Centring Our Values:

Open Access for Aotearoa

tohatoha

supporting kiwis to create, share and innovate

About Tohatoha

Tohatoha Aotearoa Commons is an incorporated society aiming to grow a national movement that advocates, promotes, and enables openness, sharing, and equity in Aotearoa New Zealand and on the internet. Our vision is to realise the full potential of the Internet — universal access to research and education, full participation in culture — to build a stronger Aotearoa New Zealand, and see to it that Kiwis and our values and culture are part of the global commons of creativity and knowledge.

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This report was made possible with funding from Internet New Zealand.

InternetNZ is a non-profit organisation, and the home and guardian of .nz – providing the infrastructure, security and support to keep it humming. We use the funding from the sale of .nz domain names to support the development of New Zealand's Internet through policy, community grants, research and events. Our mission is an Internet that is open, secure, and for all New Zealanders. We're pleased to be partners with Tohatoha, recognising the commitment our organisations share to openness and to helping New Zealand utilise the Internet, share content and ideas, and use open frameworks to enable that.

Authors' Bios

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Mandy is the CEO of Tohatoha Aotearoa Commons, with a background as a librarian, writer, and advocate for a healthy and vibrant Commons. She was named a 2012 Library Journal Mover and Shaker for her work as a founding member of the People's Library at Occupy Wall Street, and is the author of Economy, Ecology, Equity: The Path to a Carbon Neutral Library (ALA Editions 2014).

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Anton is a data librarian working at the University of Canterbury. He has written on Free, Libre and Open Source Software, and Open Access to new knowledge. He is the current technical editor for the NZ Library and Information Journal, in the process of flipping it to OA, and on the CONZUL Open Access project team. He writes occasionally about OA on his blog, http://anton.angelo.nz.

Ginny Barbour

Ginny is Director of the Australasian Open Access Strategy Group, and advisor to the library and the Office of Research Ethics & Integrity at Queensland University of Technology (QUT). In 2004 she was one of the three founding editors of PLOS Medicine, and became Editorial Director for Medicine and Biology at PLOS. She has participated in many publishing and ethics initiatives, currently including the DORA International Advisory board and NHMRC's Research Quality Steering Committee."

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Visit our webpage at **www.tohatoha.org.nz/openaccess/** to see and share our videos, sign the Declaration, and join the movement for open access for Aotearoa.

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Key Recommendations

Develop a National Strategy

- National Library, CONZUL, and LIANZA should work together collaboratively to lead the development of a national level strategy.
- Each University and Crown Research Institute should appoint a senior leader who can manage strategy development and local coordination, while liaising with the wider research community.
- Māori scientists, scholars, and researchers need to be specifically invited into this conversation and supported to participate. National Library, the Universities, and Crown Research Institutes should work to create the conditions needed for self-determination and an equitable outcome.

Fill the Knowledge Gaps

New Zealand has critical gaps in its knowledge around open access, scholarly publishing, and open data. To create good policies and move forward with this transformation, more research and more funding to conduct that research is needed. There is room for multiple robust research projects to help understand the needs of researchers, their current behaviors, and what interventions make the most sense in New Zealand.

Centre Care

- Work with the Tertiary Education Union to reform the Performance Based Research Funding system to support well-being and disentangle from proprietary non-transparent metrics. Refocus on traditional peer review and innovative ways of measuring excellence.
- Fund and support education for librarians, academics, and administrators to develop a deeper understanding of scholarly communication and open access issues.
- Support public and university community focused education campaigns to engage a wide range of people in open access issues and invite them into the conversation.

Build Alliances

There are a wide range of opportunities for collaboration and cooperation, both here at home and overseas. Working to build new relationships and strengthen existing ones is a key part of building a care centred system. New Zealand should prioritise this care work, seek out new partners, and invest in long-term relationship building to create trust and develop shared vision.

Strengthen Open Access Infrastructure

Transforming our scholarly communications system requires building both policy and technological infrastructure. To create a robust system that will support the kind of transformative change needed, we should prioritise developing this infrastructure as part of a deep engagement process with researchers, scholars, and scientists.

- New Zealand universities should coordinate with our Australian counterparts and work to develop a regional response to Plan S.
- Open Access policies across New Zealand universities and Crown Research Institutes should be harmonised to strengthen our national negotiating position - but, this process should be based on robust engagement with academics across disciplines and with the needs of Māori and other marginalised scholars at the forefront.
- Increase existing investment in university repositories to ensure that 'green' open access remains a robust path.
- Expand the existing institutional repository system to Crown Research Institutes and others.
- Develop a policy framework focused on carbon footprinting and monitoring to ensure that the system is as close to zero carbon as possible.

Executive Summary

New Zealand invests billions of dollars each year in research that is locked behind the paywalls of large academic publishers. Tohatoha wants to see a New Zealand where the work of our scholars, scientists and researchers is open and available for everyone to read, share, and reuse.

To realise this vision, New Zealand needs a national strategy to open the work of our publicly funded scholars, scientists, and researchers. Done well, this strategy will contribute to improved policy making, help to educate the electorate, and support practitioners in a wide range of professions, while also strengthening New Zealand's economy by providing access to R&D to the private sector.

This work is also crucial to the work of climate change adaptation and mitigation. Facing up to the enormous responsibility of just transition and getting the work underway requires widespread access to knowledge, data, and information. Greater access and openness are key to unlocking the innovative potential of New Zealand society as we work together to reduce greenhouse gases.

We also need to think very differently about research excellence. The Performance Based Research Fund is harming the well-being of our academic community, including Māori and Pacifika researchers. A new system that attends to the well-being of our researchers and scholars, while also redefining excellence in a way that is not tied into proprietary metrics, is crucial to opening up knowledge and building the kind of Aotearoa that shares the benefits of knowledge widely for the good of everyone.

At the same time, we want to live in a New Zealand where the Crown fulfills its commitment as a Treaty partner by living up to the diversity and equity statements made by its universities. There is ample evidence that the system as it stands now creates specific harms for Māori scholars and scientists. Reimagining our scholarly communications system offers us the opportunity to develop a system where these inequities are rectified and remedied.

Open access offers a path forward—one based in innovation, care, excellence, and honouring Tiriti.

Centring Our Values

In an age that will be defined by how we choose to transform our society in the face of a changing climate and biodiversity crisis, the work of Aotearoa New Zealand's universities and Crown Research Institutes is more vital than ever.

Across the research sector, new ways of understanding our world, improved technologies, and a deeper understanding of the Earth and its people are being brought forth. New stories are being told. Old stories are being remembered, retold, and reimagined.

The work being done by researchers, students, scientists, and others is key in the regeneration work that our world needs and that current generations owe to the future. Without knowledge, we cannot build wisdom - and ours is an era that calls for wisdom.

The President of the Royal Society Te Apārangi said in a recent speech, "In an era of engagement, impact and advancement we will need to think very differently about research excellence."[1] We at Tohatoha agree with this statement. We believe that we cannot think differently about research excellence without reforming our scholarly communication system—and through that process reforming the way we measure impact, determine excellence, and create thriving scholarly, scientific, and arts communities.

We need a system that helps us to meet our purpose. And if the purpose of the scholarly endeavour isn't to provide the world with the understanding needed to learn how to live with each other on this planet, then what is the purpose? And if that is the purpose, then we need to build systems to spread that understanding.

Tohatoha wants to see a New Zealand where each person has access to the information that they need. Where librarians, researchers, scholars, and scientists collaborate to build innovative new kinds of research outputs, reflecting the kind of regenerative work needed to build a carbon-free economy. Where the general public and working professionals have access to the knowledge they need to engage in self-directed lifelong learning. And where the New Zealand government honours its commitment to te Tiriti and mātauranga Māori thrives.

Our scholarly communication system is a barrier to realising this vision. The work of our scientists, scholars, and researchers is being enclosed behind paywalls. These paywalls exclude almost everyone who could benefit from this new knowledge. Educated professionals, engaged voters, ambitious entrepreneurs—all are required to pay excessive sums to read work funded by their government, with all of our tax dollars.

There is a better way. Across the globe, libraries, universities, and entire countries are forging exciting and diverse new paths. New ways of publishing, new ways of sharing, new ways of building knowledge together. Open access, open data, open scholarship all offer a better path to sharing and creating new knowledge with other researchers and with communities. There is no one organisation or group who can make the needed changes. This is a project that needs to cross institutional boundaries in ways that aren't always comfortable and are in some ways unprecedented.

1 "President's Address 2019 on Redefining Research Excellence," Royal Society Te Apārangi, accessed September 7, 2019, https://royalsociety.org.nz/major-issues-and-projects/presidents-address-2019/.

Together we need to help scholars, researchers, and scientists build new ways of sharing knowledge, information, and data. Multitudinous new ways of knowing and growing knowledge, all tied together by a set of values that inform us and remind us all of our shared purpose.

Centring innovation, because we must

Being alive in this time on this planet means working to replace outdated ways of thinking with new ideas, new stories, and new techniques. It means working to better understand the past, to help us build a better future. Learning how to regenerate ecosystems and discovering how best to get energy from the sun. Remembering how to live in this land and how to tell stories that support new ways of being.

The word ‘innovation’ often rings hollow from overuse, but innovation in our scholarly communication system is key because new ideas and new kinds of research need new ways of telling and new ways of showing. The research outputs of the future will be central to how we manage a just transition and how we sustain ourselves for generations to come.

Whether research article or practitioner guideline, traditional monograph or ever-changing shared online narrative—this new system needs to be creative, invigorating, and open to all.

Centring care, because we value people

We each exist in a nexus of relationships and communities, with different needs, interests and desires. Any scholarly communication system needs to recognise these relationships and meet researchers where they are. This requires care for the individual situations of author, editor and reader, as opposed to the cookie-cutter approaches of much of the publishing landscape.

Care also requires the promotion of difference. Diversity of research output and communication of that output is to be encouraged and nurtured within the publications, policies and infrastructures that make up the scholarly communication ecosystem. This requires a holistic approach to the different identities, practices and relationships involved within research, rather than a simple focus on the accessibility of ‘outputs’.

