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AN EVIDENCE-BASED APPROACH TO ADVANCING OPEN SCIENCE AT THE UNIVERSITY OF OTTAWA: EXPERIENCES FROM THE OPEN SCIENCE WORKING GROUP

Abstract

In 2023, the University of Ottawa formed an Open Science Working Group charged with examining the state of open science at uOttawa, defining its goals towards open research practices, and recommending an action plan to position the university as an open science leader. The working group's monthly meetings and final report were informed by a strong evidence base, including analyses of uOttawa's research output, a review of national and international open science policies and practices, and estimates of expenditures on open access fees. This paper provides a detailed account of these processes and methods, providing insights for institutions seeking to develop their own open science strategies.

Introduction

In 2023, the University of Ottawa (uOttawa) formed an Open Science Working Group (OSWG) to evaluate the current state of open science (OS) across the institution, with the aim of defining its “goals towards open research practices, considering disciplinary practices, our Francophonie mission, and recognizing the need for a distinctions-based approach as it relates to projects engaging with First Nations, Métis and Inuit communities” (uOttawa Open Science Working Group, 2024, p. 2).

Over a decade ago, uOttawa was one of the first Canadian institutions to develop a comprehensive open access (OA) program (uOttawa News, 2009). Today, the university aims to leverage its position as a longstanding advocate of OS with well-established expertise and champions to further

its own practices, respond effectively to developments, and achieve its priorities (uOttawa, 2019). In October 2024, the OSWG published its final report – *Open Science Roadmap: Report by the Open Science Working Group* (referred to hereafter as the uOttawa OS Roadmap). The uOttawa OS Roadmap presents eight recommendations under a four-pillar framework: 1) foster a culture of OS, 2) value open practices, 3) promote and invest in open infrastructure, and 4) implement OS through uOttawa’s strategic plans (uOttawa Open Science Working Group, 2024).

The production of the uOttawa OS Roadmap is timely as we witness many national and international developments in the OS landscape. In Canada, the Tri-Agencies announced the revision of their *Open Access Policy on Publication* (Adem et al., 2023), and the Fonds de Recherche du Québec (FRQ) joined cOAlition S (Fonds de recherche du Québec, 2021); both prioritize immediate OA. The United States’ Office of Science and Technology (OSTP) issued a memorandum in 2022 requiring immediate public access to outputs produced by federal agencies (Nelson, 2022). These policy changes require institutions to adapt quickly, ensuring their research communities are well-informed about the new requirements and their implications.

However, policy changes are not the only factors shaping open practices. Barriers across the publishing ecosystem – whether financial, educational, or technical – can impede the adoption of OS. These barriers are often rooted in the social and economic contexts of researchers operating within their own disciplinary and linguistic cultures. For example, English persists as the lingua franca (i.e., common language) across the research ecosystem, which is particularly problematic for Canada given its multilingual context and uOttawa’s bilingual mandate. Supporting multilingualism is crucial for ensuring equitable access to research and fostering bibliodiversity. Studies show the decline of francophone publications and the continued dominance of English across the scholarly publishing system (Fonds de recherche du Québec, 2023; Longfield, 2023, St. Onge et al, 2021). Despite this challenge, Canada benefits greatly from strong open infrastructure and robust dissemination platforms like Coalition Publica. Results shared in the uOttawa OS Roadmap show the continued growth of uOttawa authored publications in *Érudit*, demonstrating the platform’s impact on increasing the visibility of francophone outputs (uOttawa Open Science Working Group, 2024, p. 29-30).

The OSWG focused many discussions on the incentives and reward system for research, noting global actions to reform research assessment (CoARA, 2022; DORA, 2013). Universities play a critical role in research assessment as their policies can encourage a culture change by integrating OS practices in the hiring, promotion, and tenure process. Global initiatives like DORA¹ and CoARA², call for the move away from flawed quantitative metrics like the h-index and Journal Impact Factor, and encourage the integration of OS practices as quality indicators within evaluation systems. We see this reform playing out in Canada, with the Tri-Agencies recent

¹ <https://sfdora.org/>

² <https://coara.eu/>

announcement to integrate narrative CVs into their funding applications (Government of Canada, 2025). A commitment to using open infrastructure is another action institutions can take, as we see with the Barcelona Declaration on Open Research Information, so that the community relies less on closed and selective databases that often exclude multilingual outputs and favour the STEM fields (BDORI, 2024).

