How publication and peer review are evolving in the life sciences: implications for astronomy and development

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The world of scholarly publishing is in flux. Many current and legacy publishing systems are known to be outmoded and dependent upon models of peer review that are burdensome and largely non-transparent; perhaps most importantly, the established system of scholarly publishing is thought to be a significant cause of inefficiency and research waste, an issue thought to be particularly acute for the life and biomedical sciences.

In a world of the web, where space restrictions largely disappear, there is a demand for more rapid and fuller access to research findings. In addition, research funders and institutions are being increasingly directive in their requirements for publicly-funded research findings to be made openly available; most recently exemplified by 'Plan S', announcing that a number of major European public research funders (including the EC and UKRI) will fund only the publication of articles that are made immediately (gold) open access (OA) from 2020.

A number of scholarly publishing initiatives have emerged that provide opportunities for researchers to share research faster and more fully. Perhaps most notably, signalling the researcher demand for more rapid models of publishing, there has been a massive growth in the number of 'preprint' articles posted across discipline specific pre-print servers, with *Crossref* noting an impressive 20% growth in the number of preprints being posted between 2016 and 2018 compared to growth of 2–3% of traditional research articles for the same period. And in 2013, F1000 launched F1000Research†, the world's first open research publishing platform, combining the ability to publish rapidly with functionality to ensure greater transparency, robustness and reproducibility of research; importantly, and uniquely, F1000Research provides a post-publication, open peer review model of scientific publishing.
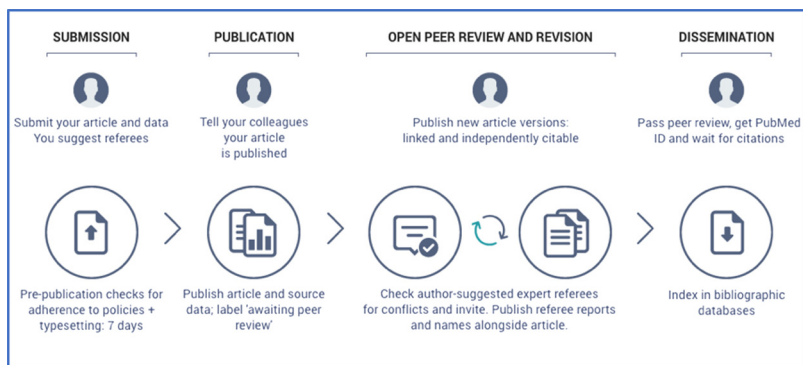
Explaining F1000's publishing model

F1000Research combines the benefits of pre-printing (rapid publication) with expert, invited peer review (quality assurance). While open peer review is not an essential feature of a post-publication peer review model F1000Research chose to adopt perhaps the purest version of open peer review being used by scholarly publishers today‡ – requiring full disclosure and naming of reviewers. The purpose of peer review in our model is to validate and improve the research being shared, helping authors to improve the quality of their work, and providing readers with context to support potential use and re-use. To do this most effectively requires full transparency and openness and it is for this reason that open peer review is now commonly described as a 'pillar' of open science¶.

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† https://f1000research.com/
‡ https://f1000research.com/articles/6-588/v2
¶ See for example: Foster Open Science - https://www.fosteropenscience.eu/learning/open-peer-review/

Figure 1. Overview of F1000's post-publication, open peer review publishing model

F1000 editors are not employed to screen content for interest, they instead conduct basic policy and author credential checks, and if the content adheres to our requirements, the work is published openly on the platform (see Fig. 1 for overview of process). Researchers can share a wide range of output types, including those that can be difficult to publish via traditional routes (e.g. case reports; datasets; research protocols; negative & confirmatory studies). And while the approach makes things easy for researchers from across the career spectrum, by removing the barriers and simplifying the process of publishing research, there are likely to be particular benefits for early career researchers who often find it difficult to build a portfolio of work at the start of a career.

As noted, peer reviewers are *invited* experts, whose affiliation is made public. Reviewers are required to provide a narrative report, which appears alongside the article, and to make one of three determinations: *approved*, *approved with reservations*, or *not approved* – if an article is 'not approved' it remains published. Once content is 'approved' it is indexed and fully discoverable on a range of international bibliographic databases. Full transparency of the peer review, together with an ability to cite reviewer reports independently of the article, provides a route for reviewers to gain credit and recognition for their contribution to the work of others and to science more broadly.

All content published is immediately (gold) OA and licenced by the authors under Creative Commons licenses (CC-BY for articles or CC0 for research data) without charge for others to view and access. Peer reviewer reports are also published under a CC BY license.

Working alongside research funding agencies and institutions
The volume of articles published on F1000Research continues to grow year on year and F1000 is now working with a number of high profile funding agencies and research organisations across the world to provide open research and data publishing services for the researcher community they support (including the Gates Foundation, and the African Academy of Sciences†). **In working with us, F1000's clients share our common high-level goals: to remove unnecessary delays and barriers that researchers face when sharing their research, to build research and researcher capacity, and to accelerate the use and potential impact of that research.**

Importantly, F1000 also provides a *transparent* and *cost-effective* route to achieving immediate open access (OA), removes the burden of article payment and management from the publishing authors, their research institutions and libraries, as well as removing subscription costs from the whole system.

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† https://wellcomeopenresearch.org/;   https://gatesopenresearch.org/;   https://aasopenresearch.org/