA market faces challenges due to following reasons:

- Perceived low quality of OA journals: Rise in predatory journals and often low quality/high acceptance rate of low-threshold journals, affect the author's decision [7].
- Variable APCs: The APC market was valued at \$182 million in 2012 and was estimated to grow

at 34%. Average APCs for gold- APC, no-APC and hybrid were estimated at \$1418, \$2097, and \$2727 respectively [8].

- Academic bias: Often academic bias against OA journals due to perceived reputation of traditional journals becomes a roadblock.
- 4. Double Dipping: Often hybrid journals charge not only subscription fee but also publication fee. This has resulted in usage of funds for APCs



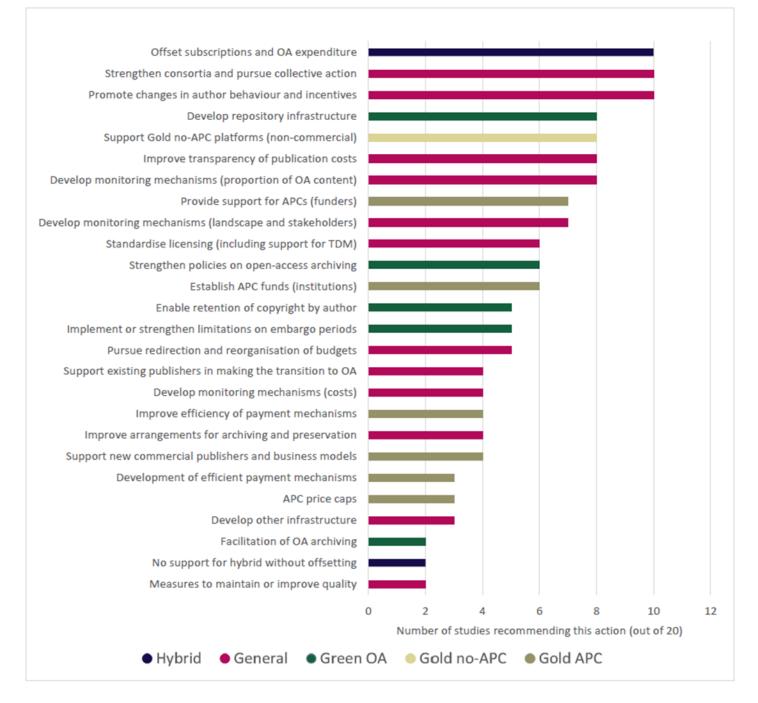
#### of full OA journals or offsetting agreements.

**Growth in immediate OA content** (Johnson R, Fosci M, Chiarelli A, Jubb M, Pinfield S. Towards a Competitive and Sustainable OA Market in Europe - A Study of the Open Access Market and Policy Environment [Internet]. 2017 [cited 20 July 2017]. Available from: https://blogs.openaire.eu/wp-content/ uploads/2017/03/OA-market-report-28Final-13-March-201729-1.pdf



### **RECOMMENDATIONS TO PROMOTE OA GROWTH**

### Suggestions by OpenAIRE



**Recommendations to promote growth of OA** (Johnson R, Fosci M, Chiarelli A, Jubb M, Pinfield S. Towards a Competitive and Sustainable OA Market in Europe - A Study of the Open Access Market and Policy Environment [Internet]. 2017 [cited 20 July 2017]. Available from: https://blogs.openaire.eu/wp-content/uploads/2017/03/OA-market-report-28Final-13-March-201729-1.pdf)