Strategically, institutions must continue to evolve their policies and strategies in response to global developments. Re-evaluating institutional policies is critical since research activities are strengthened through collaborations. Authors affiliated with an institution are already collaborating with researchers globally, who have more advanced OS policies than many Canadian institutions. We cannot take for granted that our Canadian authors may already be sharing data, publishing immediate OA, depositing preprints in repositories or sharing code and software openly. uOttawa's top collaborators include the United States, the United Kingdom, Australia, China, Germany, and France (uOttawa Open Science Working Group, 2024). While there may be challenges in adopting new OS practices, especially for certain disciplines, the long-term benefits of increasing visibility, faster dissemination, and greater reproducibility, to name a few, justify overcoming initial hurdles.

The uOttawa OSWG carefully considered this evolving OS landscape, in the context of its own mission and mandate. The uOttawa OS Roadmap (2024) is informed by data gathered and analyzed by a team at uOttawa. This paper provides a detailed account of the data collection and analysis process, highlighting how this work supported the OSWG and informed its final report. The comprehensive results of this work can be found in the uOttawa OS Roadmap (uOttawa Open Science Working Group, 2024). We hope this methodological contribution offers valuable insights for other institutions aiming to develop their own OS strategies or foster critical dialogue with their research communities.

Background

From September 2023 until August 2024, the OSWG advanced its mandate to examine OS practices at uOttawa. The OSWG was co-chaired by the Associate Vice-President of Research, Innovation and Development, Dr. Martine Lagacé and the University Librarian and Dean of Libraries, Talia Chung, and included representatives from nine faculties, the Library, uO Press, the Collège des chaires de recherche sur le monde francophone, and a PhD student from the Faculty of Social Science. In the context of uOttawa's academic mission, the OSWG considered the following questions:

- In order to achieve the vision, set out in Transformation 2030, how can the university leverage existing OS strengths and further promote open practices?
- What set of principles can the university develop to guide open practices and OA investments, to support uOttawa's research activities?

- How can uO support and incentivize open research practices via the creation, dissemination, and accessibility of research in French, which is fundamental to uOttawa’s mandate?
- What approaches and best practices are adopted by peer institutions, in Canada and internationally, to increase uptake of OS?

OSWG meetings were held from October 2023 to May 2024. To inform the OSWG discussions and the final report, a team consisting of Stefanie Haustein (Associate Professor, School of Information Studies), Leigh-Ann Butler (Scholarly Communication Librarian) and two research assistants (Maddie Hare and Saskia van Walsum, PhD students, Digital Transformation and Innovation), gathered data through an environmental scan, a literature review, and bibliometric analyses. Chantal Ripp (Research Librarian and PhD student) also participated in data collection and helped develop the Open Science Strategy Framework. Hare and van Walsum were paid research assistants (RAs), co-funded by the Office of Research, Innovation and Development and the Library. Haustein and Butler supervised the two RAs and co-presented the data to the OSWG, alongside additional context to support the monthly meetings.

Approach to data collection and analysis for the OSWG

This section outlines the data collection and analysis approach that informed the OSWG meetings and the final report. The goal is to share this approach so other institutions can adopt or adapt based on their needs. Detailed findings can be found in the uOttawa OS Roadmap (uOttawa Open Science Working Group, 2024). We include some tables and figures produced from our findings in the Appendix to this paper to showcase the outcomes of our methods. When referencing any results (tables and figures), please cite the uOttawa OS Roadmap (uOttawa Open Science Working Group, 2024).

Data collection and analysis took place from September 2023 until June 2024. The evidence base was crucial to supporting dialogue with representatives from across disciplinary faculties on the OSWG. Research questions guiding the data collection were drawn from the themes for the monthly meetings (see Table 1). These themes were strategically selected to target data collection and synthesis activities, ensuring focused dialogue during meetings. Individualized methods and data collection strategies were designed for each meeting.

Table 1. Topics of monthly OSWG meetings and the approach to data collection and analysis.

Month	Meeting topic	Method
October 2023	Open science at the University of Ottawa	Bibliometric analysis
November 2023	Barriers to open science; Open Science policies (institutional, national, and international)	Environmental scan and review of national and

		international OS/OA policies and initiatives
December 2023	The open access publishing landscape (copyright, publication models, deceptive/predatory publishing)	Literature review
January 2024	Article processing charges and publishing agreements	Bibliometric analysis
February 2024	Open practices (open data, open peer review), and research assessment (DORA)	Literature review and OSWG member presentations
March 2024	A look at disciplinary open science practices (e.g., clinical trial registration, code, and software)	OSWG member presentations
April 2024	Open access and the francophonie	Literature review

