



Australia's National
Science Agency

Prospective analysis of a national open access strategy for Australia

Report prepared by CSIRO Futures for the Office of the Chief Scientist

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This report was prepared for the Office of the Chief Scientist by Dominic Banfield, Audrey Towns, Sebastian Charnock, Mingji Liu and Vivek Srinivasan.

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Disclosure statement

CSIRO has an academic publishing arm (CSIRO Publishing) that may be impacted by the outcomes of this work. At the request of the Office of the Chief Scientist, the Director of CSIRO Publishing was interviewed by the project team. CSIRO Publishing had no other influence on this report's development.

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CSIRO Futures

At CSIRO Futures we bring together science, technology and economics to help governments and businesses develop transformative strategies that tackle their biggest challenges. As the strategic advisory arm of Australia's national science agency, we are uniquely positioned to transform complexity into clarity, uncertainty into opportunity, and insights into action.

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Glossary

TERM	DEFINITION
APC (Article Processing Charge)	A fee charged for articles to be published open access in gold or hybrid journals.
Australian journal article	Further work is needed to define the criteria by which a journal article is considered 'Australian' for the purposes of the proposed model. The working definition proposed by the Office of the Chief Scientist is that the lead author must have an Australian institution as their primary affiliation.
Australian users	End-users eligible to access reading services provided under the proposed model. This includes, but is not limited to, government, academic, and industry and public users. Further work is needed to define the criteria by which end-users are considered 'Australian' for the purposes of the proposed model.
Author accepted manuscript	The edition of a research paper that has successfully undergone peer review and been accepted by a publisher but has not yet been through the publisher's final copyediting, typesetting, and formatting processes.
Bibliodiversity	The diversity of journals and publishers, services and platforms, funding mechanisms, and evaluation measures in scientific publishing and academic communications. ¹
CC-BY (Creative Commons Attribution) license	A type of Creative Commons copyright licence that allows others to distribute, adapt, remix, and build upon an author's work, as long as the author is credited for the original creation. ² Other common Creative Commons licenses are defined in Chapter 4.3.3.
Citation	An attribution of a work of research, indicating where knowledge has been referenced and used by an author. Citations are an indicator of how frequently a piece of work has been used to inform or support other research articles.
Diamond open access	Diamond (aka platinum) journals are a subset of gold journals that are free for readers to access and authors to publish in. ³ Diamond journals are typically supported financially by sponsors such as research institutions or professional societies.
Embargo period	A publisher restriction on the public release of an author accepted manuscript. The embargo period must be followed for author accepted manuscripts deposited into a repository. The length of an embargo period can differ according to funding sources, subjects, and publishers. ⁴
ERA (Excellence in Research for Australia)	Australia's national research evaluation framework used to recognise and promote excellence across the full range of research activity from Australia's higher education institutions. ⁵

¹ Shearer K, Chan L, Kuchma I and Mounier P (2020) Fostering Bibliodiversity in Scholarly Communications: A Call for Action.

² Creative Commons (n.d.) About The Licenses. Viewed 12 October 2021, <<https://creativecommons.org/licenses/>>.

³ Open Access Australasia (2021) What are the different types of open access? Viewed 29 October 2021, <<https://oaaustralasia.org/2021/05/25/what-are-the-different-types-of-open-access/>>.

⁴ The University of Melbourne (n.d.) Open Scholarship | Definitions. Viewed 7 October 2021, <<https://library.unimelb.edu.au/open-scholarship/definitions-in-scholarly-communication>>.

⁵ Australian Research Council (2021) Excellence in Research for Australia. Viewed 12 October 2021, <<https://www.arc.gov.au/excellence-research-australia>>.

TERM	DEFINITION
Fee waiver	Publishers may elect not to charge article publishing charges for authors and organisations who meet certain criteria. ⁶
Gold open access	In a gold journal model, all articles are published as open access. There are some discrepancies about how this term is used. ⁷
Green open access	In a green open access model, either a pre- or post-print version of an article is made freely accessible in a repository, ⁸ and authors retain the right to reuse their article. ⁹ Publisher agreements typically require an embargo period of up to 12 months before the article can be archived in a repository.
Hybrid open access	In a hybrid journal model, the author(s) of a journal article may pay an optional APC to the publisher for the author(s) to retain copyright and their journal article to be published as open access in a journal that is generally paywalled. ¹⁰
Implementation body	A potential body that could be nominated or established by the Australian Government to implement the proposed model. Further consideration will be needed for the governance model used by the implementation body.
Journal	A periodical publication, operated by a publisher, in which research articles and other research outputs are published.
Journal article	A written document that describes knowledge or ideas derived from research and analysis. In this report, 'journal articles' refer to those journal articles that are published in peer-reviewed academic journals.
Learned society	A voluntary organisation dedicated to scholarship and research, often focused on a particular discipline. Most societies are funded through membership fees, event registration fees, revenue from publications, and donations. ¹¹
Open access	Literature that is freely available on the public internet, where any user is permitted to read, download, copy, distribute, print, search or link to the full texts of these articles, pass them as data to software, crawl them for indexing or use them for any other lawful purpose. ¹²
Open data	Freely available, anonymous, and easily discoverable information that anyone can assess, explore, and reuse. The data must be provided under licensing terms that allow reuse and redistribution. ¹³

⁶ Taylor & Francis (2021) Author Services | How to request an article publishing charge discount or waiver. Viewed 12 October 2021, <<https://authorservices.taylorandfrancis.com/publishing-open-access/requesting-an-apc-waiver/>>.

⁷ For example, open access articles published in hybrid journals are sometimes considered to be a subset of gold articles. Clarivate Analytics (2020) Web of Science Core Collection Help. Viewed 28 October 2021, <https://images.webofknowledge.com/WOKRS533JR18/help/WOS/hp_results.html>.

⁸ Council of Australian University Librarians (2017) Current State of Open Access: Briefing Paper for Universities Australia (UA) Deputy Vice-Chancellors Research Committee.

⁹ Elsevier (n.d.) Difference between Green and Gold Open Access. Viewed 5 July 2021, <<https://scientific-publishing.webshop.elsevier.com/publication-process/difference-between-green-gold-open-access/>>.

¹⁰ Cramond S, Barnes C, Lafferty S, Barbour V, Booth D, Brown K, Costello D, Croker K, O'connor R, Rolf H et al. (2019) Fair, Affordable and Open Access to Knowledge: The CAUL Collection and Reporting of APC Information Project.

¹¹ Encyclopedia.com (2019) Learned Societies. Viewed 12 October 2021, <<https://www.encyclopedia.com/history/dictionaries-thesauruses-pictures-and-press-releases/learned-societies>>.

¹² Budapest Open Access Initiative (2002) Read the Declaration. Viewed 15 November 2021, <<https://www.budapestopenaccessinitiative.org/read/>>.

¹³ Australian Government (n.d) About Open Data. Viewed 29 October 2021, <<https://data.gov.au/page/about-open-data>>.

TERM	DEFINITION
Open science	A movement to improve science by opening scientific processes and products to everyone. Open science affects the entire research cycle and its stakeholders by changing the way research is performed, science is organised, researchers collaborate, and knowledge is shared. ¹⁴ Open access and open data are elements of open science.
Paywall	A mechanism to restrict access to journal articles without payment of a subscription or per-article fee. Journal articles are traditionally paywalled in traditional academic publishing.
Peer review	The process in which articles submitted for publication are reviewed by independent members of the research community to assess their quality, validity, and originality. ¹⁵ Peer reviews are organised by journal publishers, but reviewers are not paid for their services.
PFRA (Publicly Funded Research Agency)	A Commonwealth research agency that conducts long term basic, strategic, or applied research across priority areas for government and the economy.
Post-print	An edition of a journal article that has undergone the peer review process however has not been typeset and formatted by the journal.
Pre-print	An edition of a journal article prior to having undergone the peer review process. Pre-prints may be available to view prior to the publication of the peer-reviewed edition in a journal.
Proposed Australian model	A proposal for open access within Australia, as developed by the Office of the Chief Scientist. This model aims to provide all Australians with free access to published journal articles and ensure all Australian journal articles are published with full open access internationally.
Publish-and-read agreements	Agreements in which a publisher is paid a fee per published open access article that includes a premium for read access to their catalogue of journals. This agreement places greater emphasis on open access publishing, compared to read-and-publish agreements.
RBG (Research Block Grant)	Research and research training funding provided to eligible Australian higher education providers. ¹⁶
Read-and-publish agreements	Agreements in which an institution pays a publisher for the rights to access journal content and to publish open access articles in their journals under a single payment. This agreement places greater emphasis on access to publisher content compared to publish-and-read agreements.
Research intensive university	A university which, relative to other universities, has a large overall budget allocation to conducting research, proportional to its size. These universities are expected to author more journal articles than teaching intensive peers of a similar size.
Repository	An archive in which research outputs are stored (including but not limited to journal articles). Repositories are commonly administered by research institutions, publishers, and other organisations. Institutional repositories may also contain an institution's intellectual property and other assets.

¹⁴ OpenAIRE (2017) What is open science. Viewed 12 October 2021, <<https://www.openaire.eu/what-is-open-science>>.

¹⁵ Barbour V (2019) The future of academic publishing: disruption, opportunity and a new ecosystem. *The Medical Journal of Australia* 211(4), 151-152.e1. DOI: 10.5694/MJA2.50265. Wiley (n.d.) What is peer review? Viewed 29 Oct 2021, <<https://authorservices.wiley.com/Reviewers/journal-reviewers/what-is-peer-review/index.html>>

¹⁶ Department of Education Skills and Employment (2021) Research Block Grants. Viewed 1 October 2021, <<https://www.dese.gov.au/research-block-grants>>.

TERM	DEFINITION
RSP (Research Support Program)	A Research Block Grant provided to higher education providers to support the systemic costs of research not supported directly through competitive and other grants (e.g., libraries, laboratories, and staff salaries). ¹⁷
Transformative agreement	An umbrella term used to encompass different kinds of contracts that seek to encourage a transition away from traditional academic publishing business models. Typically, these agreements are more transparent than traditional journal licences, allow authors to retain copyright, and facilitate open access. ¹⁸
Traditional academic publishing	A business model that uses paywalls to restrict access to some or all content without a payment. ¹⁹ In traditional academic publishing, universities or their consortia typically establish subscription contracts to pay for access to read journal articles and other content. This contrasts with open access, where scholarly content is free to access. ²⁰ The terms ‘publisher and ‘publishing’ in this report refers to academic publishing unless stated otherwise.

¹⁷ Department of Education Skills and Employment (2021) Research Block Grants. Viewed 1 October 2021, <<https://www.dese.gov.au/research-block-grants>>.

¹⁸ Borrego Á, Anglada L and Abadal E (2021) Transformative agreements: Do they pave the way to open access? *Learned Publishing* 34(2), 216–232.

¹⁹ Merja Myllylahti (2018) Newspaper Paywalls—the Hype and the Reality. *Digital Journalism* 2(2), 179–194. DOI: 10.1080/21670811.2013.813214.

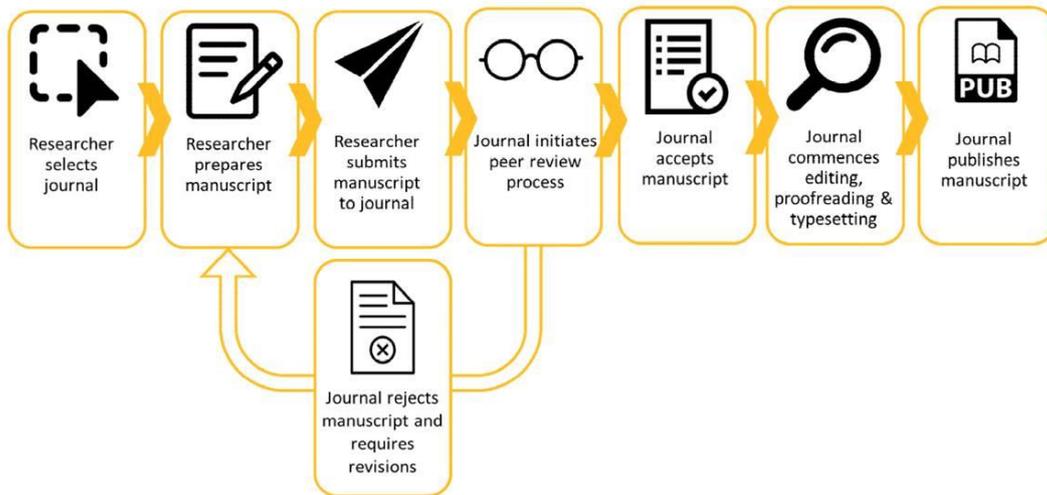
²⁰ Van Barneveld-Biesma A, Campbell C, Dujso E, Ligtoet A, Scholten C and Velten L (2020) Read & Publish contracts in the context of a dynamic scholarly publishing system: A study on future scenarios for the scholarly publishing system.

Executive Summary

Why open access

Each year Australia invests billions towards research on the principle that it may create a return on investment to society. The outcomes of this research are typically published in peer reviewed journals.

Typical process for publishing a manuscript in a peer-reviewed academic journal



However, under traditional academic publishing, these research outputs are paywalled by publishers, which may inhibit access to what is often publicly funded research. By limiting access to cutting edge knowledge, these paywalls risk slowing scientific progress, hindering innovation, and reducing the potential returns on public investment. Open access seeks to address these challenges by increasing the accessibility and usability of research outputs to enhance their potential for impact.

Potential benefits of open access

Paywalled journal articles



Authors transfer copyright of accepted articles to publishers



Users must pay to view articles



Users are granted limited or no reuse rights



Paywalls can **limit**:

- Dissemination and use of research
- Collaboration and innovation
- Potential returns on public investment

Open access journal articles



Authors retain copyright and grant reuse rights through clear licensing terms



Articles are freely accessible to all users



Open access may **improve**:

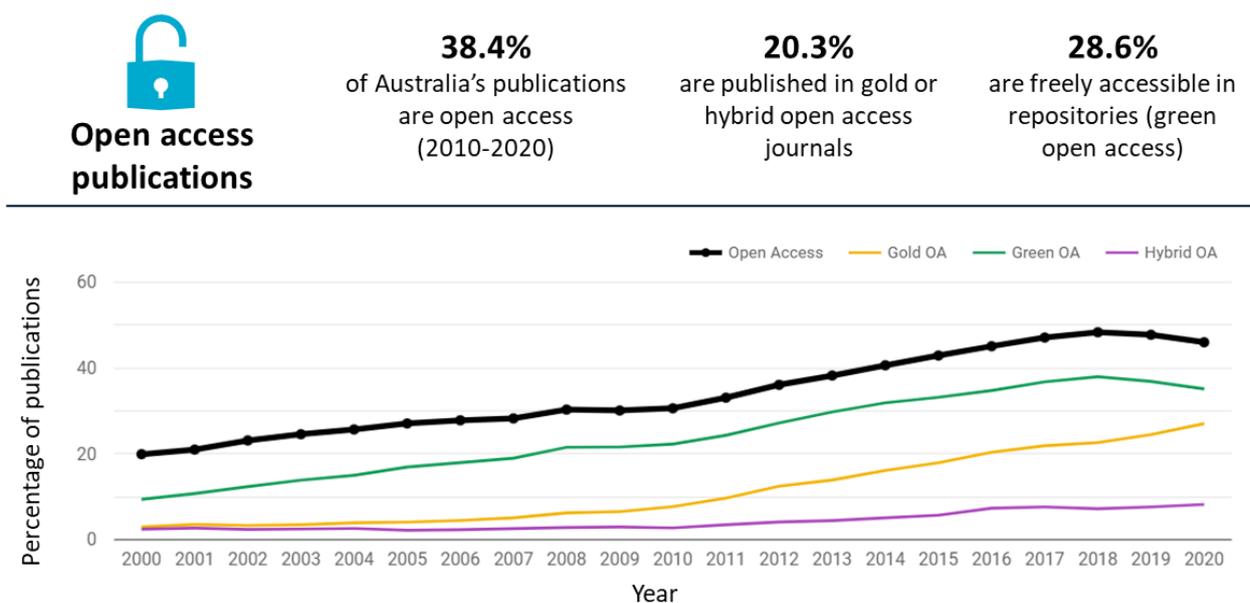
- Dissemination and use of research
- Collaboration and innovation
- Potential returns on public investment

Current state

There have been numerous calls to implement a strategic national approach to Australia’s open access policies over the years. Despite these calls to action, Australia is yet to implement a national approach, and significant accessibility and affordability issues remain unsolved.

Australia’s open access publishing rate has steadily increased, but related expenditure has too. Australia’s total expenditure on subscriptions and open access publishing reached a record high of over \$321 million in 2020 and researchers contribute unpaid peer review services to publishers, conservatively estimated at \$18.3-\$36.6 million in-kind.

Australia’s open access publishing rates have improved over the last 20 years²¹



Australia’s total expenditure on journal subscriptions and open access publishing exceeds \$321 million per year

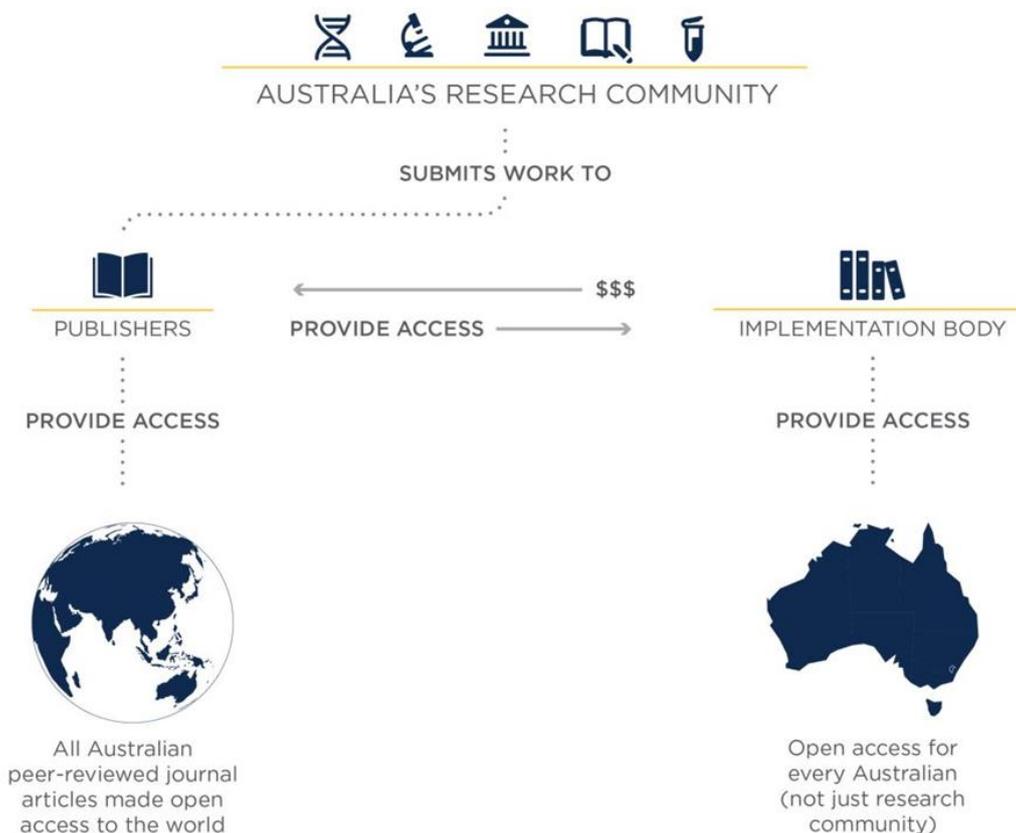
	 Journal subscriptions	 Article Processing Charges	 Transformative agreements
Current expenditure	\$302.9M+	\$14.5M+	\$4M+
Trends	<ul style="list-style-type: none"> University expenditure increased by 46% (2009-2020) 	<ul style="list-style-type: none"> Gold open access rates more than doubled between 2012-2020 Low visibility on expenditure 	<ul style="list-style-type: none"> Becoming more common Too early to see their impact on overall expenditure

²¹ See Appendix E for a description of common open access models. Data and chart from Curtin Open Knowledge Institute (2021) COKI Open Access Dashboard. <<http://openknowledge.community/dashboards/coki-open-access-dashboard/>>.

An Australian model for open access

Australia’s Chief Scientist, Dr Cathy Foley, has proposed an Australian model for open access that aims to provide all Australians with free access to published research and ensure that all Australian research is published with full open access internationally.

An overview of the proposed Australian model for open access



Prospective analysis to inform next steps

Recognising the complexity in the system and that Australia’s transition towards open access will require significant change, the Office of the Chief Scientist (OCS) commissioned this prospective analysis to inform the consideration of a national open access strategy for Australia and support discussions with key stakeholders on a possible Australian open access model.

