

## Applying Fair Principles to Scholarly Publishing Outputs to Improve Open Access Compliance

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## **Applying FAIR Principles to scholarly publishing outputs to improve open access compliance**

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### **Abstract**

While the FAIR Principles were developed for research data, they can also be aptly applied to other research outputs. Applying FAIR Principles to scholarly publications ensures research can easily be found, accessed, used and re-purposed by others. Using these principles in the context of scholarly publishing helps facilitate access to publications by other researchers and the wider community. The existing services and infrastructure, provided by The University of Queensland Library Scholarly Communication & Repository Services (SCARS) team, supports practical implementation of some of the FAIR Principles in scholarly publishing.

The Scholarly Publishing, Research Outputs & Impact, and UQ eSpace (institutional repository) teams from SCARS recently assisted a Research Centre with open access (OA) reporting. During the time the Centre was in operation the funder renewed their Open Access Policy mandating that all research outputs be made openly accessible within twelve months. This necessitated that the Centre had to approach the task of OA reporting retrospectively. The Research Outputs and Impact team provided metrics on how many publications by the researchers from the Centre were already available via open access at that time, predominantly via Gold OA. The Scholarly Publishing team provided advisory support on Green OA strategies to improve compliance. A project was undertaken by the Centre to identify and obtain author accepted manuscripts, which were then assessed by staff in the UQ eSpace team and uploaded to the repository in accordance with relevant copyright restrictions and embargo periods.

As a result of the project, the Centre optimised their level of OA compliance, with over 92% of their publications recorded as OA at the time of completion of the work done with the UQ Library. This paper will demonstrate the practical methods employed by the SCARS teams that supported the Centre's OA publishing efforts and the implementation of FAIR Principles. It will also discuss some of the work yet to be done to enhance Library systems and processes to better support all FAIR Principles.

### **Keywords:**

FAIR Principles, Scholarly Publishing, Open Access, Funder Mandates, Open Access Compliance, Institutional Repository, Research Support

### **Introduction**

The FAIR Principles were first published in 2016 as a means to improve the reusability of research data (Wilkinson et al., 2016). Since 2016 there has been increasing discussion around the application of the FAIR Principles – Findability, Accessibility, Interoperability, and Reusability – to more than just research data. The *Policy Statement on F.A.I.R. Access to Australia's Research Outputs* outlines that implementing FAIR principles for all research outputs will increase the visibility of Australian research, aid the community in accessing the body of knowledge funded by the public purse, increase collaboration opportunities for Australian researchers, and improve accountability of publicly funded research (Australian FAIR Access Working Group, 2017). The policy also acknowledges that different approaches to FAIR will be required for different types of research outputs (Australian FAIR Access Working Group, 2017).

### **FAIR and Open Research Publications**

While the FAIR Principles can be used to support open access, “open” does not always equate to “FAIR”. For example, a publication may be “open” in the sense that it is freely available, but not considered FAIR as it does not have an appropriate license to allow re-use (Australian FAIR Access Working Group, n.d.). The original Budapest Open Access Initiative from 2002 defined open access as “free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those

inseparable from gaining access to the internet itself” (Chan et al., 2002, para. 3). While this statement predates the FAIR Principles, many of the ideologies are the same – that research should be able to be found, accessed, interoperable with machines and software, and re-use should be unhindered.

Open access publishing is a constantly evolving landscape. Updates to funder policies, and now Plan S<sup>1</sup> on the horizon, are drivers for change in scholarly communication and reporting requirements. Both the National Health and Medical Research Council (NHMRC) and Australian Research Council (ARC) Open Access Policies recommend consideration of FAIR Principles when evaluating open access publishers (Australian Research Council, 2017; National Health and Medical Research Council, 2018a). Self-archiving of author-accepted manuscripts – or post-prints – is increasingly common practice to make research publications open access. Author-accepted manuscripts are considered acceptable versions under both the ARC and NHMRC Open Access Policies (Australian Research Council, 2017; National Health and Medical Research Council, 2018a). However, self-archiving may not align with FAIR. Self-archiving may pose issues for findability if websites or repositories are not well indexed, limit interoperability if publications and associated metadata are not machine-readable, and lead to confusion around re-use if licenses are not explicitly defined (Wilson & Holcombe, 2017).