Four vital components were needed to guide OSWG discussions and inform the evidence base of the final report: 1) an understanding of uOttawa OA outputs and its characteristics, 2) an understanding of Canadian institutions and global funding agencies current practices and approaches to advancing OS, 3) a global understanding of OS practices and possibilities, and 4) a cost-estimate of OA.

uOttawa OA outputs and their characteristics

The OSWG’s first meeting in October 2023 established a foundational understanding of uOttawa’s OA publishing patterns. The team presented data previously shared in March 2023 with uOttawa’s Research Commission. In January 2023, Butler, Ripp and Haustein collected publication data from the Web of Science (WoS) that includes articles and reviews published between 2013 and 2022 with at least one author affiliated to uOttawa or affiliated hospitals (n=44,952). The data was cleaned by uOttawa faculty and OA status (hybrid, gold, green) (see Appendix, Figure 1). Recognizing WoS’ limitations, such as its exclusion of francophone outputs and bias toward STEM fields, the team collaborated with Érudit to retrieve uOttawa-affiliation publications from the database. A comparison between WoS and Érudit revealed a higher number of francophone articles in Érudit, with continued growth over time.

From this dataset, the team also analysed uOttawa’s top collaborations (see Appendix, Table 1). This approach aimed to better understand the uOttawa collaborative network and determine whether uOttawa authors were already subject to OS practices due to the collaborator’s policy environment. The results on collaborations informed the team’s criteria for the environmental scan on national and international OS policies, focusing their work first on uOttawa’s top collaborating countries before broadening the scope.

The current practices and approaches to advancing OS by Canadian institutions and international funding agencies

An environmental scan of Canadian institutions, along with national and international policies, targeted discussions for the second OSWG meeting and continued to inform the group’s work. To

build an evidence-base of institutional OA or OS policies, the team scanned the websites of the U15. Results indicate that most institutions favour recommendations over mandated policies, often applying them to libraries (Betz et al., 2019). Brock University was included because several U15 policies refer to Brock’s policy as inspiration (University of Saskatchewan, 2022). Simon Fraser University was also included owing to their university OA policy, which was unique, alongside that of the Université de Montréal, in its aspiration towards institution-wide, immediate OA. (SFU, 2017; Université de Montréal, 2024). The results of this data collection activity are openly available³, and include information on policy type (statement, guideline), terminology (e.g., access or science), issuing body (e.g., library or senate), the reach of the policy (library, institution), policy features (e.g., OA publications, data, books), and more. Results are summarized and published in the uOttawa OS Roadmap (2024) (see also Appendix, Figure 2).

The policy scan of national and international funding agencies focused mostly on policies in uOttawa’s top collaborator countries. A brief scan of institutional policies was done for each country at the same time. The scan also included the European Commission’s key funding programme, Horizon Europe, since at the time of the scan (November 2023), Canada was engaged in discussions to join this program (Government of Canada, 2024). The results of this activity are summarized in Figure 1, which was omitted from the uOttawa OS Roadmap (2024), due to space limitations.



3

https://docs.google.com/spreadsheets/d/1FrCFMGn_QBZ19UMTRiI0Td5wxuD7QOxWMqIuHfke7xM/edit?gid=0#gid=0

Country	Funding Agency	Policy				Embargo	Enforcement		Format		
Canada	Québec Fonds de recherche – Nature et technologies Fonds de recherche – Santé Fonds de recherche – Société et culture					0					
	CIHR IRSC NSERC CRSH SSHRC CRSH					12	-				
United States	NIH National Institutes of Health Funding Discovery and Health					12					
						0					
United Kingdom	UK Research and Innovation					0					
Australia	Australian Government National Health and Medical Research Council					0					
	Australian Government Australian Research Council					12	-				
Germany	DFG Deutsche Forschungsgemeinschaft German Research Foundation					-	-				
France	anr agence nationale de la recherche					0					
European Commission	HORIZON EUROPE					0					

Figure 3. Categorization of OA and OS policies of global funding agencies (as of November 2023)

Surveying OS practices nationally and globally

OS practices were surveyed across 40 national and global institutions, organizations, and resources (e.g., OS toolkits, guides). Insights from this scanning activity contextualized the current state of OS practices nationally and globally. A sample of relevant individual actions, selected for applicability and feasibility, were suggested as action items for each recommendation outlined in the report. These possible actions were presented to the OSWG to aid in formulating and prioritizing recommendations. (uOttawa Open Science Working Group, 2024).

