

350 years at the cutting edge of scientific publishing – the Royal Society moves to continuous publication

'Continuous publication' is a digital-friendly concept that does exactly what it says on the tin. It is the idea that individual journal articles are published online, in their final format, as soon as they are ready. Collectively, they form a continuous feed of published articles. These articles are no longer constrained by the traditional print schedule, which means that citation details are available straight away and the reader has confidence that they are reading the version of record. A number of newly launched journals have experimented with a continuous format over the past few years, although to see established journals making the switch to a different publication model is still rare. So when the Royal Society, publisher of the world's first science journal, decided to transition its titles to a continuous publication model, it was a bold move. This case study examines the reasons behind the move and the lessons that were learned.

Introduction

The Royal Society publishes nine peer-reviewed journals across the physical and biological sciences, including the world's first science journal: *Philosophical Transactions* (now published in two parts, *A*¹ and *B*²). In recent years, digital usage of its suite of journals has steadily overtaken print, to the point where the journals are now primarily found and downloaded from the internet. With the introduction of systematic digital archiving and curation, it has become clear that the future of published research will almost exclusively be online, and therefore steps are being taken towards removing the constraints that print production places upon online publication.



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Until the end of 2012, the Royal Society's journals followed a traditional print production workflow with the addition of an online 'publish ahead of print' step, known as *FirstCite*, which allowed for articles to be copy-edited, typeset and rapidly published online before they were assigned to an issue. This workflow, along with high submission and acceptance rates, led to a build up of *FirstCite* articles waiting to be published in print issues. It was only at print publication that volume and page details could be added (see Figure 1a), which are essential for an article to be fully citable and counted towards citation metrics, such as a journal's impact factor.

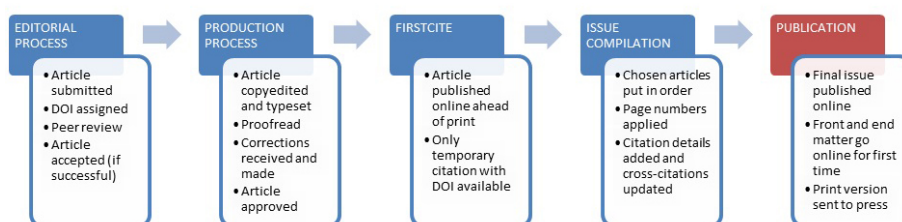


Figure 1a. Royal Society Publishing's 'FirstCite' Workflow: 2002–2012

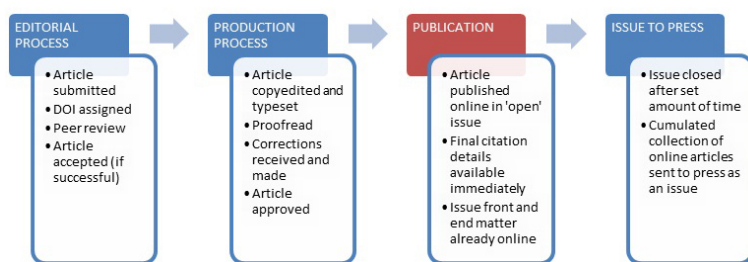


Figure 1b. Royal Society Publishing's 'Continuous Publication' Workflow: 2013 onwards

Figure 1. Royal Society Publishing's Workflows before and after continuous publication

To combat the delay between *FirstCite* and issue publication, it was decided that a new workflow, known as continuous publication, should be implemented from the beginning of 2013. The new workflow would allow rapidly published articles to be given full citation details from first publication (see Figure 1b), whilst maintaining the frequency and number of issues per volume.

The benefits of continuous publication are clear: researchers have full citation details available to them immediately, without impacting on the subscription packages that librarians are familiar with. The journals' impact factors should also be more accurate, as they will not be skewed by articles whose *FirstCite* and issue publications span two different years. The journals themselves will be able to better support the Royal Society's mission 'to recognize, promote, and support excellence in science' by doing so in a more timely fashion.³

This case study describes the practical considerations of implementing a continuous publication model on established journals published by the Royal Society, detailing parameters of the model that was chosen and the challenges faced. The project was led by the Production and ePublishing departments, and the technical implementation was collaborated with HighWire Press, who host the Society's online journal content and who were responsible for rolling out changes to the website's user interface and content management system.

