**Seek the New Zealand solution to open access publishing**

Originally compiled in 14 September 2020.

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## Key points

- The three main routes for NZ to transition to open access are identified as author self-archiving, the article publication charge (APC) model, or transformative agreement.
- The preprint initiative can effectively complement the above three approaches by making early versions of journal papers publicly accessible.
- The author self-archiving model requires little extra cost and can make a huge difference to the accessibility of accepted manuscripts.
- US$2,000,000+ needs to be set aside by NZ funders to publish all papers via the APC route, based on a rough estimate.
- Council for New Zealand University Libraries (CONZUL) could seek to reach cost-neutral transformative agreements with publishers by re-purposing their current subscription expenditure.
- An explicit national-level open access policy is expected to be made by NZ government and funders.
- We need a NZ solution instead of simply replicating others.

In a survey report compiled by Information Power Ltd. for the project commissioned by Wellcome Trust, UK Research and Innovation (UKRI) and the Association of Learned and Professional Society Publishers (ALPSP), Wise and Estelle (2019) have identified 27 different approaches and business models that (society) journals can adopt to support full, immediate OA and become Plan S-compatible. Publishers are proactively experimenting with as many business models as possible to find one or more model(s) that will enable them to survive and thrive in the changing landscape of publishing. These models provide examples of possible open access publication options that countries and funding bodies can consider when developing their own tailored approach for the research community they serve and represent.

Among the 27 open access models and strategies, a few of them can work particularly well for the New Zealand scholarly publishing ecosystem, and in turn, can accelerate transition to open access and make New Zealand research output more freely accessible. Three feasible models and a preprint initiative are explored and recommended in this report. To facilitate the process towards an open access future, close collaboration is required between libraries, funders, institutions and authors. This collaboration must be informed by a clear, consistent, and top-down national approach to open access. Redistribution of existing funding resources or additional funds may be needed for some of the recommended business models. Other models can be implemented straightaway by leveraging existing infrastructure with no extra financial investment.

A large share of the thinking in these recommendations reflects my personal views solely as a journal publisher managing a portfolio of New Zealand journals. My views or assumptions may not be entirely true and therefore can lead to recommendations that are found not practical or viable in the end. Fundamentally, NZ Government and funding bodies are suggested to take the lead to set out official open access publishing policies for funded researchers, or the entire research community of NZ, to comply with.

## Author self-archiving

This is sometimes known as green open access or manuscript posting. This isn't a new model and could have bridged the gap between closed articles and open content significantly, but the uptake rate is

disappointingly low in NZ at the moment. A study, led by Council for New Zealand University Libraries (CONZUL), on journal articles published by NZ university-affiliated authors in 2017 shows that 88% of closed papers could have been freely accessed by the public from a repository in 2019, if the authors had deposited AAMs into a repository (White et al. 2020).

Most publishers support the self-archiving route to open access and have well-established policies for authors to follow, regarding how they can share a version of their paper. This includes depositing the Author Accepted Manuscript (AAM) in an institutional repository or in a variety of subject-based repositories and making it public after an embargo period. A small portion of journals, roughly 2,600 titles published by 36 lager publishers, even allow immediate green, meaning that authors can deposit the AAM in a repository for public access without an embargo (Bosman and Kramer, 2020).

The low uptake of green OA can be easily improved if the New Zealand government implements a nationwide policy mandating that all NZ research institution-affiliated authors deposit their AAMs into institutional or disciplinary repositories at any point after publication, and make it publicly available after an embargo period in accordance with the publisher's self-archiving policy.

Fortunately, all eight NZ universities have had their own institutional repositories to support, practise and fulfil the self-archiving route, which enables their affiliated authors to comply with this potential nationwide policy. Besides the regular maintenance costs, there shouldn't be major expenses that the extra activity of authors depositing AAMs will incur, at least compared with the potential cost of other models discussed within this report.