Canadian institutions were prioritized, followed by international institutions/organizations which were either comparable in their research culture (e.g., The United States) or established leaders in OS (e.g., Sorbonne Université, League of European Research Universities). A spreadsheet was developed with columns which listed 1) the affiliation of the OS practice, 2) a summary of the OS practice, 3) a categorization of the type of practice (i.e., capacity-building, documentation, education, hiring and evaluation, incentive, monitoring, or policy), 4) an indication of whether the practice was recommended or implemented within the context from which it was sampled, 5) the facet of OS under which the practice could be most closely attributed (i.e., OS, OA, open data, open code, open education), and 6) whether the practice could be implemented at the institutional or faculty level.

In total, 184 practices were surveyed and collated, and these results are openly available⁴. They were analyzed in aggregate for themes and trends, as well as in granular detail. For example, 74 sampled practices related to OA specifically.

Estimating OA spend at the University of Ottawa for 2022

An analysis of the fees paid for publishing OA at uOttawa in 2022 was conducted by Haustein, Butler, and Hare and presented alongside an overview of the uOttawa Library's OA investments at the OSWG January meeting⁵. This analysis was important to carry out given the scale of the academic publishing industry, which was valued at \$26.5 billion in 2021 (STM, 2021). In 2024, Relx reported £3,051 million in revenue from its Scientific, Technical, and Medical (STM) division, which includes Elsevier – one of the largest commercial publishers (Relx, 2024). The “author-pays” model, where publishers charge authors a fee to make their publication OA, is the dominant business model for financing OA among commercial publishers and poses challenges to researchers and institutions due to their high cost, difficulty in estimating spending, and the variability of fees according to OA publication model and discipline. An understanding of the costs of OA for researchers at uOttawa is helpful to the institution, particularly the library, when negotiating read-and-publish agreements, and supporting sustainable OA publishing beyond the author-pays model. Results can also direct educational and outreach efforts and support the institution in determining the impact of policy developments, like the Tri-Agency OA Policy revision.

Methods

uOttawa, like many institutions, does not monitor the payment of APC fees outside of its existing agreements. No public information is available about fees paid per article and it is unknown which author paid and from what funding source. An estimate was reached using publication metadata and APC list prices. Based on 2,142 WoS publications for 2022 (5,016-indexed research articles and reviews published by at least one author affiliated with uOttawa), 1,588 were published in gold OA journals and 544 as hybrid OA publications. APCs were retrieved for 1,687 articles (584 journals) from 2022 snapshots of the publishers' websites using Wayback Machine⁶. Median gold and hybrid APCs were used to estimate fees for the remaining 455 papers (364 journals).

It was estimated that in 2022, \$7.3 million CAD was paid for APCs for the 2,412 articles with at least one uOttawa author. For publications where the corresponding author is affiliated with uOttawa (n=878, 692 gold, 186 hybrid), estimated spend was \$2.9 million CAD. When applying discounts from negotiated agreements with publishers, it was estimated that authors paid \$744k less. These discounts reduce OA fees for authors, but are instead paid by the uOttawa Library,

⁴ <https://docs.google.com/spreadsheets/d/1WZvo4siLliUIsggRIslrlyT-oDqNDiBH7Z4BV1hhm58/edit?gid=0#gid=0>

⁵ <https://www.uottawa.ca/library/sites/g/files/bhrskd381/files/2024-03/open-science-working-group-meeting-4.pdf>

⁶ <http://wayback.archive.org/>

representing a redistribution of fees paid to publishers, rather than cost-savings for the institution. Visualizations of these results are presented in the uOttawa OS Roadmap.

Conclusion

It is hoped that the uOttawa OS Roadmap, along with the detailed methods and approaches taken to build its evidence base described here, will support the advancement of OS at uOttawa and other institutions across Canada. As a U15 research institution, uOttawa aims to remain a competitive collaborator in national and international contexts and advance cutting-edge research. Institutions of varying sizes and resources that cannot form their own working groups may benefit from uOttawa's approach, strategies, processes, and methods, adopting them to fit their own needs and capacities. An evidence-based approach was essential for productive conversations and dispelling misconceptions about OS. The effectiveness of OS practices increases significantly when developed collaboratively. In the spirit of OS, the success of its movement is further ensured through the sharing of knowledge.

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A. Appendices

A.1 Supplementary materials

The following tables and figures provide a sample of the outputs from the data collection project for the uOttawa Open Science Working Group (OSWG). For a more robust look at the results from this work, see the final report of the OSWG (uOttawa Open Science Working Group, 2024).

