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Open Secrets: Exploring Institutional Spending on Open Access

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ABSTRACT

A robust corpus exists on Open Access (OA) spending within libraries, however there is less literature on assessing OA expenditures across colleges and universities. Due to the nature of the fragmented and uneven investment in OA, researchers are likely not optimizing institutional resources on Article Processing Charges (APCs) as part of the open access environment. This article describes how personnel at University of Oregon Libraries built a Power BI model to encapsulate and visualize our institution's open access outlay as well as apprise researchers of their options for selecting OA publication venues based on APCs and impact metrics.

Keywords: Open Access, Article Processing Charge, Impact Metrics, Data Visualization, Library Expenditures, Institutional Spending

INTRODUCTION

How much is being spent on Open Access (OA) publishing at your institution? We can track what our library is funding through OA memberships, partnerships, and Article Processing Charge (APC) funds, for instance, but looking beyond the library to APCs paid by various individuals and organizations across campus, the human labor of processing these funds, the labor put into managing OA publications, and other unknown expenses, reveals a more intricate puzzle. While we are all limited by what data is collected and shared across an institution, there are clues found in the literature and in publication-analysis databases that can help provide a panoramic picture. As a companion to the motivation of assessing the larger economic picture of Open Access at our institution, we are eager to explore the future of Open Access publishing beyond APCs.

In Fiscal Year 2022-23, University of Oregon (UO) Libraries spent approximately $148,000 on a wide variety of OA publishing models (not including personnel). Including, but not limited to payments for memberships with Open Access publishers, Subscribe to Open (S2O) journal agreements, supporting Open Educational Resources (OERs), publishing OA Journals locally, and awarding about $80,000 to University of Oregon researchers[1] to cover article and book processing charges (BPCs) via an OA Article Processing Charge Fund, UO Libraries is working towards identifying and supporting many paths to open access. And yet, based on incomplete, but reliable, data that we will delve into in this article, individual researchers across the institution

[1] In this article we use "researchers" to refer to anyone conducting research and publishing their works. This includes but is not limited to university faculty, students, and staff.

spent approximately $3.3 million on APCs in the same timeframe; an amount close to half of the entire annual collections budget of UO Libraries.

Given the global movements towards supporting open access publishing (Piwowar et al., 2018; Robinson-Garcia et al., 2020) for reasons ranging from global equity (Harris, 2019; Roh et al., 2020; White House Office of Science and Technology Policy, 2023, p. 27–28) to gaining a larger audience (SPARC, 2024b), and the budgetary strain that libraries are under due to the vastness of materials available, high costs of many subscriptions and one-time package deals alike, as well as ongoing inflation (Elliott, 2023), there is a need for more funding to be shifted towards sustainable paths to open access in order to take the burden off of individual researchers (e.g. those imposed by APCs) and allow for more thorough access to scholarly output.

Groups and organizations such as SPARC (2024a) and Plan S (cOAlition S, 2024) are among many who are rethinking funding models for open access. With this comes the conversation around shifting funding from subscription-based models to sustainable options, such as community-funded and membership based open access projects and Subscribe to Open (2024). As conversation around the equity of APCs continues to churn (cOAlition S, 2023b; Klebel & Ross-Hellauer, 2023) we began our exploration of institutional spending on OA by taking a closer look at our library's APC Award, then realized the bigger picture of assessing APC fees across campus. In this article we do not aim to tackle all the issues and mysteries of publishing and budgets in the OA sphere, however, our immediate focus is to assess the financial burden of publishing by researchers at our institution.