The only challenge of implementing this policy across the country is the accessibility to a repository by authors affiliated to Crown Research Institutes (CRIs), government organisations or commercial companies. Most of these organisations do not maintain a repository to preserve the research output generated by their staff and make it publicly accessible. A possible workaround is to take advantage of the well-established subject repositories, many of which offer free service to global researchers. A list of open access subject repositories for each discipline is available from the Open Access Directory: http://oad.simmons.edu/oadwiki/Disciplinary_repositories.

The self-archiving route with minimal cost is easy to operate and can largely be controlled by the policy maker of a country without disrupting the traditional subscription business model, while substantially improving accessibility, visibility and impact of published articles over time. The obvious drawback of this route is that most recently published content in subscription or hybrid journals will be pay-walled until the embargo period ends. However the preprint initiative proposed later in this report may partially bridge the gap.

*Is it a Plan S compliant model?*

It is worth noting that the self-archiving route can be fully compliant with Plan S, *only if* cOAlition S-funded authors make their AAM openly available immediately upon publication, without any embargo period, when publishing with subscription/hybrid journals. In addition, a CC BY license must be attached to the AAM unless an exception has been agreed to by the funder. However, in this situation cOAlition S funders will not pay for APC to subscription/hybrid journals. Whether NZ needs to mandate a self-archiving procedure that entirely matches the level of access mandated by cOAlition S is a question for the policy makers in NZ. This issue is outside the scope of this briefing report.

On July 15, 2020, cOAlition S announced their bold Rights Retention Strategy (Plan S, 2020). Instead of authors signing exclusive publishing agreements with publishers (as they used to do when publishing with subscription-based journals), cOAlition S will start contractually obliging researchers to retain intellectual ownership rights to their work in order for them to make their AAM open access at the time of publication, either with an open license or CC BY licence (CC BY-ND license allowed with exemption). cOAlition S organisations will therefore change their grant conditions to require that a CC BY

licence must be applied to all AAMs or VoRs reporting original research that is supported in whole, or in part, by their funding. In this instance, the grant agreement with researchers will legally take precedence of, or override, the publisher's agreement with the authors, empowering cOAlition S grantees to continue publishing with their preferred journals under the subscription model, while still being able to achieve compliance with Plan S. It will be interesting to see how publishers will respond to this strategy. Some may change their policies in favour of the strategy developed by cOAlition S, but others may have to consider rejecting Plan S-funded papers for publication in their subscription journals.

**APC-funded OA**

When authors choose to publish Gold OA in an open access journal or a hybrid journal, Version of Record (VoR) is free for everyone to read and use immediately and permanently. This route usually involves fees payable by the author or by their institution/funding body/society on their behalf, typically in the form of an Article Processing Charge (APC) to cover publisher's costs, including their loss of subscription revenue. APC-funded OA is viewed as a synonym for open access by many, even among publishing professionals, but in fact it is simply one of the options identified as part of the article transaction model towards open access (Wise and Estelle 2019).

This popular equivocation is not a surprise, as APC-funded OA is arguably the most well-known, fully established and commonly adopted option when authors choose to publish OA. Based on the data and stats accessed from the European Commission's Open Science Monitor for 2018, the total number of Gold OA and Hybrid OA publications account for 68.5% of OA publications and 24.8% of all publications (including closed papers) around the world, while the percentage of all OA publications in the given year is 36.2%.

Specific to articles with at least one NZ author, White et al. (2020)'s study shows that a combination of Gold and Hybrid articles similarly contribute to the largest proportion of OA articles, namely 46% of OA articles and 19% of all articles. Of the same sample set, OA articles of all types account for 41% of all.

The APC-funded OA model has proved to be a viable option and works particularly well for those well-funded countries, regions and subject disciplines. This model largely relies upon whether authors can access open access funding. Funding can either be from the authors' grant package or provided by their institutions. From January 2021, cOAlition S funders will financially support their grantees to publish in open access journals or subscription journals under transformative agreements.