The project plan

So what does the term continuous publication mean in practical terms? When experimenting with new launch journals, various publishers have approached the concept in different ways. As a result, the concept of continuous publication varies slightly from publisher to publisher and from research field to research field. This is typical of new publication models where best practice has not yet been established and meant that, for the Royal Society, project parameters would need to be thoroughly defined before work on transitioning journals to continuous publication could begin.

The final agreed parameters of the transition project were as follows.

1. Volume page numbers will be removed from each article, thus eliminating the need for articles to be uploaded in a fixed, predetermined order. To make each article fully citable as soon as it appears online, a 'unique ID' number will be assigned and included in the citation. To minimize confusion and duplication of effort, the unique ID is taken from the article DOI (see highlighted sections of Figure 2a).
2. For the reader's easy reference, each article will have self-contained page numbers that run from 1-x, where x is the last page of the individual article. Article citation details are also shown prominently on every page.
3. The page hosting *FirstCite* articles will be removed from each journal website; articles will instead be published directly onto the 'current issue' page as soon as they are ready (see Figure 2b). E-mail alerts will be sent out when new articles are published.

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4. Each current issue will be 'open' online for the duration of its print publication frequency. For example, under the *FirstCite* model, *Proceedings B* publishes an issue once every two weeks, so each continuously published online issue will be open for two weeks. Articles can only be uploaded to that particular issue during that time period. Only one issue can be open at a time.
5. Issue cover images will be decided before each issue is opened, so that each issue cover is available online at the start of the open period. Issue covers will no longer include the page range covered by the issue.
6. Each issue cover will still include the print publication date, at least for the first year. This would provide subscribers with some continuity as they will be able to see that the new model follows the same issue frequency and structure as the previous, familiar, model. The table of contents in each printed issue will use the article unique ID numbers rather than page numbers as the main navigational element.
7. Each issue will be printed after the online issue has closed. This will be reassessed in due course, as demand for print drops away.
8. Downstream feeds to third parties such as PubMed and Thomson Reuters will happen immediately after each article is published, rather than waiting for each issue to close. Existing rules for content embargoes in PubMed and other A&I services will remain in place.
9. *Philosophical Transactions A* and *B* will transition to a continuous publication platform even though these titles only publish theme issues. This means that there will be few discernible changes to the reader, as complete issues will continue to be uploaded with the articles arranged in a predetermined order. One of the Society's newer journals, *Interface Focus*, will also follow this theme issue model from 2013. Moving these three titles to a continuous publication platform gives the Production team greater control over issue uploads, and the journals will have greater flexibility to allow for any future changes in publication structure.
10. *Notes and Records of the Royal Society* will retain the *FirstCite* model for the time being since this journal has a different readership base to the other titles involved in the project.



Figure 2a. Comparison between the 2012 (left) and 2013 (right) PDF/print page designs of *Proceedings of the Royal Society B*, with citation details and copyright details highlighted in each