Centring excellence, because our work matters

Excellence in research is so much more than publishing in prestigious journals. It’s rigour, it’s creativity, it’s collaboration.

Being tied into an ever tightening web of vertically integrated external metrics—driven by proprietary data and algorithms— isn’t the kind of future that will build an excellent research programme. Retweets and likes, shares and downloads are not the future. Excellence isn’t a popularity contest.

Open Access for Aotearoa

Knowledge has never been more vital to the well-being of the world. The work done in our universities, Crown Research Institutes, and other publicly funded institutions benefits from taxpayer funding. Unlike journalists or novelists, these thinkers, researchers, and writers have funded positions. The public should benefit from their work.

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Right to read

Taxpayer funded research should be available for everyone to read. This work has already been paid for by taxpayers for the benefit of everyone. It should not be locked behind paywalls and sold back to us for profit.

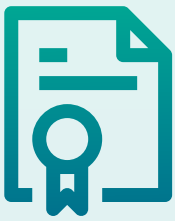
Right to share

Knowledge only has value when shared. Students, professionals, and the general public all benefit from the wide availability of scientific, medical, social science, and humanities knowledge. Being able to pass that knowledge on through the internet and in print is crucial to a healthy information system. Paywalls privilege the privileged and allow propaganda to flourish.

Right to reuse

All works build on those that came before. The right to creatively and productively engage with prior work is a core part of how we all benefit from new knowledge. Making full use of a given work requires us to engage with it not only as readers, or information consumers, but as creators in our own right. Paywalls inhibit this process and create a stifling effect on creativity.

To make this happen we need

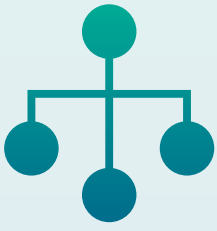


Open licensing

Copyright licenses serve as the permission to use, share, and reuse a work. Licenses need to be clearly explained, widely used, and acceptable on the platforms we all use as knowledge seekers and creators. At this time, Creative Commons licenses are the best tools available. Open platforms such as Wikimedia require a CC0 or CC-BY license and these should be used for publicly funded research outputs.

Open data

Data, code, and other research products should be shared openly and as widely as possible, while attending to the dignity, rights, and expectations of those from whom the data has been gathered. These research products should be made available alongside research outputs to ensure that they are available for use, review, and reuse by other researchers, professionals, and the general public.



Open infrastructure

To share knowledge widely and without cost to readers and creators, we need to direct resources towards projects that enable publishing, distributing, collecting, cataloging, indexing, and archiving research outputs. That infrastructure should be coordinated, open source, scholar-led and governed, environmentally friendly, and benefit from long-term financial commitments from the New Zealand government, universities, and research institutes.

Metrics that matter

We measure what matters and it matters what we measure. Contributions to human knowledge cannot be reduced to a set of metrics. The evaluation of scholarship is a complex and multifaceted activity. It should not be limited to bibliometrics, social media based alt-metrics, or any other single metric. Rather, metrics should be an adjunct to qualitative assessments.

Āheinga Tūwhera mō Aotearoa

Koinei te wā i ora ai te mātauranga mō te oranga o te āo. Ko ngā mahi kua oti i ō tātou Whare Wānanga, Whare Takiura Karauna Rangahau, me ētahi atu Whare Takiura e utua ana e ngā whare tumatawhānui mā ngā pūtea tāke. Atu i ngā kairīpoata kaituhi rānei, ko ēnei kaiwhakaaro, kairangahau, kaituhi he tūranga utu ā rātou. Me whai hua te katoa i ā rātou mahi.

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Te Mana ki te pānui

Ko ngā ranghau a ngā kaiutu tāke e tika ana kia whai wāhi ki te katoa ki te pānui. Kua utua kētia ēnei e ngā kaiutu tāke hei hua mō te katoa. Me kaua e noho ki muri i ngā pātū ā-utu ka hokona atu ai ki a tātou mō te mahi moni te take.

Te Mana ki te tohatoha

Ka whai mana te mātauranga mehemea ka tohaina. Ka whai hua ai ngā ākonga, kaiako, te tumatawhānui i te aheinga o ngā mātauranga pūtaiao, hauora, hāpori, tangata. Ko te aheinga o te tuku i taua mātauranga mā te ipurangi me te tārua he motuhake mō te pūnaha oranga hauora. Ko ēnei pātū he whakaora i te hunga whai rawa me te puawaitanga o ngā rūpahu.

Te mana ki te tōai

Ko ngā mahi katoa he mea hanga i tēnā kua hangaia kētia. Ko te mana o te auahatanga me te whanaketanga ki ngā mahi o mua he wāhanga motuhaka e whai hua ai tātou i ēnei mātauranga hōu. Ko te uru ki ēnei mahi me whakapā atu tātou kaua hei kaipānui, hei kiritaki mōhiohio rānei, engari hei kaihanga ki a tātou ake. Ko ngā pātū ā-utu e tāmoe ana i tēnei tukanga me te aupēhi i te auahatanga.

E tutuki ai tēnei anei ngā hiahia

Raihana Tūwhera

Ko ngā raihana manatārua e tuku ana i te whakaaetanga ki te whakamahi, te tohatoha, te tōai i tētahi mahi. Me mātua whakamārama ēnei raihana, te whakamahinga, te whakaatetanga hoki ki ngā tūāpapa katoa e whakamahi ana e tātou, pēnei i te mātauranga, ngā kaikimi me ngā kaihanga. I tēnei wā ko ngā raihana a Creative Commons ngā mea pai. Ko nga tūāpapa tūwhera pēnei i a Wikimedia me whai raihana CCO, raihana CC-BY rānei, ā, e tika ana kia whakamahia e ngā whakaputanga rangahau utu tumatawhānui.

Raraunga Tūwhera

Ko ngā raraunga, te uhingaro, me etahi atu hua me tohatoha ki te katoa ahakoa te aha, nō te tae atu ki ngā huatau, ki ngā mōtika, me ngā hiahia o te hunga nō rātou ngā raraunga i whakaemi. Me kite ēnei hua rangahau ki te taha o ngā whakaputanga rangahau e motuhake ai ki te katoa ki te whakamahi, te aromātai, te tōai i ētahi atu kairangahau, mātanga, te tuamatawhānui hoki.

Hanganga Tūwhera

Ko te tohatoha i te mātauranga ki te katoa me te kore utu ki ngā kaipānui me ngā kaihanga, me horipū ngā rauemi ki ngā hinonga e whakaae ana ki te whakaputa, te tohatoha, te kohikohi, te whakarārangi, te rārangi whakaatu, me te pūranga whakaputanga rangahau. Ko te hanganga me whakarite e te ahunga tūwhera, he mea ārahi, he mea whakaruruhau, e te tautaiao, e whai hua ai i te pūtea tautoko i te Kawanatanga o Aotearoa, ngā wānanga, me ngā whare rangahau.

Te Pūnaha Whai Mana

Ka ine mātou i tēnā e whai mana ana, ā, e whai mana ana tēnā ka inea e mātou. E kore e taea e te pūnaha te whakaheke i ngā tāpaetanga ki te mātauranga a te tangata. Ko ngā arotake o ngā karahipi he take uaua, he nui ngā mata. Kia kaua e noho noaiho ki ngā bibliometrics, ki ngā altimetrics pae pāpori, ētahi atu pūnaha rānei. Engari, me noho tahi ngā pūnaha ki ngā aromatawai tikanga kounga.

Excellence in our scholarly communication system doesn't come from the impact factor or the h-index. It will come from transforming the existing system into one that supports all readers and writers—from first-year students reading their first peer reviewed article to emeritus professors writing their last.

Centring Tiriti, because we are people of integrity

Aotearoa New Zealand is a bicultural nation, united by a Treaty. Tiriti O Waitangi is a commitment to work alongside each other in partnership.

Fulfilling our commitment to honouring Tiriti means prioritising Māori scholars, scientists, researchers and students in our scholarly communications system. It means keeping their interests and needs at the forefront. mātauranga Māori and Te Ao Māori aren't peripheral to the work of our universities and Crown Research Institutes. They are at its core.

We need a scholarly communication system that reflects this bicultural commitment—one designed for and defined by a 21st century Te Ao Māori.

Building our shared future

We who live in Aotearoa New Zealand have before us the opportunity to strengthen our democracy and work toward transformative change in how we share, learn, and live together in community. This is an era when we get to remake the world in ways that benefit us all—where we must remake the world or else it will remake itself.

Our best hope for realising a shared vision of aroha on a regenerated and thriving Earth is the exploration of the world, our societies, and the work of imagination—telling new stories, imagining new ways of being, and working together to drive transformation and regeneration.

Understanding the Academic Publishing Market

Academic publishing is dominated by a small number of large multinational commercial publishers and a large number of small presses. Just four publishers, Springer, Elsevier, Wiley, and Taylor & Frances, publish more than 2,000 journals each.[2] Between them they own over 50% of the total scholarly journal article output, with rates over 70% for some disciplines.[3] As an industry, the academic publishing market is highly concentrated, consolidated, and able to exert considerable market power.

The global revenue for journal publishing was estimated at $9.9 billion USD for 2018.[4] The sector has enjoyed a long run of exceptional profit margins, generally understood to be between 35%-40%.[5] This places the industry in line with, or higher than, the profits enjoyed by the world's most profitable companies. It is no surprise then that literature aimed at investors describes the sector as a sound investment.[6]

But why? How did scholarly and scientific publishing come to be one of the most profitable industries in the world? The answer to that lies in the way that commercial publishers have been able to develop captive markets while offloading the costs of production to taxpayers. These companies have been strategic in their ability to transform the scholarly communication system. They have done this by embedding their products into recognition and reward systems, positioning librarians against researchers, and ensuring that financial flows are hidden from the general public, university leadership, and others who might serve as a check on the system.[7]

Academic and scholarly publishing differs from the rest of the publishing industry in some key ways. Outside of the academic market, publishers face a range of challenges that limit their profitability. They face significant costs for content, distribution, and sales. Paying authors and editors, organising distribution channels, investing in developing an audience to buy their books and magazines; these costs are significant and many publishers struggle to keep their doors open in a very challenging economic environment. As a general rule, book publishers manage a 10% profit margin and magazine publishers bring in 12-15%.[8] [9]

Large commercial academic publishers benefit from a very different model. Under this model, the academics who do the research, writing, and peer reviewing are paid by universities or research

2 Mark Ware and Michael Mabe, "The STM Report: An Overview of Scientific and Scholarly Journal Publishing," *Copyright, Fair Use, Scholarly Communication, Etc.,* March 1, 2015, https://digitalcommons.unl.edu/scholcom/9.