### **Research Support Services at UQ Library**

The University of Queensland (UQ) Library’s research support services have evolved to meet the needs of the Institution and its research community. The UQ Library has a tiered or “triangle” service model, with all Library staff having an awareness of research support services on offer, liaison librarians having an understanding of the specific needs of researchers within their discipline, and functional teams providing a more advanced level of support on complex cases and offering training to library staff and the Institution’s research community (Brown, Alvey, Danilova, Morgan, & Thomas, 2018). These functional teams are:

- UQ eSpace (the Institutional repository)
- Scholarly Publishing
- Research Outputs & Impact
- Data Management

The UQ eSpace, Scholarly Publishing, and Research Outputs & Impact teams in particular are integral to supporting Open Access and promoting the application of the FAIR Principles for non-data research outputs among the UQ research community.

### **UQ eSpace**

UQ eSpace is the Institutional repository and the official platform for archiving metadata on all UQ publications, which is used for internal and external reporting purposes. In addition, it also acts as the Institution’s open access repository, providing a home for digitised materials, published datasets, and open access publications.

In support of the FAIR Principles, the UQ eSpace repository helps make research outputs Findable by including accurate, detailed metadata records for each publication. The repository utilises automated workflows to harvest metadata and link publications to researcher profiles within UQ eSpace. Metadata sources include ORCID, Scopus, Web of Science, PubMed and Crossref. The repository is also indexed by Google and Google Scholar, increasing discoverability.

Publication metadata in UQ eSpace is publicly viewable, aiding accessibility. Each record clearly identifies how to access an open-access version of a publication, should one be available. The Open Access Status field in the metadata record indicates if the publication is open access and available via the DOI provided on the record, or if an acceptable open access version is uploaded to the repository and linked to the record. Additionally, the orange padlock open access badge is shown at the top of a record when a publication is open access, and appears greyed out when an embargo period is in place for an attached manuscript. Acceptable manuscript versions are post-prints or publisher versions with an appropriate licence allowing archiving.

### **Scholarly Publishing**

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<sup>1</sup> Plan S, starting in Europe in 2018, is committed to see all research publications publicly funded by participating European research councils and funders made available via compliant open access channels by 2020.

The Scholarly Publishing team provides training and advice on a range of scholarly communication matters, including open access publishing models, the use of author identifiers, and promoting research via online platforms.

Training provided to researchers from postgraduate through to senior level covers Gold, Green and hybrid open access models, and the advantages and potential pitfalls of each. Green open access is recommended as a viable alternative to paying an article processing fee. In accordance with University policy, researchers are encouraged to self-deposit their author accepted manuscripts into the UQ eSpace repository, where publisher and journal policies will be considered by the UQ eSpace team and appropriate embargoes applied. Education on identifying manuscript versions appropriate for archiving is also provided but in a big institution is not always scalable. While the UQ eSpace team does conduct quality control assessments of all files uploaded to the repository, this education helps improve efficiency of the process as fewer incorrect manuscript versions – such as copyrighted publisher PDFs – are deposited by researchers. Depositing eligible manuscripts in UQ eSpace improves findability and accessibility of open access research outputs.

Author identifiers are also useful tools for supporting FAIR research outputs. Maintaining comprehensive and accurate publication lists in the likes of an author's ORCID profile improves the visibility of a researcher's works, promoting findability. Researchers are also encouraged to promote their research via channels including social media (Twitter, Facebook and LinkedIn), news outlets, and online networking sites such as ResearchGate by including the DOI and a link to the metadata record in UQ eSpace, promoting research across these platforms also improves findability and access.

### **Research Outputs & Impact**

The Research Outputs & Impact team provide analysis and reporting services to individual researchers, Schools, Faculties, Institutes, and university executives on the quality and performance of UQ publications. The team also provides training on bibliometrics and alternative metrics (for example Altmetric and Plum Analytics), and support to liaison librarians offering bibliometric assistance to researchers within their disciplinary area.

While the function of this team might be one step removed from directly supporting open access and FAIR research outputs, the reporting and analysis provided can demonstrate the value of implementing FAIR Principles. Open access availability improves findability and access of research, and may contribute to higher citation rates than publications hidden behind a paywall (Piwowar et al., 2018), therefore bibliometric training offered by the team encourages researchers to consider if open access publishing might be a suitable strategy to improve citation metrics. In addition, alternative metrics provide insight into the reach and potential impact achieved by promoting research via online platforms such as Twitter or through news outlets.