After four full fiscal years (2020 - 2024) of awarding funds for OA article and book processing charges (*UO Libraries Article Processing Charge Award*, 2024), UO Libraries is probing deeper into the role that libraries can have in guiding researchers toward good venues for publishing in the same manner as we guide them to research sources. The authors asked ourselves: how do we enable researchers to publish in reputable journals without significant financial barriers? Researchers may encounter many hurdles in their scholarly communication processes including unfamiliarity with all their publication options. They may not know of relevant journals, or how various journals match the demands of their promotion and tenure processes. They may have incomplete understandings of citation metrics, open access, or if there are field-based repositories for their works and what that even means (Bryant & Thomas, 2024, p. 11; Niles et al., 2020). A further hurdle is finding article fee information related to open access publication options, especially in fields where article fees have not historically been common. Some of this information is out there, but it is spread across a range of databases with varied functions, purposes, presentations, and in many cases, paywalls. We determined that it would be of use to our university community to evaluate what data was available to us at UO Libraries and then find a way to present this information for our community in ways that were easy to compare across datasets, subject areas, and types of information.[2] The primary tools and information available to us were via the databases Delta Think (https://deltathink.com/) and InCites (Clarivate, https://incites.clarivate.com/).

Aligned with this thought we determined it would be helpful to have a tool to find publication venues that presented the right balance of fees and citation impact to match

[2] The process of collecting data also served as a useful opportunity to evaluate a variety of databases and tools to which the UO Libraries is a paid subscriber. In this article we note some limitations of the data we collected in relation to our specific project but are not offering a broader evaluation of our data sources.

researchers' foci and funding constraints. Thus, we set out to use the variety of data we had available to create a tool with multiple purposes: (1) to visualize the costs and changes in costs over time for gold and hybrid open access publishing across the disciplines, (2) to provide a tool to liaison librarians to support researchers in finding open access publication venues that suit their particular mix of needs and funding, and (3) to visualize a profound landscape of open access spending across our institution. This article therefore has two purposes: we will briefly summarize the current landscape of open access at the UO and how our tool is being used assess it, and we will describe our tool so as to allow the reader to recreate a similar tool using the data available at their institution.

LITERATURE REVIEW

In our investigation of spending on open access at the UO, we identified two main areas to research: (1) known library expenditures to support open access through methods such as our local APC Fund, OA memberships and partnerships, and payments for Subscribe to Open publications, and (2) unknown expenditures across campus for APCs. Further, we investigated broad scale analyses of APCs, existing tools for finding information about APCs and institutional spending, and broader issues of scholarly communication, including researcher understandings of scholarly communication, open access, publishing fees, and related topics. Along the path of our investigation, we discovered that Plan S Journal Comparison Service access would not meet our needs because it is only provided for Read and Publish institutions, of which we are not, and that subscription costs tied to S2O prices are undisclosed. Institutional spending on open access fees is not transparent and therefore not well understood (Jahn & Tullney, 2016). This lack of data and transparency, also indicated in a Utah State University poster (Finch et al., 2023), inspired us to help fill in this gap in literature. In this section we review key literature that informed our inquiry.

The primary focus of our study, APCs, have been problematized by many scholars on the forefront of open access publishing. In a meeting of the Open Access Scholarly Publishing Association (OASPA) in March 2023, they came to a "consensus view … that APCs … are a barrier to participation in OA publishing for authors in every region." (*Report from Equity in Open Access Workshop #1*, 2023) In June 2023, cOAlition S announced joint plans with Jisc and PLOS to convene a working group to move away from APCs towards "business models that enable equitable participation in knowledge-sharing" (cOAlition S, 2023a). Putting the cost of publishing on authors is not the ideal model for open and equitable publishing (DiVittorio & Gianelli, 2021). This is especially unsustainable as APC rates increase.