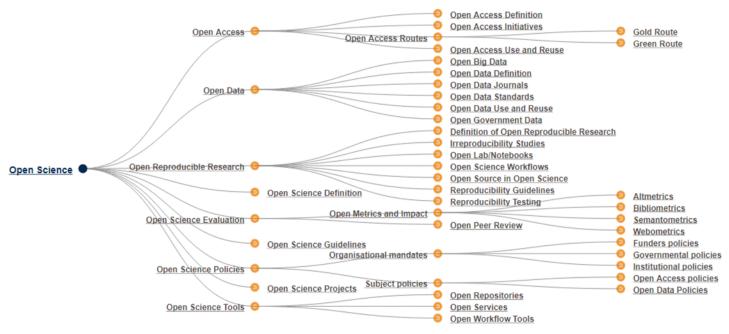
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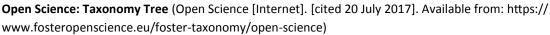
# **OPEN SCIENCE**

### Making Information Available to All

Open science movement supports accessibility to research, data, and dissemination. It assists researchers with tools and framework to maintain transparency while transferring, reproducing and disseminating research information [9].

Facilitate Open Science Training for European Research (FOSTER), a platform that provides resources and training on open science to researchers, librarians, administrators and students, gives a comprehensive taxonomy tree defining various aspects of open science [9].





Many other notable organizations support open access movement and provide resources and information to the society and stakeholders.

- Open Access Scholarly Publishers Association (OASPA): It represents OA book and journal publishers and assists in business models, tools, and guidelines that encourage open access publishing.
- The Scholarly Publishing and Academic Resources Coalition (SPARC): It supports and advances policies that empower open research and education by providing resources and information.
- Author Alliance: It supports authorship to assist authors in public dissemination of information and knowledge.



### UNDERSTANDING IDENTIFIERS

### A Quick Look



### **Understanding Identifiers**

Open Researcher and Contributors ID repository (ORCID): 16-digit persistent identifier for authors that distinguish them from others and helps to link professional activities, ensuring that researcher's work gets proper recognition. ORCID ID is used on researcher's webpages, when making submissions, or applying for grants.

**Signi** International Standard Name Identifier (ISNI): It was created as an ISO-certified global standard repository for a broader audience of creative artists, including producers, performers, writers, artists, and researchers.

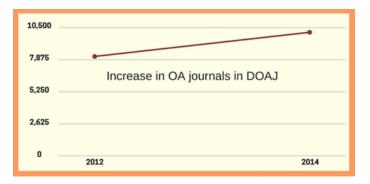
Funding agencies track the published work of the research projects they sponsored. Authors when sharing their funding resources while submitting manuscript can provide funder's name, funder ID, and grant ID.



# OA JOURNALS

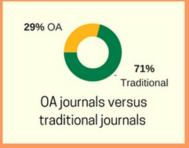
### Types of OA Journals

In 2014, English language peer-reviewed journals and non-English language peer-reviewed journals accounted for 28,100 and 6450 respectively [10]. The growth rate has been consistent in the number of journals at 3.5% per year [10]. The number of open access journals has significantly increased in Directory of Open Access Journals (DOAJ), an online directory that houses indexed, open access, and peer-reviewed journals. However, not all journals are peer-reviewed in DOAJ. Scopus had 4,200 OA journals (19.5%) as of January 2016 and Web of Science had 1,234 (9.9%) OA journals as of October 2015.



Mega journals, pioneered by PLOS ONE are the most rapidly growing segment of the OA journals. Many journals have tried to implement the same model of these mega journals, keeping the traditional peer-review process [10]. In addition, increasing number of journals in biomedical and life sciences fields are opting for delayed open access,





492 journals were delayed access. Interestingly, it was observed that delayed OA journals had twice as high citation rates as subscription journals [10].