The prospective analysis was informed by desktop research, a survey of relevant expenditure, economic analysis, and consultations with a cross-section of stakeholders.



Design considerations

Stakeholders consulted typically indicated strong support for a nationally coordinated approach to open access. However, many stakeholders expressed concerns and raised questions about potential challenges and unintended consequences that may result from the proposed model's design.

Three themes of design considerations for the proposed model were identified through consultations and analysis.



The way forward

As the first stage in the development of a national open access strategy for Australia, this prospective analysis identifies potential next steps to support the development of a comprehensive business case for a national open access strategy. This business case will need to be informed by additional analysis, broad consultation, and strategic planning. The report also identifies potential metrics that could be used to monitor the implementation of the proposed model and a selection of broader considerations raised by stakeholders that could be considered as part of the future national open access strategy.

Key issues for the development of a comprehensive business case for a national open access strategy.

ANALYSIS	CONSULTATION	PLANNING
<p>Additional analysis will be critical to inform the development of a national open access strategy.</p> <p>Key issues that require further analysis include:</p> <ul style="list-style-type: none"> • Australian journal subscriptions, including read rates. • The number and characteristics of publishers that publish the long tail of Australian research output. • The expected cost of the proposed model. • The cost and benefit distribution of different funding approaches. • The impacts of the model on the costs and benefits associated with institutional repositories. • The options and costs associated with the development of a secure digital portal for content access. 	<p>Public consultation and ongoing engagement with key stakeholders will remain essential.</p> <p>Key issues that will need additional input from consultations include:</p> <ul style="list-style-type: none"> • The potential impact of the proposed model on competition in the academic publishing market and related legal implications. • The strengths and weaknesses of different funding approaches and stakeholder implications and levels of support. • Appropriate definitions for eligible Australian users and Australian journal articles. • Appropriate licensing options for journal articles. • End-users' needs and their support for the proposed model. 	<p>Many of the design considerations will only be addressed through strategic planning.</p> <p>Key issues that require additional consideration and planning include:</p> <ul style="list-style-type: none"> • An appropriate governance model for the proposed implementation body. • Flexibility to include diverse publishers and be responsive to changes in the publishing sector. • Enhancing Australia's ability to negotiate standard, open access terms with publishers. • Possible additional funding contributions, including from broader stakeholder groups such as industry. • Communications and engagement to support uptake and use of information available through the proposed model.

Report background

Australia's Chief Scientist, Dr Cathy Foley, has identified open access as a priority and is working to accelerate Australia's transition to open access.

Recognising the complexity in the system and that Australia's transition towards open access will require significant change, the Office of the Chief Scientist (OCS) engaged CSIRO Futures – the strategic and economic advisory arm of Australia's national science agency – to partner with the OCS in conducting a prospective analysis to inform consideration of a national open access strategy for Australia.

This report is designed to initiate and support discussions with key stakeholders on a possible Australian model developed by the OCS. It has been informed by analysis of international case studies, a survey of stakeholders' expenditure on journal subscriptions and open access publishing, economic analysis to help consider the possible cost of the proposed model, and consultation with diverse stakeholders with interests in academic publishing and the broader research and innovation ecosystem. These stakeholders included research funders, universities and research institutions, publishers, regulatory bodies, industry, and not-for-profits and advocacy groups (see Appendix A for consulted organisations).

As the first stage in the potential development of a national open access strategy for Australia, the scope of this report is limited to exploring the current state of open access in Australia and understanding concerns, unintended consequences and design considerations for the proposed Australian model developed by the OCS. Further engagement, analysis, consultation, and strategic planning will be required to inform the national open access strategy.

This document is intended to inform the work of the OCS and to support further and deeper engagement with stakeholders. As such, it is not intended to be a public document. While the OCS has helped guide the prospective analysis process, this document may not reflect the views of the OCS nor those of Australia's Chief Scientist.

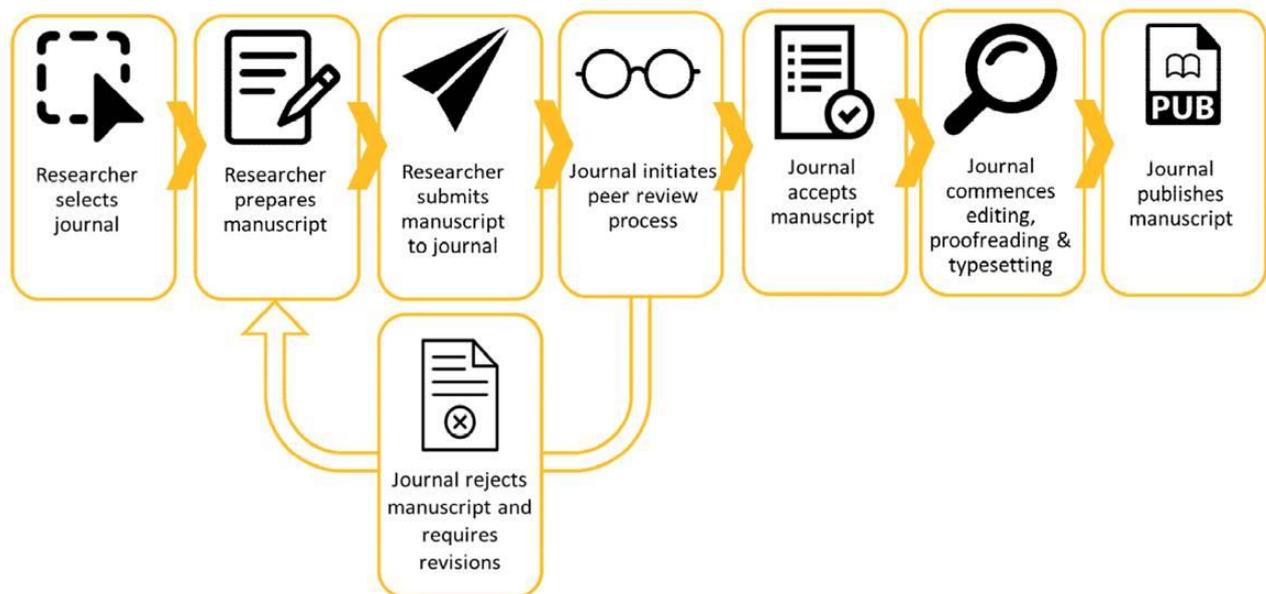
1 Why Open Access?

Each year Australia invests billions in research on the principle that it may create a return on investment to society. Australia’s government, non-profit, and higher education expenditure on research and development exceeded \$17.4 billion in the 2019-20 financial year.²² Academic research and related innovations can create impact for Australia by advancing knowledge, creating new products and services, increasing productivity, and solving societal and environmental challenges.²³

Increasing access to this research could improve Australia’s return on investment in research and development, and provide benefits to a wide variety of stakeholders. For example, research outputs can be used by professionals in diverse industries, by public servants to develop evidence-based policies, and by members of the public to engage with research and develop a deeper understanding of the world around them.

The academic publishing sector provides services (see Figure 1) that support Australia’s research integrity and promote the dissemination of research outputs. However, research outputs (in the form of peer-reviewed journal articles) are commonly paywalled by publishers, which may inhibit access to what is often publicly funded research.

Figure 1: Typical process for publishing a manuscript in a peer-reviewed academic journal²⁴



Under the traditional academic publishing model, researchers transfer copyright of an author accepted manuscript to the publisher in exchange for their services. These services include but are not limited to: managing the peer review process, providing guidance on funder requirements,

²² Australian Bureau of Statistics Research and Experimental Development, Businesses, Australia. Viewed 23 September 2021, <<https://www.abs.gov.au/statistics/industry/technology-and-innovation/research-and-experimental-development-businesses-australia/2019-20>>.

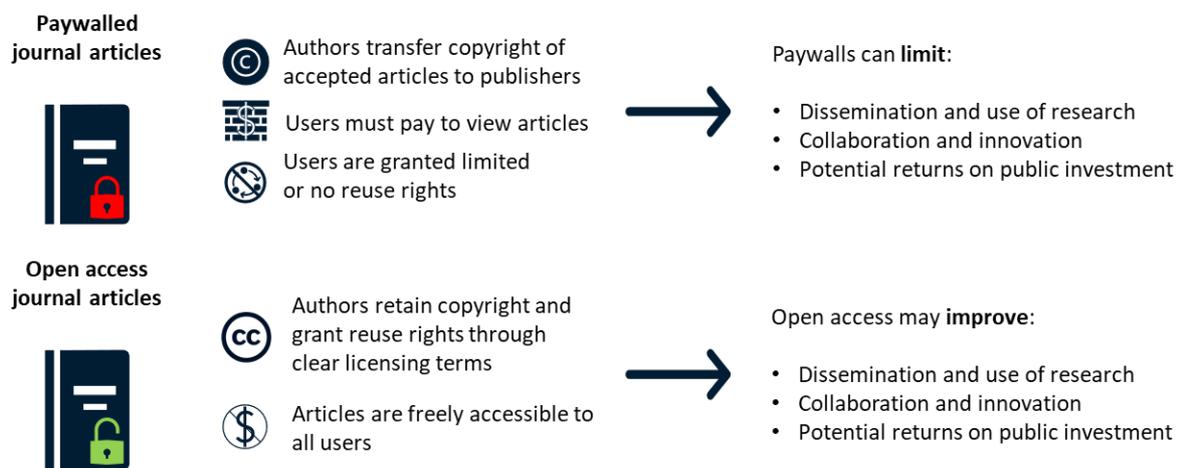
²³ CSIRO Futures (2020) Value of science and technology. CSIRO, Australia.

²⁴ Image provided by the OCS.

linking publications and data to associated information services and copyediting, typesetting, and formatting manuscripts. Publishers then charge subscription fees to those wishing to access their journals.²⁵ This limits access to peer reviewed research and has potential to slow scientific progress and limit return on public investment. The academic publishing sector has also been widely criticised for the fact that many publishers are monetising access to intellectual property that is developed with public or philanthropic funding.^{26,27}

Open access seeks to improve the accessibility and affordability of research, and its use and impact. Open access involves unrestricted use and free access to journal articles and the scientific knowledge and evidence contained within them. Compared to traditional academic publishing, which places journal articles behind paywalls, open access removes access fees and specifies clear usage licenses to increase the potential impact of research (see Figure 2).

Figure 2: Potential benefits of open access



Recognising the potential benefits of open access, there have been numerous calls to implement a strategic national approach to Australia’s open access policies over the years. These include the Productivity Commission identifying the need for a National Open Access policy in 2016,²⁸ the Government accepting its recommendation in 2017,²⁹ and the House of Representatives Standing Committee on Employment, Education and Training recommending that “the Australian Government develop a more strategic approach to Australia’s open scholarship environment” in 2018.³⁰

Despite these calls to action, Australia is yet to implement a national approach, and significant accessibility and affordability issues remain unsolved. Australia has experienced significant improvement in open access publication rates, but most Australian research publications remain

²⁵ Australian stakeholders paid more than \$303 million to publishers for access to journal articles in 2020. See Appendix B.

²⁶ The Cost of Knowledge (2021) The Cost of Knowledge. Viewed 28 September 2021, <<http://thecostofknowledge.com/>>.

²⁷ May C (2019) Academic publishing and open access: Costs, benefits and options for publishing research. *Politics* 40(1), 120–135.

²⁸ Productivity Commission (2016) Intellectual Property Arrangements, Inquiry Report.

²⁹ Australian Government (2017) Australian Government Response to the Productivity Commission Inquiry into Intellectual Property Arrangements.

³⁰ Standing Committee on Employment Education and Training (2018) Australian Government Funding Arrangements for non-NHMRC Research.s

paywalled,³¹ and open access publishing rates vary dramatically by research field.³² There is poor visibility of Australia's expenditure on journal subscriptions and Article Processing Charges (APCs), especially outside the university sector, but overall expenditure has increased (see Chapter 2.4). Furthermore, many university and research stakeholders consulted believe current prices for accessing journal content are too high, with some industry stakeholders reporting cutting subscriptions to constrain costs in recent years.

Australia's Chief Scientist, Dr Cathy Foley, has identified open access as a priority and is working to accelerate Australia's transition to open access. The proposed model developed by the OCS aims to provide all Australians with free access to journal articles and to ensure that all Australian journal articles are published with immediate open access internationally. All stakeholder groups consulted recognised the value of a nationally coordinated approach and broadly supported the efforts of Australia's Chief Scientist.

³¹ Only 38.4% of Australian publications (published between 2000-2020) are now openly accessible. Curtin Open Knowledge Institute (2021) COKI Open Access Dashboard. Viewed 21 October 2021, <<http://openknowledge.community/dashboards/coki-open-access-dashboard/>>.

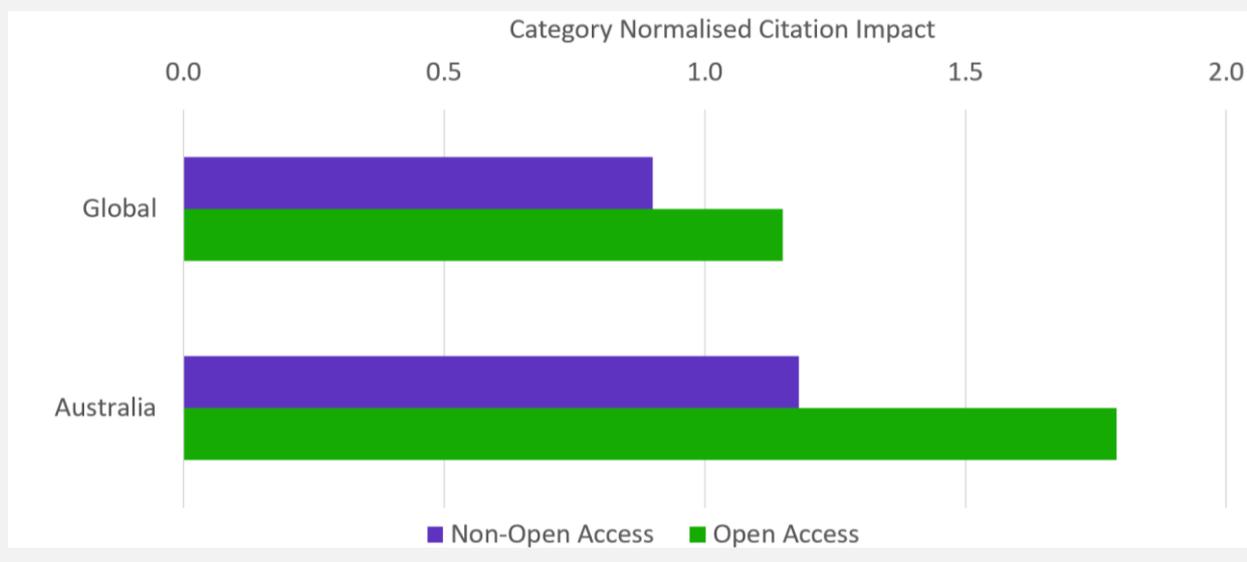
³² For example, 51.2% of Australian life sciences articles and reviews are open access, compared to only 10.8% of those in the arts and humanities. Clarivate analysis of articles and reviews published between 1 Jan 2016 and 31 Dec 2020.

Benefits of open access

Open access can provide a broad range of benefits and has the potential to improve government return on investment in research and development. Under traditional (pay-to-read) publishing models, stakeholders who cannot afford or justify paying for access have limited access to peer reviewed research. Open access seeks to address this and has potential to:

- **Improve the dissemination and use of research:** Open access has been linked to improved dissemination and citation of research (Figure 3). A systematic review of studies that compared the citation of open access and paywalled journal articles found that most (71.7%) of the reviewed studies identified open access correlating with high citations in at least a subset of their sample.³³
- **Improve access to research beyond academic institutions:** Open access ensures that governments, industry, and the public have access to the high-quality information in journal articles.
- **Increase collaboration and innovation:** After the outbreak of COVID-19, most research published on the topic was made immediately accessible, enabling rapid dissemination of findings to accelerate understanding of the virus and development of vaccines.³⁴

Figure 3: Category normalised citation impact³⁵ for paywalled and open access articles and reviews



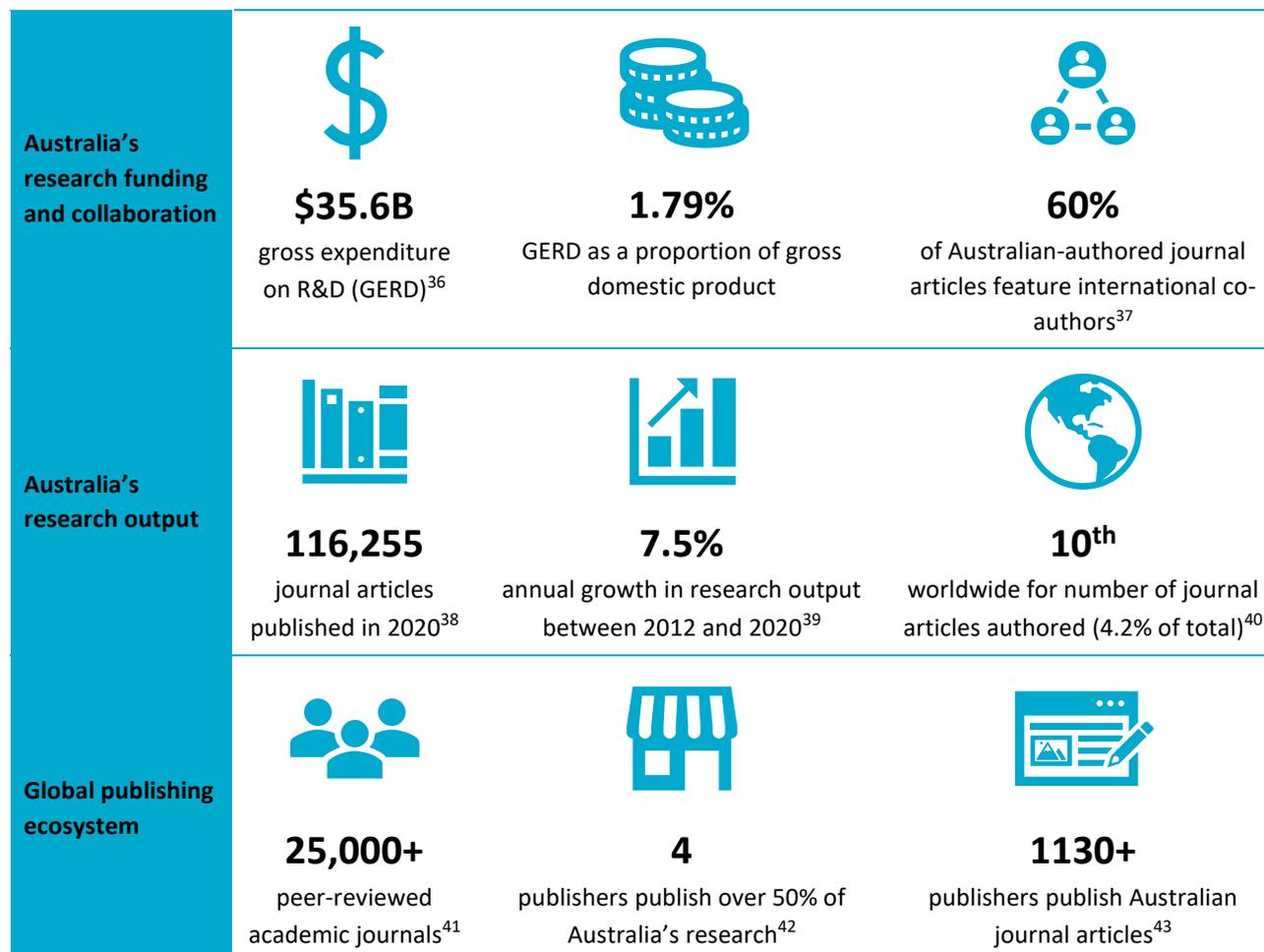
³³ Langham-Putrow A, Bakker C and Riegelman A (2021) Is the open access citation advantage real? A systematic review of the citation of open access and subscription-based articles. PLOS ONE 16(6), e0253129.

³⁴ OECD (2020) Why open science is critical to combatting COVID-19. Viewed 21 October 2021, <<https://www.oecd.org/coronavirus/policy-responses/why-open-science-is-critical-to-combatting-covid-19/>>.

³⁵ Clarivate analysis (2021). Category Normalised Citation Impact (CNCI) is calculated by dividing the actual count of citations by the expected citation rate for documents of the same type, year and subject area. A result of 1.0 indicates that the document is performing exactly as expected. The results shown here are average CNCIs articles and reviews published between 1 January 2016 and 31 December 2020.

2 Open access in Australia

Research and academic publishing by the numbers



³⁶ Australian Bureau of Statistics Research and Experimental Development, Businesses, Australia. Viewed 23 September 2021, <<https://www.abs.gov.au/statistics/industry/technology-and-innovation/research-and-experimental-development-businesses-australia/2019-20>>.