*How much will it cost NZ funders to support the payment of APCs?*

At the moment, neither NZ government nor major funders can dedicate money within funding packages for their grantees to pay APC. As a publishing practitioner, I am not positioned to ascertain whether there is a lack of funding at the national level for New Zealand to adopt the APC-funded model that many of our European counterparts have chosen. However if our government and funding agencies do consider this option and are willing to source extra funding to cover APCs with the commitment to allocating ring-fenced money to funding recipients, it will then be relevant and important to explore how much budget is required by funded NZ researchers to pay for APCs. Again, the results from the informative evidence-based study by White et al. (2020) enables us to have a rough estimate of the required budget for this purpose.

In their 2017 sample, a total of 1,072 papers were published, resulting from the funded research across 9 major NZ funding agencies. In the same year of the study, a total of 849 OA papers were published under the APC model by NZ university-affiliated authors. Among these, it is found that 82% were published in Gold OA journals with an average APC of US$1,682, and 18% ended up in hybrid journals with an average APC of US$2,558. Assuming that the authors of all 1,072 papers supported by one of the NZ funders now choose to publish OA with the choice between Gold OA and hybrid journals at the percentage (82% vs

18%) the same as the 849 OA papers reported, the total costs of the APCs would be roughly US$1,972,137 (≈NZ$2,959,536), based on the average APC costs calculated by White et al. (2020).

Table 1 Estimate for publication fees to make all funded papers open access

| **Funders** | **# of actual published articles** | **APCs required as an estimate** | | |
|---|---|---|---|---|
| | | Gold OA (82%) at US$1,682 | Hybrid OA (18%) at US$2,558 | Total APCs by funders |
| Health Research Council of New Zealand | 281 | 387,566 | 129,384 | 516,950 |
| Royal Society of New Zealand | 221 | 304,812 | 101,757 | 406,569 |
| Ministry of Business Innovation and Employment | 204 | 281,365 | 93,930 | 375,295 |
| Medical Research Foundation | 100 | 137,924 | 46,044 | 183,968 |
| Auckland Medical Research Foundation | 59 | 81,375 | 27,166 | 108,541 |
| Rutherford Discovery Fellowship | 58 | 79,996 | 26,706 | 106,701 |
| Heart Foundation | 52 | 71,720 | 23,943 | 95,663 |
| Ministry of Health | 50 | 68,962 | 23,022 | 91,984 |
| Medical Research Council | 47 | 64,824 | 21,641 | 86,465 |
| | | 1,478,545 | 493,592 | |
| **Total** | **1072** | **US$1,972,137** | | |

Unfortunately one of the major defects affecting the accuracy of the estimate is that the 2017 sample is only concerned with the papers produced by researchers affiliated to one of the eight NZ universities. In other words, the research output by funded authors at CRIs, government or industry organisations are excluded from this estimate. It is worth figuring out the volume of papers from these sectors. In addition, the percentage of preferred publishing outlets between gold OA and hybrid journals will inevitably vary from the one used to create the estimate, once all funded author can publish OA in their journals of choice. The other caveat is that the average APC calculated by White et al. (2020) is based on publishers' 2017 'list price' that is publicly available. While Morrison (2019) reports that the global average APC among OA journals is rather stable from 2018 to 2019, it is not clear how outdated the 2017 price can be when making these estimates. The number of journal articles also grows each year, although the rate for NZ is minimal. In summary, the actual total cost for APCs can only be higher than what is presented here.

Despite the above, this estimate still provides useful information to our policy makers on the possible amount of budget needed if they choose to take a bold approach to sponsoring APCs for all papers arising from NZ major funders. One thing to bear in mind is that the APC-funded model to open access favours the researchers who are likely to have money for APC from their funders. For many NZ researchers who do not have funding available for their research, they will be in a disadvantaged position to publish OA. Our policy makers or funders should not introduce any open access mandate to their grantees until ring-fenced money can be guaranteed.

*Is it a Plan S compliant model?*

APC-funded model is totally compliant with Plan S as long as the articles are published open access under a CC BY licence in an open access journal or a hybrid journal under a transformative arrangement. In these circumstances, cOAlition S funders can financially support the open access fee. For the hybrid journals not currently under a transformative arrangement, this route can still be complaint with Plan S only if the

authors make either the VOR or AAM freely accessible in a repository with no embargo. However any publication fees incurred from this option won't be covered by cOAlition S funders.