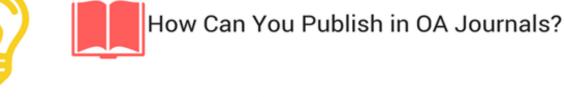
04	A JOURNAL TYPES
MEGA JOURNALS	These are broad scope journals with objective peer-review. These are generally low-cost and high-volume. (PLOS ONE; BMJ Open; SAGE Open)
FLIPPED JOURNALS	These are the journals that converted from subscription to OA. (Nucleic Acids Research; Nature Communications; Stem Cell Research)
CASCADE JOURNALS	These journals are used as tests for OA strategy while protecting the main journals. (J Nutrition Science; Physiological Reports (Wiley/APS))
HYBRID JOURNALS	These subscription journals that can offer OA on article basis after payments of APCs. Major biomedicine journals published by main publishers fall in this category.
BROAD-SCOPE SELECTIVE JOURNALS	These are similar to megajournals, but use a traditional peer-review process for selecting articles. (Open Biology; Open Library of the Humanities)



# OA JOURNALS

### Publishing in OA Journals

Several new technologies are driving OA journal publishing. Key sectors where these technologies can help include, transforming from PDFs to HTMLs, using web hosting service, utilizing services such as DOIs, indexes, and organizing content production in terms of metadata and layout.



- Find appropriate journal by consulting your peers or by browsing through the DOAJ, or similar listings.
- Open Access does not imply that there are no publication charges for the author, though this is true in some cases. Check for APC/other charges. Even when journals charge for publishing, you could request the charges to be waived citing special circumstances.
- Once the journal is selected, prepare the article in the format suitable for the journal.
- Keep in mind that peer review will be conducted at some point in the future.
- There are new models of open access journals like overlay journals which accept pre-prints from archives, and interdisciplinary or multidisciplinary journals which venture into areas at the interface of more than one subject area.
- Usually, you will be able to retain copyright on your article. Read copyright policies of the publisher beforehand.



# ALTERNATIVES TO OPEN ACCESS

### Self-Archiving

Green OA or self-archiving can be an alternative to OA journals. Researchers can archive at university/ institutional repositories, subject specific repositories, or self-publish at their homepage/website. Universities and funding agencies are mandating that publishers grant them rights for open access self-archiving (OASA) of articles they sponsor.

#### RoMEO has described archiving policy of the publishers based on the colour scheme [11].

RoMEO Colour	Policy	<u>% of publishers</u>
Green	Archive pre-print and post-print	41 (987)
Blue	Archive post-print (final draft post-reviewing)	33 (776)
Yellow	Archive pre-print (pre-reviewing)	6 (151)
White	Archiving not formally supported	20 (471)

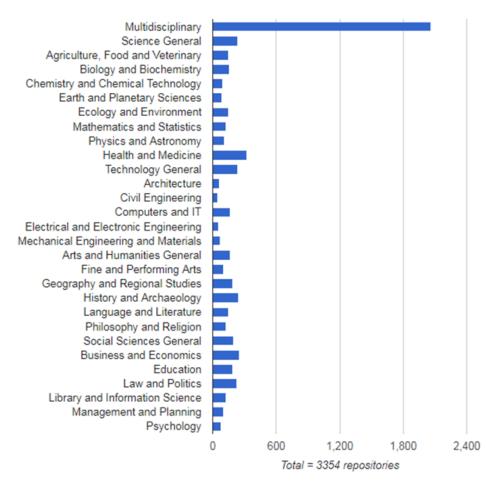
One of the studies observed that homepages/websites accounted for 27%-49% of self-archived articles. In addition, institutional and subject repositories accounted for 19%-44% and 29%–43% respectively [10].



# OA REPOSITORIES

### Subject/Disciplinary Repositories

Open access repositories or archives are intended for researchers to contribute to the results of their research. Repositories or archives are organized by subject area or certain institutions maintain archives that cut across different disciplines. These repositories can house different types of content, namely articles, books, monographs, data, multimedia files (audio/video), conference proceedings, and more.