The Research Outputs & Impact team can also compile reports on open access publications using tools such as Unpaywall and publication databases including Web of Science and Scopus. Such reports can provide insight into the open access publishing behaviours of individual researchers, or entire research groups, Schools, Institutes or Faculties, and may be of benefit for compliance reporting.

### **Case Study**

A Research Centre approached the UQ Library for advice on open access publishing strategies. The request for assistance came via the liaison librarian for the Centre, and was escalated to the third tier of the Library's triangle service model – the specialised functional teams. In this particular case, the Scholarly Publishing, UQ eSpace, and Research Outputs & Impact teams worked closely with the Centre to provide tailored support and advice.

The Scholarly Publishing team provided advice on publishing strategies the Centre could implement to maximise compliance with their funder's Open Access Policy going forward. Self-archiving of author-accepted manuscripts was a desirable approach to allow the Centre to save money on the cost of article processing fees required for Gold open access journals, instead allowing them to put more money into their research. Depositing an author accepted manuscript into their institutional repository is considered an acceptable approach under both the NHMRC and ARC's Open Access Policies (Australian Research Council, 2017; National Health and Medical Research Council, 2018b). In addition, the Scholarly Publishing team provided training to the administration staff within the Centre on identifying and capturing author-accepted manuscripts during the journal submission process, and the process

required to archive manuscripts in UQ eSpace, arming these staff members with the skills required to support the Centre's researchers. UQ eSpace was recommended over other self-archiving locations including a researcher's personal website, FigShare and other general repositories, or other discipline-specific repositories. UQ eSpace is well indexed by search engines, thus increasing findability, and clearly identifies a record as open access when a manuscript is attached, which improves accessibility.

The UQ eSpace team processed the deposited manuscripts as part of their regular workflow. For authors to self-archive a manuscript in the UQ eSpace system there must be an existing metadata record linked to the researcher's UQ eSpace profile. This allows the researcher to find the record for the publication of interest in their publication list, where they can upload a file. The researcher has the opportunity to set required embargo periods at the time of uploading, should these be required, and add additional notes to the record. If a metadata record does not exist the researcher can go through a workflow to create a record for a missing publication. Before any changes a researcher makes become public a member of the UQ eSpace team must check and approve the changes. This process ensures quality control – it allows a team member to verify that the correct version of a manuscript has been uploaded, that appropriate embargo periods have been applied, and any other changes are correct and satisfactory for public view. In the event that an incorrect manuscript version has been uploaded (most commonly a copyrighted publisher's version) or an incorrect embargo period has been set the UQ eSpace team member will contact the researcher responsible for the changes to notify them if a file must be removed or an embargo set or changed.

The Centre was keen to self-audit their records of open access publications and enlisted the assistance of the Research Outputs & Impact team. This functional team utilised both the Web of Science database and Unpaywall's Simple Query Tool<sup>2</sup> to obtain a list of publications authored by researchers from within the Centre and determine their open access status. The Unpaywall Simple Query Tool allows a user to input a list of up to 1000 DOI's which are then run through their API. The resulting report indicates if the publication is open access, the journal is open access, who the open access host is, the website URL of the open access version, if a PDF is available, and what version of the manuscript is available. The list of publications obtained via this search process was used in conjunction with manual checks to ensure all publications authored by researchers from the Centre were documented and their open access status was accurately recorded.

### **Limitations**

This case study should be considered in light of some limitations. As the focus of this paper was on the lessons that could be learned from this experience, the Centre has not been identified. In addition, only limited data on the Centre's open access publishing outcomes was available and therefore included in this paper. The authors feel the discussion of the support provided by the UQ Library teams is valuable, as many research centres could find themselves in similar situations where they must comply with changing funder mandates in this rapidly evolving landscape.

### **Lessons Learned and Future Directions**

The work presented in this case study brought to light some areas that could benefit from improvements. At the time the work was done limitations of the Unpaywall tool were apparent. While the Simple Query Tool is accessible to users unfamiliar with using APIs, it only allows 1000 DOIs to be checked at a time. For large publication sets, such as the one in this case study, multiple lists of DOIs must be entered. Additionally, in some cases the open access status of publications was incorrectly flagged. Fortunately, in this case study, the data obtained from this tool was used for the purpose of verifying existing records, and manual checks were considered the ultimate authority for the Centre's records. However, it is worth noting the inconsistencies found, as this may have implications for any applications that rely on the completeness and accuracy of this data.