## Transformative models

Transformative arrangement is an alternative to the traditional subscription model that is still predominant in the current journal publishing landscape. It seeks to move institutional libraries and library consortia's main expenditure away from accessing subscription-based content, and instead use that money to enable their affiliated researchers to publish open access in subscription, hybrid and OA journals as part of the transformative agreement, preventing the cost of the APC falling on the researcher independently.

Unlike the APC-funded model mainly favouring the well-funded researchers, a transformative model would benefit everyone currently working for or studying at the institution covered by the transformative agreement. This way, 100% of the research output made by all authors affiliated to that institution can be published open access and be openly available immediately.

If an increasing number of such agreements can be made around the world, it will systematically drive a large-scale transition to open access. Many publishers will find it viable to flip more subscription journals to open access faster once the uptake rate reaches a certain level.

As one of the routes compliant with Plan S, the transformative model has been widely discussed among stakeholders and explored, experimented and practised by library consortia and publishers proactively during the past two years. Almost every week, a brand-new transformative agreement is announced via press release. As at August 2020, there are a total of 132 entries registered in the Efficiency and Standards for Article Charges (ESAC), which tracks transformative agreements globally.

Unfortunately across ANZ, the only two transformative deals currently made are between Council of Australian University Librarians (CAUL) and the Biochemical Society (Portland Press) and Microbiology Society, respectively. These two deals, concerning a total of 14 journals comprising no more than 80 articles per year, are being piloted for consortium members on an opt-in basis. Council of New Zealand University Librarians (CONZUL), a long-time strategic partnership with CAUL when negotiating deals with publishers, is not part of the pilot initiated by CAUL.

*Two major forms*

There are generally two major types of transformative agreements – "publish-and-read" and "read-and-publish". They are defined based on the component(s) within the contract.

A publish-and-read (PAR) agreement involves fees largely for publishing articles open access based on a pre-agreed volume of papers likely to be published by all corresponding authors affiliated with a participating institution, while at the same time that everyone in that institution receives access to the entire portfolio of subscription journals at no extra cost. One commonly identified challenge with PAR is that the consortium needs to find a mutually acceptable solution on how to distribute costs fairly among all members. Essentially, the allowance for OA articles determines the total value of a contract, instead of the size of faculty staff and student enrolment. Those research-intensive universities within a consortium will inevitably have to pay significantly more than they did in the past, as their affiliated authors tend to produce larger research output than others.

A read-and-publish (RAP) agreement is usually made up of fees for both reading and publishing, although the read component takes a larger share in the final agreement's price in this instance. Authors can continue accessing subscription content as they did before, and in exchange they are entitled to publish OA free of charge, although a cap on the number of OA per year may be included in the agreement.

*Challenges of reaching transformative deals*

When libraries and library consortia enter into negotiations with a publisher for either PAR or RAP, the daunting task facing almost all libraries is that they aim to reach a transformative deal that can be cost-neutral, or less expensive, than their previous subscription contract. However the goal of publishers is to ensure the existing subscription fees are guaranteed, with separate publication fees to be added into the contract. The final price can end up higher than what libraries originally anticipate or what they paid for their previous subscription agreement.

In addition, almost all large commercial and society publishers are giving full priority to negotiations with library consortia and university libraries in Europe at the moment, as there is a pressing need for many European researchers and universities to meet compliance obligations of Plan S from 2021. Large publishers are also more willing to start negotiating with consortia and universities that can generate research output of huge volume and significant impact, as this usually leads to a high-value contract. An explicit open access policy at the national level or by funding bodies in place can usually be the starting point for both parties entering a negotiation.