Usually, arXiv, bioRxiv, SSRN, RePEC, and PubMed Central are considered subject repositories. However, because of the development of effective search engines, changing publisher's OA policy landscape, and emergence of institutional repositories have resulted in the slow growth of these subject repositories [10]. SciELO and Redalyc are not conventional repositories, but a database of bibliographies and digital library for OA journals

OpenDOAR - 19-Jul-2017

Subjects represented in OpenDOAR: Global Outlook (OpenDOAR Charts -Worldwide [Internet]. 2017 [cited 20 July 2017]. Available from: http:// www.opendoar.org/find.php?format=charts)



# OA REPOSITORIES

### Institutional Repositories

These repositories are generally housed in a research institution or a university to store the research content generated by its members. These repositories not only provide open access to different versions of author's manuscript but also act as a storage platform for dissertations, theses, technical reports, and e-learning materials. According to a study in 2013, 82% of the top 148 research institutes had institutional repertories that were capable to store 85% of the research output [10]. Maintaining such repertories helps universities to host research output and to present their prolific research environment.

Interestingly, in a 2013 copyright study of 100 publishers, it was observed that immediate selfarchiving was allowed for 61% of the accepted articles in institutional repositories and only 21% in subject repositories [12].

### Tips For Self-Archiving

- Check publisher (your target journal) policies on selfarchiving using SHERPA/RoMEO.
- Find self-archiving or institutional (university's) repositories- arXiv, SSRN, PubMed Central, bioRxiv, and more.
- You can use pre-print or post-print version of your article to submit, based on the publisher's policies and copyright agreements.

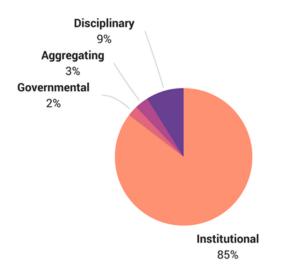


# OA REPOSITORIES

### **OpenDOAR**, ROAR, and Aggregators

OpenDOAR (Directory of Open Access Repositories) is a directory for open access repositories, which helps in access and discovery of the OA repository and its content. As of 2017, it reports information of 3354 repositories [13].

#### **OA Repository Types: Global Outlook**



Region wise, Europe holds the biggest share (45%) of repositories followed by Asia (20%) and North America 918%) [13].

ROAR (Registry of Open Access Repositories) provides information on the growth and status of OA repositories. As of 2017, it provides information on 3838 repositories globally; of which, 1524 are In Europe, 917 in North America, and 795 in Asia [14]. On similar lines, ROARMAP (Registry of Open Access Repository Mandates and Policies) provides information on growth and status of OA mandates and policies globally adopted by universities, research institutions and research funders. Costs of introducing and maintaining a repository have been elucidated. For instance, a study in 2011 estimated that cost of establishing a repository at MIT may come between \$130,000 per year to over \$248,000 per year. In addition, ongoing costs can average upto \$159,000. The breakdown of the cost can be divided as staff-37%, vendor-38%, hardware-10%, software-2.5%, and maintenance and back-12.5% [15].

Apart from that there are aggregators such as ScienceOpen (a platform that offers preprint repository, open peer review, post publication peer review, publishing, sharing and collection-building/ aggregating), OAIster (a catalogue of bibliographies aggregated using OAI-PMH), and Paperity (multidisciplinary aggregator of OA journals and research papers) [10].



# OA DATA

#### Data Journals

The practice of sharing data becomes important in research areas that are driven by data. The concept of open data has become more relevant in fields like soil science, human genetics, and digital humanities. After publication of research, data remains with the person or in archives of the university or department. In a global survey of 1200 researchers, it was observed that only 15% researchers shared data and more than 80% did so with their direct contacts/colleagues [16]. These observations are supported by the fact that data sharing involves data management, privacy, intellectual and ethical issues. However, recently, advancements have been made to publish data after research for re-use and collaboration. In another survey of 90,000 authors of manuscripts related to health, life sciences, physical sciences, social sciences, and humanities by Wiley, it was observed that 52% of researchers shared data. Among those sharing research data, two-thirds did so in the form of supplementary material in a journal. NIH has created policies that require data sharing. This policy mandates sharing of the data generated by studies with direct costs of more than \$500,000 per year. However, there are exceptions, including patient protection guaranteed under governmental privacy rules [17]. However, barring reasonable reasons to not share, data generated during the research cycle must be accessible following acceptance for publication of manuscripts associated with final data sets. In addition, the International Committee of Medical Journal Editors (ICMJE) has created a policy in which de-identified individual

data points from clinical trials must be made available within six months of publication [17].