³⁷ Document ratio whose affiliation includes more than one country address (rounded). Scimago (2021) Journal & Country Rank - Australia. Viewed 23 September 2021, <<https://www.scimagojr.com/countrysearch.php?country=AU>>.

³⁸ Journal articles with Australian affiliated authors Provided by Springer Nature from Dimensions data.

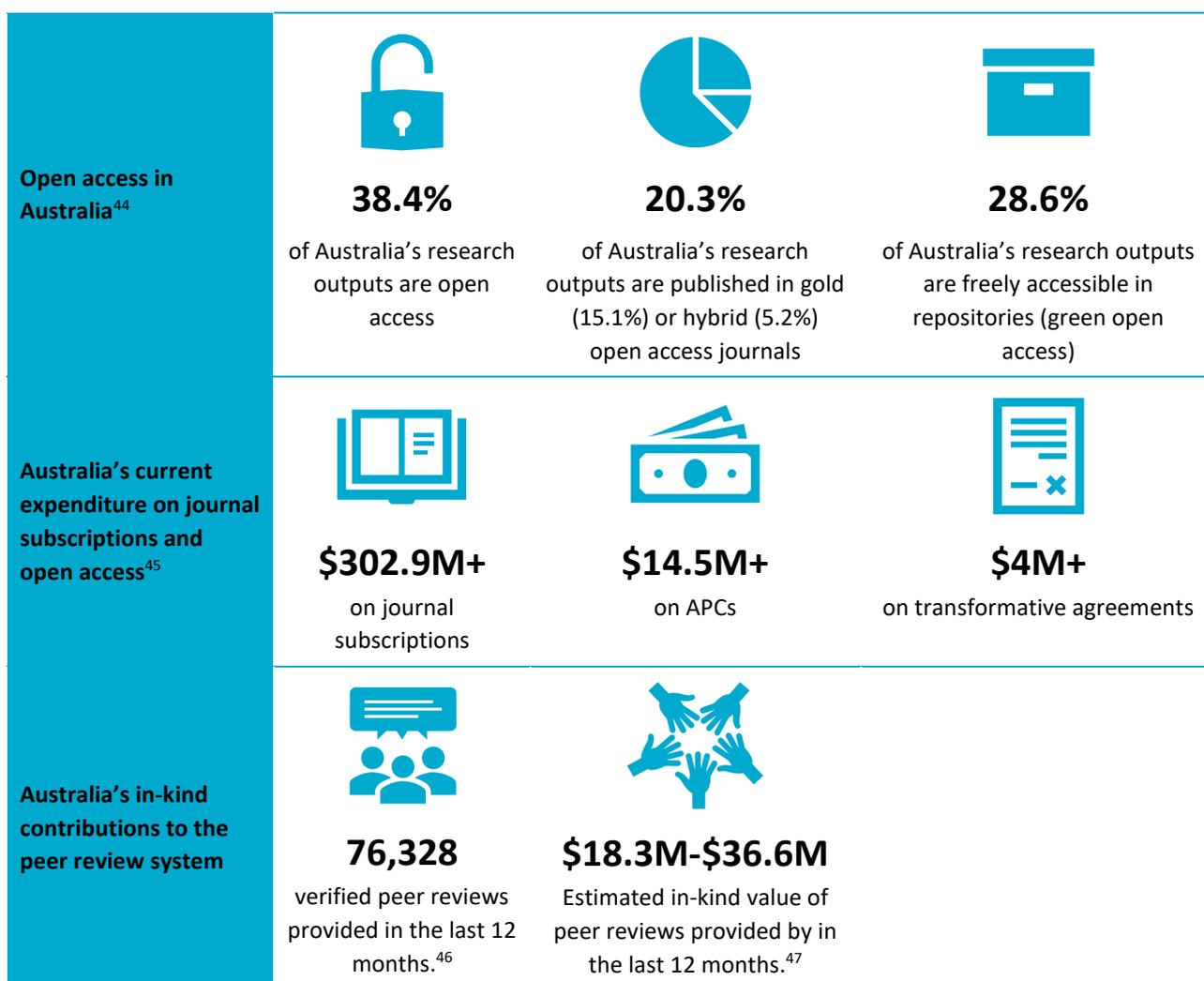
³⁹ Average annual growth rate for all Australian research outputs (2012-2020). Provided by Springer Nature from Dimensions data.

⁴⁰ Department of Industry Science Energy and Resources (n.d.) Research Output | Australian Innovation System Monitor. Viewed 23 September 2021, <<https://publications.industry.gov.au/publications/australianinnovationsystemmonitor/science-and-research/research-output/index.html>>.

⁴¹ Australian Research Council (2019) ERA 2018 Journal List. Viewed 23 September 2021, <<https://www.arc.gov.au/excellence-research-australia/era-2018-journal-list>>.

⁴² Elsevier, Springer Nature, Wiley and Taylor and Francis published 54% of Australian-affiliated journal articles in Web of Science Core Collection. (2011-2020). Viewed 4 August 2021, <<https://www.webofscience.com/wos/woscc/summary/9ed172b7-6171-4679-ad51-8d7d5484ed0a-030f2c86/relevance/1>>

⁴³ 1137 publishers published an average of 1 or more Australian-affiliated journal articles per year in the Web of Science Core Collection. (2011-2020). Viewed 4 August 2021, <<https://www.webofscience.com/wos/woscc/summary/9ed172b7-6171-4679-ad51-8d7d5484ed0a-030f2c86/relevance/1>>



2.1 Publishing Australia's research

Australia's research output has grown substantially and is considered to have a high academic impact. Australian authors contributed to over 134,000 research publications in 2020, a number which has grown at approximately 7.5% per annum since 2012.⁴⁸ Australia is ranked 10th globally by publication volume, accounting for 4.2% of the world's scientific publications in 2019. Australian

⁴⁴ Percentages of all Australian research outputs (not limited to only journal articles) published between 2000-2020. Gold or hybrid open access and green open access figures are not mutually exclusive; gold or hybrid research outputs can also be uploaded in repositories. Curtin Open Knowledge Institute (2021) COKI Open Access Dashboard. Viewed 21 October 2021, <<http://openknowledge.community/dashboards/coki-open-access-dashboard/>>.

⁴⁵ Each of these figures are expected to be underestimates of total Australian expenditure. See Appendix B for more details.

⁴⁶ Clarivate (2021) Publons: Countries/Regions. Viewed 20 October 2021, <<https://publons.com/country/>>.

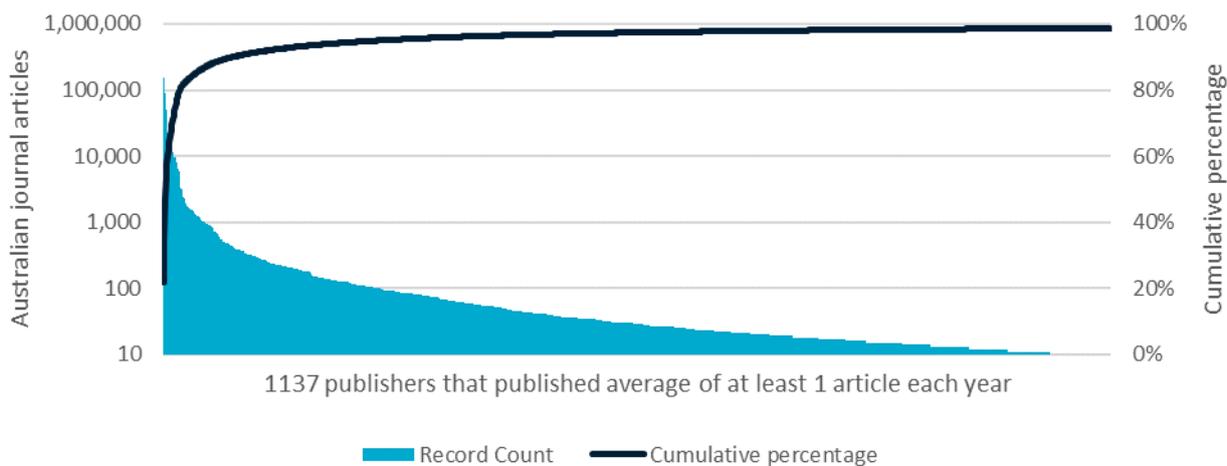
⁴⁷ Lower bound assumes 4 hours of work per review at a wage of \$60/hr, upper bound assumes 6 hours of work per review at a wage of \$80/hr.

⁴⁸ Publication outputs from Australia in 2020 including 116,255 (86%) journal articles. Provided by Springer Nature from Dimensions data.

authors are publishing highly impactful research, authoring 8.6% of the world's top 1% most cited publications, substantially above the OECD average of 3.9%.⁴⁹

There are more than 25,000 academic, peer reviewed journals operating globally,⁵⁰ approximately 770 of which are based in Australia.⁵¹ However, the global academic publishing sector is dominated by a small number of publishers. The four largest publishers of Australian research (Elsevier, Wiley, Springer Nature, and Taylor & Francis) published more than 50% of Australia's journal articles published between 2011 and 2020. Web of Science data indicates a long-tailed distribution curve of publishers of Australian journal articles (see Figure 4).

Figure 4: Distribution of journal articles amongst publishers of research with Australian authors (2011-2020)⁵²



Many publishers and journals have started to transition to business models that charge authors APCs instead of (or in addition to) relying on subscription-based revenue. Funders and authors are also commonly insisting on the right to make pre-print versions of journal articles openly accessible, even if they are published in traditional journals. The most common approaches are described in

⁴⁹ Department of Industry Science Energy and Resources (n.d.) Research Output | Australian Innovation System Monitor. Viewed 23 September 2021, <<https://publications.industry.gov.au/publications/australianinnovationsystemmonitor/science-and-research/research-output/index.html>>.

⁵⁰ Journals in the ERA list publish original research and were active between 1 January 2011 – 31 December 2016. Australian Research Council (2019) ERA 2018 Journal List. Viewed 23 September 2021, <<https://www.arc.gov.au/excellence-research-australia/era-2018-journal-list>>.

⁵¹ Australian Publishers Association (n.d.) Scholarly and Journal Publishing Committee. Viewed 23 September 2021, <<https://www.publishers.asn.au/sectors-committees/sectors-committees/scholarly-and-journal-publishing-committee>>.

⁵² Because the publishing market is so concentrated, a logarithmic scale has been used for the vertical axis. Please note that this data set has not been cleaned and may contain some duplicates (see also Figure 11). Web of Science Core Collection. Country=Australia, Year range: 2011-2020, Document types: Articles. Accessed 4 August 2021, <<https://www.webofscience.com/wos/woscc/summary/8cb32269-dfbc-4e21-b01a-b8e9c9f470e3-0ed289f1/relevance/1>>

Table 1.

Table 1: Common models for open access

OPEN ACCESS MODEL	DESCRIPTION	COST STRUCTURE	RESPONSIBILITY FOR INFRASTRUCTURE
Hybrid	In a hybrid journal model, the author(s) of a journal article may pay an optional APC to the publisher for the author to retain copyright and their journal article to be published as open access in a journal that is generally paywalled. ⁵³ Australian hybrid journal examples include the <i>Australian Journal of Chemistry, Crop and Pasture Science</i> , and <i>Pacific Conservation Biology</i> .	<ul style="list-style-type: none"> • Authors pay optional APCs to publishers to publish their paper as open access. • Readers pay subscriptions or pay-to-view fees to access the paywalled articles (i.e., articles for which an APC has not been paid) in the same journal. 	<ul style="list-style-type: none"> • Publishers maintain journal infrastructure and metadata.
Gold	In a gold journal model, all articles are published as open access. For example, all MDPI journals are gold journals. Diamond (aka platinum) journals are a subset of gold journals that are free for readers to access and authors to publish in. ⁵⁴ Australian examples include <i>The International Journal of Critical Indigenous Studies</i> , <i>The Journal of Social Inclusion</i> , and <i>The International Review of Environmental History</i> .	<ul style="list-style-type: none"> • Authors typically pay an APC to publishers. • Diamond journals are typically supported financially by sponsors such as research institutions or professional societies and charge no fees. 	<ul style="list-style-type: none"> • Publishers maintain journal infrastructure and metadata.
Green	In a green open access model, either a pre- or post-print version of an article is made freely accessible in a repository, ⁵⁵ and authors retain the right to reuse their article. ⁵⁶ Publisher agreements typically require an embargo period of up to 12 months before the article can be archived in a repository.	<ul style="list-style-type: none"> • No additional charge to author. 	<ul style="list-style-type: none"> • Research institutions or repository owners maintain repository infrastructure and metadata.

⁵³ Cramond S, Barnes C, Lafferty S, Barbour V, Booth D, Brown K, Costello D, Croker K, O’connor R, Rolf H et al. (2019) Fair, Affordable and Open Access to Knowledge: The CAUL Collection and Reporting of APC Information Project.

⁵⁴ Open Access Australasia (2021) What are the different types of open access? Viewed 29 October 2021, <<https://oaaustralasia.org/2021/05/25/what-are-the-different-types-of-open-access/>>.

⁵⁵ Council of Australian University Librarians (2017) Current State of Open Access: Briefing Paper for Universities Australia (UA) Deputy Vice-Chancellors Research Committee.

⁵⁶ Elsevier (n.d.) Difference between Green and Gold Open Access. Viewed 5 July 2021, <<https://scientific-publishing.webshop.elsevier.com/publication-process/difference-between-green-gold-open-access/>>.

2.2 Open access initiatives

Open access has broad support from Australian stakeholders – including researchers, publishers, and funders – who recognise its associated potential economic, innovation and social benefits. Since the early 2000s, stakeholders in the Australian publishing ecosystem have invested in a variety of initiatives and actions that support open access. These include but are not limited to the following:

- **Open access policies:** Australia’s research funding councils, the Australian Research Council (ARC) and the National Health and Medicine Research Council (NHMRC), have both implemented open access policies that require that publications associated with the research they fund must be made open access within a year of publication.^{57,58} The Universities Australia Deputy Vice Chancellors (Research) Committee’s Australian FAIR Access Working Group published a policy statement in 2017, indicating that Australian publicly funded research organisations should have policies, standards and practices to make publicly funded research outputs findable, accessible, interoperable and reusable (FAIR) in place by 2020.⁵⁹ However, only half of Australia’s universities have now established open access policies.⁶⁰
- **Investment in institutional repositories:** Australia has invested in repositories affiliated with each university to archive research conducted there, providing an alternative pathway to making journal articles openly accessible. These institutional repositories were established through the Australian Scheme for Higher Education Repositories between 2007 and 2011 to assist reporting for Australia’s research assessment exercise – the planned Research Quality Framework, which was replaced with Excellence in Research for Australia (ERA). In total, almost \$42 million was provided to universities to help them develop digital repositories and data systems.⁶¹ Archiving freely accessible versions of journal articles in institutional repositories (green open access) can provide a cost-effective alternative to paying APCs and is the only open access option for research published in journals without an APC option. However, a recent review of compliance with the NHMRC’s open access policy found low levels of author accepted manuscripts in Australian institutional repositories.⁶²
- **Open access advocacy:** Open Access Australasia, founded in 2013 as the Australian Open Access Support Group, has been a strong advocate for open access in Australia and New Zealand. The Council of Australian University Libraries (CAUL) and the Australian Library and Information Association (ALIA) are also strong proponents of open access.

⁵⁷ Open access is necessary unless an overarching contract prohibits this. Australian Research Council (2018) ARC Open Access Policy. Viewed 25 June 2021, <<https://www.arc.gov.au/policies-strategies/policy/arc-open-access-policy>>.

⁵⁸ National Health and Medical Research Council (2018) National Health and Medical Research Council Open Access Policy.

⁵⁹ Australian FAIR Access Working Group (2017) Policy Statement on FAIR Access to Australia’s Research Outputs.

⁶⁰ Wakeling S, Kingsley D, Jamali H, Kennan MA, Jamali H and Sarrafzade M (2021) Free for all, or free-for-all? A content analysis of Australian university open access policies. bioRxiv .

⁶¹ This includes investment through the Australian Scheme for Higher Education Repositories and the related Implementation Assistance Program.

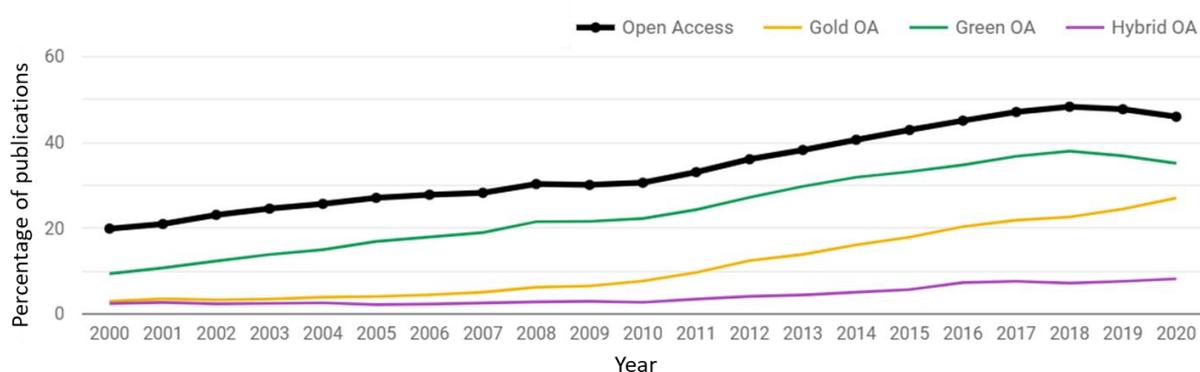
⁶² Kirkman N, Haddow G (2020) Compliance with the first funder open access policy in Australia. *Information Research*, 24(4), paper 857. <http://InformationR.net/ir/25-2/paper857.html>

2.3 Current state of open access in Australia

Due in part to past open access initiatives, Australia's open access publication rates have steadily increased over the last 20 years. Despite this, most journal articles with Australian authors are paywalled.

There has been a modest increase in Australia's rates of open access. In Australia, open access rates have been above 40% since 2014 – up from approximately 20% in 2000 (see Figure 5).⁶³ The apparent decline of open access rates since 2018 can be attributed to lower rates of green open access. This may be partially due to embargo periods, which delay archival of new journal articles. Gold and hybrid publishing, which are not limited by embargo periods, have continued to increase over the same period.

Figure 5: Australia's open access (OA) rates have improved over the last 20 years⁶⁴



Almost 40% of Australian publications published between 2000-2020 are now openly accessible.⁶⁵

- 28.6% are accessible via repositories (green open access)
- 15.1% are published in fully open access journals (gold open access)
- 5.2% are published in hybrid journals with payment of an APC (or a fee waiver)
- 10.3% are accessible but lack a clear license for reuse.

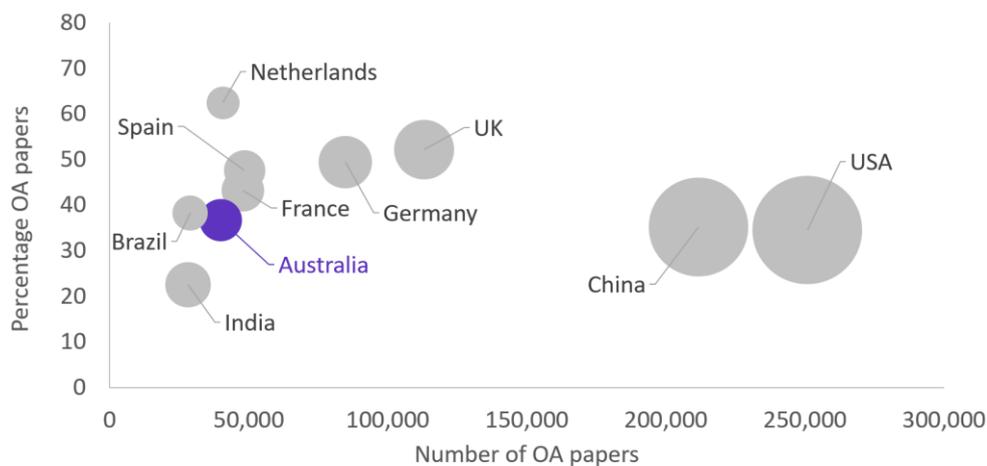
Data provided by Clarivate indicates that Australia's open access rates are now comparable to that of China and the United States of America, but lag European nations, including the Netherlands, the United Kingdom, Germany and France (see Figure 6).

⁶³ Not all open access publications are available immediately and some are available as submitted and not peer reviewed. Curtin Open Knowledge Institute (2021) COKI Open Access Dashboard. <<http://openknowledge.community/dashboards/coki-open-access-dashboard/>>.

⁶⁴ See Appendix E for a description of common open access models. Chart from Curtin Open Knowledge Institute (2021) COKI Open Access Dashboard. <<http://openknowledge.community/dashboards/coki-open-access-dashboard/>>.