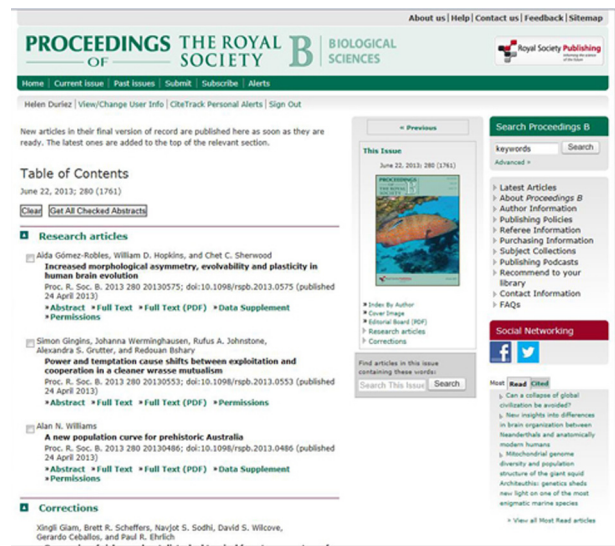
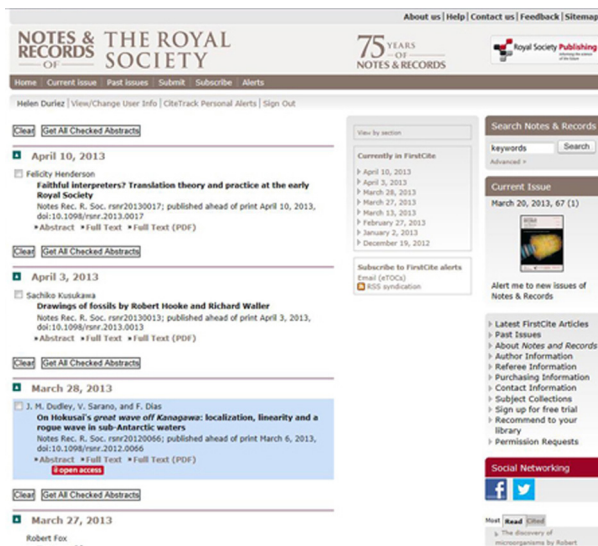


Figure 2b. Comparison between the 'latest articles' pages for the *FirstCite* (left) and Continuous Publication (right) models used by The Royal Society – the *FirstCite* page lists articles under dated subheadings, while the 'open' CP issue's table of contents is structured as you would expect a standard table of contents, with article types grouped together. Articles are listed within their subject groups in reverse date order, with the date they were published online given in brackets after the article DOI

Figure 2. Examples from the transition project (for illustrative purposes only)

It is worth noting that the Society's newest title, *Open Biology*, was launched in 2011 as an online only, continuously published, open access journal.⁴ The title has provided many useful insights into such experimental publishing models, and helped Royal Society Publishing staff to understand the challenges of a continuous workflow before established journals took up the same approach. *Open Biology's* page design, citation format and publication journey through the HighWire eXpress⁵ production tool have all been scaled up and adapted to apply to the Society's wider suite of journals. Even using this approach, the challenges faced in moving established journals to a new publication model were still significant and untested, since it was imperative that the established readership base be taken on the journey to a new publication model, whilst retaining the same integrity and service they have come to expect from the Royal Society.

Implementation

Each journal was to be launched on the continuous publication platform with the first issue of 2013. Before this could happen, there were two main tasks for the Production team to undertake. The first was to reduce the number of articles on each journal's *FirstCite* page. In mid 2012, each *FirstCite* page contained several issues' worth of papers and, in keeping with the project plan, this page was to be removed completely. At no point could published papers be taken offline. This meant that these *FirstCite* papers needed to be published in 2012 issues and, to this end, a conscious decision was made to take liberties with the print page budget in order to publish the backlog of *FirstCite* papers by the end of 2012. Subscribers to *Journal of the Royal Society: Interface*, in particular, will have noticed the publication of some bumper issues towards the end of 2012. Any remaining *FirstCite* papers that could not be published in a 2012 issue were to be published into the first continuously published issue on the day of launch.

The second key production task was to arrange a redesign of the articles' PDF and print pages. The articles had long been due a redesign, and it was important to find a clear way to highlight the new format that the citations would take. The *Open Biology* page design had proved itself popular, so this was applied to the transitioning journals with individual

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194 branding changes for each. The new citation format was given a prominent position on the left-hand side of the first page (see Figure 2a), and each subsequent page shows citation details on the top right-hand side. The page design is intended primarily for PDF use with print as a by-product, an approach which is reflected in the page design since the citation details do not flip from the right margin to the left margin on alternate pages, as you would expect in a printed two-page spread.