Data journals are journals that are solely dedicated to publish research data. Few examples can include Data in Brief and Scientific Data. Usually, data is represented as tables/figures in a research article. However, the trend of publishing data as an article in traditional or data journal is catching up [16].

#### Discipline Based Citations to Data Journals (2016)

Discipline	No. of Citations
Medical sciences	294
Life sciences	563
Earth and environmental sciences	246
Multidisciplinary journals	164
Chemistry, physics, and astronomy	146
Engineering sciences	34
Mathematics, statistics, and computer	20
Social sciences	20
Health sciences	9
Information and communication	2

Open Data Report by Leiden University's Centre for Science and Technology Studies (CWTS) and Elsevier



# OA DATA

### OA Data Repositories

Dryad is a curated repository for diverse types of data resulting from and related to scientific publications. This resource helps in free dissemination, discoverability, making it citable and easy to reuse data. Many publishers encourage researchers to archive data in Dryad while submitting manuscript. Data is linked to both the publication and specialized data repositories. In addition, digital object identifiers (DOIs) are tagged to data to help in data citation.

Figshare is again a digital repository to store different types of data sets, images, figures, and videos. It thus helps researchers to share, discover, and reuse data. Figshare also assigns a DOI for a submission.

Sharing data helps in many ways by ensuring transparency in the entire research and publication process, checking and maintaining good quality research, ultimately leading to economic growth and policy-making.



### How to Find and Reuse Data?

- Research Pipeline: Provides a list of free data and includes multiple categories, such as bioinformatics and astrological date.
- Biosharing.org: Provides data locations for subjects in the life, environmental, and biomedical sciences.
- DataCite: Indexed by the University of Sheffield Library catalog StarPlus.
- European Union Open Data Portal: Allows browsing by subject or group.
- Data Citation Index (DCI): A single point of access to quality research data from repositories across disciplines and around the world. See also Web of Science.
- EMBL-EBI: Most up-to-date molecular databases.
- Registry of Research Data Repositories (re3data): Provides access to more than 1,000 repositories.
- The National Institutes of Health (NIH): Provides its own list of repositories specific to the biomedical field of research.



## UNDERSTANDING COPYRIGHT LICENSING

#### **Creative Commons**

For those involved in research and academic publishing, licensing policies are necessary to ensure that permission to use one's work is clear. Open licenses ensure that the copyright holder is clearly identified and it promotes open access publishing, as this is particularly important in allowing others to use the published work. Open Access Scholarly Publishers Association advocates the use of such liberal licenses and works in tandem with OA publishers. Commonly used public copyright licenses are those offered by Creative Commons (CC).

CC offers some sound suggestions to both licensors and licensees. For example, licensors should consider that the license is irrevocable, that the content is appropriate for the public, and that the material is not already in the public domain. Licensees must fully understand the terms of the license and know their obligations under that particular license. Remember, all CC licenses require attribution. Overall, these licenses still provide authors with protection, but also allow use under certain restrictions. This helps promote the free exchange of information and encourages research [18].

For the most part, when an article is published in a journal, the work is automatically copyrighted by the publishers and they can grant user licenses as they see fit. Open access is a hot topic and more publishers are now under pressure to provide access to such research work for free. OASPA recognizes the need for more standardized licenses and attribution practices; therefore, any publisher that belongs to OASPA must agree to use licenses that "encourage the reuse and distribution of content." OASPA also requires that its members use CC licenses, and sometimes people confuse attribution with citation; however, they are not synonymous. The former is a legal requirement for a specific license, while the latter is a practice dictated by specific disciplines [18].



# UNDERSTANDING COPYRIGHT LICENSING

#### **Types of Licenses**

Researchers are currently faced with the challenge of understanding the different licenses that are available. Below are some of the common types of licenses that can be used [19].