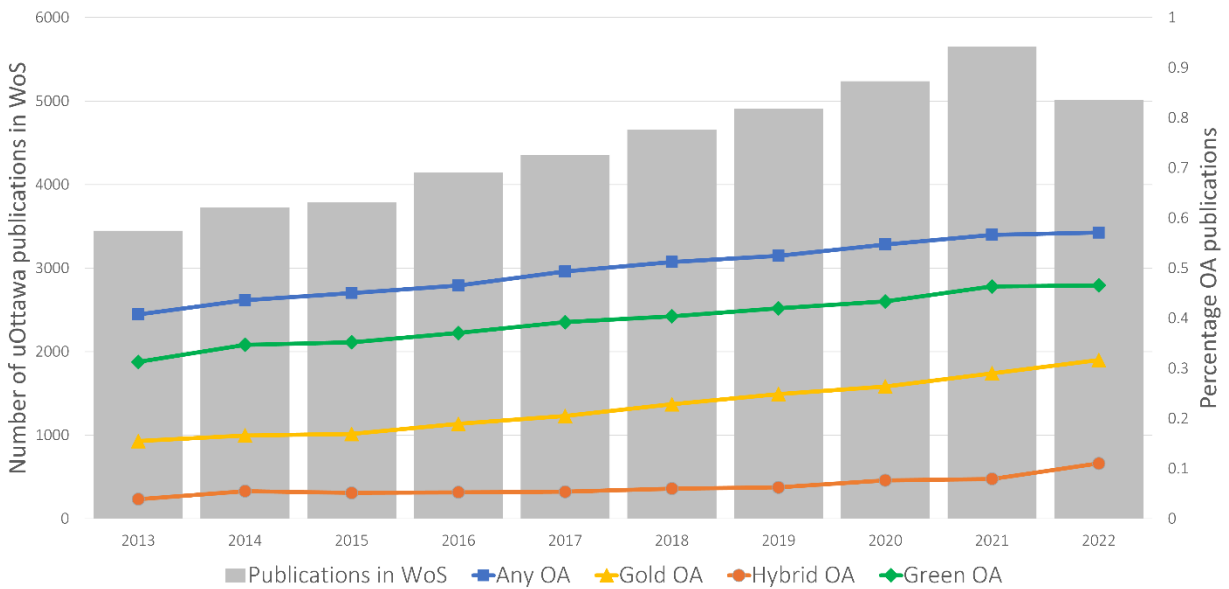


Figure 1. Rates of open access at the University of Ottawa 2013-2022. Based on data collected from the Web of Science in January 2023. Categories are not mutually exclusive, since green OA articles may also be published as gold or hybrid

Table 2. uOttawa-affiliated publications co-authored with top six collaborating countries 2013-2022, based on articles and reviews indexed in WoS with at least one author affiliated to uOttawa or affiliated hospitals (n=44,952). Collaborations represent the number of uOttawa publications including at least one co-author from the respective country.

		Publications 2013-2022	Any OA	Green OA	Gold OA	Hybrid OA	Closed
	uOttawa	44,952	51 %	40 %	23 %	7 %	49 %
with co-authors from...	US	10,076	66 %	56 %	21 %	11 %	34 %
	UK	4,035	80 %	74 %	26 %	17 %	20 %
	Australia	2,885	73 %	65 %	25 %	14 %	27 %
	China	2,830	54 %	45 %	26 %	8 %	46 %
	Germany	2,517	75 %	69 %	23 %	17 %	25 %
	France	2,395	69 %	61 %	19 %	13 %	31 %

	Gold OA		Commitment to monitor
	Green OA		Policy applies to journal articles
	Hybrid OA		Policy applies to data
	Hybrid (Transformative only)		Policy applies to books and chapters
	Creative Commons License		Policy applies to other outputs (theses, patents, creative output...)




























































University	Approach	Policy	Embargo	Enforcement	Format
Institution-wide					
 THE UNIVERSITY OF BRITISH COLUMBIA	Declaration		-	-	   
 UNIVERSITÉ LAVAL	Policy		0	-	
 McGill UNIVERSITY	Declaration	  	-	-	   
 Université de Montréal	Policy		0		 
 SFU SIMON FRASER UNIVERSITY	Policy		0	-	
Library					
 uOttawa	Policy	   	12	-	   
 UNIVERSITY OF SASKATCHEWAN	Commitment	  	-	-	   
 Western UNIVERSITY • CANADA	Declaration	  	-	-	   
 UNIVERSITY OF ALBERTA	Statement	   	12	-	   

Figure 2. Categorization of OA and OS policies at Canadian Institutions (as of November 2023).