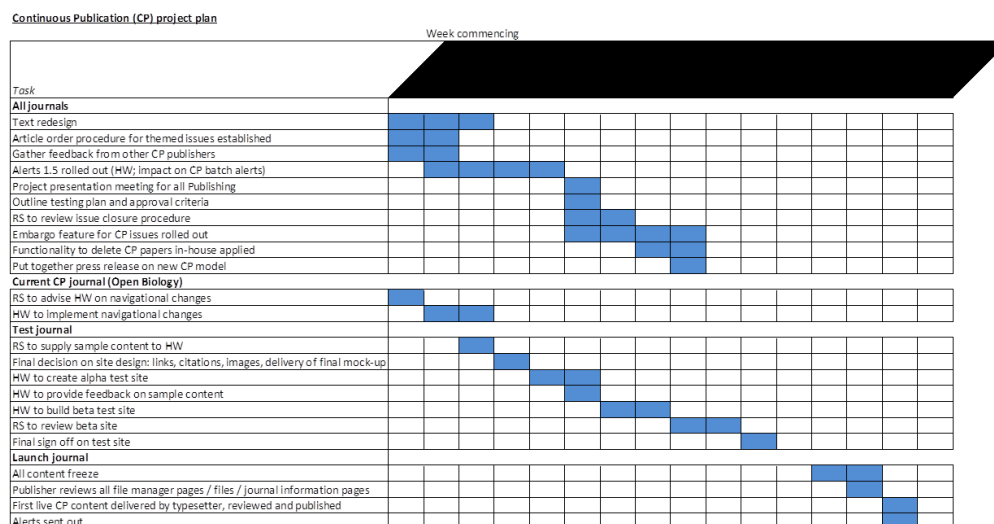


Figure 3. Continuous Publication (CP) project plan

At the same time that Production were working on the *FirstCite* backlog and page designs, ePublishing staff were working with HighWire Press to put the technical implementation stages in place (see Figure 3). There were some unusual navigational aspects of the *Open Biology* site that needed to be brought back into the fold, such as adding dynamic issue cover thumbnails to the journal website. Once these updates had been made, the *Open Biology* site could be – and was – used as a model for the other journal sites to imitate.

With the *Open Biology* template in place, the HighWire team were able to create a test continuous publication site using one of the Royal Society’s established journals. This allowed the inclusion and behaviour of the new site elements to be checked, including the revised ‘current issue’ page layout, revised headings and links and an updated box for a ‘latest article’ RSS feed on the home page.

The production schedules and varying publication frequencies of the project titles meant that the first 2013 issue of each journal was due online at a different date to the others, resulting in the adoption of a staggered roll-out plan. This worked well, as any new bugs identified in the new, live system at the first journal launch could be addressed before the majority of the journal sites switched over to continuous publication in November 2012.

The first journal to go live with the new publication model was *Interface*. Three weeks prior to launch, it was necessary to impose a ‘site freeze’ for two weeks, in which no new content was to be uploaded to the website. The site freeze allowed HighWire’s technical team to make the back end changes to the production system while it was empty. The site freeze necessarily took place on each journal in turn before it was launched. At the end of each site freeze, a window of one week was built into the schedule so that Production could upload the first continuously published papers to HighWire eXpress, including any *FirstCite* articles that had not made it into a 2012 issue. These last remaining *FirstCite* papers were reformatted into the new 2013 layout and given new citation details. The week-long window allowed for any system errors brought about by the workflow changes to be identified and resolved before the papers were officially launched into the first open issue.