Specific to New Zealand, although the citation impact of our research is comparable with that of many developed countries or even higher than some, the minimal volume of output per year and lack of national policy are obstacles for CONZUL entering into negotiations with any publishers and ultimately reaching a transformative agreement. Therefore, in support of CONZUL making transformative deals, it is important that CONZUL, government organisations (presumably MBIE) and funding agencies take a coordinated approach, particularly in terms of repurposing CONZUL's existing spends with publishers, as well as aggregating other existing funds from various stakeholders across the country, for open access publications. Additional budget from MBIE to make up the gap of price between subscription and transformative deals will also put CONZUL in a much better position for negotiations with publishers. At the same time, it will be a practical and sensible approach if CONZUL continues partnering with CAUL to form economies of scale which can help improve the chance of striking a deal.

In light of the existing low percentage of active NZ researchers who can receive funding for their research, not to mention the current absence of ring-fenced money for APCs, the transformative models could work particularly well for the NZ research community, as part of a holistic approach that accelerates the transition to Gold and Hybrid OA.

*Implication for NZ journals*

When affiliated authors benefit from the transformative model involving one publisher, there might be an unexpected but immediate impact on other NZ titles if they are not covered by a similar deal. A consortium normally wouldn't be able to reach deals with various publishers in the same time, so agreement periods will vary. In this way, authors can be sensitive to the choice of journals in a certain period and may naturally prefer those where they are entitled to publish open access without an APC, given that they are covered by an agreement between CONZUL and a publisher. The affected journals will no longer be able to operate in a healthy way and some may even discontinue, as they can be left struggling with copyflow issues during this uneven period before they are covered by another deal themselves.

Table 2 NZ journals published in partnership with commercial publishers
Source: Scopus

| **Publishers** | **# journals** | **# articles in 2019** |
|---|---|---|
| Self-publishing by societies | 15 | 381 |
| Taylor & Francis | 11 | 248 |
| Wiley | 6 | 84 |
| SAGE | 3 | 33 |

| | | |
|---|---|---|
| Springer | 1 | 17 |
| **Total** | 36 | 763 |

19 out of the 36 New Zealand journals active in 2019 were published in partnership with large commercial publishers, accounting for 50% of papers with a NZ author as the corresponding author in all these NZ journals. Among these 19 journals, 11 are published by Taylor & Francis, which makes it the largest publisher by the number of journals and published papers. The 8 titles owned by Royal Society Te Apārangi are also published by Taylor & Francis. In view of this, CONZUL could prioritise the negotiation of this kind with Taylor & Francis, although it is equally important to figure out how the overall research output by NZ authors are distributed among commercial publishers.

*Is it a Plan S compliant model?*

Transformative models are Plan S compliant until the end of 2024. cOAlition S-funded authors can continually publish open access in subscription journals under transformative arrangements during this time as long as a CC BY licence is attached to the Version of Record. The cOAlition S funders will contribute to financing such deals, provided that they adhere to the ESAC Guidelines. However cOAlition S funders view transformative arrangements as only temporary, with the expectation or desire that publishers will proactively transform as many subscription journals as possible to full open access by 2024.

## Preprint submission initiative

A preprint, also known as author original manuscript, is a full academic manuscript that is shared publicly via an open access platform or repository before it has been formally peer reviewed by a journal. One of the original purposes of doing so is to improve the manuscript into a better form by seeking feedback from fellow researchers of the relevant community before it is formally submitted to a journal. However in a recent study on bioRxiv, it was found that a considerable percentage of preprints were actually posted on bioRxiv after they were submitted to the journal that accepted them for publication (Anderson, 2020). The latest trend of posting behaviour suggests that authors now appreciate other benefits that they can gain from preprint posting as much as, or even more than, the pre-submission review function. These benefits include establishing a record of priority, self-promotion of the earlier draft version of a paper to capture attention, and having a way to make the non-peer-reviewed preprints freely accessible and citable by everyone. A preprint may also be a paper that has been, or will be, rejected by a journal. Based on the preprint server directory maintained by ASAPbio (2020), many preprint servers can allocate submissions with a DOI for permanent preservation of content or guarantee read access for 50+ years.