Prepared licenses: Often a researcher's department or institution already has a license prepared that researchers can apply to their data. These prepared licenses can be both at the institutional level and as public domain, such as in the case of genome data. Ultimately, when these are available to a researcher there is less work involved in obtaining the data license.

Bespoke licenses: These are custom licenses that are not easy to prepare. These are not commonly used, but when there is a significant commercial value associated with the data or the researcher needs to clarify his or her responsibilities and those of the re-users with respect to the data, then a custom license in often necessary.

Standard licenses: These are the most commonly used licenses, as most research projects are better served by using one of the standard licenses. For instance, Creative Commons or Open Data Commons license.

Authors who hold a CC license do waive certain rights, but revisions to these copyrights, such as modifications or commercial uses of works, are clearly stipulated. Anyone can use public licenses; however, there are some international restrictions. For example, Creative Commons Developing Nations License limits licensees to those individuals and companies who live in developing nations. There are also public licenses for specific disciplines. For example, the Free Software Foundation provides licensing for software developers. The Open Source Initiative provides licenses that "allow software to be

freely used, modified, and shared," and the Open Knowledge Foundation provides licenses for specific types of data [18].

### Tips to Select Right License

- Gain a full understanding of all types of licenses.
- The License Chooser tool at Creative Commons
- The Open Data Commons for databases



## UNDERSTANDING COPYRIGHT LICENSING

#### **Types of Creative Commons Licenses**

### CREATIVE COMMON LICENSES



### ATTRIBUTION (CC-BY)

It requires that appropriate credit is given for the work. If not, anyone using the work must first get the necessary permission. Under this license, the user must also provide a link to the license and indicate if there were any changes made.

### SHARE ALIKE (CC-SA)

The terms of this license are the same as those for the CC-BY license, except that this license also allows the users to share and modify the work, as long as they distribute the modified work on the same terms. For any different terms, prior permission is necessary.

### NON Commercial (CC-by-NC)

The terms of this license build on the other two unless you have chosen NoDerivatives. Here, the user can also modify and use the work for any purposes other than commercial.

### NO DERIVATIVES (CC-BY-ND)

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# **RECENT DEVELOPMENTS IN OA**

### Global updates in OA movement

In December 2015, OA2020 roadmap was prepared by Max Planck Digital Library towards "Building on the Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities and on the progress that has been achieved so far, we are pursuing the large-scale implementation of free online access to, and largely unrestricted use and re -use of scholarly research articles [20].

In another milestone, under Horizon 2020 program (EU's Research & Innovation funding programme for 2014-2020), Commission pledged to make open access to scientific publications with following objectives [21]:

- articles will either immediately be made accessible online by the publisher (Gold OA) upfront publication costs can be eligible for reimbursement by the European Commission; or
- researchers will make their articles available through an open access repository no later than six months (12 months for articles in the fields of social sciences and humanities) after publication ('Green' open access).

In addition, with the adoption of the Digital Single Markets strategy, the Commission announced the launch of a cloud for research data – the 'research open science cloud (HLEG EOSC)' that will offer 1.7 million researchers and 70 million STM researchers and professionals a place to store, share and re-use data across disciplines [22].

In February 2017 a report titled, "Towards a Sustainable and Competitive Open Access Market in Europe" was released as part of the OpenAIRE 2020 project, a partnership comprising of 50 European Union countries. The study addressed the economic factors that contribute to the OA market and evaluated ongoing competition and how that competition affects new OA policies. Six steps were recommended to "enable a competitive and sustainable open access market in Europe" based the current roadblocks [23].

- Author incentives: Create author incentives and remove disincentives.
- Publisher incentives: Provide subscription publishers with a viable transition route.
- Competition: Improve transparency.
- Pluralism: Support diverse approaches.
- Infrastructure: Develop a robust infrastructure.
- Monitoring: Ensure policy compliance.



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