195 Communicating the publication model and citation style changes to the journal community was an important part of the implementation plan. The citation changes in particular had the potential to cause confusion if they were not clearly communicated. It was decided that information would be disseminated along three lines: to editorial boards, to libraries and direct to authors and readers of the journals. The move to continuous publication had the backing of the journal editorial boards from the early stages, and prior to launch they were given fact sheets on the changes to help them respond to author queries. Some editors chose to supplement the communication plan by highlighting the publication changes in their 2013 editorials^{6,7}. The internal editorial fact sheet was revised and was published online as a 'frequently asked questions (FAQ)' page⁸, which all further communication then referred to. The main aim of this page was to minimize any confusion brought about by the publication changes. A press release was prepared to formally announce the move to continuous publication, and was sent out to coincide with the launch of the first 2013 issue. The news was also included in e-mail newsletters to librarians, authors and readers, and featured prominently on the Royal Society⁹ and Royal Society Publishing¹⁰ homepages.

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Lessons learned post launch

The move to continuous publication was well received by the community and this was due, at least in part, to the successful marketing and communication strategy. The feedback received from readers, authors and librarians centered around two topics: one, the lack of page numbers with which to cite articles; and two, the frequency of e-mail alerts.

Queries about the lack of page numbers were expected, and were easily resolved by pointing the inquirer to the online FAQs page and providing examples of how articles should be cited. The frequency of e-mail alerts, however, required HighWire to make some further changes on the Society's behalf. Under the *FirstCite* model, users could subscribe to automatically generated alerts that were sent out once a week, when new articles were published. They could also choose to subscribe to issue alerts, which were generated upon issue publication. With the move to the continuous model, these alert types remained with the issue alerts now being triggered by the close of each online issue. When the journals went live in the new model, alert subscribers began to receive both types of alert, irrespective of what they had signed up for. This behaviour was unexpected and had not shown up in testing. A number of users reported that the level of e-mail traffic they were receiving was too high, while others, who had only previously received new content alerts, found the issue round-up e-mail to be a useful addition.

To address the high alert frequency, each user profile was reset so that they were receiving the same type of alerts that they had received before the transition to continuous publication. Users who had been subscribed to *FirstCite* new content alerts now receive the continuous publication new content alerts, while those who had only received issue alerts before now receive issue summary alerts. HighWire's team also built additional functionality into the e-mail alert system to simplify the process by which each user could configure their alerts to their own preferences. This approach has proved successful in the months since it was implemented.

As well as responding to community feedback, it has been necessary to make some minor adjustments to the HighWire-hosted sites post launch. For example, when articles were loaded into the production system and they were of an article type that had not previously been published in an issue, a new (empty) subheading was being generated before the article was actually published online. The empty subsections were only visible for a short time while the system was processing the article, but even so, it needed fixing. The nature of the incident meant that it was not something that could have been picked up in testing, nor was it apparent on the *Open Biology* site since that title does not have subheadings on its table of contents.

196 In fact, under the new publication model, the established journals behave differently from *Open Biology* (OB) in a number of ways, highlighting the contrasts between online only (OB) and print-and-online (others), and between full (OB) and hybrid open access (others). It has been necessary to factor print schedules and subscription models into the transition project, both of fundamental importance to customers but neither tried and tested with the Society's existing continuously published journal. The Royal Society is, however, very pleased with the results, and the move to continuous publication has delivered the hoped-for continuity of service, whilst improving the publication model to meet the demands of a digital age.

The next steps

At a strategic level, the Royal Society plans to continue to reduce the reliance of online journals on traditional print schedules. Now that the issues are being compiled live online before being sent to press, the importance of the traditional issue publication date is waning, especially for the titles that have a large online and small print readership. The Society does, however, recognize that some subscribers still look for a print edition each month, and print issues will still be offered on applicable titles for the foreseeable future.

In addition, HighWire is planning further refinements to HighWire eXpress to improve the flexibility of the production workflow, which will allow the Production team to carry out previously complex tasks in a straightforward manner. The Royal Society Publishing department continues to monitor journal performance and feedback relating to continuous publication. Any comments in response to this article will be gratefully received and should be sent to helen.duriez@royalsociety.org.

"... the move to continuous publication has delivered the hoped-for continuity of service, whilst improving the publication model to meet the demands of a digital age."

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