3 Vincent Larivière, Stefanie Haustein, and Philippe Mongeon, "The Oligopoly of Academic Publishers in the Digital Era," ed. Wolfgang Glanzel, *PLOS ONE* 10, no. 6 (June 10, 2015): e0127502, https://doi.org/10.1371/journal.pone.0127502.

4 Rob Johnson, Anthony Watkinson, and Michael Mabe, "The STM Report: An Overview of Scientific and Scholarly Publishing" (The Netherlands: International Association of Scientific, Technical and Medical Publishers, October 2018), https://www.stm-assoc.org/2018_10_04_STM_Report_2018.pdf. p. 22

5 Larivière, Haustein, and Mongeon, "The Oligopoly of Academic Publishers in the Digital Era."

6 Aileen Fyfe et al., "Untangling Academic Publishing: A History of the Relationship between Commercial Interests, Academic Prestige and the Circulation of Research" (Zenodo, May 25, 2017), https://doi.org/10.5281/zenodo.546100.p.10.

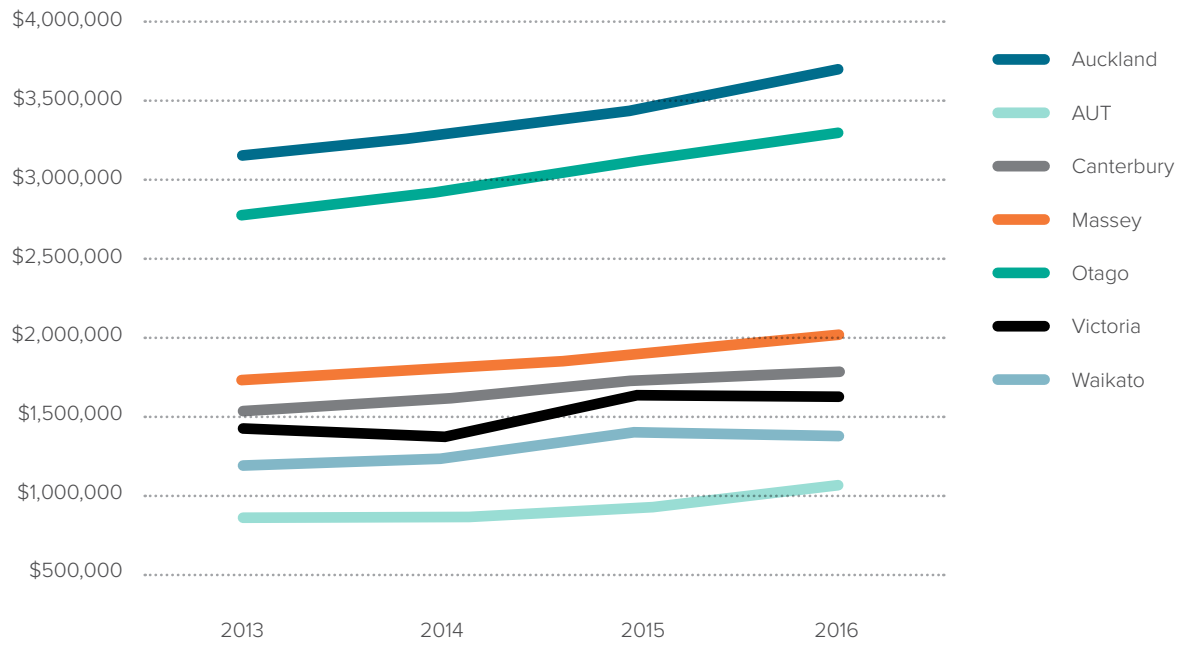
7 "Opening the Black Box of Scholarly Communication Funding: A Public Data Infrastructure for Financial Flows in Academic Publishing," *Open Library of Humanities* 2, no. 1 (April 11, 2016): e10, https://doi.org/10.16995/olh.72.

8 Jeremy Greenfield, "Why Amazon Is Going After Publisher Profit Margin," Forbes, accessed September 6, 2019, https://www.forbes.com/sites/jeremygreenfield/2014/06/16/why-amazon-is-going-after-publisher-profit-margin/.

9 Stephen Buranyi, "Is the Staggeringly Profitable Business of Scientific Publishing Bad for Science?," *The Guardian*, June 27, 2017, sec. Science, https://www.theguardian.com/science/2017/jun/27/profitable-business-scientific-publishing-bad-for-science.

institutes. These institutions, particularly in New Zealand, are almost entirely taxpayer funded. Unlike most book publishers, academic publishers don't pay royalties to article authors or to the research universities and institutes who employ them. The publishers do contribute typesetting, copy editing, and digital platform development and hosting. In return for this, academics sign over the copyrights to their work and then publishers license these works back to the universities. It's a system that transfers money from universities to publishers.

Just how efficiently it does this can be seen in the continuing increase in costs over time. In recent years, they have risen at four times the rate of inflation. Figures released after an Official Information Act request in 2016 asking for the total cost of subscriptions for the top four publishers to NZ Universities showed a 15% increase over four years, from $12,725,000 to $14,895,000 (see below). Over roughly the same period, global university library budgets remained relatively flat.[10] This is not a financially sustainable situation. Moreover, paying this much of the budget to such a small number of publishers reduces New Zealand libraries' ability to diversify collections, support our local publishing sector, and develop innovative new research support services and products.



NZ Journal subscription costs for the largest four publishers, 2013 to 2016. Data from: Wilson, Mark (2017): Spreadsheet of journal subscription costs.. Dataset.[11] Note: Lincoln did not provide figures.

Publishers have justified these increases with claims about the need to invest in digital infrastructure, storage, and search capacity, alongside claims about the benefits of letting the free market do its work and the supposed benefits of increased publishing volume. But given their strong profit margins, this argument is weak, at best.

10 Publishers Communications Group, "Library Budget Predictions for 2017," 2017.
11 Mark Wilson, "Journal Expenditure 2013-2016 by NZ Universities," 2017, https://figshare.com/projects/Journal_expenditure_2013-2016_by_NZ_universities/27160.

Scholarly publishing is largely supported by the budgets of academic libraries, with STEM publishers in the US market receiving 80-90% of their revenue from library subscriptions.[12] Despite this, the market power of libraries is limited. Individual journal titles are, by their nature, monopolies. It is not possible to substitute one for another. Moreover, journals are not competing on subscription price, rather they are competing for prestige. Because students and researchers need access to a wide range of scholarly literature, often including very specific titles, libraries have limited power to refuse to renew a given package, which makes them weak at the negotiating table.

New Zealand and Australian university libraries and government research institutions have worked to increase their bargaining power by negotiating as a bloc. This has been a common tactic globally and one that brings considerable benefits, while not solving the problem outright. The primary negotiating consortium for New Zealand is the Council of Australian University Librarians (CAUL) Content Procurement Strategic Advisory Committee (CPC).[13] It acts on behalf of both New Zealand and Australian libraries to negotiate subscription prices.

12 Heather Morrison, "Economics of Scholarly Communication in Transition," *First Monday* 18, no. 6 (June 3, 2013), https://doi.org/10.5210/fm.v18i6.4370.

13 "Content Procurement Committee," CAUL, November 6, 2017, https://www.caul.edu.au/programs-projects/content-procurement-caul-consortium/content-procurement-committee.

How The Big Deal Works

The bundling of titles into "big deals" is one of the primary mechanisms that publishers have used to drive subscription costs.

Here's how big deals work

Within each offered subscription package is a set of bundles. Each bundle is a fixed set of titles. If title A is particularly important to an institution, then it has to purchase a bundle that includes title B, C and D as well, whether or not they are relevant.

Often publishers quote a 'price per article', as a signifier of the value they are providing, but the bundle system undercuts the value of this signifier because it is not actually possible to purchase a single article. The system also encourages the proliferation of new journals in order to seem to provide as much content as possible.

When they were introduced, the 'big deals' were seen as only an option; "We don't force customers to buy anything they don't want or need", [said Elsevier's director of corporate communications, Eric Merkel-Sobotta] , comparing the packages to a Christmas hamper. "If you don't like gingerbread, don't eat it." [14]

Over time, this model has become compulsory - with gingerbread for all - as described in a report released by the University of Montreal, which states out of 50,000 titles subscribed to, half of which were seen as useful, and between 36% to 11% essential, depending on the publisher.[15] The extra 64% to 89% of titles were only subscribed to as they were part of required bundles.

Beyond the big deal, the large commercial publishers have mounted an aggressive response to digital transformation. They have worked to tie recognition and reward systems into their products via vertical integration and platformisation. This strategy has worked to further position librarians (who pay the bills) against researchers (who need to access journals). At the same time, these publishers use a range of tactics to ensure that financial flows are hidden and non-transparent to the general public, university leadership, and others who might serve as a check on the system.[16]

As libraries divert budgets towards ever-increasing journal subscriptions, their ability to support other areas of scholarship has also been restricted. For example, although book pricing has kept broadly in line with inflation, libraries have been forced to dip into the budgets allocated for books in order to continue to subscribe to scientific journals.[17] This means that fewer books can be purchased, a situation particularly detrimental to humanities and social science disciplines.[18] The rising cost of journals therefore negatively impacts scholarly disciplines in a variety of different

14 Faith McLellan, "Publishers Face Backlash over Rising Subscription Costs," *The Lancet* 363, no. 9402 (January 2004): 44–45, https://doi.org/10.1016/S0140-6736(03)15248-8.
15 Stéphanie Gagnon, "Journal Publishers' Big Deals: Are They Worth It?," May 2017, https://papyrus.bib.umontreal.ca/xmlui/handle/1866/18507.
16 "Opening the Black Box of Scholarly Communication Funding."
17 See Monograph and Serials Costs in ARL Libraries 1986-2011. https://arl.nonprofitsoapbox.com/storage/documents/monograph-serial-costs.pdf
18 Janneke Adema and Gary Hall, "The Political Nature of the Book: On Artists' Books and Radical Open Access," *New Formations* 78, no. 78 (July 1, 2013): 138–56, https://doi.org/10.3898/NewF.78.07.2013.

ways and serves to create an atmosphere of competition within the disciplines which can make interdisciplinary collaboration challenging.