> "There is already evidence that APC hyperinflation is a real phenomenon. Data from 2005 to 2018 on the APCs paid by European institutions (Figure 1) shows that from a mean APC of T858 in 2005, APCs have nearly doubled, to over T1,600 in 2018 (Aasheim et al., 2019...). However, inflation as reported by the United States Bureau of Labor Statistics or the European Central Bank would only have increased the 2005 APC to a 2018 APC of T1,100 and T1,046, respectively." (Khoo, 2019, p. 3)

Likewise, "Many publishers increase journal APCs on a regular basis, for example, after the end of an introductory free period or upon being assigned an impact factor" (Khoo, 2019, p. 3). Yet, APCs are currently a common funding model for OA publishing. Our exploration of the database Delta Think revealed 43 unique publishers with over 12,900 unique journals charging APCs for open access publishing. Further, many libraries have experimented with APC funds to support their institution's researchers.[3]

During our explorations of the current state of open access spending across the university, we sought out literature to help guide our research and frame what hidden spending we might look for, as well as opportunities for spending (such as redirecting traditional subscription funds towards journals launching Subscribe to Open models). We also looked for broader studies on spending on APCs or open access in general.

There is a strong collection of works on open access publishing that address what publications are out there and the OA models they employ. The general state of OA publishing has been covered widely and there is a growing body of research on the types of article processing charges (Borrego, 2023; Piwowar et al., 2018; White House Office of Science and Technology Policy, 2023). As the authors were finishing edits on this article, Haustein et al. published on global APC expenditures to six of the top publishers (Haustein et al., 2024).

There is still a gap when it comes to institutional spending on OA publishing, and the publications that cover this topic note this gap as well. At the federal level, the White House Office of Science and Technology Policy's (OSTP) November 2023 report notes, "Limited data are available to estimate the total APCs federal researchers and grantees paid from 2016 to 2021, as true APC expenditure records rest with the authors or institutions that pay these fees and the publishers that invoice them" (White House Office of Science and Technology Policy, 2023, p. 17). OSTP goes on to note that they estimated such expenditures by looking at average APC fees in the journals that federally funded researchers published and the number of articles published with federal funding support, with acknowledgement of differing average charges across various OA models (White House Office of Science and Technology Policy, 2023, p. 17) (which we simplify down to "hybrid" or "fully OA" to match our work as described in the section on building our Power BI model). These 2023 publications emerged after we built our tool, so our methodology is not based on their work, however they reinforce our experience in exploring these issues. Likewise, a couple articles from 2016 laid out a methodology for piecing together spending on APCs. Solomon and Bjork's study of four research intensive institutions in the United States and Canada "used three types of data to characterize what the likely cost of APCs would be for research intensive universities in the USA and Canada… WoS Metadata… APC Prices for Publications [where researchers would likely publish] … [and] Subscription journals converting to APCs" (2016, p. 4). A study of German institutions similarly notes,

> "The study of institutional spending on open access journal articles has been limited for several reasons. The first is that payment of these charges is fragmented across the budgets

> of grant agencies, research institutions, and libraries, or is covered by personal budgets… Another key problem in this regard is that funding for open access journals using publication fees lacks transparency because the parties involved – authors, universities, funders, and publishers – do not release information about who pays for what or the costs of publishing." (Jahn & Tullney, 2016, p. 2)

This article was followed by a variety of other country-specific analyses on APC spending, such as for Brazil (Pavan & Barbosa, 2018) and Chile (Krauskopf, 2021). Another German investigation of APC payments found similar barriers as Jahn and Tullney, stating,

> "An ideal APC monitoring instrument would cover complete APC payments from all research organizations of a given domain. In the real world, APC monitors are lacking in two respects: not all institutions in a given domain deliver data to APC monitors, mostly because of the fact that not all of them have a central publication fund that processes APC payments and collects the data of these transactions... Moreover, research institutions that have a central publication fund are often unable to report all payments of the institution to the monitoring systems as a number of APC payments are made by different entities of a research organization and are processed in various ways." (Bruns & Taubert, 2021a, p. 1-2)

Bruns and Taubert go on to highlight the OpenAPC dataset, "the world's largest collection of APC payments" (2021a, p. 2). All these projects employ methods for counting APC Payments by institution or country, based on estimates that factor in their affiliated authors on published articles in journals with APC fees. In the preprint version of Bruns & Taubert, they go on to showcase that the APC costs included directly observed fees as well as estimates (Bruns & Taubert, 2021b, p. 20). Some of these research projects include any publications with at least one author (for instance: Krauskopf, 2021) from an institution or country in their payment estimates, while others limited their count to publications where specifically, the corresponding author was affiliated with their institution or country (Bruns & Taubert, 2021a, p. 3). While we will discuss this further later, it is worth noting here that at the UO Libraries, we pursued the latter methodology.