⁶⁵ The term 'publications' here includes all research outputs with Crossref DOIs. Percentages do not sum to the total due to overlap. Curtin Open Knowledge Institute (2021) COKI Open Access Dashboard. <<http://openknowledge.community/dashboards/coki-open-access-dashboard/>>.

Figure 6: Open access (OA) rates and volumes for selected countries.⁶⁶



Clarivate™ Note: The data are for articles and reviews published between 1 Jan 2020 and 31 Dec 2020

Based on current trajectories in research publication rates, it is plausible that almost 60% of Australia’s 2026 publication output will be openly accessible.⁶⁷ Open access growth for Australia between 2000-2020 averaged 13% per year, whereas total publication growth averaged 9% for the same period.⁶⁸ If these growth rates continue, then all new Australian research publications would be open access by around 2039 (see Figure 7).

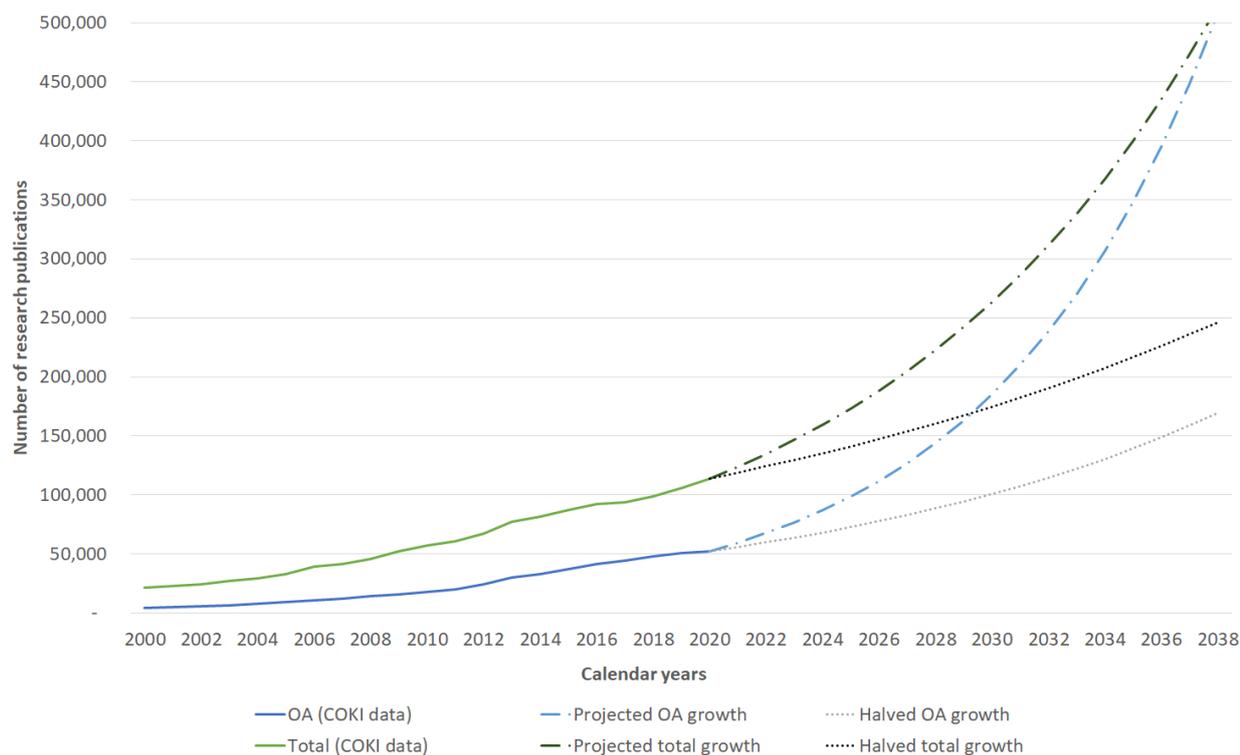
Acknowledging that persistent compounding growth is likely to be an overestimate of future publication rates, these growth rates were halved and projected forward to describe more pessimistic scenarios for both Australia’s total and open access publication output. Under these halved growth scenarios, only 70% of Australia’s research publications would be openly accessible by 2039 (see Figure 7).

⁶⁶ Clarivate analysis (2021)

⁶⁷ CSIRO analysis using average yearly growth in “open” and “not open” publications over the last 10 years (2011-2020) derived from the Curtin Open Knowledge Institute (2021) COKI Open Access Dashboard. <<http://openknowledge.community/dashboards/coki-open-access-dashboard/>>.

⁶⁸ As above, the term publications here includes all research outputs with Crossref DOIs. Curtin Open Knowledge Institute (2021) COKI Open Access Dashboard. <<http://openknowledge.community/dashboards/coki-open-access-dashboard/>>.

Figure 7: Total and openly accessible publications projected based on Curtin Open Knowledge Institute (COKI) data



2.4 Current expenditure on journal subscriptions and open access publishing

A survey of stakeholders found that Australian organisations spent over \$321 million on journal subscription and open access publishing in 2020 (see Table 2 and Figure 8).⁶⁹ In addition, Australian peer reviewers contribute in the order of \$18.3-36.6 million of in-kind value annually.⁷⁰

Poor visibility of APC expenditure in many organisations and limited responses from non-university stakeholders (including no responses from industry stakeholders) suggest this is an underestimate of Australia’s total expenditure. Respondents noted several issues associated with APC expenditure, including expenditure not being tracked and reported by their institution and the variety of funding sources (e.g., research grants, personal, faculty budgets) that can be used to pay APCs. In addition, estimates may also be affected by fee-waivers or contributions from other authors from different institutions. A nationally coordinated approach to journal subscriptions and open access publishing may help to address this poor visibility.

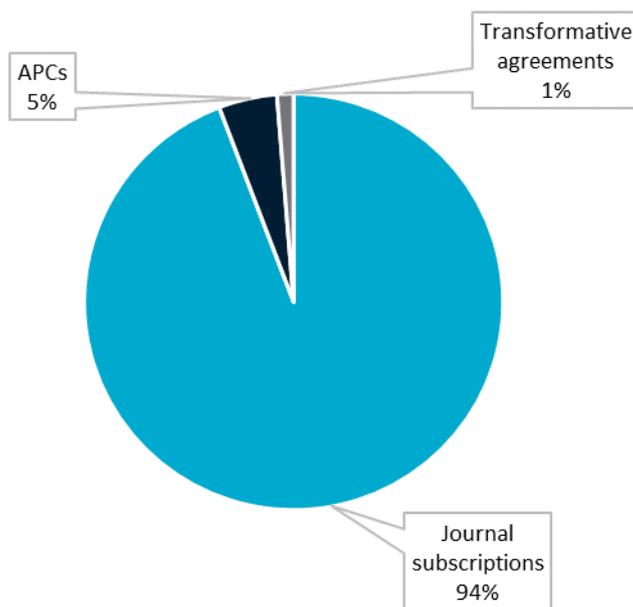
⁶⁹ Further details on the survey methodology and results are included in Appendix B.

⁷⁰ A conservative estimate calculated for the 76,328 verified peer reviews provided by Australian reviewers in the last 12 months by assuming a lower bound of 4 hours of work per review at a wage of \$60/hr, and an upper bound of 6 hours of work per review at a wage of \$80/hr. Peer review numbers were sourced from Clarivate (2021) Publons: Countries/Regions.

Table 2: Reported expenditure on journal subscriptions and open access publishing

REPORTED EXPENDITURE		TRENDS
Journal subscriptions	\$302.9M+	The total cost of journal subscriptions for Australian university libraries increased by about 40% between 2009 and 2016. This increase was largely due to significant, higher than consumer price index (CPI) subscription price increases each year and was further impacted by a weaker Australian dollar. ⁷¹ However, since 2016, total expenditure on subscriptions by universities appears to have stabilised (see Figure 9).
APCs	\$14.5M+	The percentage of Australia’s journal articles published in gold and hybrid journals rose from 16.6% in 2012 to 35.2% in 2020. ⁷² This increase in gold and hybrid publishing is likely to have increased Australia’s APC expenditure.
Transformative agreements	\$4.1M+	Transformative agreements are becoming more common in Australia, with additional agreements announced since the data collection period of this prospective analysis. ⁷³ However, overall expenditure on them is comparatively low and it is too early to see the impact of these agreements on overall costs and open access outcomes.

Figure 8: Breakdown of reported expenditure on journal subscriptions and open access publishing

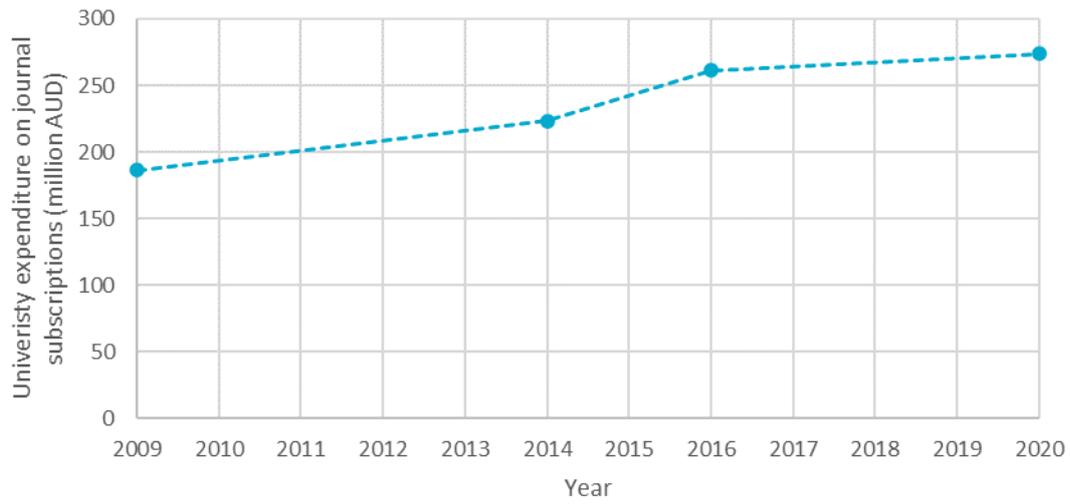


⁷¹ Council of Australian University Librarians (2017) Current State of Open Access: Briefing Paper for Universities Australia (UA) Deputy Vice-Chancellors Research Committee.

⁷² Curtin Open Knowledge Institute (2021) COKI Open Access Dashboard. <<http://openknowledge.community/dashboards/coki-open-access-dashboard/>>.

⁷³ For example, in 2021, CSIRO struck a deal for a one-year pilot read-and-publish agreement with the Royal Society of Chemistry and CAUL negotiated read-and-publish agreements with Cambridge University Press and Springer Nature.

Figure 9: University expenditure on journal subscriptions since 2009⁷⁴



⁷⁴ Curtin Open Knowledge Institute (2021) COKI Open Access Dashboard. <<http://openknowledge.community/dashboards/coki-open-access-dashboard/>>.

3 A proposed Australian model for open access

3.1 Objectives and principles

To improve Australia's access to research literature, the OCS has proposed a model for a nationally coordinated approach to open access in Australia. The primary objectives of the model are to:

1. Increase industry and government access to leverage research investment to support economic recovery and growth.
2. Improve Australia's return on investment in the research sector.
3. Maintain Australia's global position in science, research, and innovation.

It is proposed the Australian model is developed according to the principles that the model should:

- Use, and increase benefits from, Australia's existing expenditure on academic subscriptions and publishing.
- Allow people residing in Australia to freely access all peer reviewed journal articles from the date of publication.⁷⁵
- Ensure Australian peer reviewed journal articles⁷⁶ in all disciplines are openly accessible internationally from the date of publication.
- Support research integrity by facilitating the provision of quality metadata, keeping versions of record, and assisting in discoverability.
- Preserve author autonomy regarding where to publish.
- Recognise the role of publishers in the system and ensure the sustainability of their businesses.
- Use infrastructure that is user-friendly, internationally interoperable and designed for future developments in publishing and open research.
- Be equitable for all stakeholders.

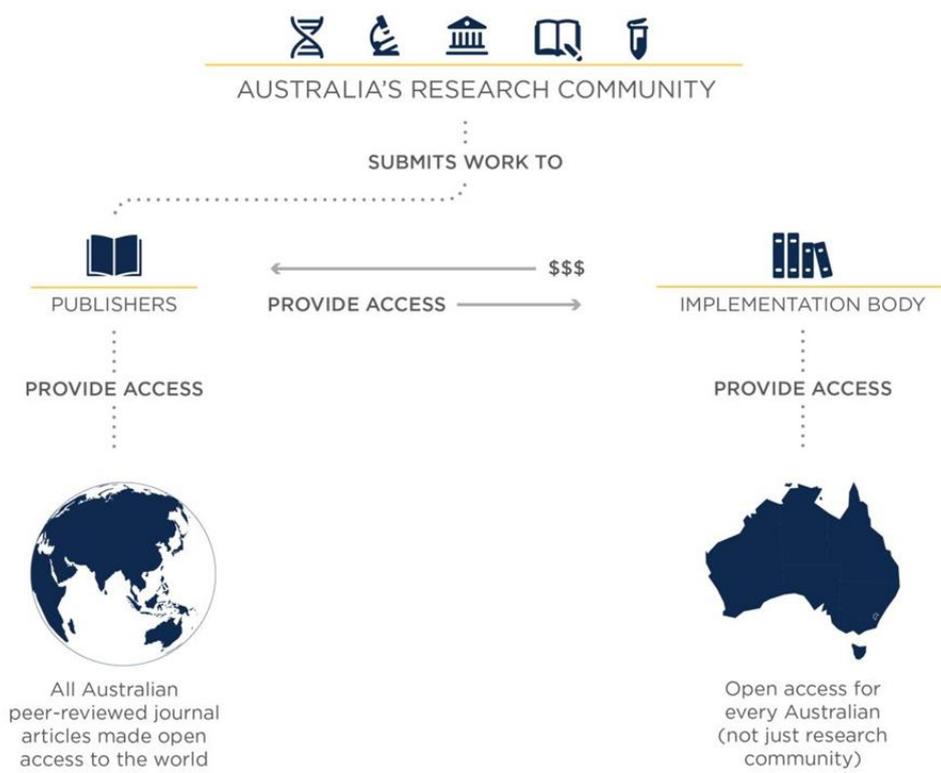
3.2 Overview

Under the model, one central implementing body would negotiate comprehensive national read-and-publish agreements with publishers on behalf of all Australian stakeholders (see Figure 10). The agreements would cover read access for Australian users and costs associated with publishing Australian journal articles as open access.

⁷⁵ The proposed Australian model would include access to all reputable, high quality, peer reviewed journal articles in all disciplines, from a diverse range of publishers, including small publishers, without an additional payment by Australian users. However, there are outstanding design considerations related to the definition of eligible 'Australian users' (see 4.3.2).

⁷⁶ Further work is needed to define the criteria by which journal articles are considered 'Australian' for the purposes of this model.

Figure 10: An overview of the proposed Australian model for open access



The intended benefits of this model to key stakeholder groups are described in Table 3.

Table 3: Intended benefits of the proposed model

STAKEHOLDER GROUP	INTENDED BENEFITS OF PROPOSED MODEL
Universities and research institutions	<ul style="list-style-type: none"> • Simplification of academic publishing and access costs. • Easier compliance with funder policies. • Improved open access publication rates and elimination of individual APCs. • Potentially improved access to a broader range of research. • A level playing-field for citations-based metrics. • Improved research integrity as final versions of papers can easily be accessed.
Libraries	<ul style="list-style-type: none"> • Reduced cost and workload associated with managing journal subscriptions. • Potentially reduced cost and workload associated with managing institutional repositories.
Publishers	<ul style="list-style-type: none"> • Streamlined, sustainable revenue streams. • Reduced transaction and negotiation costs due to fewer contracts to negotiate.
Industry	<ul style="list-style-type: none"> • Improved access to the latest research.
Government	<ul style="list-style-type: none"> • Increased return on public investment in research. • Improved access to the latest research to inform evidence-based policy development.
Australian public	<ul style="list-style-type: none"> • Improved access to the latest research. • Better informed public debate.

The following sections provide additional details related to the proposed agreement structure and funding approach. Stakeholder feedback on the design and implementation of the model is discussed in Chapter 4.

Read-and-publish agreements

The model proposes negotiating national read-and-publish agreements that cover both national read access to publishers' catalogues for Australian users, and unlimited open access publishing of Australian journal articles:

- The model will provide access to journal articles to all Australian users, including government, industry, and members of the public. By contrast, most other transformative agreements only include read access for academic institutions.
- The model will cover unlimited open access publication in participating journals. There are some precedents for read-and-publish agreements without capped publishing quotas,⁷⁷ however this is not a common model, and it may receive some resistance from some publishers.

The international trend is for a transition away from paying to read (e.g., journal subscriptions) to paying to publish (e.g., APCs or publish-and-read agreements). This fee-for-service approach can increase transparency and may create a more competitive market in which researchers consider the cost of open access publication when deciding which journal to publish in. However, this does not necessarily improve open access publishing rates, and broad access to existing journal articles is not guaranteed by this approach.⁷⁸

By focusing on read-and-publish subscription agreements, the proposed model seeks to strike a balance between paying for access and paying for publication. This is designed to prevent research intensive universities from bearing most of the cost burden, and to cap Australia's expenditure on academic journal subscriptions and publishing. However, as read-and-publish agreements are most compatible with traditional and hybrid journals, which already feature subscriptions in their business models, this may create unintended consequences for some journals and publishers (see Chapter 4.1).

Centralised funding

Instead of institutions and individuals paying for subscriptions and APCs, or for their own read-and-publish agreements, the model proposes that all payments would be managed by a national implementation body.⁷⁹ This approach is designed to improve visibility over journal subscriptions and open access costs, improve efficiencies, and increase Australia's ability to negotiate standard, open access terms with publishers – all acting to increase the return on Australia's expenditure on research and academic publishing.

⁷⁷ For example, CSIRO Publishing has negotiated uncapped transformative agreements with some organisations.

⁷⁸ Typically research institutions paying publish-and-read charges per article will get access, but industry, government and other stakeholders will not).

⁷⁹ See glossary.

4 Design considerations

A broad range of considerations and challenges related to the proposed model were raised by stakeholders during consultations. These have been grouped into three themes: market dynamics and competition, affordability and funding, and access and impact. For each theme, fundamental design questions and potential next steps have been identified to inform the development of a national open access strategy. Potential next steps have been identified for each question. Key issues that require further analysis, consultation or planning are summarised in Chapter 5.1.

4.1 Market dynamics and competition

4.1.1 Would the proposed model have unintended consequences on market dynamics?

4.2 Funding and affordability

4.2.1 How much would the proposed model cost?

4.2.2 Could Australia successfully negotiate satisfactory agreements with publishers?

4.2.3 How could the proposed model be equitably funded?

4.3 Access and impact

4.3.1 What role and value would repositories have under the proposed model?

4.3.2 How would the implementation body provide end-user access for all Australians?

4.3.3 Should specific licensing arrangements be mandated for the model?

4.3.4 How could the model support industry uptake?

In addition to these themes, stakeholders mentioned broader issues that are out of scope of this analysis, including the role of researcher incentives, the importance of open science and independent bibliometrics, and the consideration of monographs and non-traditional research outputs. These broader considerations are briefly summarised in Chapter 5.3.

4.1 Market dynamics and competition

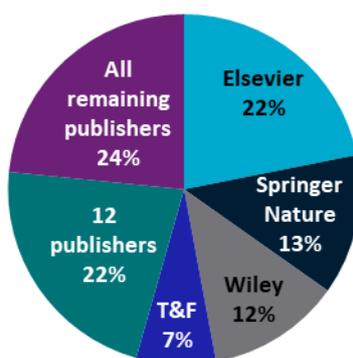
4.1.1 Would the proposed model have unintended consequences on market dynamics?

Stakeholder consultations highlighted that the proposed model may risk further consolidation of the academic publishing market in favour of major publishers with traditional business models. The model may also potentially be deemed as anti-competitive. Further analysis and consultation will be required to understand these market dynamics.

Market concentration

Nationally coordinated read-and-publish agreements may disadvantage publishers that account for a small share of the Australian publishing market. The biggest weakness of read-and-publish agreements recorded by a Technopolis Group survey is their potential to further consolidate the market.⁸⁰ The publishing market for Australian research is already highly concentrated (see Figure 11). Only four publishers account for over half of the publishing market for Australian research, and the top 16 publishers publish over three quarters of Australian journal articles. However, a long tail of publishers publishes the remaining 24% of articles.⁸¹ Further analysis is required to determine the practicality and potential cost of reaching national read-and-publish agreements with all of these publishers. The proposed model would risk further concentrating the market if the implementation body is unable to enter into agreements with that publish less Australian research publishers (including new entrants and publishers of niche journals). The implementation body may also need to consider a suitable governance model and how changes to the academic publishing sector could be managed to avoid market concentration.