Beyond the damaging impact that subscription publishing has had on the budgets of libraries, the commercial control of the system itself represents a serious problem to scholarly communication in New Zealand and beyond. By and large, the academy has ceded control of publishing to the market.[19] Ownership of publications and infrastructures rests with commercial organisations, over which academics and administrators have little control. This marketisation of academic publishing is a relatively recent phenomenon that gathered momentum in the 1980s.[20] Prior to this, academic publishing was institutionally subsidised and often under the primary control of academic-led learned societies.

The lack of academic governance of publishing works against cultures of care, innovation and a diversity of identity in scholarly communication. Commercial publishing promotes a uniform approach to publishing by incentivising researchers to publish in commercial journals for prestige and CV recognition. This means that publishing practices are dictated by bodies that are external to the academy, and these practices are in turn reflected in guidelines for academic job attainment and promotion. This mutually reinforcing cycle is difficult to break and prevents the possibility of experimenting with anything new, all while keeping research locked away from the public behind paywalls.

The current system poses other problems as well. It has been demonstrated to work against the publication of negative results[21], non-traditional scholarship[22], and a host of experimental practices of research presentation, all of which would have scholarly merit if valued for their own sake. The system itself is inherently conservative and promotes an understanding of scholarship most aligned with the Global North at the expense of indigenous and marginalised cultures and communities.[23] In the context of Tiriti this means that Māori scholars are coerced into a colonial publishing structure. This structure inhibits the development of mātauranga Māori and feeds into a system that limits representation, innovation and self-determination.[24]

The marketisation of publishing is therefore antithetical to a culture of innovation, excellence and care in New Zealand's knowledge communities. Not only is research inaccessible to people outside of the university system, commercial imperatives have a particularly detrimental impact on scholarship across all disciplines.

To effectively manage university budgets, ensure broad access to scholarly literature, and help New Zealand research make a global impact, advocates for change have focused on a different model for scholarly publishing: open access.

19 Larivière, Haustein, and Mongeon, "The Oligopoly of Academic Publishers in the Digital Era."
20 Fyfe et al., "Untangling Academic Publishing."
21 Jonathon Kram and Adam Dinsmore, "Publication Bias against Negative Findings Is Detrimental to the Progression of Science.," *LSE: Impact of Social Sciences* (blog), September 15, 2014, https://blogs.lse.ac.uk/impactofsocialsciences/2014/09/15/publication-bias-negative-findings-detrimental/.
22 Angela Okune, "Decolonizing Scholarly Data and Publishing Infrastructures," *OCSDNET* (blog), May 30, 2019, https://ocsdnet.org/decolonizing-scholarly-data-and-publishing-infrastructures/.
23 Cooper, Danielle, Tanya Ball, Michelle N. Boyer-Kelly, Anne Carr-Wiggin, Carrie Cornelius, J. W. Cox, Sarah Dupont, et al. "When Research is Relational: Supporting the Research Practices of Indigenous Studies Scholars." Ithaka S+R. Last Modified 11 April 2019.; https://doi.org/10.18665/sr.311240.
24 Joanna Kidman et al., "Māori Scholars and the University," December 2015, 109.; T G McAllister et al., "Why Isn't My Professor Māori?" 8, no. 2 (2019): 15.; Sereana Naepi, "Why Isn't My Professor Pasifika?" 8, no. 2 (2019): 16.; Joanna Kidman and Cherie Chu, "Scholar Outsiders in the Neoliberal University: Transgressive Academic Labour in the Whitestream," *New Zealand Journal of Educational Studies* 52, no. 1 (July 2017): 7–19, https://doi.org/10.1007/s40841-017-0079-y.

The Replication Crisis in the Social Sciences

The progress of science is built on replicability.[25] Unfortunately, there is now strong evidence that much of the published research in multiple disciplines—especially social science—is not standing up when attempts are made to reproduce this work.[26] The causes of this failure are complex, but the publishing system and recognition and reward systems are clearly implicated.

Understanding the Problem

Part of the problem is that there is no such thing as a pure replication in the social sciences. Of necessity, a second study conducted in a different place at a different time will have different study characteristics. A replication study is really then a test of the generalization of the original findings to other conditions. It is perfectly possible for a replication study to get a different result without casting any doubt on the initial study.

It is also unclear how similar quantitative results in a follow-up study need to be to demonstrate a successful replication. The goal cannot be to achieve the exact same results, since that is not possible in a social science context. This leaves the question: Is repetition of the results of significance tests (i.e., whether statistically significant, or a particular level of statistical significance) an adequate measure of replication?

Scholarly Communications Connection

The scholarly communications system contributes to this problem in a few different ways. For example, journal editors typically consider the results of replications not important enough to warrant journal space.[27] Similarly, researchers themselves avoid replication studies—even of their own work—because of their seeming unoriginality and their low probability of publication. This lack of published replications eliminates meta-analysis of existing studies as a strategy for assessing replicability without conducting new studies.[28] When those new studies have been conducted, they have frequently failed to replicate the findings of earlier studies

The established bias favoring positive results is further increased by journal editors' reluctance to publish negative results, researchers' motivation to keep conducting statistical tests until a positive one is found, and researchers' inclination to shelve studies if the results remain negative.[29]

25 Fiona Fidler and John Wilcox, "Reproducibility of Scientific Results," December 3, 2018, https://plato.stanford.edu/archives/win2018/entries/scientific-reproducibility/.

26 Monya Baker, "1,500 Scientists Lift the Lid on Reproducibility," *Nature* 533, no. 7604 (May 2016): 452–54, https://doi.org/10.1038/533452a. ; C. Glenn Begley and Lee M. Ellis, "Raise Standards for Preclinical Cancer Research," *Nature* 483, no. 7391 (March 2012): 531–33, https://doi.org/10.1038/483531a.

27 Christian Zimmermann, "On the Need for a Replication Journal," SSRN Scholarly Paper (Rochester, NY: Social Science Research Network, August 7, 2015), https://papers.ssrn.com/abstract=2647280.

28 Matthew C. Makel, Jonathan A. Plucker, and Boyd Hegarty, "Replications in Psychology Research: How Often Do They Really Occur?," *Perspectives on Psychological Science* 7, no. 6 (November 2012): 537–42, https://doi.org/10.1177/1745691612460688.

29 Daniele Fanelli, "Do Pressures to Publish Increase Scientists' Bias? An Empirical Support from US States Data," ed. Enrico Scalas, PLoS ONE 5, no. 4 (April 21, 2010): e10271, https://doi.org/10.1371/journal.pone.0010271.; Marjan Bakker and Jelte M. Wicherts, "The (Mis)Reporting of Statistical Results in Psychology Journals," *Behavior Research Methods* 43, no. 3 (September 2011): 666–78, https://doi.org/10.3758/s13428-011-0089-5.

Open Access: A Better Way

The Budapest Open Access Initiative released a public statement in 2002 that buzzed with optimism for the future of scholarly publishing: "An old tradition and a new technology have converged to make possible an unprecedented public good. The old tradition is the willingness of scientists and scholars to publish the fruits of their research in scholarly journals without payment, for the sake of inquiry and knowledge. The new technology is the internet."[30]

That vision is now being realised across disciplines and geographic borders. Open access to scholarship is one of the great success stories of the internet, but it is a story that is still being written.

A Brief History

In the late 1990s, as academic journals moved from being mostly available in hard copy to being available online, digital transformation offered a path to expanding access to knowledge.[31] For the first time, there was no need to have a physical journal volume to share articles. The transformative potential of digital technologies opened a whole range of new possibilities for sharing and collaboration.

This enthusiasm fueled a focus, not just on traditional journal based publishing, but also on the new possibility that authors could share their manuscripts via repositories of scholarly content - either university based, as proposed by Stephen Harnad, or via larger nationally run repositories like the early E-Biomed proposal from Harold Varmus, which eventually became PubMed Central and now has a mirror site, Europe PMC.[32]

By the early 2000s, the movement for open access was growing rapidly, both in terms of the amount of material available and as a core concept for how the internet and scholarship would intersect. Three declarations from academic communities further sharpened this vision for open access—Berlin, Bethesda and Budapest. Each of these helped to catalyse new and existing scholarly communities around the process of building this new system and so drove further growth in the adoption of open access models.

The Budapest declaration offered real clarity in defining open access: "By 'open access' to this literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles." This definition is now taken by many as canonical and has served as the basis for a range of open access policy interventions, particularly those promoting the application of Creative Commons licences allowing the access and reuse of scholarly publications.

30 "Budapest Open Access Initiative | Read the Budapest Open Access Initiative," accessed September 7, 2019, https://www.budapestopenaccessinitiative.org/read.

31 Samuel Moore, "Revisiting 'the 1990s Debutante': Scholar-Led Publishing and the Pre-History of the Open Access Movement," April 26, 2019, https://hcommons.org/deposits/item/hc:24075/.

32 "Nature Debates: The Self-Archiving Initiative," accessed September 7, 2019, http://cogprints.org/1642/1/nature4.htm.http://cogprints.org/1642/1/nature4.htm.; Colin Macilwain, "E-Biomed to Be Launched as a Repository for Research," News, Nature, accessed September 7, 2019, https://doi.org/10.1038/43259.

Green and Gold: Two Paths to Open Access

Green Open Access is access to publications provided through subject and institutional repositories. Green open access is often associated with postprints, or author accepted manuscripts, which include research that has been accepted to a journal but not formally typeset or published. Green open access is also frequently subject to publisher-imposed embargoes whereby papers are not made openly accessible until after a period of time (in order for publishers to charge for access until that time). However, it is unclear whether embargoes are necessary for publishers to recuperate their costs.