It was discovered that researchers within the Centre had greatly varying levels of understanding on open access publishing matters, and, in particular, the Green open access model of self-archiving author-accepted manuscripts. In the authors' experience this finding also holds true across the wider UQ research community. There was often confusion associated with the terminology of author-accepted manuscripts or post-prints. Some authors would submit either pre-prints or copyrighted publisher PDFs to UQ eSpace for archiving, which required UQ eSpace staff to remove the publication, contact the

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<sup>2</sup> Unpaywall's Simple Query Tool can be accessed via: <http://unpaywall.org/products/simple-query-tool>

researcher to request the correct version of the manuscript, and re-upload the appropriate file. This process is inefficient for UQ eSpace staff and frustrating for researchers. On reflection of this experience the authors considered that there may be the opportunity to provide compulsory training on publishing strategies that meet the requirements of funder Open Access Policies and University strategic direction through a Staff Development Program. Such training could cover the different open access publishing models, the terminology used for different manuscript versions, as well as clarifying some of the specific requirements outlined in the policies, such as ensuring publications were recorded in UQ eSpace within the timelines specified. Such training sessions should be promoted to ARC and NHMRC grant recipients. Additionally, tools such as Direct2AAM<sup>3</sup> could be included in training material and self-help Library guides.

Currently, interoperability of research publications in UQ eSpace is supported only in a rudimentary way. Goals of interoperability include machine-readability and the ability to integrate data into larger datasets (GO FAIR, n.d.). However, this is inherently more difficult to apply to publications rather than datasets due to their nature. While the use of commonplace, standard file formats allows for interoperability across systems and software – with the preferred document format for UQ eSpace being PDF<sup>4</sup> – this alone is not sufficient. A PDF document of a publication is not machine-readable – data displayed in tables and figures dispersed between text might be easily understood by humans, but is unlikely to be well-interpreted by machines (Open Knowledge Foundation, n.d.). Inclusion of publications in secondary works is one example of research output interoperability (Australian FAIR Access Working Group, n.d.). Research that analyses multiple publications via text-mining relies not only on machine-readability, but also requires sufficient metadata for publications to be correctly cited, which UQ eSpace provides. Publications also must be licenced in such a way that allows this kind of use. More discussion is required to understand what interoperability of scholarly publishing outputs requires, and how the FAIR Principles of interoperability and reusability closely relate in this context.

As Green open access becomes increasingly popular, it is also important to evaluate existing systems to determine if they are up to the task of supporting best practice recommendations and meeting the evolving requirements of funders. During the work completed in this case study, there was discussion between the UQ eSpace and Scholarly Publishing teams on how best to incorporate licencing of attached manuscripts into the publication metadata. At that time, there was no metadata field defined for licences within the metadata form for publications. Instead, licences were added in the additional notes field, if required. As licences are essential for supporting the FAIR Principle of Reusability, they must be integrated into metadata records. Discussions are ongoing on how best to incorporate licences into metadata records for publications within UQ eSpace.

## **Conclusion**

Since the conception of the FAIR Principles three years ago there has been growing interest in how these principles apply to more than just research data. In a climate where open access is getting increasing attention, information professionals providing research support services have a role to play promoting the application of FAIR Principles to open scholarly publications as a best practice approach. Our discussion of the research support services offered at UQ Library and lessons learned from the included case study highlight how services can be aligned with the FAIR Principles, in particular by archiving author-accepted manuscripts in the institutional repository, where high-quality indexed metadata increases findability, clearly indicates the means of access, and provides sufficient information for interoperability - to allow the publication to be included in other works and cited appropriately. To eliminate confusion around reusability metadata also should include licencing information. Moving forward, the discussions on how FAIR and open access publishing can be aligned must continue, especially in line with changes Plan S could bring in once implemented, so that practical techniques and solutions to remaining problems can be developed.

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<sup>3</sup> Direct2AAM by Open Access Button can be found at: <https://openaccessbutton.org/direct2aam>

<sup>4</sup> The PDF file format is described by the open standard ISO 32000

comprehensive approach the teams undertook to support the Centre with reporting on open access compliance for their research outputs.

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