Figure 11: Market share of Australian journal articles published by each publisher (2011-2020)⁸²



⁸⁰ Van Barneveld-Biesma A, Campbell C, Dujso E, Ligtvoet A, Scholten C and Velten L (2020) Read & Publish contracts in the context of a dynamic scholarly publishing system: A study on future scenarios for the scholarly publishing system.

⁸¹ Web of Science analysis suggests that 4075 publishers were responsible for publishing the last 24% of Australian linked articles. However, this is an overestimate as it includes duplicates. Additional data cleaning and analysis would be required to determine the number of discrete publishers in this distribution.

⁸² Australian-linked journal article output in the Web of Science Core Collection. Country=Australia, Year range: 2011-2020, Document types: Articles. Accessed 4 August 2021, <<https://www.webofscience.com/wos/woscc/summary/8cb32269-dfbc-4e21-b01a-b8e9c9f470e3-Oed289f1/relevance/1>>

Gold open access journals

Publishers of gold open access journals may face a disadvantage. Gold journals have already established pay-to-publish open access business models, typically based on charging APCs per paper. There are some precedents for transformative agreements with publishers of gold journals, however most of them do not offer unlimited publishing.⁸³ Publishers of gold journals may face higher costs in adapting their business models and systems to new agreements under the proposed model.

If gold journals are not willing or able to offer an uncapped publishing agreement, they might be excluded from the proposed model. If this is the case, researchers would be incentivised to favour publishers that are covered by the model's agreements to avoid paying APCs.⁸⁴

Depending on the nature of the agreements, it is also possible that paywalled journals would have two sources of revenue (read and publish), but gold open access would only have one (publish) under the proposed model. While this is already the case, the model could seek to take this into account and potentially rectify this potential imbalance. Similarly, the model may wish to consider how it could support diamond/platinum journals which do not charge fees.

Further consultation and analysis will be required to determine the extent to which gold journals and publishers could be disadvantaged, and how this could be addressed through agreement terms.

Learned societies

Stakeholders in both the university and publishing sectors expressed concern about the potential impact of open access on learned societies, which often publish journals under a traditional publishing model for their diverse learned and professional communities.

Consultations highlighted that some society publishers are less prepared for transformative open access agreements and many rely on journal subscriptions as a key membership benefit. Additionally, consultations suggested that some learned societies receive up to 80% of their revenue from subscription services. While many learned societies see value in open access, a large proportion have not converted to open access as it poses a threat to the value proposition of their memberships, and revenue as a result. Further consultation with learned society publishers would be useful to understand the potential impact on them in full.

Competition and consumer law

The proposed model needs to consider if it would have the potential to breach elements of the Australian Competition and Consumer Law Act. This requires further consideration as consultations suggested it was possible the proposed model could be classified as anti-competitive behaviour.⁸⁵ However, it was suggested that it would be possible that a public interest exemption may be

⁸³ According to a review of transformative agreements, only 6 of 18 agreements with gold journals offered unlimited publishing. Borrego Á, Anglada L and Abadal E (2021) Transformative agreements: Do they pave the way to open access? *Learned Publishing* 34(2), 216–232.

⁸⁴ APCs are currently paid through a range of sources such as grants, institutions, and out-of-pocket researcher funds. Monaghan J and Lucraft M (2020) APCs in the Wild: Exploring Funding Streams for an Accelerated Transition. <<https://doi.org/10.6084/m9.figshare.11988123.v4>>.

⁸⁵ Australian Competition and Consumer Commission (n.d.) Anti-competitive behaviour. Viewed 23 September 2021, <<https://www.accc.gov.au/business/anti-competitive-behaviour>>.

obtained. Following an application for exemption, the Australian Competition and Consumer Commission (ACCC) would undertake further analysis and a public consultation to fully assess the market impacts and the net public benefit.

Potential next steps

Analysis

- Undertake further analysis to understand potential issues and how the model can include publishers with smaller market shares to avoid further market consolidation. This could include:
 - Collecting and analysing more detailed data on journal subscriptions and usage to provide a better understanding of Australia's journal access needs to inform the design and implementation of the model.
 - Analysing the long tail of publishers that account for a small individual share of Australia's journal articles to understand the number and characteristics of these publishers, as well as the potential impact on their operations.

Consultation

- Conduct additional roundtable and public consultations to better understand and address how the model may impact competition in the publishing market.

Planning

- Consider how the model can incorporate a degree of flexibility to ensure it is responsive to the needs of stakeholders and changes in the academic publishing sector.
- Consider a suitable governance model for the proposed implementation body. It may be valuable to have representation from different sectors to ensure it meets the needs of diverse users. A clear scope for the role of any representative body would need to be defined.
- Consider how the model can include gold and diamond open access journals, such as by negotiating publish-only subscription agreements with gold open access publishers. There is some precedent for such a model, but this approach has not been attempted on a national scale. Alternatively, consider whether a portion of funding should be reserved to pay APCs on a per article basis for Australian research in gold (not hybrid) open access journals.
- Consider whether the model will need different strategies or agreements to accommodate learned society journals. Continue to engage with the ACCC regarding the application of Australian Competition and Consumer Law Act to the model and apply for a public interest exemption if it is deemed appropriate.

4.2 Funding and affordability

Critical concerns for many stakeholders included exactly how the model will be funded, how the transition to the model would be negotiated, and how it might impact the affordability of reading and publishing in academic journals. However, there is quite poor visibility of Australia's total expenditure on journal article subscriptions and open access publishing (see Chapter 2 and Appendix B). As such, further analysis and engagement will be required.

4.2.1 How much would the proposed model cost?

Consultations identified a variety of opinions on the overall cost of the proposed model and if Australia would have sufficient funds. A few stakeholders, including a publisher, suggested that Australia's current expenditure on journal article subscriptions and open access publishing should theoretically be sufficient to pay for the model. However, a greater number of stakeholders expressed concern that the actual cost of the proposed model may be greater than current expenditure due to the proposed model's aims to expand read access to all Australian users and to significantly increase Australia's open access rates.

High-level cost estimates

International case studies⁸⁶ and consultations suggest that publishers often negotiate transformative agreements with consortia on a cost-neutral basis. This means that the initial overall price of consolidated agreements is based on the sum of agreements with existing users, so publishers do not lose revenue. As such, the cost of new agreements – at least, initially – may be comparable to the sum of Australia's current expenditure on subscriptions (at least \$302.9 million), transformative agreements (at least \$4.1 million) and APCs (at least \$14.5M million). This suggests that the cost of the model's agreements under a cost-neutral transition would be at least \$321 million per year (see Chapter 2). However, it is important to note that there is no precedent for providing national read access as per the proposed model.

To provide a benchmark for the potential cost of the proposed model's agreements, the publish-and-read fee approach adopted by Germany's Projekt DEAL was scaled to Australia's research publication output.⁸⁷ This provides a cost estimate of between \$250-437.5 million per year (see Table 4, and Appendix C for approach and limitations). While this figure could be used to provide a rough benchmark or comparison cost for future Australian agreements, it should be noted that the Projekt DEAL model is structured differently to the proposed model and only includes read access for Germany's research institutions.

⁸⁶ For example, Projekt DEAL's agreements and the transformative agreement between Norway and Elsevier are designed to be cost-neutral. ESAC Initiative (2020) Springer Nature 2020 deal. Viewed 27 October 2021, <<https://esac-initiative.org/about/transformative-agreements/agreement-registry/sn2020deal/>>; ESAC Initiative (2019) Wiley 2019 deal. Viewed 28 October 2021, <<https://esac-initiative.org/about/transformative-agreements/agreement-registry/wiley2019deal/>>; Else H (2019) Elsevier strikes its first national deal with large open-access element. Nature DOI: 10.1038/D41586-019-01349-6.

⁸⁷ This model was chosen due to its publicly available and scalable cost structure.

These figures should be interpreted as indicative and very high-level benchmark costs for open access publishing of all Australian journal articles. Further analysis will be required to increase confidence in the estimate and understand the implications on potential funding sources.

Table 4: Potential cost estimates of the proposed model

ESTIMATE	COST
Upper bound benchmark	\$437.5M
Cost neutral	>\$321M
Lower bound benchmark	\$250M

Cost drivers

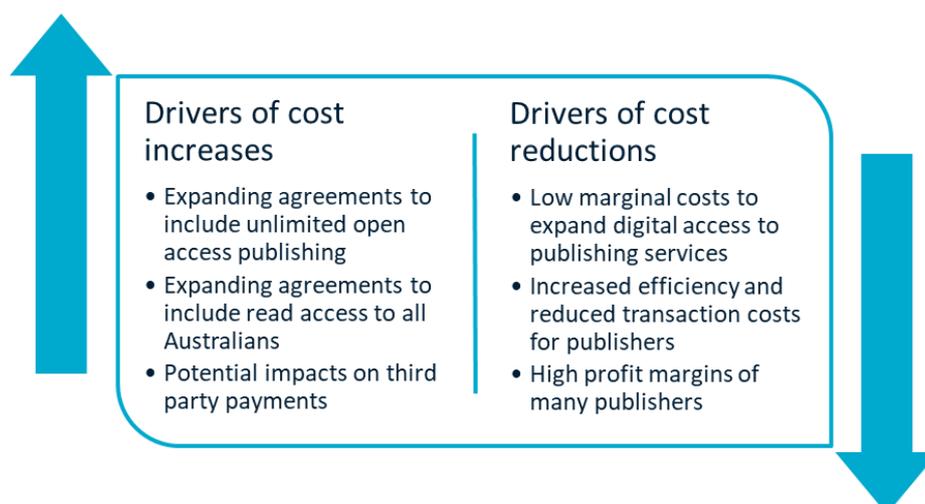
A cost-neutral transition and the potential cost estimates provided assumes that publishers agree to provide increased read access and open access publishing without significantly increasing their prices. No comparable transformative agreements that provide read access to an entire nation of potential users were identified by this research.

The proposed model aims to expand read access to all Australian users, which may impact publishers’ revenue streams from on demand access or subscriptions by companies or individuals. Publishers may attempt to charge additional fees for the increased read access, which would not align with the principles of the model. Publishers may also seek additional payment for the increased percentage of Australian journal articles that would be openly accessible, which would also not align with the principles of the model.⁸⁸ Some publishers also expressed concern that third party payments, including royalties paid by the Copyright Agency for the reuse of copyrighted material by third parties, may also be impacted.

However, some stakeholders and analysis of international models identified several reasons why a cost neutral transition may be achievable. Some stakeholders noted low marginal costs associated with expanding digital access to additional users (if publishers do not need to develop new systems and infrastructure), and the already high profit margins of many publishers as arguments against publishers seeking reimbursement for increased access. Publishers may also benefit from the efficiency and reduced transaction costs of having to manage only one Australian agreement. These reasons presented for and against cost-neutrality for the proposed national agreements have been summarised in Figure 12 below:

⁸⁸ Only 35% of Australia’s 2020 research outputs were published with immediate open access in Gold or Hybrid journals. Curtin Open Knowledge Institute (2021) COKI Open Access Dashboard. <<http://openknowledge.community/dashboards/coki-open-access-dashboard/>>.

Figure 12: Cost drivers for proposed national agreement compared to existing agreements



Potential next steps

Analysis

- Conduct further analysis to increase confidence in Australia's current expenditure and the potential costs associated with the proposed model. This analysis could include, but is not limited to:
 - Detailed data collection and analysis of current expenditure from Australian stakeholders.
 - Consideration of how indirect benefits (across industry, society, and government) from open access could be measured, recognised, and used to strengthen the case for funding of the proposed model.
 - Analysis of transformative agreements from international jurisdictions, of opportunities to lower costs and of any subscription and pricing data provided by publishers.
 - Estimation of other costs associated with the model, including the cost of negotiating national read-and-publish agreements and the costs associated with related infrastructure.
 - Modelling of different cost drivers to understand the proposed model's potential long-term costs. For example, modelling the implications of changes to reading and publishing pricing and the number of Australian journal articles authored.

4.2.2 Could Australia successfully negotiate satisfactory agreements with publishers?

Some stakeholders also expressed concern that Australia may not be in a strong position to negotiate satisfactory agreement terms with publishers. Stakeholders cited international examples of countries and consortia that have faced challenges negotiating financially sustainable transformative agreements with large commercial publishers. For example:

- The UK initially facilitated their open access transition through national transformative agreements with publishers, which resulted in cost increases averaging 11% annually for subscription costs and APCs. This increase between 2013 and 2016 was above inflation and normal year-on-year growth rates for subscription costs and APCs.⁸⁹ In a reported attempt to constrain costs and build influence in publisher negotiations, the UK later updated their open access policies to allow for green open access.⁹⁰
- In Germany, the Projekt DEAL Consortium failed to reach an agreement with Elsevier for a transition to a publish-and-read model for open access on behalf of all German academic institutions. Because of this, more than 180 German scientific institutions chose not to extend their contracts with Elsevier and more than 40 scientists have resigned from their editorial activities for Elsevier in support of DEAL's negotiations.⁹¹
- Norway's proposal for a read-and-publish agreement was declined by Elsevier in 2019. The publisher explained that the consortium was 'asking to receive two services for the price of one.' As a result, the Norwegian consortium cancelled their contracts with Elsevier in 2019.⁹²

Given the challenges seen internationally, some stakeholders suggested that Australia should be prepared for challenges in negotiating satisfactory agreement terms with major publishers. Some university and research institutions suggested that Australia's comparatively small publication output may also limit its bargaining power. However, some stakeholders dismissed this risk, with one suggesting that Australia's medium size and growing, high-quality publication output (see Chapter 2) make it an excellent test case for new models of open access. Regardless, pooling agreements through the proposed model can be expected to improve Australia's ability to negotiate standard, open access terms with publishers compared to the status quo.

Elsevier, Springer Nature, Wiley, and Taylor & Francis published more than 47% of journal articles globally between 2011 and 2020.⁹³ This concentrated market means that failed negotiations with any of these publishers could affect Australia's access to new research. In addition, some stakeholders suggested that Australia, like Germany and Norway, should be prepared to boycott publishers that do not negotiate in good faith. As discussed earlier, further consultation with the ACCC would be required prior to considering this course of action (see 4.1.1).

⁸⁹ See Appendix D. Pinfield S and Johnson R (2018) Adoption of open access is rising – but so too are its costs. Viewed 6 July 2021, <<http://eprints.lse.ac.uk/88427/1/impactofsocialsciences-2018-01-22-adoption-of-open-access-is-rising.pdf>>.

⁹⁰ Times Higher Education (2021) UKRI's support for green open access is the right way forward. Viewed 2 September 2021, <<https://www.timeshighereducation.com/blog/ukris-support-green-open-access-right-way-forward>>.

⁹¹ Projekt DEAL (2019) Elsevier News. Viewed 7 October 2021, <<https://www.projekt-deal.de/elsevier-news/>>.

⁹² See Appendix D. Offord C (2019) Norway Joins List of Countries Canceling Elsevier Contracts. The Scientist Magazine .

⁹³ Analysis of 18,196,219 Articles from Web of Science Core Collection published between 2011-2020. Web of Science (2021) Viewed 7 October 2021, <<https://www.webofscience.com/wos/woscc/summary/31de4b1e-aef1-49bd-8659-2ef9c1b1ee67-0b9a2ee2/relevance/1>>

Potential next steps

Planning

- Consider seeking advice from international jurisdictions that have had success or otherwise in negotiating transformative agreements with publishers. Understanding why some approaches have been successful and some have ended in stalemates or boycotts may inform Australia's approach to negotiations.
- Continue to engage with the ACCC to understand the implications of the model with reference to competition law, and the proposed implementation body's ability to walk away from negotiations if satisfactory terms cannot be agreed to (see also 4.1.1).
- Consider the role of green open access and repositories in influencing negotiations and maintaining scientific integrity. For example, if research organisations continue to have the option to achieve open access via repositories, publishers may lose some bargaining power in negotiations.⁹⁴ If it is decided that maintaining support for green open access and repositories has value, then further actions might include:
 - Investing in increased accessibility and interoperability of institutional repositories (see also 4.3.1).
 - Strengthening researcher funder policies to ensure that research they fund is published as open access with reduced embargo periods and full rights retention for authors.
- Consider what interventions might be appropriate if satisfactory agreements cannot be reached with publishers. Some stakeholders suggested compulsory arbitration or regulatory interventions could offer a possible solution if negotiations with publishers prove unsuccessful. For example, the Australian Government requested a mandatory bargaining code from the ACCC in 2020 to address the bargaining power imbalance between Australian news media businesses and digital platforms (namely Facebook and Google).⁹⁵ Further investigation would be needed to understand if a similar approach would be feasible here.

4.2.3 How could the proposed model be funded?

The approach to funding the proposed model was highly contentious for some stakeholders, especially those in the university sector. There are a variety of possible funding approaches that could be considered but the scope of consultations was not sufficient to reach a consensus on the way forward. Some of these approaches are outlined in Table 5, below.

⁹⁴ Harms D (2016) The influence of open access on the higher education publishing industry. A five forces model analysis. University of Twente.

⁹⁵ Australian Competition and Consumer Commission (2020) Q&As: Draft news media and digital platforms mandatory bargaining code. Viewed 20 September 2021, <<https://www.accc.gov.au/focus-areas/digital-platforms/draft-news-media-bargaining-code>>.

Table 5: Possible approaches to funding the proposed model

FUNDING CONTRIBUTION APPROACH	CONSIDERATIONS
<p>Approach 1: Current payments to publishers</p> <p>Funding contributions based on stakeholders' current expenditure on journal subscriptions.</p>	<ul style="list-style-type: none"> • Potential funding shortfall if only subscription expenditure from federally funded stakeholders can be repurposed. • Stakeholders with currently large expenditures would be locked into those larger expenditure and may perceive that they are subsidising access for others. • Could further entrench existing subscription pricing inequities based on historic pricing approaches. • Would not consider the cost of publishing and may not be responsive to changes in Australia's research output.
<p>Approach 2: Fixed amount or proportion of funding from each stakeholder (or stakeholder group)</p> <p>A proportion of government funding for universities, PFRAs and Federal Government departments is redirected to directly fund national agreements.</p>	<ul style="list-style-type: none"> • Potentially easier to administer than other funding approaches, as it could be implemented by government without negotiating individual contributions. • Taking a fixed proportion of Research Block Grant (RBG) funding, for example, could mean that better performing universities pay a greater share of the proposed model's costs because this funding is based on university performance. • Could create perceptions of inequity from stakeholders that have their funding redirected.
<p>Approach 3: Publishing volume</p> <p>Funding contributions based on the number of journal articles published by universities and PFRAs.</p>	<ul style="list-style-type: none"> • Aligns with the pay-to-publish approach favoured internationally but may not be compatible with the model's proposed read-and-publish agreements, as they are not priced based on publication rates. • Research-intensive universities would fund a greater proportion of the model's costs because of their higher publication rates.

High-level analysis of each of these approaches has been undertaken to illustrate potential budgetary implications of each of these approaches. The estimated values in this section are indicative and assume a cost-neutral transition (i.e., that the cost of the model is \$321 million).

Approach 1: Funding contributions based on current payments to publishers

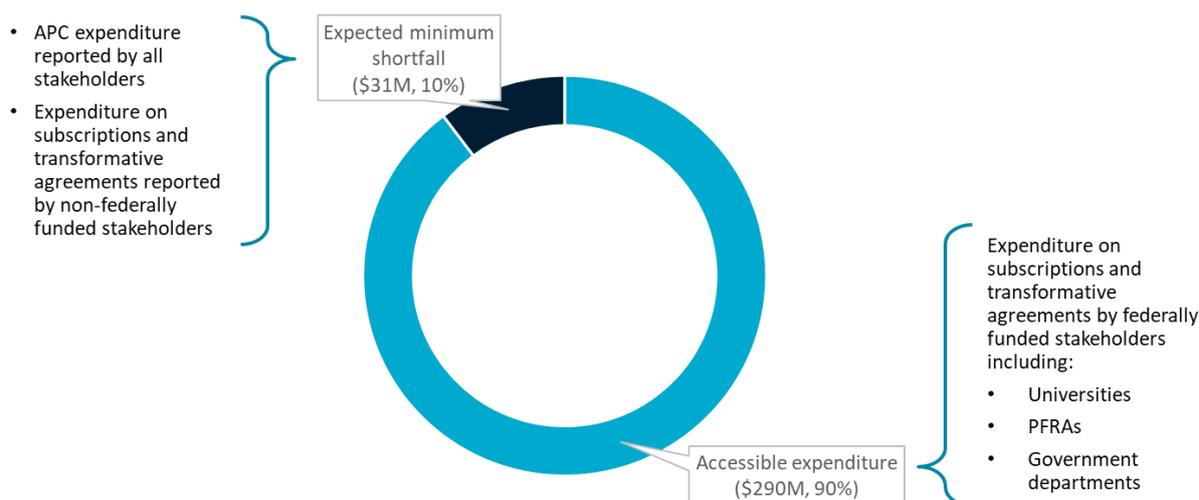
One of the principles of the proposed model is to use Australia's existing expenditure on academic subscriptions and publishing more effectively and for increased benefit.