Gold Open Access is open access provided at the point of publication by the publisher. Gold open access books and articles look exactly the same as their toll-access counterparts, but are simply freely accessible to all readers. There are a range of business models associated with gold open access explored below.

Green Momentum

QUT in Australia developed the first repository-based open access policy. This policy required researchers to deposit their accepted manuscript with QUT eprints, the university's institutional repository. QUT was followed by Harvard University, who has since led the development of policies supporting institutional open access. Its model open access policy has been widely adapted across the globe. At the same time, ongoing international collaboration in the development of repositories is being led by the Confederation of Open Access Repositories (COAR). The repository movement continues to expand with an ever growing list of repositories maintained by Open DOAR.[33]

Although there is no national level open access mandate in New Zealand, many of our universities do have policies requiring researchers to self-archive their research within their institutional repositories.[34] The call for a collaborative approach to open access in New Zealand and Australia was further bolstered in 2013 by the Tasman Declaration, which states: "Publicly funded research should be openly available to maximise return on investments into research, and to increase participation in research and its translation beyond the traditional research sector."[35]

Gold Future?

While repository-based open access was expanding, open access publishers and initiatives at individual journals were also growing. The two most important early publishers were BioMedCentral, a UK-based commercial publisher, and the Public Library of Science, a US-based not-for-profit.

33 "Directory of Open Access Repositories - v2.Sherpa," accessed September 7, 2019, http://v2.sherpa.ac.uk/opendoar/.
34 "Open Access in New Zealand," in *Wikipedia*, August 11, 2019, https://en.wikipedia.org/w/index.php?title=Open_access_in_New_Zealand&oldid=910328461.
35 "Open Research," accessed September 7, 2019, https://sites.google.com/site/nzauopenresearch/tasman-declaration.

The most important driver toward journal-based open access came in the UK in 2012 with the publication of a report, chaired by Dame Janet Finch, which concluded that OA will bring "substantial benefits in transparency and accountability, engagement with research and its findings, closer linkages between research and innovation, and improved efficiency in the research process itself."[36] As a result of the report, money was provided for UK higher education institutions to support journal based open access via article processing charges.

While open access is not simply about author charges, it is a significant model for open access publishers. That said, there are now many thousands of open access journals from a variety of commercial and non-commercial publishers, the majority of which do not charge authors to publish. A comprehensive list of these journals is maintained by the Directory of Open Access Journals.[37]

Within the wider world, national and regional approaches to open access have varied. In Latin America there has been a thriving network of nationally supported journals and databases since 1997, when SciELO was launched. In Europe, approaches have been at the level of policy and infrastructure development. In 2016 these policies were consolidated when the Netherlands had the Presidency of the EU and outlined an ambitious road map for the EU.[38] Funding has also been provided at the national and EU levels to support open infrastructures through initiatives such as Open AIRE and OPERAS.[39] At the same time as national and regional approaches, research funders have pursued their own open access agendas, most notably the Wellcome Trust in the UK, the Bill and Melinda Gates Foundation in the US. [40]

Open Access Today

Open access is now firmly on the agenda for researchers, universities and governments around the world. But the open access landscape is complex. What started as a simple movement to provide access to research papers has now developed a complicated system that itself impacts on scholarly communication in a variety of ways.

Despite the growth of open access approaches, the commercial dominance of publishing has continued to strengthen in recent years. Large commercial publishers have started to charge thousands of dollars for authors to publish open access in their prestigious journals. These article-processing charges (APCs) have changed the publishing landscape immeasurably, meaning that research is made freely available, but only at great expense. From the available data, the three largest publishers themselves now make up almost half of the total APCs paid by universities across the world.[41]

36 Working Group on Expanding Access to Published Research Findings, "Accessibility, Sustainability, Excellence: How to Expand Access to Research Publications," June 2012, https://www.acu.ac.uk/research-information-network/finch-report-final . p. 4
37 DOAJ, "Directory of Open Access Journals," accessed September 7, 2019, https://doaj.org.
38 "Open Access In The Dutch EU Presidency: A Historic Turning Point? | ZBW MediaTalk," accessed September 7, 2019, https://www.zbw-mediatalk.eu/2016/02/open-access-in-the-dutch-eu-presidency-a-historic-turning-point/.
39 "OPERAS – Open Access in the European Research Area through Scholarly Communication," accessed September 7, 2019, https://operas.hypotheses.org/ .https://operas.hypotheses.org/"OPERAS – Open Access in the European Research Area through Scholarly Communication."; Katerina Iatropoulou, "OpenAIRE," OpenAIRE, accessed September 7, 2019, https://www.openaire.eu/.
40 "Open Access Policy | Wellcome," accessed September 7, 2019, https://wellcome.ac.uk/funding/guidance/open-access-policy.https://wellcome.ac.uk/funding/guidance/open-access-policy"Open Access Policy | Wellcome."; "Open Access Policy," Bill & Melinda Gates Foundation, accessed September 7, 2019, https://www.gatesfoundation.org/how-we-work/general-information/open-access-policy.
41 "OpenAPC - Open APC," accessed September 7, 2019, https://treemaps.intact-project.org/apcdata/openapc/#publisher/.

The original object behind APCs was to exert downward price pressure through the free market, but in practice commercial publishers have been able to charge very high fees. This is because there is less of an incentive for authors to be price sensitive. They are using funders' money rather than their own. They are also incentivised to seek the most prestigious venue possible. Article-processing charges have simply recreated many of the problems with the old system, while also introducing new problems around who can (and cannot) afford to publish in high-impact venues. For this reason, we believe that any system of scholarly communication for New Zealand should be free of individual article-processing charges and funded in other ways.

One important policy intervention in open access is Plan S, the multi-stakeholder European funder mandate for open access. Plan S requires that "from 2021, scientific publications that result from research funded by public grants must be published in compliant open access journals or platforms."[42] It mixes both green and gold approaches to publishing and requires research to be made available at the point of publication. While admirable in its intentions, Plan S is a controversial initiative and has met with much resistance from publishers and learned societies.[43] Yet there are benefits to a joined up, international approach to open access and these should be explored. It would be wise for New Zealand as a whole to engage with cOAlition S and reach a position on Plan S in the near future.

In Australia, the Australasian Open Access Strategy Group and the Council of Australian University Librarians have called for a national approach to open scholarship, but that has not yet been implemented.[44]

The commercial dominance of publishing has also met with resistance from universities, libraries and researchers in a variety of ways. Notably, many large national consortia and university systems are cancelling their subscriptions with commercial publishers in order to negotiate fairer forms of open access for their researchers.[45] Norway, Germany and Sweden all have cancelled subscriptions,[46] while the University of California has cancelled its entire Elsevier subscription package and is currently in negotiation with the publisher for a fairer deal.[47]

Alongside locking horns with publishers, there have been many recent experiments to provide alternative forms of open access led by libraries, scholars and universities. In the UK, for example, there is a resurgent university press culture based on open access. Goldsmiths Press, UCL Press and the University of Westminster Press have all taken innovative approaches based on both gold and green forms of open access. In Australia, ANU Press has run a successful open access books programme for many years, while many universities and libraries in New Zealand publish their own open access journals, including the forward-thinking Tuwhera at AUT.[48]

So-called 'scholar-led' forms of open access are making a real impact by pushing for a more researcher-controlled publishing landscape for books and journals. In South America, the AmeliCA

42 "'Plan S' and 'COAlition S' – Accelerating the Transition to Full and Immediate Open Access to Scientific Publications," accessed September 7, 2019, https://www.coalition-s.org/.
43 More information and commentary on Plan S are available here: https://unlockingresearch-blog.lib.cam.ac.uk/?p=2433
44 https://aoasg.org.au/developing-a-strategic-approach-to-open-scholarship-in-australia-joint-caul-aoasg-election-statement/
45 "Big Deal Cancellation Tracking," SPARC, accessed September 7, 2019, https://sparcopen.org/our-work/big-deal-cancellation-tracking/.
46 Catherine Offord, "Norway Joins List of Countries Canceling Elsevier Contracts," The Scientist Magazine, March 13, 2019, https://www.the-scientist.com/news-opinion/norway-joins-list-of-countries-canceling-elsevier-contracts-65594.
47 "UC and Elsevier: Overview," *Office of Scholarly Communication* (blog), accessed September 7, 2019, https://osc.universityofcalifornia.edu/open-access-at-uc/publisher-negotiations/uc-and-elsevier/.
48 "New Zealand Open Access Journals," *Australasian Open Access Strategy Group* (blog), August 30, 2016, https://aoasg.org.au/new-zealand-open-access-journals/.

initiative is a community-led publishing project that seeks a "collaborative, sustainable, protected and non-commercial solution for Open Knowledge in Latin America and the Global South."[49] Similarly, the Radical Open Access Collective is a global network of scholar-led publishers who support each other through a non-competitive and mutually reliant approach to publishing. The Open Library of Humanities and Scholar-Led organisations are designing a series of open-source tools and infrastructures to support this form of scholarly publishing.[50]

Community-led publishing is another highly innovative path that looks quite different to commercial forms of publishing. In a recent study by Adema and Stone, the authors explored this new publishing landscape, concluding that such publishers prioritise a different set of concerns than commercial presses.[51] In particular, academic-led presses foreground non-competitive, experimental approaches, and those that care for the relationships involved in the publishing process. Such publishing, while often precarious and labour intensive, should be supported as a counterpoint to open access policies and commercial forms of publishing. Only through a diverse ecosystem will we be able to fully explore the innovative potential of open access.

49 "AmeliCA," accessed September 7, 2019, http://amelica.org/index.php/en/about/#que-es.
50 "Open Library of Humanities," accessed September 7, 2019, https://www.openlibhums.org/.https://www.openlibhums.org/"Open Library of Humanities."; "ScholarLed - Open Access Presses," accessed September 7, 2019, https://scholarled.org/.
51 Janneke Adema and Graham Stone, "Changing Publishing Ecologies: A Landscape Study of New University Presses and Academic-Led Publishing," July 2017, http://repository.jisc.ac.uk/6666/1/Changing-publishing-ecologies-report.pdf.