It has been a long tradition for researchers in some disciplines, particularly mathematics and physics, to make a preprint submission to arXiv first (Larivière et al. 2014). This practise has spread quickly to researchers of other fields in the recent past, as a wide range of quality-assured preprint servers with specific disciplinary scope were founded in the past decade or so, for example bioRxiv, MedRxiv, ChemRxiv and EarthArXiv, to name a few. In addition, most publishers do not view publication as an electronic preprint as prior publication, so this also makes preprint posting more common across a wider range of disciplines. Innovative collaboration between preprint servers and publishers has been created to improve author experience and introduce preprints-friendly policy. B2J is a typical example allowing researchers who have uploaded a preprint in bioRxiv to seamlessly transfer the manuscript files and metadata to 172 journals that are part of this programme. The number of participating journals and publishers are increasing (bioRxiv, 2020; Cell MENTOR, 2017; frontiers Science News, 2019).

*What NZ funders can do?*

Among the many benefits recognised by the global research community, New Zealand researchers, regardless of accessibility to funds, can specifically take advantage of the de facto Green OA function by posting preprints to a server prior to formal journal submission. This will allow most research outputs and

the latest scientific developments by NZ researchers to be immediately available and properly preserved in the form of a draft manuscript months or even years ahead of formal publication in a peer-reviewed journal, not to mention more than half of the published articles to be pay walled. In this instance, preprint servers can play a strategic role in bridging the gap of accessibility between open access papers and subscription content, as well as the gap in dissemination speed between new results and those reported in published papers following the lengthy editorial process.

Although preprints, as a preliminary version of articles, have not been scrutinised by the usual peer review process, they do include a complete description of the scientific work, ranging from the conception and design of the study, the acquisition and interpretation of data etc. New Zealand funders should therefore consider mandating their grantees, as well as encouraging others not currently funded, to submit preprints to a quality server that is either registered in OpenDOAR or indexed by the ASAPbio directory before formal peer-review and publication in journals. This will mean that at least the early versions of most published research funded by NZ funding bodies can be made immediately available through open access preprint servers without an embargo. This is also an important route complementary to the author self-archiving of Author Accepted Manuscripts discussed in the previous section.

Despite the above, in some situations a (funded) author may be exempt from complying with a potential preprint-posting mandate. For example, authors of taxonomic papers may have to publish in a peer-reviewed journal to adhere to the requirements of the international code, and to establish priority. Preprint servers can also reject submissions on the grounds such as relevance of content and risk of harming human health. While servers do not arrange peer review, many have screening standards in place and have recently tightened up their vetting processes because of the surge in COVID-19 content (Kwon, 2020). NZ funders and policy makers should compile a list of exemptions for preprint submissions after extensively consulting researchers of various disciplines.

## Conclusions

This briefing report highlights three major models along with a preprint initiative that NZ funders and policy makers could seriously consider in our attempt to rapidly break down the accessibility barrier to scholarly publications by NZ researchers, and to match the pace of other countries. Not all of the recommended models require extra financial support from any stakeholders to implement. Instead, changes to author publishing behaviour prior to journal submission and post publication, as well as making full use of existing infrastructure such as university repositories, could already make a huge difference to the portion of open work that can be freely accessible. Of course, with additional budgets made available by government and re-arrangement of current financial resources for open access publications, New Zealand would be on a fast track to making as many research output freely accessible as possible, as a result of a combination of different approaches.

With Plan S to be implemented in less than four months and many funders outside Europe, including our neighbour Australia, actively setting out their roadmap, open access will become an essential feature of the future of publishing and it will not be reversible. As the trend is fast-evolving around the world, New Zealand needs to keep a close eye on the pathways that other countries choose to follow, particularly those we collaborate the most, namely Australia, US, UK, China and the European countries represented by cOAlition S. However we need to be clear that there isn't a 'one-size-fits-all' model that NZ can simply replicate without tailoring it for our needs and unique circumstances. It is important that our government, funding bodies and CONZUL can jointly develop a nationwide open access policy in the near future for NZ researchers to comply with. They should also exhaust all avenues to source additional funds and make them available to support the community in accelerating the change. Anyway, it must be a 'New Zealand' solution.

## Acknowledgements

A sincere thank-you to Jasmine Gabrielle-Hinchey for her diligent proofreading of this report.

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