It is conceivable that a national implementation body could relatively simply negotiate to repurpose university, PFRA and Federal Government department expenditure for journal subscriptions and transformative agreements because this expenditure is relatively easy to identify, and these institutions are – at least partially – federally funded.

This would amount to an accessible budget of approximately \$290 million.⁹⁶ This suggests a possible shortfall of at least \$31 million under a cost-neutral transition, assuming APC expenditure and expenditure by non-federally funded stakeholders cannot be repurposed (see Figure 13).

⁹⁶ This is the value of the reported subscription agreements and transformative agreements associated with universities, PFRAs and federal government departments.

Figure 13: Potential accessible budget and potential shortfall



This shortfall is only created if the proposed implementation body is not able to successfully repurpose APC expenditure (at least \$14.5 million) and expenditure in subscriptions and transformative agreements by non-federally funded stakeholders (at least \$16.6 million). Further consultations and analysis would be required to understand how APC expenditure could be accounted for, and how the implementation body could negotiate to repurpose expenditure from non-federally funded subscribers. Some stakeholders noted plans to implement APC tracking processes in the future. One stakeholder expressed interest in the development of guidelines for best practice APC data collection.

Approach 2: Funding contributions based on a fixed amount or proportion of funding across each stakeholder (or stakeholder group)

For this funding approach it is assumed that Federal Government expenditure on the Research Block Grant’s Research Support Program (RSP) and PFRA funding is indirectly funding most of Australian’s expenditure on journal subscriptions, and that this funding could be used to pay for national agreements with publishers.⁹⁷ Further analysis is required to understand the feasibility and implications of such a funding approach. However, the proposed model’s assumed cost is equivalent to approximately 11% of total RSP⁹⁸ and PFRA⁹⁹ funding for 2020-21.¹⁰⁰ Please note that this assumes that an equal percentage of funding would be drawn from the RSP and PFRA funding. This is an unlikely scenario and as such should be taken as an indicative figure of the total cost burden – not the contribution by individual stakeholders. The figure should also be contextualised against

⁹⁷ This model was chosen due to its publicly available pricing structure and scalable cost structure. However, it should be noted the DEAL’s publish-and-read fee-based model, only includes read access for research institutions.

⁹⁸ \$0.93B in funding for the Research Support Program stream of the Research Block Grant Program in 2021. This does not include the additional \$1B provided to alleviate the financial impacts of the COVID-19 pandemic. Department of Education Skills and Employment (2021) Research Block Grants. Viewed 1 October 2021, <<https://www.dese.gov.au/research-block-grants>>.

⁹⁹ Approximately \$2B, which includes 2020-21 estimated actual government funding for the Australian Institute of Marine Science, Australian Nuclear Science and Technology Organisation, CSIRO and Geoscience Australia, as well as 2014-15 budget for the Defence Science and Technology Group (the most recent published figure). While there are other agencies that perform research functions, only organisations with a core research function were selected for this analysis.

¹⁰⁰ Approximately \$2.9 billion in total.

other sources of funding for universities and PFRAs, including the Commonwealth Grant Scheme, which is the biggest single source of Government funding for universities.

Approach 3: Funding contributions based on publication volume

A publication-based funding approach would align with the pay-to-publish approach favoured internationally (e.g., Projekt DEAL) but may not be compatible with the model's proposed read-and-publish agreements as they are not priced based on publication rates. As such, no economic analysis was conducted on this approach. Further consideration would be necessary to determine whether this approach has merit. It may be appropriate to devise a contribution calculation based on each stakeholder's overall usage (both reading and publishing) of the model, which could distribute the cost burden more evenly between stakeholders.

Stakeholder concerns

In parallel to analysing the financial requirements and mechanisms to implement the proposed model, further analysis should also focus on stakeholder sentiment to understand and address concerns.

Some university sector stakeholders noted that changing the distribution of expenditure or sharing the benefits of current expenditure could result in perceptions of winners and losers, which may receive resistance. One stakeholder involved in the university sector recalled a previous attempt by the Australian Vice-Chancellors Committee to form a national subscription licence with a major publisher in the early 2000s. Negotiations were discontinued because some large, research-intensive universities were concerned their long-term investments in scholarly journals would be repurposed for a licence that provided equal access to non-research-intensive universities (i.e., those that have a primary focus on teaching). Universities also expressed concern that they may effectively be subsidising access to journal articles for industry and public users if industry contributions are not required.

While not examined in this report, further analysis and engagement should consider the possibility to seek contributions from non-federally funded stakeholders. For example, one industry stakeholder with existing subscriptions expressed tentative support for redirecting their current expenditure on journals towards national agreements. However, if they would get free access regardless, they acknowledged that some form of recognition (i.e., a sponsorship-based funding model) or additional benefit might be required to justify their contributions.

Further analysis of the distribution of costs and benefits for each funding approach will be important. This will require additional information from stakeholders to understand their needs, which can be partially informed by analysis of existing subscriptions, and to identify how the transition to open access could be best managed.

Other concerns raised by stakeholders include:

- Stakeholders in Australia's research and library sectors expressed concern about a loss of control over how they spend their library budgets and a potential loss of library jobs. Universities were particularly concerned about the prospect of losing control over how their funds are spent, particularly as some have subscriptions that are in niche areas or are used for teaching purposes. There were also concerns expressed at the potential loss of library jobs and the changing role of

librarians in the proposed model. It will be critical to engage with stakeholders in the university library sector to manage these concerns.

- Some university stakeholders expressed concern that the model may be exposed to budget cuts by future governments. If the proposed model is funded by withholding government funding from universities and PFRAs, those institutions could be left with neither their previous budgets to pay for access, nor the access provided by the model.
- Some university stakeholders noted that there are existing inequities in the pricing of journal subscriptions due to publishers basing the price of digital subscriptions on the historic size of each university's hardcopy library. Because an individual university's agreements with publishers are rarely transparent, these inequities are difficult to identify and address. Basing funding contributions on current levels of expenditure has the potential to entrench these differences, so it may be more equitable for contributions to be based on usage, or on a standard proportion of funding.

Potential next steps

Analysis

- Identify and analyse different funding approaches and understand the mechanisms available to repurpose, redirect or use existing expenditure.
- Conduct a detailed cost distribution analysis of the different funding approaches and how they compare to the status quo.

Consultation

- Undertake formal public consultation to test the strengths and weaknesses of different funding approaches, understand perceptions of winners and losers, and identify the best solution.

Planning

- Consider funding approaches that spread the contributions across a broader range of stakeholders (including industry) who will benefit from open access.
- Consider whether legislation would be necessary to provide a degree of certainty and stability for the proposed model's budget.

4.3 Access and impact

Stakeholders raised questions and concerns about the how the model will govern access and enable impact. Key issues included the role of institutional repositories, the scope and security of how access will be provided to Australian users, appropriate licensing arrangements for Australia's open access journal articles, and how the proposed model could encourage industry use.

4.3.1 What role and value would repositories have under the proposed model?

Currently, repositories enable green open access by providing an alternative to paying publisher fees to meet open access mandates. As these fees will be covered by national agreements under the proposed model, this might replace the need for green open access.

The value of institutional repositories

Many university stakeholders expressed strong views on the ongoing value of institutional repositories, noting that:

- Institutional repositories enable research organisations to assess and report on their total research output. Stakeholders have advised information within these repositories forms the basis for Excellence in Research Australia (ERA)¹⁰¹ reporting, some of which would be lost if research was only published in journals. However, it is possible that this need may eventually be met by innovative use of metadata and identifiers or other mechanisms.
- Institutional repositories enhance the reach and impact of an institution's research. A 2020 review showed that institutional repositories have a positive impact on the citation count and the exposure of institutions and researchers.¹⁰² Stakeholders suggested that this can help to attract new research collaborations.
- Institutional repositories are used as a central location for an institution's research and can support longer term goals related to open science. Universities value their repositories for long-term preservation of diverse documents, not just of journal articles. As such, repositories, including new systems such as the UK's Octopus platform,¹⁰³ are also critical enablers of open science by allowing researchers to archive elements of research that are not typically included in journal articles.

Potential improvements

Some stakeholders noted the quality and functionality of institutional repositories varied and a review of compliance with the NHMRC's open access policy found low levels of author accepted manuscripts in Australian institutional repositories.¹⁰⁴ As such, there might be potential to improve the return on investment in Australia's repository expenditure.

CAUL's Review of Australian Repository Infrastructure highlighted that Australia's repositories differ by content stored, open access monitoring and compliance, software used, and discoverability in search engines and portals.¹⁰⁵ This review highlighted improving interoperability as the most

¹⁰¹ Developments related to publishing metadata and identifiers could eventually negate the need to use repositories for ERA purposes. The ERA assessment is designed to encourage Australian universities to develop higher quality research and strengthen engagement and impact outside academia. ERA EI Review Advisory Committee (2021) ERA EI Review Final Report 2020-2021.

¹⁰² Demetres MR, Delgado D and Wright DN (2020) The impact of institutional repositories: A systematic review. *Journal of the Medical Library Association* 108(2), 177–184. DOI: 10.5195/JMLA.2020.856.

¹⁰³ UK Research and Innovation (n.d.) Funding agreed for a platform that will change research culture. Viewed 4 October 2021, <<https://www.ukri.org/news/funding-agreed-for-a-platform-that-will-change-research-culture/>>.

¹⁰⁴ Kirkman N, Haddow G (2020) Compliance with the first funder open access policy in Australia. *Information Research*, 24(4), paper 857. <http://InformationR.net/ir/25-2/paper857.html>

¹⁰⁵ Council of Australian University Librarians (2018) CAUL Review of Australian Repository Infrastructure.

important undertaking to improve Australia's repository infrastructure. This includes implementing common standards, shared languages, and metadata, and the use of consistent identifiers between institutional repositories.¹⁰⁶

Some stakeholders also flagged that current expenditure on institutional repositories might be made more productive. Some university stakeholders acknowledged that some of this expenditure is effectively duplicated across institutions, and a national repository might be more efficient. Similarly, CAUL's repository review recommended improving existing infrastructure, developing national or regional infrastructure, and exploring procurement of a next generation repository system.¹⁰⁷

Three possible options for a national repository service were identified during consultations:

- 1. Invest in a centralised national repository platform.** This model was favoured by some stakeholders for its simplicity and its potential to avoid duplication of operational and infrastructure costs. However, concerns about duplicating the sunk cost of capital investment in existing institutional repositories were also raised.
- 2. Improve interoperability and link Australia's existing institutional repositories together.** Linking existing repositories has proven successful internationally and has the added benefit of not relying on one single point of potential failure, as is the case with existing centralised repository solutions. The Netherlands national portal, NARCIS, was cited as an effective platform that automatically collects data sources and publications from institutional repositories.¹⁰⁸ CAUL's repository review also suggested setting minimum standards to improve interoperability of existing institutional repositories.
- 3. Use international repository infrastructure.** Some stakeholders also advised Australia could position itself as a member of the global research community by supporting existing international repository infrastructure. For example, CERN operates the international repository Zenodo to provide free uploads and free access to all researchers.¹⁰⁹ Further investigation would be needed to determine whether such a system would replace or support existing institutional repositories.

Further analysis will be required to understand how the function and value of Australia's repositories may change under the proposed model.

Potential next steps

Analysis

- Consider undertaking a full cost and benefit analysis of institutional repositories and whether a national approach would be a more efficient investment. This analysis could be considered in

¹⁰⁶ Council of Australian University Librarians (2018) CAUL Review of Australian Repository Infrastructure.

¹⁰⁷ Council of Australian University Librarians (2018) CAUL Review of Australian Repository Infrastructure.

¹⁰⁸ Elly Dijk D (2017) Open Science in Europe | The Netherlands. Viewed 29 September 2021, <<https://www.openaire.eu/os-netherlands>>.

¹⁰⁹ OpenAIRE (2021) Guides for OpenAIRE services. Viewed 28 September 2021, <<https://www.openaire.eu/zenodo-guide>>.

combination with or independently of any planning for the proposed model. For example, CAUL recommended conducting a similar analysis in their initial repository review, which also showed that FAIR principles could be used to define an ideal state for Australia's national repository solution.¹¹⁰

4.3.2 How would the model provide end-user access for all Australians?

It is expected that the proposed model would require the development of an online access portal through which users can access journal articles included under the proposed model. Stakeholders suggested that scope and security are important considerations for the design of this infrastructure.

Scope

Many stakeholders requested a clear definition of scope to understand exactly who will have access under the proposed model. The most significant difference between the proposed Australian model and other international models is the objective of providing access to all Australian users. While this goal was generally supported, common questions included whether the model would include Australians overseas; foreign nationals working, studying, or living in Australia; or multinationals with offices and staff in Australia. Some stakeholders also noted that access is more critical for researchers in academia, industry, and government than for the public.

Security

It will be important to consider the scope of content that would be indexed and searchable via the centralised portal. For example, whether the portal should index content not covered by national read-and-publish agreements, such as other open access articles (e.g., articles published in diamond journals) and institutional repository content.

Publishers were also concerned that illegitimate users may be able to use Australia's portal to access paywalled articles. Early discussions with stakeholders suggested that Internet Protocol (IP) addresses could be used to help restrict access to computers located within Australia. However, it was noted that this would prevent Australian citizens living or travelling internationally from accessing the system. Publishers also expressed concerns about the security of this approach, as it is easy to fake an Australian IP address using a Virtual Private Network (VPN). Another suggestion was to define access through registration and some form of proof of eligibility. As well as providing additional security, the latter approach may provide more detailed usage statistics that could also help measure the proposed model's success (for examples of usage-related metrics, see 5.2.4).

¹¹⁰ Council of Australian University Librarians (2018) CAUL Review of Australian Repository Infrastructure.

Potential next steps

Analysis

- Seek technical guidance to evaluate the options and costs associated with the development of a secure digital portal for content access. Stakeholders have recommended numerous organisations that could provide support and guidance on open access models and platforms including the Australian Access Federation, as well as international organisations including Force11, Invest in Open Infrastructure (IOI), the Open Access Scholarly Publishing Association (OASPA), the Research on Research Institute (RoRI), the Sustainability Coalition for Open Science Services (SCOSS), and the Wikimedia Foundation.

Consultation

- Seek input through consultations to create a clear definition and eligibility criteria for ‘all Australian users’ to define exactly who will receive read access under the proposed model, and an appropriate definition for ‘Australian journal articles’ to define what publications will be covered by publish element of the proposed model.

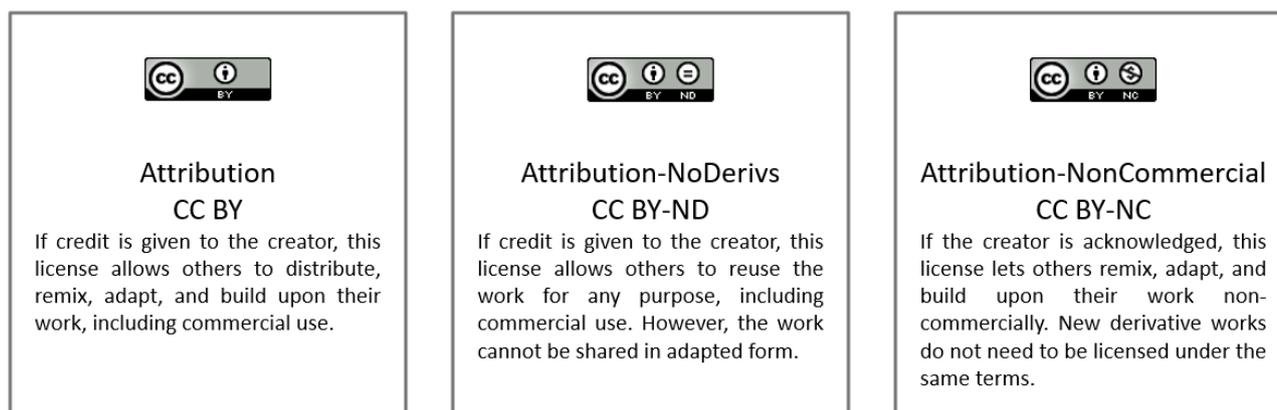
4.3.3 Should specific licensing arrangements be mandated for the model?

Stakeholders generally agreed that the model should encourage or mandate appropriate licensing arrangements.

Most research and library stakeholders indicated that Creative Commons Attribution (CC BY) licences should be the default option for articles published under the proposed model’s agreements. This would enable others to access, distribute, adapt, and build upon journal articles to maximise their potential impact. However, publishers and some other stakeholders noted circumstances where more restrictive options from the Creative Commons suite of licenses such as Attribution-NoDerivs (ND) and Attribution-NonCommercial (NC) licences (see Figure 14) may be appropriate. For example, the International Science Council suggests that the use of ND licences can protect text from potential distortion when the integrity of the publication relies on precisely phrased formulations.¹¹¹ Publishers typically suggested that the proposed model shouldn’t be prescriptive, and that researchers should be able to choose an appropriate license for their journal articles.

¹¹¹ For example, in legal and philosophy journal articles. International Science Council (2021) Opening the record of science: making scholarly publishing work for science in the digital era. Paris, France.

Figure 14: Creative Commons licenses to consider under the proposed model¹¹²



Some stakeholders noted sensitivities relating to the publication and use of Indigenous cultural and intellectual property. Emerging protocols establish the continuing rights of Indigenous researchers and contributors to control the use of their material in perpetuity, including via community input after their death. It was suggested by stakeholders that making Creative Commons licences mandatory might not be consistent with these protocols.

Potential next steps

Consultation

- Seek feedback on how licencing should be managed over the long-term. Based on consultations, the initial position may be to allow researchers to choose the most appropriate Creative Commons license for their journal articles. However, broader engagement may help understand long-term needs and how this may evolve in Australia and internationally.
- Consult on the appropriateness of mandatory Creative Commons licenses for publication of Indigenous cultural and intellectual property. The Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS) has published guidelines for ethical publishing of Indigenous Australian authors and may be an appropriate advisor on this issue.¹¹³

4.3.4 How could the model support industry uptake?

Industry stakeholders suggested that ease of use and promotion of a potential centralised portal system will be necessary to encourage industry users to make use of openly accessible journal articles.

¹¹² Creative Commons About The Licenses. Viewed 12 October 2021, <<https://creativecommons.org/licenses/>>.

¹¹³ The Australian Institute of Aboriginal and Torres Strait Islander Studies (2015) Guidelines for the ethical publishing of Aboriginal and Torres Strait Islander authors and research from those communities. Canberra.

Ease of use is essential to encourage new and time poor users to access and use the potential open access portal. Industry stakeholders also suggested that high quality search and recommendation algorithms be implemented to make relevant papers easily discoverable. They noted that a functional search feature is critical to finding the right resources that can be used to solve specific problems, while recommendations generated through algorithms can help inspire users to innovate. Ensuring that the system is interoperable with and accessible via existing search engines (such as Google Scholar) and library systems will help to improve ease of use and provide alternative modes of discovery.

Some industry stakeholders also recommended investing in promotion for the proposed model and in training resources to encourage industry uptake.

Potential next steps

Consultation

- Consult non-academic end-users (particularly industry, but also the public) during the proposed model's development to ensure it meets the needs of a diverse range of users.

Planning

- Consider the role of communications and engagement in the model to support use of openly accessible journal articles.

5 The way forward

As the first stage in the development of a national open access strategy for Australia, this prospective analysis aims to help understand the issues that will require detailed analysis to understand model design and financing options.

To help inform future activities, this chapter summarises potential considerations and actions that may help to address the questions and themes raised through consultations (see Chapter 4). These include near-term next steps (Chapter 5.1), potential metrics for measuring success (Chapter 5.2) and broader considerations for the future (Chapter 5.3).

5.1 Next steps

Additional analysis, broad consultation, and strategic planning will be necessary to address the proposed model's outstanding design considerations, and to support the development of a comprehensive business case for a national open access strategy. Table 6 summarises the key issues identified through consultations and desktop research for consideration by the OCS. Additional details can be found in Chapter 4. While most of these actions could be undertaken by the OCS, it will be valuable to secure funding for a detailed design and evaluation of the proposed model.