Recognition and Reward Systems

What we measure matters

By entwining the reward and recognition systems of academia into the scholarly communication system, the large commercial publishers have embedded themselves into the administration of the modern university. They have created for themselves a captive market. Because of this, it is impossible to reform the scholarly publishing system without also reforming the recognition and reward systems of our universities.

Publishing an article in a prestigious high impact-factor journal is not the only way to measure quality or impact. For the humanities and arts disciplines in particular, disciplines where reputations are made with books and careers can be built with book chapters, the bibliometric based evaluation of quality is nonsensical. It also harms Māori and other marginalised scholars by imposing a colonised system of evaluation.[52]

How we measure matters

Bibliometrics is a niche topic, but it is a powerful methodology with considerable influence over New Zealand universities and scholarship. Understanding how it works is important. It is also important to recognise that bibliometrics as a branch of scientific inquiry is both useful and important. The work of bibliometricians contributes significantly to our understanding of how scholarship works. This critique, then, is not aimed at the subdiscipline, but rather the uses to which that work has been put.

Citation Analysis

If you think of the scholarly literature of a given discipline or set of disciplines, you can imagine it as a network. Each work is connected to others through citations. Paper A cites Paper B; Paper C cites both A and B; Paper D cites C and A, and so on. Taken together, these links form a network that can then be studied. This study is citation analysis.

Gather enough data, from a wide enough range of disciplines, and you can create a model of the historical growth and development of knowledge in society.[53] You can see what areas grew when, what is growing now, who is influential, and who is not. From the perspective of someone interested in how knowledge grows and develops within society, bibliometrics and citation analysis offer interesting and useful tools. But as technological tools, bibliometrics are particularly vulnerable to abuse and misuse.[54]

52 Tom Roa et al., "New Zealand's Performance Based Research Funding (PBRF) Model Undermines Maori Research," *Journal of the Royal Society of New Zealand* 39, no. 4 (December 1, 2009): 233–38, https://doi.org/10.1080/03014220909510587.https://doi.org/10.1080/03014220909510587Roa et al.; McAllister et al., "Why Isn't My Professor Māori?"

53 This discussion of citation analysis and bibliometrics in general owes much to the work of Paul Wouters. Paul Wouters, "The Citation Culture" (University of Amsterdam, 1999), http://garfield.library.upenn.edu/wouters/wouters.pdf.

54 Jochen GläSer and Grit Laudel, "The Social Construction Of Bibliometric Evaluations," in *The Changing Governance of the Sciences: The Advent of Research Evaluation Systems*, ed. Richard Whitley and Jochen Gläser, Sociology of the Sciences Yearbook (Dordrecht: Springer Netherlands, 2007), 101–23, https://doi.org/10.1007/978-1-4020-6746-4_5GläSer and Laudel.; Milena Žic Fuchs, "Bibliometrics: Use and Abuse in the Humanities," *Academia Europaea & Wenner-Gren Foundation Bibliometrics: Use and Abuse in the Review of Research Performance*, June 6, 2013, https://www.bib.irb.hr/631951.

Citation analysis on its own is only one part of what the bibliometrics community does. It forms the core of the discipline's methodology, but the main product of bibliometric databases are a number of metrics that they generate using citation analysis. This first and most obvious are citation counts. These are simple counts of how many times a given article has been cited by other articles that are also in that particular database.

In some fields, citation counts are standard metrics and widely accepted as accurate measures of a scholar's impact.[55] They are deeply controversial in other fields.[56] Part of how well a given discipline responds to this metric has to do with how quickly the literature develops. The distinction is often articulated by using the terms urban and rural. Urban disciplines move quickly, while rural disciplines develop more slowly. Physics is a classic example of a field that moves quickly. In contrast, theology develops at a much slower pace.[57] Disciplines that do much of their publishing as books struggle with this metric. For example, many books do not have digital object identifiers (DOIs), a prerequisite for tracking citation data in digital environments.[58] Books are also simply not integrated into bibliometric databases in the same way as journal articles, so when citation counts are used as a metric for judging research performance, book heavy disciplines struggle.

Disciplines that primarily use English are also highly favoured by bibliometric measures.[59] Citation databases heavily favour English language databases. In science and engineering disciplines, the impact might be marginal. In history, linguistics, and area studies, the impact is such that the metrics themselves can be worthless for some scholars.

Journal Impact Factor

Journal impact factor is another widely used metric. Journal impact factors are calculated for journal titles and the claim is that they offer some kind of information about how influential a given journal is. Developed by Eugene Garfield himself, the inventor of the first citation database, impact factor can be calculated by taking the total number of specific types of articles published over two years and dividing them by the number of citations to all articles in the third year. For example, if a journal published a total of 200 articles in the year 2015 and 2016 and those articles were then cited a 400 times in 2017, the journal's impact factor would be 2.[60]

This seemingly straightforward calculation is more complex than it appears. Questions about what articles are counted, gaming, and the opacity around how "citable" articles are counted have long plagued this metric.[61] In response to this, a variety of researchers have worked to develop what

55 GläSer and Laudel, "The Social Construction Of Bibliometric Evaluations."
56 "Living with the H-Index? Metric Assemblages in the Contemporary Academy - Roger Burrows, 2012," accessed September 8, 2019, https://journals.sagepub.com/doi/abs/10.1111/j.1467-954X.2012.02077.x?journalCode=sora.
57 Björn Hammarfelt, "Following the Footnotes : A Bibliometric Analysis of Citation Patterns in Literary Studies," 2012, http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-170504 Hammarfelt.; Tony Becher and Paul Trowler, *Academic Tribes and Territories: Intellectual Enquiry and the Culture of Disciplines* (Society for Research into Higher Education & Open University Press, 2001).
58 Mike Taylor, "Do Monographs Have a Future? Publishers, Funders and Research Evaluators Must Decide," *Impact of Social Sciences* (blog), August 5, 2019, https://blogs.lse.ac.uk/impactofsocialsciences/2019/08/05/do-monographs-have-a-future-publishers-funders-and-research-evaluators-must-decide/.
59 Diana Hicks et al., "Bibliometrics: The Leiden Manifesto for Research Metrics," *Nature News* 520, no. 7548 (April 23, 2015): 429, https://doi.org/10.1038/520429a.https://doi.org/10.1038/520429aHicks et al.
60 John Bohannon, "Hate Journal Impact Factors? New Study Gives You One More Reason," Science Magazine, July 6, 2016, https://www.sciencemag.org/news/2016/07/hate-journal-impact-factors-new-study-gives-you-one-more-reason Bohannon.
61 Mike Rossner, Heather Van Epps, and Emma Hill, "Show Me the Data," *The Journal of Cell Biology* 179, no. 6 (December 17, 2007): 1091–92, https://doi.org/10.1083/jcb.200711140.https://doi.org/10.1083/jcb.200711140Rossner, Epps, and Hill.; "The Impact Factor Game," *PLoS Medicine* 3, no. 6 (June 2006), https://doi.org/10.1371/journal.pmed.0030291.https://doi.org/10.1371/journal.pmed.0030291"The Impact Factor Game."

they argue are better journal impact factors. One of these, the Eigenfactor score, extends the census time for citations from two years to five years to compensate for disciplines whose literature develops at a slower pace.[62]

Metrics Proliferate

There has been a recent uptick in the range of metrics available overall. As the use of these tools has grown, researchers, university and corporate, have worked to improve them and to expand what they measure. The h-index, for example, has been in use since 2005. Developed by Jorge E. Hirsh for comparing theoretical physicists, it's a way of balancing the prolificness of an author with the number of times their work is cited.[63]

Different disciplines have differing publication and citation cultures and the h-index is one metric in particular where this reality has had a significant impact.[64] The response has been a proliferation of competing metrics that each purport to work better for certain disciplines or to offer a number that is in some way more valid. Some new metrics, like the Immediacy Index, are only found in proprietary databases.[65] Others have been developed within research communities themselves, like the SCImago Journal Rankings—though those too rely on proprietary data in making calculations.[66]

Proprietary Metrics

Even where algorithms and formulas are publicly available, the underlying data to which they are applied are always part of a set of proprietary data. This is part of the fundamental nature of bibliometric data—it is privately owned and controlled. To remedy this, the nascent open bibliometric data movement needs strong support from across the disciplines. The Initiative for Open Citations coalition advocates for open, machine-readable and usable citation data, while the Open Citation Index collates what data are currently available.[67]

Saying No to (Social Media Based) Altmetrics

In response to the limitations of traditional bibliometrics, some have argued for the widespread adoption of alternative metrics. The authors of the Alt-Metrics Manifesto define altmetrics as "the creation and study of new metrics based on the Social Web for analyzing, and informing scholarship." They argue that "scholarship's three main filters for importance are failing" and go on to criticise peer review as slow and ineffective while claiming that it "encourages conventionality."[68] They find bibliometrics useful, but inadequate.

62 "Eigenfactor," accessed September 8, 2019, http://www.eigenfactor.org/about.php"Eigenfactor."
63 J. E. Hirsch, "An Index to Quantify an Individual's Scientific Research Output," *Proceedings of the National Academy of Sciences* 102, no. 46 (November 15, 2005): 16569–72, https://doi.org/10.1073/pnas.0507655102.
64 "Living with the H-Index? Metric Assemblages in the Contemporary Academy - Roger Burrows, 2012." https://journals.sagepub.com/doi/abs/10.1111/j.1467-954X.2012.02077.x?journalCode=sora"Living with the H-Index? Metric Assemblages in the Contemporary Academy - Roger Burrows, 2012."
65 "Know Your Metrics: Immediacy Index," *Web of Science Group* (blog), May 17, 2017, https://clarivate.com/webofsciencegroup/blog/know-your-metrics-immediacy-index/"Know Your Metrics."
66 "SCImago Journal Rank," in *Wikipedia*, July 31, 2019, https://en.wikipedia.org/w/index.php?title=SCImago_Journal_Rank&oldid=908760549"SCImago Journal Rank."
67 "Initiative for Open Citations," accessed September 7, 2019, https://i4oc.org/.https://i4oc.org/"Initiative for Open Citations."; "OpenCitations," accessed September 8, 2019, https://opencitations.net/index"OpenCitations."
68 J. Priem et al., "Altmetrics: A Manifesto," October 2010, http://altmetrics.org/manifesto/Priem et al.