A common theme in the literature is the higher cost to institutions and researchers of hybrid open access compared to fully open access publishing (Jilani & Banerjee, 2023; Morrison et al., 2022). This has two direct causes: the additional subscription fees paid for these journals on top of OA APCs, as well as the typically higher OA APCs for hybrid journals than for fully OA ones. Solomon and Bjork note, "For researchers at research intensive universities, APCs… paid for the fully OA journals average around 1,800 USD while hybrid journal APCs average about 3,000 USD" (2016, p. 7).

This raises the question of why researchers are commonly selecting the more expensive hybrid journal route when publishing OA. One can speculate that many researchers do not

approach their journal selection based on OA as a top priority. Subscription-fee supported journals are still more common, and funding to pay APCs is less common in some fields of research. Many researchers may focus on the perceived importance of a journal, or topical fit of their article, with hybrid OA options sold to them by the publishers later in the process. While these are not easy trends to counter, the authors argue that education and outreach are important in shifting the publication process towards more equitable forms of publishing through open access.

Key topics that are essential to education researchers on to help them make informed decisions on where to publish, include understandings of open access in general, addressing concerns around tenure, impact and prestige, the perceived risks and potentially unknown benefits of publishing in different venues. Library personnel may be keeping up with OA (Scott et al., 2021), but not all the researchers are. A tool could help librarians guide researchers toward making informed choices on OA, especially in fields where OA and APCs are newer concepts. Bryant and Thomas address many of these topics in their 2024 article, noting, "Several participants stated that their disciplines discouraged OA publishing, possibly because there was a perceived difference in quality between OA and closed journals in their fields" (2024, p. 17). Addressing Black, Indigenous, and People of Color (BIPOC) faculty specifically, they go on to state they "said that they were unaware of peer-reviewed OA venues in their traditional humanities disciplines (philosophy, literature, etc.), and that any would likely be perceived as of lesser quality than closed journals, but again, that interdisciplinary offshoots (such as digital humanities or game studies) respect and promote OA publishing fully" (2024, p. 18). And, "we discovered that faculty were unlikely to be aware of the full breadth of terms and nuances (e.g., "green" or "diamond" open access pathways) compared to open access advocates based on awareness levels reported in previous studies" (2024, p. 8).

As for the relative pricing of APCs, researchers may not be concerned about the amount of an APC once they have determined that they will pay one. Khoo's analysis of hyperinflation of APCs notes,

> "Authors may therefore assess APCs on a binary basis, assessing whether they can pay an APC but not weighing the magnitude of the APC. Authors who are satisfied with their free-to-publish options may choose a subscription journal or platinum open access journal (subject to availability), but if they are able to, will likely choose to publish in an outlet that is commonly perceived as more prestigious, even if that means paying an APC or a higher APC." (2019, p. 11)

Or researchers may not be aware of the costs until late in the publishing process, when they either pay or do not publish (or do not publish OA). Halevi and Walsh note, "our results echo the disconnect reported in previous studies, where researchers and authors support the concept of OA but believe that APCs are too expensive and should not be paid by authors... It is clear that despite support for the concept of OA, authors will typically publish behind a paywall when funding is not available" (2021, p. 396).