Table 6: Key issues to be addressed as potential next steps

ANALYSIS	CONSULTATION	PLANNING
<p>Additional analysis will be critical to inform the development of a national open access strategy.</p> <p>Key issues that require further analysis include:</p> <ul style="list-style-type: none"> • Australian journal subscriptions, including read rates. • The number and characteristics of publishers that publish the long tail of Australian research output. • The expected cost of the proposed model. • The cost and benefit distribution of different funding approaches. • The impacts of the model on the costs and benefits associated with institutional repositories. • The options and costs associated with the development of a secure digital portal for content access. 	<p>Public consultation and ongoing engagement with key stakeholders will remain essential.</p> <p>Key issues that will need additional input from consultations include:</p> <ul style="list-style-type: none"> • The potential impact of the proposed model on competition in the academic publishing market and related legal implications. • The strengths and weaknesses of different funding approaches and stakeholder implications and levels of support. • Appropriate definitions for eligible Australian users and Australian journal articles. • Appropriate licensing options for journal articles. • End-users' needs and their support for the proposed model. 	<p>Many of the design considerations will only be addressed through strategic planning.</p> <p>Key issues that require additional consideration and planning include:</p> <ul style="list-style-type: none"> • An appropriate governance model for the proposed implementation body. • Flexibility to include diverse publishers and be responsive to changes in the publishing sector. • Enhancing Australia's ability to negotiate standard, open access terms with publishers. • Possible additional funding contributions, including from broader stakeholder groups such as industry. • Communications and engagement to support uptake and use of information available through the proposed model.

5.2 Measuring success

This section describes potential metrics that could be used to monitor the successful implementation of the proposed model. Four themes of metrics have been identified based on the stated objectives of the proposed model (Table 7). Potential quantitative and qualitative metrics for each of these themes were identified through consultations and literature review. They are designed to inform further consideration of how the proposed model’s performance could be best measured and are by no means exhaustive. Where possible, appropriate baseline data, and potentially targets, would need to be determined for each chosen metric.

Table 7: Objectives and associated metric themes suggested for the proposed model

OBJECTIVES	THEME
1. Improve Australia’s return on investment in the research sector	<ul style="list-style-type: none"> • Coverage (5.2.1) • Cost (5.2.2)
2. Maintain Australia’s global position in science, research, and innovation	<ul style="list-style-type: none"> • Research and innovation (5.2.3)
3. Increase industry and government access to leverage science and research investment to support economic recovery and growth	<ul style="list-style-type: none"> • Usage and impact (5.2.4)

5.2.1 Coverage

Broadly, the implementation of the proposed model can be measured through the coverage of its read-and-publish agreements. This includes both the number of journal articles that are openly accessible, and the percentage of Australian journal articles that are published as open access.

MEASURE	EXAMPLE METRICS AND DESCRIPTION
Read coverage of agreements	<p>Number and percentage of publishers, journals, and journal articles available to read under national agreements.</p> <p>The number of journals and number of articles covered by national agreements could be used to indicate the extent to which the proposed model has achieved the aim of increasing journal access.</p> <p>The variety of publisher sizes, disciplines and business models could also be used to monitor the bibliodiversity of the proposed model. This data could be used to demonstrate the extent to which proposed agreements cover the long-tailed distribution curve of publishers of Australian journal articles (see Figure 4).</p>
Publication coverage of the agreements	<p>Number and percentage of Australian journal articles that are open access</p> <p>This metric could help indicate the progress that the proposed model has made in achieving open access status for Australian journal articles. It can also be used to identify potential open access disparities between disciplines as implementation occurs. Segmenting this metric by institution could also show which institutions are receiving the most value from having the costs of APCs covered.</p>

5.2.2 Cost

The proposed model aims to improve Australia’s return on investment in the research sector. Comparing the increased coverage and costs of the proposed model against the cost of historical Australian publishing agreements can provide a simple measure of its return on investment. Other metrics relating to the potential benefits of open access are considered in 5.2.4. Qualitative analysis of the expenditure and funding distribution may also help monitor the equity of the model.

MEASURE	EXAMPLE METRICS AND DESCRIPTION
Expenditure on agreements	<p>Total expenditure on read-and-publish agreements</p> <p>Tracking total expenditure on read-and-publish agreements will be important to contextualise the coverage (and benefits) they provide.</p> <p>Tracking related expenses that occur outside the agreement will also be important to understanding the impact of the proposed model’s implementation on the overall cost of academic subscriptions and publishing for Australian stakeholders.</p>
Payment distribution	<p>Distribution of payments to publishers</p> <p>Tracking the value of payments distributed amongst publishers under the proposed model could be useful for demonstrating where funding is being concentrated, who is receiving the greatest benefit, and how much of the funding is being directed to publishers outside of Australia.</p>
Funding distribution	<p>Distribution of funding contributions from stakeholders</p> <p>Tracking the funding contributions from stakeholders could be important to determine which institutions are bearing a greater or lesser proportion of the costs.</p>

5.2.3 Research and innovation

The proposed model seeks to maintain Australia’s global position in science, research, and innovation. Measuring improved outcomes from research and the connection between research and innovation will be important to demonstrate the achievement of this goal. It may also be important to monitor other measures of Australia’s research performance, such as publication rates, to ensure there are no unforeseen negative impacts on Australian research.

MEASURE	EXAMPLE METRICS AND DESCRIPTION
Citation impact	<p>Citations of articles by discipline and sector</p> <p>Increased accessibility of Australian research may result in increased rates of citation. Measuring the citation rates for Australian research globally could demonstrate the increased use of Australian research. Further analysis should be conducted to understand the most appropriate citation metric(s) to measure. For example, normalised citation impact, citation rates by sector (academia, industry, government, etc.) or the timeliness of citations.</p>
Research collaboration	<p>Collaboration rates for domestic and international research</p> <p>Research collaborations and their impacts are difficult to measure. However, it would be valuable to monitor co-publication rates to see if the proposed model has any impact on them. This may demonstrate how Australian research expertise and investments are being leveraged, and the potential role that open access plays in supporting collaboration.</p>

5.2.4 Usage and impact

The proposed model aims to increase industry and government access to leverage science and research investment to support economic recovery and growth.

MEASURE	EXAMPLE METRICS AND DESCRIPTION
System users	Number of registered/active users from industry/government/public Data related to the number and activity of different user types accessing journal articles covered by the model could be an important measure of the proposed model's success. This data could be provided by publishers as part of agreements, or it could be tracked through a digital platform.
Access rates	Number and frequency of access instances per user Rates of access to journal articles could act as an indicator for the value that the proposed model provides across different types of users. Users could be segmented by group – such as government, industry, research and public – to determine which groups are drawing most value from the system. Access rates are already used by publishers to track both successful and unsuccessful attempts at accessing articles. This data could be provided by publishers as part of agreements or tracked through a digital platform.

Usage metrics alone cannot be used to monitor the full impact of the proposed model. However, it is very difficult to substantiate connections between open access implementation and its potential broader impacts and further analysis will be required to determine suitable metrics. Another approach could be to use case studies to help demonstrate value. Future analysis could consider surveying users and collecting testimonials to help understand how stakeholders have benefitted from using open access to solve problems and innovate.

It may also be valuable to explore measures that can indicate the impacts of open access on public awareness and use of scientific information. For example, Altmetrics monitors the citation of publications in news articles and on social media to provide a set of metrics that can be used as measures of attention, dissemination, influence, and impact.

5.3 Broader considerations

The proposed Australian model could be a significant step towards solving systemic challenges in academic publishing. However, the proposed model does not capture all considerations raised by stakeholders related to researcher incentives, open science, independent bibliometrics, and inclusion of monographs and non-traditional research outputs. For the purposes of this report, these considerations are out of scope but could be considered over the long term. Actions and considerations include:

- **Researcher incentives:** Researchers are typically incentivised to publish in prestigious, high impact factor journals. Consideration should be given as to how this impacts the transition to open access. Some stakeholders suggested that alternative career or performance incentives may be needed, such as adopting the recommendations of the San Francisco Declaration on Research Assessment (DORA), which recommends that stakeholders should 'not use journal-based metrics, such as Journal Impact Factors, as a surrogate measure of the quality of individual

research articles, to assess an individual scientist's contributions, or in hiring, promotion, or funding decisions.'¹¹⁴

- **Open science:** Many stakeholders emphasised the opportunity to improve transparency and reproducibility of scientific research, by considering how Australia can support open science. Open science refers to the movement to make elements of research that are not typically included in journal publications openly available for discussion and use. These elements can include unpublished research, data sets, software tools, and other materials. Suitable repositories, including new systems like the UK's Octopus platform,¹¹⁵ will be critical to facilitating open science. It should be noted that UNESCO has drafted a recommendation that is designed to set standards for open science, which will be put forward for adoption by UNESCO's General Conference in November 2021.¹¹⁶
- **Independent bibliometrics:** Further analysis is required to understand stakeholder concerns that databases, aggregators, search systems and metrics used to interface with research content are concentrated to a small number of commercial vendors. For example, Clarivate's Web of Science was the exclusive source of citation data used to assess the quality of Australian research in the 2018 ERA.¹¹⁷ Stakeholders warned that relying on commercial systems to access Australia's research may lock in higher costs, impede innovation in research assessment, and create a lack of transparency (e.g., how research is ranked in search results). These stakeholders recommended developing independent, open, and free bibliometric infrastructure to manage analytics, search functions, and scholar profiles.
- **Monographs and other research outputs:** While monographs are deemed out of scope for the proposed model, they are an important research output in the humanities, arts, and social sciences. Stakeholders recommended planning ahead for the potential inclusion of monographs and more diverse research outputs as part of a future national open access strategy. Evidence from the UK,¹¹⁸ which plans to include monographs under the UKRI's open access policies from 2024,¹¹⁹ may help to inform how this can be managed.

¹¹⁴ San Francisco Declaration on Research Assessment (2012).

¹¹⁵ Jisc (2021) Funding agreed to develop platform that will change research culture .

¹¹⁶ United Nations Educational Scientific and Cultural Organisation; (2021) Open Science. Viewed 28 October 2021, <<https://en.unesco.org/science-sustainable-future/open-science>>.

¹¹⁷ Clarivate (2017) Clarivate Analytics exclusive provider of Web of Science citation data to Australian Research Council for ERA 2018.

¹¹⁸ For example, Universities UK Open Access Monographs Group (2019) Open access and monographs evidence review.

¹¹⁹ See Appendix D. UK Research and Innovation (2021) UKRI open access policy. Viewed 1 October 2021, <<https://www.ukri.org/publications/ukri-open-access-policy/>>.

Appendix A: Consulted organisations

The table below lists the stakeholders that provided input to the development of this report through consultations or written submissions,¹²⁰ and describes each stakeholder group's (high level) roles within the publishing ecosystem. In parallel to this prospective analysis, the OCS has been involved in broader open access consultations with key stakeholders. These have not been included in the table below.

STAKEHOLDER GROUP	ROLE IN ACADEMIC PUBLISHING	CONSULTED STAKEHOLDERS
Research funders	<ul style="list-style-type: none"> • Fund public research directly, through research councils, and through research block grants. 	<ul style="list-style-type: none"> • Australian Research Council (ARC) • National Health and Medical Research Council (NHMRC)
Universities and research institutions	<ul style="list-style-type: none"> • Conduct and publish results of research projects. • Create intellectual property (IP) through results and outcomes of research. • Undertake peer-reviews of academic publications. • Maintain institutional repositories. 	<ul style="list-style-type: none"> • ARC Centre of Excellence for Automated Decision-Making and Society (ADM+S)* • Curtin Open Knowledge Initiative (COKI) • Queensland University of Technology (QUT) • The University of Sydney • Universities Australia • University of New South Wales (UNSW)* • Walter and Eliza Hall Institute (WEHI)
Academic publishing	<ul style="list-style-type: none"> • Provide publishing and related services including arranging peer reviews, formatting articles, hosting articles in online journals, and generating analytics. 	<ul style="list-style-type: none"> • Clarivate • CSIRO Publishing • Elsevier • Institute of Physics (IOP) Publishing • Multidisciplinary Digital Publishing Institute (MDPI) • Springer Nature • Taylor & Francis* • Wiley
Regulatory bodies	<ul style="list-style-type: none"> • Governing authorities enforce compliance to relevant national laws and regulations. 	<ul style="list-style-type: none"> • Australian Competition and Consumer Commission (ACCC)
Industry	<ul style="list-style-type: none"> • May co-fund research for innovation purposes and use research to inform industrial R&D and develop new products or services. 	<ul style="list-style-type: none"> • Woodside
Not-for-profits and advocacy groups	<ul style="list-style-type: none"> • Various peak bodies and advocacy groups associated with research, academic publishing, and industry. 	<ul style="list-style-type: none"> • Association of Learned and Professional Society Publishers (ALPSP) • Australian Council of Learned Academies (ACOLA) • Australian Industry (AI) Group

¹²⁰ Stakeholders that only provided written input are denoted by an asterisk (*).

- Australian Library and Information Association (ALIA)
- Australian Publishers Association (APA)
- Council of Australian University Librarians (CAUL)
- cOAlition S
- Copyright Agency
- Open Access Australasia
- Royal Australian College of General Practitioners (RACGP)
- STM Association
- Technology Council
- Wikimedia Australia*

Appendix B: Journal subscription and open access publishing expenditure survey results

Methodology

The journal subscription and open access publishing expenditure survey was conducted to collect data relating to institutions and organisations' subscription and publishing expenditure. The survey was jointly designed by CSIRO Futures and the OCS using the online survey platform SurveyMonkey and distributed by the OCS to stakeholders via email. The survey was distributed to stakeholders from the following groups: government, university, medical research institute, publicly funded research agency, and other (largely composed of health, education and non-profit organisations).

The survey response collection, data management and analysis were administered by CSIRO Futures. Analysis was conducted to summarise survey data and produce estimates for expenditure relating to APCs. Analysis methodology details are discussed in the survey results.

Results

Responses

In total, there were 93 valid survey responses, of which 33% were universities, 19% were state and federal government, 12% were medical research institutes, and 6% were PFRA. 10% of respondents were in the 'other' group, composed of primarily health, education and non-profit organisations.

While consultations identified some notable subscribers and authors in industry sectors such as energy and biotechnology, there were no industry respondents to this survey. This is a knowledge gap that could be addressed in future work.

Table B1: Respondent breakdown

STAKEHOLDER GROUP	COUNT	PERCENTAGE
Government (federal)	8	9%
Government (state)	10	11%
University	31	33%
Medical research institute	11	12%
Publicly funded research agency (PFRA)	6	6%
Health sector	18	19%
Other	9	10%
Total	93	

Journal subscriptions

For the purposes of this report, CAUL data is assumed to be more accurate for universities than the survey respondent data. The CAUL data for the 2020 subscription year indicated university libraries spent \$273.7 million on both physical and digital journals.

The survey identified approximately \$25.0 million in journal subscription expenditure from 39 organisations outside of the university sector.

Additionally, the OCS provided data on journal subscriptions from an additional nine stakeholder groups not covered by the survey or the CAUL data (this consisted of federal government, state government and PFRA stakeholders). This came to \$4.2 million. Note that while no specific year was provided for these expenditure figures, the most recent available year for this data can be assumed.

Combining these data sets suggests approximately \$302.9 million in journal subscription expenditure nationally for 2020. This is considered a lower bound because the survey only sampled a portion of the non-university stakeholder groups.

By far the largest average journal subscription spend was reported by the university category, at an average of \$7.2 million in total journal subscription spend per university.

Table B2: Journal expenditure – CAUL data, OCS data and survey data combined

STAKEHOLDER GROUP	EXPENDITURE (TOTAL)	TOTAL NO. RECORDED PAYING SUBSCRIPTIONS	AVERAGE JOURNAL SUBSCRIPTION EXPENDITURE (FOR STAKEHOLDERS WHO RECORDED EXPENDITURE)
University (CAUL data)	\$273,679,960	38	\$7,202,104
Federal Government	\$3,351,214	9	\$372,357
State Government	\$7,641,531	13	\$587,810
Medical research institute	\$409,500	2	\$204,750
PFRA	\$9,384,377	8	\$1,173,047
Health sector	\$7,361,117	17	\$433,007
Other	\$1,080,490	7	\$154,356
Total	\$302,908,189	94	\$3,222,428

Transformative agreements (TAs)

The CAUL data for 2020 subscription year indicated that the total university expenditure on TAs was around \$211,000 (or 0.1% of total university expenditure on journal subscriptions and TAs). Only three non-university survey respondents, from government and PFRAs, provided TA expenditure, totalling \$3.9 million. Adding these together gives lower bound figure of approximately \$4.1 million.

Table B3: Transformative agreement expenditure for 2020/2021 – CAUL data and survey data combined

STAKEHOLDER GROUP	TOTAL TA EXPENDITURE IN THE 2020 OR 2021 SUBSCRIPTION YEAR
Universities (CAUL data)	\$210,727
All other stakeholders (survey data)	\$3,851,727
Total	\$4,062,454

Article Processing Charges (APCs)

Thirty-one survey respondents reported their APC expenditure for 2020. These organisations reported spending an estimated \$14.5 million to publish 8,533 open access articles in gold or hybrid journals. This results in an average APC of \$2844.

Table B4: Summary of APC data from survey

STAKEHOLDER GROUP	EXPENDITURE (TOTAL)	NO. PAPERS COVERED BY APC EXPENDITURE	TOTAL NO. ORGANISATIONS RECORDED PAYING APCS
Government (federal)	\$25,138	12	1
Government (state)	0	0	0
University	\$13,008,661	7,886	15
Medical research institute	\$1,147,241	474	8
PFRA	\$325,909	43	3
Health sector	\$10,290	105	3
Other	\$21,550	13	1
Total	\$14,538,789	8,533	31

Note that this only includes organisations who know and are willing to share APC data and that it does not include APCs covered as part of transformative agreements. Over 20 survey respondents noted poor visibility of expenditure on APCs, and many indicated that the totals they provided in the survey were likely to be an underestimate.

Respondents noted several issues associated with APC expenditure, including expenditure not being tracked and reported by their institution and the variety of funding sources (e.g., research grants, personal, faculty budgets) that can be used to pay APCs. In addition, estimates may also be affected by fee-waivers or contributions from other authors from different institutions. Some stakeholders noted plans to implement APC tracking processes in the future. One stakeholder expressed interest in the development of guidelines for best practice APC data collection.

Upper-bound on APC expenditure

Additional to the potentially lower-bound findings from the survey results, the OCS has guidance on an alternative estimation of the current 2020 APC expenditure. This approach yields an upper-bound estimate on current APC expenditure.

This is done by drawing on Web of Science data on 2020 open access publications with Australian authorship from 10 major publishers and publicly available average APC charges for those publishers.

If it is assumed that 70% of these publications are led by Australians who pay the open access fee (see Appendix C below for further discussion on how this was calculated),¹²¹ then multiplying Australian publications by the average APC charge results in a total cost of approximately \$84.8 million. This is a significantly higher figure than that indicated by the survey and should therefore be treated as an upper-bound estimate.

Table B5: Summary of upper-bound estimation of current total APC expenditure in Australia

2020 WEB OF SCIENCE DATA	AUSTRALIAN OPEN ACCESS PUBLICATIONS	ASSUMING 70% OF THESE ARE LED BY AUSTRALIANS WHO PAY THE FEE	AVERAGE APC PER PAPER (AUD)	EXPENDITURE (MILLION AUD)
Elsevier	6,314	4,420	\$3,600	\$15.9
Wiley	6,932	4,852	\$4,403	\$21.4
Springer/Nature	7,328	5,130	\$4,110	\$21.1
Taylor and Francis	1,717	1,202	\$6,576	\$7.9
IEEE	1,189	832	\$2,802	\$2.3
MDPI	4,738	3,317	\$2,276	\$7.5
SAGE	1,374	962	\$1,096	\$1.1
Oxford U	1,635	1,145	\$3,229	\$3.7
Lippincott Williams and Wilkes	649	454	\$4,247	\$1.9
Frontiers Media	1,850	1,295	\$1,565	\$2.0
Total	33,726	23,609	-	\$84.8

Overall expenditure

Total expenditure across all categories (journal subscriptions, TAs, and APCs) for the survey respondents, combined with the CAUL data and OCS data, came to a total of \$321.4 million. Note, again, that this figure should be treated as a lower bound due to the sample size of the survey.

¹²¹ Available data from Scimago Lab suggest that currently approximately 40% of papers with Australian authors do not involve international collaboration. If half of the remaining papers with Australian papers (which involve international collaboration) are assumed to be Australian led, this gives a proportion of 70%.

Table B6: Total expenditure across all categories – journal subscriptions, TAs and APCs (n=77)

STAKEHOLDER GROUP	EXPENDITURE (TOTAL, AUD)	PERCENTAGE
Government (federal)	\$3,376,352	1.1%
Government (state)	\$7,793,258	2.4%
University	\$286,761,642	89.2%
Medical research institute	\$1,556,741	0.5%
PFRA	\$13,410,286	4.2%
Health sector	\$7,371,407	2.3%
Other (survey data)	\$1,102,040	0.3%
Total	\$321,371,726	100%

Appendix C: Benchmarking costs of the Australian open access model

Estimating potential costs of open access for Australia

A high-level and rough costing that could be used as a benchmark comparison for a future open access model for Australia was developed based on Projekt DEAL in Germany.¹²²

Projekt DEAL provides access to academic journals to research consortium members in Germany, funded through a central pool of contributions based on publication rates for each member. At the time of writing, it is the world's largest transformative agreement.¹²³ While Projekt DEAL only has agreements with Wiley and Springer-Nature, it is also one of the few major open access initiatives where the publish-and-read fee per article is readily available.¹²⁴

Using this information, it is possible to create a high-level estimate of costs for the Australian context.