To replace these systems, they and other proponents point to the wide range of data now available from the social web. This includes "citations, blogs, tweets, download statistics and attributions in research articles, such as mentions within methods and acknowledgements."[69] Altmetrics then should be understood as an expansion of metrics —an evolution rather than a revolution.

Using data collected from online behavior as a metric to judge the quality and impact of scholarly work is a bad idea. It's nonconsensual, as the people interacting with the work have no way to consent or not consent to participation in a review process. There's no clear measure of accuracy, no way of knowing that the numbers actually are what they seem to be. Given what we know and understand about the underlying platforms, the online spaces where this data gathering takes place, there is no reason to be confident that numbers reflect actual human engagement, haven't been manipulated by either the authors or some other group, and have not been subject to the impacts of political censorship.

Giving Silicon Valley based technology companies—Facebook, Twitter, Google, and others—more power over our lives is not a good idea. These companies have plenty of influence as it is. Handing them and others the ability to game and manipulate the basis of our scientific and scholarly recognition systems, while profiting from our use of them, is a step backwards from the kind of system that centres our values.

A question of political economy

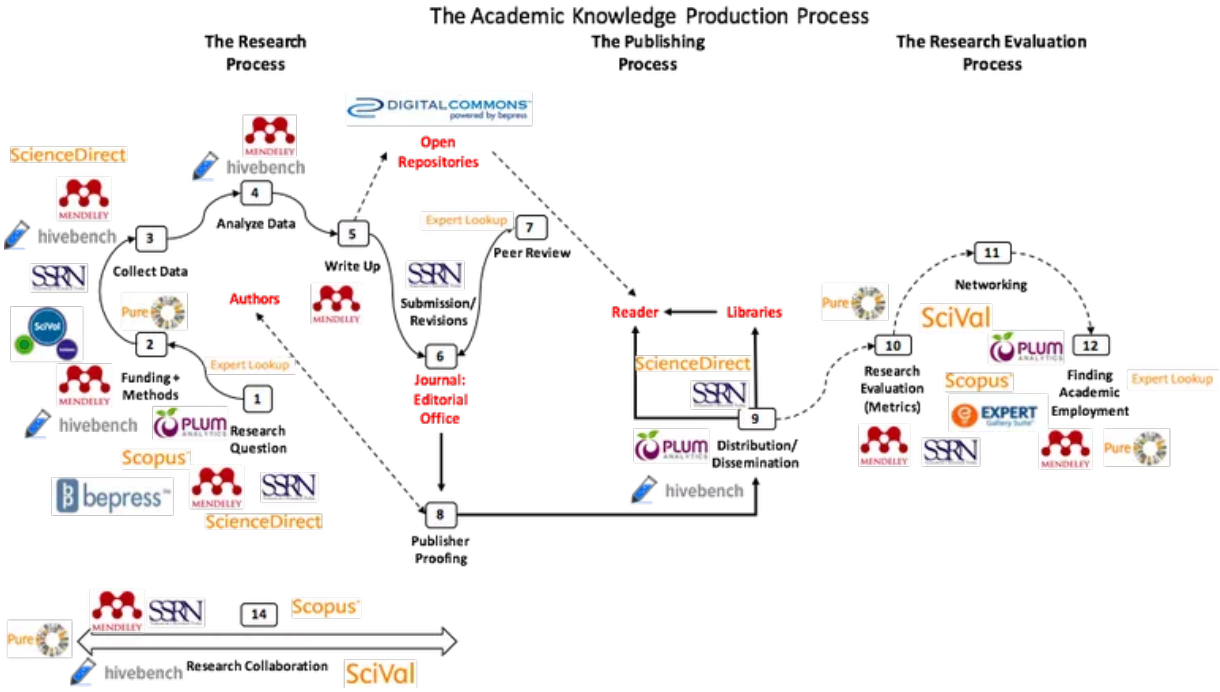
Taken together, both bibliometrics and altmetrics are bundled and sold to universities, funders, and governments in the form of products that claim to measure and compare vast numbers of institutions. Elsevier's SciVal is the prime example of this type of product.[70] Thompson Reuters spun off its product InCites into an independent company, but it still relies on Web of Science data in its products.[71]

These products are advertised as bringing together multiple sources of data—bibliometrics, altmetrics, patent data, grant information, and information on corporate-academic partnerships—and using them to quantitatively assess researchers and universities.[72] Elsevier assures potential subscribers that SciVal "helps you assess your institution's research performance from a variety of perspectives in order to establish, execute and evaluate strategies based on reliable evidence."[73]

It's important to understand that metrics, biblio- and otherwise, are big business, so much so that Elsevier has rebranded itself from a mere publisher to an 'information analytics' business. Data on the size of this industry are hard to come by, but with so few players it isn't hard to get a sense of the scope and scale.

69 Heather Piwowar, "Altmetrics: Value All Research Products," *Nature* 493, no. 7431 (January 10, 2013): 159, https://doi.org/10.1038/493159a.
70 "SciVal," accessed September 8, 2019, https://www.scival.com/
71 "InCites," *Web of Science Group* (blog), accessed September 8, 2019, https://clarivate.com/webofsciencegroup/solutions/incites/
72 "Research Metrics Guidebook," accessed September 8, 2019, https://www.elsevier.com/research-intelligence/resource-library/research-metrics-guidebook"Research Metrics Guidebook."
73 "Features - SciVal," accessed September 8, 2019, https://www.elsevier.com/solutions/scival/features.

Both the biblio- and alt-metrics markets are controlled by the large commercial publishers, plus Google. Elsevier owns Scopus and SciVal. Web of Science is owned by Thompson Reuters; Google Scholar by Google and ultimately by Alphabet. Together these three companies have complete control over the market, its data, and its customers. Each has annual revenues in the multi-billion dollar range and each is a multinational company with a global reach. The figure below from Alejandro Posada and George Chen shows Elsevier's presence throughout the entire research lifecycle.[74] These walled ecosystems are an area of competition for large, commercial organisations.



Alejandro Posada and George Chen, "Inequality in Knowledge Production: The Integration of Academic Infrastructure by Big Publishers," in ELPUB 2018, ed. Leslie Chan and Pierre Mounier (Toronto, Canada, 2018), https://doi.org/10.4000/proceedings.elpub.2018.30 Posada and Chen. Figure reproduced under a CC BY licence https://hal.archives-ouvertes.fr/hal-01816707v1

Alt-metric companies too are mostly, though not exclusively, controlled by major publishers. Altmetric and Symplectic are owed by the Holtzbrinck Publishing Group, the owner of Springer Nature and Palgrave Macmillan. Plum is an Ebsco company. Impact Story is a non-profit supported by the Alfred P. Sloan Foundation and the National Science Foundation.

Kudos, an independent company, and Symplectic are both products with a slightly different focus. Kudos aims to help researchers increase their impact on social media platforms while Symplectic focuses on gathering data from a variety of sources, including bibliometric databases. In that way Symplectic's primary product, Elements, is closer in function to SciVal and InSight.

74 Alejandro Posada and George Chen, "Inequality in Knowledge Production: The Integration of Academic Infrastructure by Big Publishers," in *ELPUB 2018,* ed. Leslie Chan and Pierre Mounier (Toronto, Canada, 2018), https://doi.org/10.4000/proceedings.elpub.2018.30Posada and Chen. Figure reproduced under a CC BY licence https://hal.archives-ouvertes.fr/hal-01816707v1

To whom are we accountable?

Metrics can only answer particular kinds of questions, but the availability of commercial products purporting to sell answers can change the nature of the questions we ask. As it stands now, disciplinary judgement is being mediated through algorithms, software interfaces, and proprietary data. It is being influenced in ways that are out of our control and unaccountable in a genuine sense. Too much power has been handed over to those whose real purpose is to make a profit. The cost of this goes far beyond the dollars spent.

The contemporary research environment is rapidly transforming to meet the range of challenges humanity is facing. Accountability is more important than ever, but we need to change the way we think about accountability. Accountability is about the ways in which we are responsible to others; it is a relational concept. Researchers are accountable to a wide range of people: communities who partner with them to build new knowledge; immediate colleagues; students; institutions; disciplines. The current system has allowed simplistic questions (eg. How many times has this been cited?) and commodifiable answers. It has allowed us to focus on the wrong questions and in doing so sidestep a much wider range of accountabilities.

It's time to rethink that system as we work to remake our scholarly communications system.

What others have done

It is worth turning our attention to the approaches to scholarly communication taken by other countries and institutions. It is a time of great change and lessons can be learned from coordinated approaches, many of which include a mixture of community-led and policy-based initiatives. Successful approaches also comprise a mixture of central coordination and projects nurtured and supported at local, institutional levels.

Country-wide: Sweden

Sweden is a good example of how to take a national approach to open access policies and negotiations. The country included open access as part of their government's 10-year research policy in 2016.[75] In 2017, the Government directed the National Library of Sweden and the Swedish Research Council to collaborate. The National Library acts as a national coordinating body in the work towards a transition to open access to scholarly publications, while the Swedish Research Council coordinates the national work in establishing open access to research data.[76] The transition to open access is set to be fully implemented by 2026 at the latest. Sweden has also embraced the concept of FAIR as an approach to research, meaning that data must be findable, accessible and re-usable for the public.[77]

As part of its evidence-based approach, Sweden has coordinated a range of research led by the National Library of Sweden:

- The current merit and resource allocation system versus incentives for open access
- Funding for a transition from a subscription-based to an open access publishing system
- Open access to scholarly monographs
- Financial and technical support for converting peer-reviewed and scholarly journals from toll access to open access
- Monitoring of compliance with open access policies and mandates

These reports illustrate that Sweden's holistic approach to open scholarship is grounded both in different community needs and the broader systemic issues that influence the potential adoption of open practices, such as financial issues, technical support, and the reward and recognition system. A number of committees have been formed to support these initiatives, including an open access advisory group and a high-level negotiating Committee chaired by the President of Stockholm University.

75 Beate Eellend, "Coordination of Open Access to Research Publications in Sweden," *Septentrio Conference* Series, no. 1 (November 8, 2017), https://doi.org/10.7557/5.4243 Eellend.
76 "Sweden," accessed September 8, 2019, https://www.openaire.eu/item/sweden"Sweden."
77 "The FAIR Data Principles," accessed September 8, 2019, https://www.force11.org/group/fairgroup/fairprinciples"The FAIR Data Principles."

Sweden has also followed through in a cancellation of Elsevier subscription content. In June 2018 the BIBSAM consortium, composed of 79 member institutions, decided to not renew its Elsevier subscription because the publisher could not meet BIBSAM's requirement for immediate open access for consortium members or a sustainable price model to make the transition to open access possible.[78] Elsevier and BIBSAM have resumed negotiations and talks are ongoing.

Country-wide: Germany

Like Sweden, Germany has also cancelled its national subscription to Elsevier content and is currently negotiating with the publisher via its Projekt DEAL consortium. Through its multi-tiered organisational structure (see below), Project DEAL seeks to negotiate so called 'Publish and Read' deals with large publishers whereby German researchers are able to publish open access free of charge (as part of the journal subscription). This strategy prevents universities paying to access content and then paying article-processing charges to the same journals to make work open access.

Although they are still in negotiations with Elsevier, Projekt Deal signed its first Publish and Read deal with Wiley that allows "publication of all future scientific articles in Open Access at no extra costs and permanent access for all participating institutions to the entire portfolio of e-journals of the publisher, as far back as 1997."[79] Publish and Read deals look set to grow in popularity and ultimately replace the Big Deal as the primary way of accessing the content of large commercial publishers. The Netherlands and Norway have also recently signed up to such deals.

On the face of it, Publish and Read is better than the Big Deal: it ensures open access to new content while continuing national access to subscription content in the normal way. Yet we should be cautious about a wholesale move to Publish and Read. As Lindsay McKenzie writes in *Inside Higher Education:* "the Norwegian consortium appears to have been willing to pay more than its current subscription to cover the cost of open-access publishing."[80] By adding open access on top of journal subscriptions, Publish and Read could end up costing libraries *more* than the Big Deal, which clearly goes against one of the main original motivations of the open access movement to *reduce* library expenditure. Blogger Richard Poynder makes a similar point about the increased cost of such deals, particularly with regards to the lack of transparency of Publish and Read.[81] Caution should therefore be exercised if New Zealand goes down the Publish and Read route.

78 "Agreement with Elsevier," accessed September 8, 2019, https://www.kb.se/samverkan-och-utveckling/oppen-tillgang-och-bibsamkonsortiet/open-access-and-bibsam-consortium/bibsam-consortium/agreement-with-elsevier.html"Agreement with Elsevier."

79 "About DEAL – Projekt DEAL," accessed September 8, 2019, https://www.projekt-deal.de/about-deal/"About DEAL – Projekt DEAL."

80 Lindsay McKenzie, "Elsevier Agrees to First Read-and-Publish Deal," accessed September 8, 2019, https://www.insidehighered.com/news/2019/04/24/elsevier-agrees-first-read-and-publish-deal McKenzie.

81 Richard Poynder, "Open and Shut?: The Open Access Big Deal: Back to the Future," March 28, 2018, https://poynder.blogspot.com/2018/03/the-open-access-big-deal-back-to-future.html Poynder.

Institution-wide: the University of California system

Looking at the institution level, the University of California has been an active change agent in open access since the early 2000s. The key to their success has been in engagement of their faculty in policy development. In 2013 they passed a system-wide open access policy (across all 10 campuses) that followed years of discussions with and the involvement of professional and academic staff.[82]

They have have taken a systematic, evidence-based approach to the cost involved, which includes modelling where any increase in cost from APC would need to come from - the so-called UC model transformative agreement.[83]

Having such widespread support has allowed them to negotiate with one voice when it comes to publishers and this was most notable when they walked away from negotiating the renewal of a deal with Elsevier.[84] There were many points of disagreement but the key precipitating cause was when Elsevier attempted to undermine negotiations by contacting editors and authors based at the University of California. The University of California has recently produced a helpful fact-check to explain what is happening.[85] At the same time, UC faculty are threatening to resign from all Elsevier journals if the publisher refuses to restart negotiations for a Publish and Read agreement.[86] Negotiations are at a standstill as of August 2019.

The University of California has also adopted an innovative approach to supporting faculty publication efforts. Their eScholarship platform hosts a repository and a range of journals published by UC scholars (which they are investing in further), while UC Press publishes open access monographs through its Luminos programme. This is a laudable approach that combines high-level engagement with large commercial publishers, while nurturing community-based alternatives for journal and book provision. It would be wise for New Zealand to learn from University of California's tactics and long-term strategy.

82 "UC Systemwide Academic Senate Open Access Policy," *Office of Scholarly Communication* (blog), accessed September 8, 2019, https://osc.universityofcalifornia.edu/open-access-at-uc/open-access-policy/policy-text/systemwide-senate/"UC Systemwide Academic Senate Open Access Policy."

83 "An Introductory Guide to the UC Model Transformative Agreement," *Office of Scholarly Communication* (blog), accessed September 8, 2019, https://osc.universityofcalifornia.edu/open-access-at-uc/publisher-negotiations/negotiating-with-scholarly-journal-publishers-a-toolkit/an-introductory-guide-to-the-uc-model-transformative-agreement/"An Introductory Guide to the UC Model Transformative Agreement."

84 Sarah Zhang, "University of California Drops Elsevier Contract," The Atlantic, March 4, 2019, https://www.theatlantic.com/science/archive/2019/03/uc-elsevier-publisher/583909/.https://www.theatlantic.com/science/archive/2019/03/uc-elsevier-publisher/583909/Zhang.

85 "Fact Check: What You May Have Heard about the Dispute between UC and Elsevier," Office of Scholarly Communication (blog), August 2, 2019, https://osc.universityofcalifornia.edu/2019/08/fact-check-uc-and-elsevier/"Fact Check."

86 Robert Sanders, "UC Faculty to Elsevier: Restart Negotiations, or Else," Berkeley News, August 7, 2019, https://news.berkeley.edu/2019/08/07/uc-faculty-to-elsevier-restart-negotiations-or-else/Sanders.

A Roadmap for New Zealand

New Zealand needs a national strategy to ensure that the work of our scholars, scientists, and researchers is open to all. In 2018, the New Zealand government invested 1.74 billion dollars in research and development, including funding Crown Research Institutes and universities.[87] Opening the research and data outputs produced by this funding would help to ensure that the impact of this spending is maximised and create the evidence base needed to improve policymaking, educate the electorate, and support practitioners in a wide range of professions. It would also serve New Zealand's economy by providing access to research and development to the private sector.

As it is now, around 2/3 of New Zealand university based research outputs end up behind a publisher's paywall.[88] Even less data is released. New Zealand can do better than that.

Develop a National Strategy

We need a national strategy to drive this transformation—one that is based in our shared values and Treaty relationships.

- We believe that the National Library, CONZUL, and LIANZA should work together collaboratively to lead the development of this strategy and appoint a coordinating body.
- Each University and Crown Research Institute should appoint a senior leader who can manage strategy development, local coordination, and liaise with the wider research community.
- Māori scientists, scholars, and researchers need to be specifically invited into this conversation and supported to participate. National Library, the Universities, and Crown Research Institutes should work to create the conditions needed for self-determination and an equitable outcome.

Fill the Knowledge Gaps

New Zealand has critical gaps in its knowledge around open access, scholarly publishing, and open data. To create good policies and move forward with this transformation more research and more funding to conduct that research is needed. There is room for multiple robust research projects to help understand the needs of researchers, their current behaviors, and what interventions make the most sense in New Zealand.

Centre Care

The well-being of our scholars, researchers, and scientists—and our librarians—is not an afterthought. The systems that we have built to distribute research funding, manage promotions, and make hires have proved deeply damaging to health, well-being, and community building. The scholarly communication system sits at the core of this system. By reforming that, we also have an opportunity to redirect ourselves toward a care focused model of academic management.

87 "Research and Development Survey: 2018," StatsNZ, February 28, 2019, https://www.stats.govt.nz/information-releases/research-and-development-survey-2018"Research and Development Survey: 2018."
88 COZUL Research. Unpublished.

- Work with the Tertiary Education Union to reform the Performance Based Research Funding system to support well-being and disentangle from proprietary non-transparent metrics. Refocus on traditional peer review and innovative ways of measuring excellence.
- Fund and support education for librarians, academics, and administrators to develop a deeper understanding of scholarly communication and open access issues.
- Support public and university community focused education campaigns to engage a wide range of people in open access issues and invite them into the conversation.

Build Alliances

There are a wide range of opportunities for collaboration and cooperation, both here at home and overseas. Working to build new relationships and strengthen existing ones is a key part of building a care centred system. New Zealand should prioritise this care work, seek out new partners, and invest in long-term relationship building to create trust and develop shared vision.

Strengthen Open Access Infrastructure

Transforming our scholarly communications system requires building both policy and technological infrastructure. To create a robust system that will support the kind of transformative change needed, we should prioritize developing this infrastructure as part of a deep engagement process with researchers, scholars, and scientists.

Policy

Policy is a key part of transitioning, but it is also a tool to be used with care. Mandates and other blunt instruments risk turning researchers away. Rather than focusing on mandates, we should use policy to offer guidelines, frameworks, and to support collaborative approaches.

- New Zealand universities should coordinate with our Australian counterparts and work to develop a regional response to Plan S.
- Open Access policies across New Zealand universities and Crown Research Institutes should be harmonised to strengthen our national negotiating position. But, this process should be based on robust engagement with academics across disciplines and with the needs of Māori and other marginalised scholars at the forefront.

Technology

The internet is what has made open access possible. Building technological infrastructure that will support New Zealanders' access to knowledge is a key task in realising the full potential of digital technologies.

- Increase existing investment in university repositories to ensure that Green open access remains a robust path.
- Expand the existing institutional repository system to Crown Research Institutes and others.
- Develop a policy framework focused on carbon footprinting and monitoring to ensure that the system is as close to zero carbon as possible.

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