- For Projekt DEAL, the publish-and-read fees are **2,750 EUR per published research article**.¹²⁵ This is approximately 4,500 AUD, which can be conservatively rounded up to 5,000 AUD (if it is assumed that a similar but not smaller equivalent fee per article can be negotiated for Australia).
- There were at least 116,255 journal articles published with Australian affiliated authors in 2020.¹²⁶ This does not consider whether Australian authors have lead authorship.
- This was the highest number in recent years and this number could be conservatively rounded up to **125,000 articles per year** to allow for continued growth of publications in upcoming years.
- However, not all publications that include an Australian author would be eligible for APC funding; only a subset would meet the criterion for inclusion, likely based on Australian lead authorship. Approximately 60% of papers with Australian authors involve international collaboration.¹²⁷ Therefore, **40%** can be stated as the lower bound on the proportion of Australian articles.¹²⁸ Applying this to the 125,000 articles published each year yields **50,000 articles per year**.

¹²² The team also attempted to scale costs associated with the Bibsam Consortium in Sweden. The results for this were similar in scale, but they have not been reported due to low confidence in the approach.

¹²³ Springer Nature (2020) Springer Nature and Germany's Projekt DEAL Finalise World's Largest Transformative Open Access Agreement. Viewed 15 November 2021, <<https://www.springer.com/gp/livingreviews/news/springer-nature-projekt-deal/17553680>>.

¹²⁴ Note that Wiley and Springer-Nature comprise approximately 25% of Australian-linked journal articles in the web of science core collection (2011-2020)

¹²⁵ Springer Nature (2020) Springer Nature and Germany's Projekt DEAL Finalise World's Largest Transformative Open Access Agreement. Viewed 15 November 2021, <<https://www.springer.com/gp/livingreviews/news/springer-nature-projekt-deal/17553680>>.

¹²⁶ Provided by Springer Nature from Dimensions data.

¹²⁷ SJR (2021) Scimago Journal & Country Rank | Australia. Viewed 15 November 2021, <<https://www.scimagojr.com/countrysearch.php?country=AU>>.

¹²⁸ That is to say, 40% of Australian publications do not involve international collaboration and are therefore definitely Australian research.

- To determine an upper bound on the rate of Australian research, it was assumed that half of the remaining articles published are Australian research which gives an upper bound on lead authorship of **70%** (i.e., 40% plus 30%). Applying this to the 125,000 articles published each year yields **87,500 articles per year**.
- Multiplying the lower and upper bound number of articles by the assumed article fee (5,000 AUD) gives a yearly total cost estimate that ranges from **\$250 million to approximately \$440 million**.

These figures can be used to benchmark the expected cost of the proposed open access model for Australia. The lower bound of \$250 million cost per year can be treated as an optimistic price for open access publication of Australia's journal articles and read access for publishing institutions.

Similarly, the \$440 million cost per year cost estimate is likely to be a pessimistic upper bound. One strong reason to suspect this is the case is that an open access model may be negotiated with cost neutrality, as was the case with the Norwegian consortium and Projekt DEAL agreements.¹²⁹

Limitations

As it stands, confidence in the optimistic lower bound estimate of \$250 million and the pessimistic upper bound estimate of \$440 million are constrained by the available data. There are three areas that limit the accuracy of the upper bound and lower bound cost estimates.

1) Uncertainty on publish-and-read fees

It is unclear whether 5,000 AUD is an appropriate assumption for an average publish-and-read fee for the proposed model. It should be noted that the average APC from the survey data is approximately \$2,800. This is low compared to some reported average APCs (see Table B5, above).

Additional effort to collect data on open access costs from a variety of overseas jurisdictions and scale them to the Australian context could help increase confidence in the likely cost of the proposed model.

2) Limited confidence in the number of Australian journal articles published

Both the upper and lower bound figures for Australian research publication rates are broad assumptions that limit benchmarking accuracy. To further refine the estimates and better understand the needs of the model in the future, forecasts of expected publication volumes need to be identified or developed. Figure 7 extrapolates current growth rates for research publications with Australian authors but Australia's future publication rates will be affected by many factors including government policy and research funding.

¹²⁹ Borrego Á, Anglada L and Abadal E (2021) Transformative agreements: Do they pave the way to open access? *Learned Publishing* 34(2), 216–232.

3) The exclusion of additional costs relevant to an open access model

While the cost estimates provided here can be used to benchmark reasonable direct costs of agreements with publishers, many additional costs would need to be considered as part of a design and cost-benefit analysis of the model.

These could include the costs associated with the development and maintenance of any necessary digital infrastructure and the staffing costs for the implementation body. Ultimately, these costs will need to be determined as part of a detailed development and design process for a specific open access model.

Appendix D: International context

National approaches to open access

The below table outlines key activities undertaken by other countries to progress the open access transition and the impact of these approaches overall.

COUNTRY	OPEN ACCESS INITIATIVES	OUTCOMES
UK	<ul style="list-style-type: none"> Implementation of open access in the UK is complex, requiring support and coordination from numerous key players including UK Research and Innovation (UKRI) made of nine councils, seven research councils and the UK's innovation agency. This is in addition to four funding bodies, Universities UK (UUK), two libraries, two supporting organisations and six charities in the open access fund.¹³⁰ In 2012, the UK Government announced policy support for gold open access based on recommendations from their Working Group on Expanding Access to Published Researched Findings (the Finch Report).¹³¹ Jisc Collections established transformative agreements with a variety of publishers allowing UK researchers to publish open access at no additional cost by balancing APCs and subscription fees.¹³² In 2021, the UKRI updated its open access policy to allow both gold and green publishing. The action was considered a strategic move to build influence in renewal negotiations with Elsevier.¹³³ 	<ul style="list-style-type: none"> The proportion of articles available immediately through gold or green open access in the UK grew from 20% in 2014 to 37% in 2016.¹³⁴ The proportion of UK articles available through immediate gold open access terms grew from 12% in 2012 to 30% in 2016. During this time, the number of APCs paid by a sample of ten universities grew fivefold.¹³⁵ Between 2013-2016, the combined costs of subscriptions and APCs for ten UK institutions faced average cost increases of 11% per year. This was above inflation and normal year-on-year growth rates for the same period.¹³⁶ Across 37 universities in the UK in 2016, £56.1 (\$104 AUD) million was spent on subscription costs and £11.3 (\$21 AUD) million on APCs.¹³⁷

¹³⁰ European Commission (2019) Open Research Policies in the United Kingdom: Open Science Monitor Case Study. Luxembourg.

¹³¹ Council of Australian University Librarians (2017) Current State of Open Access: Briefing Paper for Universities Australia (UA) Deputy Vice-Chancellors Research Committee.

¹³² Borrego Á, Anglada L and Abadal E (2021) Transformative agreements: Do they pave the way to open access? *Learned Publishing* 34(2), 216–232.

¹³³ Times Higher Education (2021) UKRI's support for green open access is the right way forward. Viewed 2 September 2021, <<https://www.timeshighereducation.com/blog/ukris-support-green-open-access-right-way-forward>>.

¹³⁴ Universities UK (2017) Monitoring the Transition to Open Access.

¹³⁵ Universities UK (2017) Monitoring the Transition to Open Access.

¹³⁶ Pinfield S and Johnson R (2018) Adoption of open access is rising – but so too are its costs. Viewed 6 July 2021, <<http://eprints.lse.ac.uk/88427/1/impactofsocialsciences-2018-01-22-adoption-of-open-access-is-rising.pdf>>.

¹³⁷ Universities UK (2017) Monitoring the Transition to Open Access.

COUNTRY	OPEN ACCESS INITIATIVES	OUTCOMES
US	<ul style="list-style-type: none"> In 2021, the US had 147 open access mandates and policies, growing from 52 in 2010.¹³⁸ In 2013, the White House Office of Science and Technology Policy issued a directive requiring research funded by federal agencies to be made available for free and in a timely manner.^{139 140} The US' largest medical researcher, the National Institute of Health launched a mandate requiring all research to be available as open access within one year of publication.¹⁴¹ 	<ul style="list-style-type: none"> The percentage of open access publications per year in the US dropped from 68% in 2010 to 45% in 2015.¹⁴²
Canada	<ul style="list-style-type: none"> In 2015, three major research funders in Canada released a harmonised open access policy, which allows both green and gold open access.¹⁴³ This was modelled after the original 2008 policy by the Canadian Institutes of Health Research.¹⁴⁴ 	<ul style="list-style-type: none"> The percentage of open access publications per year in Canada dropped from 61% in 2010 to 45% in 2015. In 2019, the aggregate costs of open scholarship activities for 28 Canadian universities were \$23 million CAD (\$25 million AUD).¹⁴⁵ High journal costs have caused numerous Canadian universities to cancel large subscription contracts.¹⁴⁶
Sweden	<ul style="list-style-type: none"> To support Sweden's transition to gold open access,¹⁴⁷ the Bibsam Consortium was established to organise centrally fund APCs through agreements with 90 higher education and research institutions.¹⁴⁸ 	<ul style="list-style-type: none"> The percentage of open access publications per year in Sweden dropped from 62% in 2010 to 54% in 2015.¹⁵¹ Sweden's higher education subscription and publishing costs in 2019 totalled 504 million SEK (\$80 million AUD). This figure includes 74

¹³⁸ Registry of Open Access Repository Mandates and Policies (2021) Browse by Country | Policies Adopted by Quarter. Viewed 15 July 2021, <<http://roarmap.eprints.org/view/country/un=5Fgeoscheme.html>>.

¹³⁹ Council of Australian University Librarians (2017) Current State of Open Access: Briefing Paper for Universities Australia (UA) Deputy Vice-Chancellors Research Committee.

¹⁴⁰ SPARC Browse Article Sharing Requirements by Federal Agency. Viewed 13 July 2021, <<http://researchsharing.sparcopen.org/articles>>.

¹⁴¹ U.S. Department of Health & Human Services (2008) NIH Public Access Policy Details. Viewed 13 July 2021, <<https://publicaccess.nih.gov/policy.htm>>.

¹⁴² Science-Metrix Inc (2018) Analytical Support for Bibliometrics Indicators: Open access availability of scientific publications. Montréal.

¹⁴³ Council of Australian University Librarians (2017) Current State of Open Access: Briefing Paper for Universities Australia (UA) Deputy Vice-Chancellors Research Committee.

¹⁴⁴ UNESCO Global Open Access Portal | Canada. <<http://www.unesco.org/new/en/communication-and-information/portals-and-platforms/goap/access-by-region/europe-and-north-america/canada/>>.

¹⁴⁵ Canadian Association of Research Libraries (2020) CARL Member Libraries Quantify Their Investments in Open Scholarship. Viewed 8 October 2021, <<https://www.carl-abrc.ca/news/carl-member-libraries-quantify-their-investments-in-open-scholarship/>>.

¹⁴⁶ Council of Australian University Librarians (2017) Current State of Open Access: Briefing Paper for Universities Australia (UA) Deputy Vice-Chancellors Research Committee.

¹⁴⁷ Taylor & Francis Open access funding for authors in Sweden. Viewed 14 July 2021, <<https://authorservices.taylorandfrancis.com/publishing-open-access/oa-agreements/open-access-funding-for-authors-in-sweden/#>>.

¹⁴⁸ National Library of Sweden (2021) Bibsam Consortium. Viewed 14 July 2021, <<https://www.kb.se/samverkan-och-utveckling/oppen-tillgang-och-bibsamkonsortiet/open-access-and-bibsam-consortium/bibsam-consortium.html>>.

¹⁵¹ Science-Metrix Inc (2018) Analytical Support for Bibliometrics Indicators: Open access availability of scientific publications. Montréal.

COUNTRY	OPEN ACCESS INITIATIVES	OUTCOMES
	<ul style="list-style-type: none"> The National Library of Sweden coordinates and funds the OpenAccess.se programme in collaboration with a breadth of national research institutions.¹⁴⁹ Established in 2006, the programme has created a global Directory of Open Access Journals (DOAJ), a national publications portal, and research institute and funder policies.¹⁵⁰ 	<p>million SEK (\$12 million AUD) on open access publishing, 93 million SEK (\$15 million AUD) on transformative agreements and 17 million SEK (\$3 million AUD) on fully open access agreements.¹⁵²</p>
Norway	<ul style="list-style-type: none"> Since 2014, all Norwegian institutional archives can be searched through the Norwegian Open Research Archive (NORA).¹⁵³ In 2016, Norway had 11 open access mandates and policies; two with research funders and nine with research organisations across the country.¹⁵⁴ In 2017 the Norwegian Government introduced an open access mandate to scholarly articles.¹⁵⁵ In 2019, Norway's consortium proposed a combined read-and-publish deal with Elsevier. As a result of unsuccessful negotiations, the consortium cancelled its subscription contracts with Elsevier.¹⁵⁶ In 2019, Norway established a pilot transformative agreement with Elsevier expected to be relatively cost neutral with previous agreements.¹⁵⁷ 	<ul style="list-style-type: none"> More than 70% of Norwegian articles published between 2011-2015, are openly available.¹⁵⁸
Germany	<ul style="list-style-type: none"> In 2020, Germany had 75 open access mandates and policies; the majority of these (71) with research organisations across the country.¹⁵⁹ A group of German institutions collaborated to form a country-wide initiative known as Projekt DEAL. The initiative aimed to establish national 	<ul style="list-style-type: none"> The percentage of open access publications per year in Germany dropped from 56% in 2010 to 46% in 2015.¹⁶³

¹⁴⁹ UNESCO Global Open Access Portal | Sweden. Viewed 13 July 2021, <<http://www.unesco.org/new/en/communication-and-information/portals-and-platforms/goap/access-by-region/europe-and-north-america/sweden/>>.

¹⁵⁰ European Commission (2013) Open Access Strategies in the European Research Area.

¹⁵² Kungliga Biblioteket (2021) Cost of scholarly publishing. Viewed 30 July 2021, <<https://www.kb.se/samverkan-och-utveckling/oppn-tillgang-och-bibsamkonsortiet/open-access-and-bibsam-consortium/cost-of-scholarly-publishing.html>>.

¹⁵³ United Nations Educational S and CO (2017) Global Open Access Portal | Norway . Viewed 13 October 2021, <<http://www.unesco.org/new/en/communication-and-information/portals-and-platforms/goap/access-by-region/europe-and-north-america/norway/>>.

¹⁵⁴ Registry of Open Access Repository Mandates and Policies (2021) Browse by Country | Policies Adopted by Quarter. Viewed 15 July 2021, <<http://roarmap.eprints.org/view/country/un=5Fgeoscheme.html>>.

¹⁵⁵ Ministry of Education and Research (2017) National goals and guidelines for open access to research articles. regjeringen.no.

¹⁵⁶ Offord C (2019) Norway Joins List of Countries Canceling Elsevier Contracts. The Scientist Magazine .

¹⁵⁷ ESAC Initiative (2019) Elsevier 2019 unit. Viewed 28 October 2021, <<https://esac-initiative.org/about/transformative-agreements/agreement-registry/els2019unit/>>.

¹⁵⁸ Mikki S, Gjesdal ØL and Strømme TE (2018) Grades of Openness: Open and Closed Articles in Norway. Publications 2018, Vol. 6, Page 46 6(4), 46. DOI: 10.3390/PUBLICATIONS6040046.

¹⁵⁹ Registry of Open Access Repository Mandates and Policies (2021) Browse by Country | Policies Adopted by Quarter. Viewed 15 July 2021, <<http://roarmap.eprints.org/view/country/un=5Fgeoscheme.html>>.

¹⁶³ Science-Metrix Inc (2018) Analytical Support for Bibliometrics Indicators: Open access availability of scientific publications. Montréal.

COUNTRY	OPEN ACCESS INITIATIVES	OUTCOMES
	<p>licensing agreements with major academic publishers from 2017 onwards.¹⁶⁰</p> <ul style="list-style-type: none"> • The Projekt DEAL Consortium failed to reach a read-and-publish agreement with Elsevier and more than 180 German scientific institutions chose not to extend their contracts in 2017.¹⁶¹ • Projekt DEAL has established transformative agreements with both Springer Nature and Wiley.¹⁶² 	

¹⁶⁰Projekt DEAL About DEAL. Viewed 28 October 2021, <<https://www.projekt-deal.de/about-deal/>>.

¹⁶¹ Science D, Hook D, Hahnel M and Calvert I (2019) The Ascent of Open Access.

¹⁶² ESAC Initiative (2020) Springer Nature 2020 deal. Viewed 27 October 2021, <<https://esac-initiative.org/about/transformative-agreements/agreement-registry/sn2020deal/>>. ESAC Initiative (2019) Wiley 2019 deal. Viewed 28 October 2021, <<https://esac-initiative.org/about/transformative-agreements/agreement-registry/wiley2019deal/>>.

Key international initiatives

The table below highlights key international open access initiatives and the scale and impact of these programs so far.

INITIATIVE	DESCRIPTION	IMPACT
	<p>COAR is an association established to gather individual repositories and networks. COAR aligns policies, builds capability and acts as a representative body for repositories.</p>	<ul style="list-style-type: none"> • Includes a global network of 151 members across 51 countries. • Four Australian universities are members.¹⁶⁴
	<p>DORA is the San Francisco Declaration on Research Assessment, which aims to improve the methods for evaluating scholarly research. DORA supports institutions to incorporate contributions to Open Science into promotion, hiring and funding decisions.</p>	<ul style="list-style-type: none"> • Currently holds 2252 signatories. • Springer Nature is the largest signatory to date.¹⁶⁵
	<p>LA Referencia is a network of repositories in Latin America promoting open and free visibility of research.</p>	<ul style="list-style-type: none"> • La Referencia and OpenAIRE (below) account for half of the world's open access repositories.¹⁶⁶
	<p>OA2020 is a global alliance aiming to convert journals from a subscription based to open access model through a collaborative agreement, community of practice and repurposed funding.</p>	<ul style="list-style-type: none"> • Open Access Australasia have signed this agreement.¹⁶⁷

¹⁶⁴ Confederation of Open Access Repositories (2021) Working towards a sustainable, global knowledge commons based on a network of open access repositories: COAR Annual Report 2020-2021.

¹⁶⁵ Declaration on Research Assessment Signers. Viewed 27 July 2021, <<https://sfdora.org/signers/>>.

¹⁶⁶ Confederation of Open Access Repositories Europe and Latin America expand their collaboration for open science. Viewed 27 July 2021, <<https://www.coar-repositories.org/news-updates/europe-and-latin-america-expand-their-collaboration-for-open-science/>>.

¹⁶⁷ OA2020 (2020) OA2020 Progress Report. Viewed 27 July 2021, <<https://oa2020.org/progress-report/#info>>.

INITIATIVE	DESCRIPTION	IMPACT
	<p>OpenAIRE is a participatory initiative to support Open Science in Europe through repository infrastructure, guidelines, training and network support.</p>	<ul style="list-style-type: none"> • Net social value is estimated to be five times higher than costs.¹⁶⁸
	<p>Plan S is an initiative to accelerate the transition to full and immediate open access. Participating funders agree to a set of 10 open access principles.¹⁶⁹</p>	<ul style="list-style-type: none"> • Organisations that support the Plan S initiative form the international cOAlition S consortium. Supporting members include the European Commission, the World Health Organisation, and the Gates Foundation.¹⁷⁰
	<p>SHARE is a community based open-source initiative to enable new discoveries through tools and services able to link related research.¹⁷¹ Involves a partnership between the Association of Research Libraries (ARL) and Centre for Open Science (COS).</p>	<ul style="list-style-type: none"> • ARL includes 123 universities across the US and Canada.¹⁷²

¹⁶⁸ Koundouri P, Chatzistamoulou N, Dávila OG, Giannouli A, Kourogenis N, Xepapadeas A and Xepapadeas P (2021) Open Access in Scientific Information: Sustainability Model and Business Plan for the Infrastructure and Organization of OpenAIRE. *Journal of Benefit-Cost Analysis* 12(1), 170–198.

¹⁶⁹ European Science Foundation (n.d.) Plan S Principles. Viewed 19 July 2021, <https://www.coalition-s.org/plan_s_principles/>.

¹⁷⁰ Plan S (2021) Organisations endorsing Plan S and working jointly on its implementation. Viewed 8 October 2021, <<https://www.coalition-s.org/organisations/>>.

¹⁷¹ SHARE (n.d.) SHARE Homepage. Viewed 8 October 2021, <<https://www.share-research.org/>>.

¹⁷² Association of Research Libraries (2020) SHARE Database Shutting Down While SHARE Services Enter New Phase.

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