Further, researchers are often concerned about a journal's impact and whether their publication will be perceived as valuable in their tenure and promotion review. "Connected to the idea of rigor is the journal impact factor, which a few participants mentioned is emphasized in their disciplines when considering which journals to publish in" (Bryant & Thomas, 2024, p. 18). Questions about whether impact metrics should be considered useful at all have arisen in the field. For instance, PLOS has come out with the statement, "PLOS does not consider Impact Factor to be a reliable or useful metric to assess the performance of individual articles. PLOS supports DORA – the San Francisco Declaration on Research Assessment – and does not promote our journal Impact Factors" (PLOS ONE, 2024; See also: PLOS, 2024). Yet prestige and impact are still at the forefront of many researchers' minds.

Moreover, many publishers are deeply tied to their prestige and impact metrics. Discussing APCs and metrics, Khoo notes, "data suggests that publishers are adept at pricing journals according to the prestige value of the title and the funding available to authors in each market" (2019, p. 14). High Impact and high APCs often go hand-in-hand, but our tool can show examples of low APC-funded journals producing high impact papers.

OUR LOCAL SITUATION

The authors' institution reflects the literature; it is difficult to collect spending information from across the University of Oregon, outside of the UO Libraries. Further, there are some aspects of library spending that cannot be fully shared publicly. This is reflected in our later discussion of our tool, in which we estimate some expenditures, and obscure some specific dollar amounts and proprietary data from some outside sources. However, it is our goal to share some ways to explore this information for your own institution; it is our intention here to provide as clear a picture of the state of spending on open access in the UO Libraries as we can.

UO Libraries' known OA expenditures include an APC Fund which is four years into a second iteration[16] and has awarded between $60,000-$80,000 per fiscal year since 2020 to UO researchers to cover APCs as well as BPCs. This award stemmed out of a multi-year project to promote open access publishing at the university, which included a successful effort to pass an Open Access Policy through the University of Oregon Faculty Senate in 2021 (*Open Access Scholarship Policy (Motion US 20/21-18*, 2021). The current UO Libraries Open Access Article Processing Charge Award (*UO Libraries Article Processing Charge Award*, 2024) is available to any person currently affiliated with the UO, whether student, faculty, or staff member, with an emphasis on supporting early-career researchers in publishing in fully open access publications. The funds can be used to pay fees for any fully open access publication. Researchers pursue publication in the typical manner. Once a researcher's work has been accepted for publication and an invoice has been issued, faculty, staff, and students may apply for up to $2,000 per fiscal year for fully OA APCs, and an additional $5,000 per OA monograph publication. We do not have a pre-approval process as of 2024. The award committee reviews the publisher selections to ensure

that they meet our open access standards. As such, the primary reason the committee will reject an application is if the publication is not fully open access. There is significant demand for APC funds at the UO, as evidenced by the latest round of library funding being fully spent out by February 2024, approximately halfway through the fiscal year.

UO Libraries' support for open access publishing necessarily goes well beyond this fund as we follow the logic of OASPA, cOAlition S, and others, that APCs are not the ideal model. We have a many-pronged approach, including local education endeavors about our institutional repository, Scholars' Bank (https://scholarsbank.uoregon.edu), open access in general, and a wide variety of informational town halls, a video, and a white paper included in the successful push for the University of Oregon Faculty Senate to adopt an Open Access Policy in 2021 (Senate Sub-Committee on Open Access, 2024). Supporting local researchers in their understanding of open access and the many publishing models can also help them find not just open access publishing venues, but non-APC based ones. Further, by deploying a multi-pronged approach to supporting a wide range of open access endeavors, we believe that we are not just relieving our own researchers of the burden of the cost of publishing, but we are also increasing global access both for reading and for publishing.[4]

Additionally, we direct fiscal and in-kind support towards many open access endeavors. Our local support of OA is largely driven by personnel costs in every echelon from faculty to student labor. This has been an intentional strategy, wherein we leverage existing platforms, initiatives, and campus resources to navigate our path to OA. A snapshot of non-labor expenses in fiscal year 2023 (July 2022 – June 2023) includes:

Open Access Collections Expenditures	$ 44,176.54
APC Fund	$ 80,000.00
OER Expenses	$ 13,578.00
Services, Products, and Tools	$ 10,067.17
Marketing the Oregon Undergraduate Research Journal	$ 107.30
Total FY23	$147,929.01

Figure 1. UO Libraries Open Access Total Spend for FY23

Open Access Collections Expenditures includes S2O subscriptions, Knowledge Unlatched, funding for preprint servers such as arXiv and PsyArXiv, and memberships support like the Directory of Open Access Journals. As of this writing we have not supported any Transformative Agreements[5] as several internal reviews found that they would not be cost effective in our instance. The APC Fund is straightforward; it includes article and book support for APC fees. OER Expenses include membership and platform fees, and awards to faculty for adapting their coursework to the Open Educational Resources framework. Services, Products, and Tools are expenses for operational expenses that don't fit neatly into a single department, like ORCiD, as well as Aviary, Datacite, and Reclaim Hosting. The only non-labor costs found for our locally

hosted publication, the Oregon Undergraduate Journal (OURJ), in fiscal year 2023 were minimal costs for marketing.

There are many OA costs indirectly borne by the university, as well as through a partnership with Oregon State University. UO Libraries works with Oregon State University Libraries on a shared installation of the Public Knowledge Project's Open Journal System platform for library-led open access publishing initiatives, supporting new and extant open titles and encouraging editors to make the switch to open access through the availability of free-to-them software and a basic level of publishing services and support. Open Journal System (OJS) journals are hosted by OSU Libraries. OURJ publishing costs are baked into campus level hosting of WordPress, so this in-kind cost was not included in our breakdown of expenses. There was grant funding for a digital humanities project, but the non-labor aspect occurred outside our library. We have an institutional repository, and we had a recent upgrade to include statistics, however this expense fell in fiscal year 2022. If we were to duplicate this snapshot for fiscal year 2024, we would find several more items to add to Open Access Collections Expenditures as well as a new-to-us data tool, Dryad, though our APC Fund has been reduced by $20,000, so these changes would likely offset each other.

Beyond UO Libraries, across the wider ecosystem of the UO, much less is known about open access expenditures. As we explored APCs and impact factors, we realized we needed a way to pull all the information together in one place. We selected Power BI, which is Microsoft's data visualization platform, due to our campus access.

BUILDING OUR POWER BI MODEL AND UNDERSTANDING ITS LIMITATIONS

To build our tool, we required a list of locally authored publications, pricing data, and impact metrics. The databases we had access to for this information were Delta Think and InCites[3] We retrieved APC prices and Source Normalized Impact per Paper (SNIP) metrics from Delta Think for fiscal year 2017 through fiscal year 2023, Journal Citation Indicator (JCI) metrics and UO-Corresponding Author OA Publications from InCites from annual year 2022, and UO Libraries Cost data from Ex Libris' Alma Integrated Library System (ILS) from fiscal year 2023[4]. We joined the data in Excel before loading it into Power BI. 266 duplicate journal titles (out of more than 70,000) were cut when joining two InCites data sets. Some obvious limitations of our data can be seen in the date ranges covered. The second half of the 2022 calendar year is covered by all three sources but InCites being on an annular calendar and the other on a July-June fiscal calendar, respectively. Similarly, SNIP and JCI address impact in significantly different ways; we found this

[3] In the time since we built our tool, OpenAlex (https://openalex.org/) has emerged as an open tool for some similar types of information regarding scholarly output.

[4] It is worth noting that we worked with SNIP and JCI due to those being the metrics available to us in the databases we had access to. There is no reason other metrics might not also be used if they are readily available to a researcher aiming to create their own tool.

to add interesting depth to our ability to look at how different publications have impact in different fields and from varied perspectives. Included in our tool's informational page, we include this definition for the users, "Under SNIP, a journal's subject field is defined as *the set of papers citing that journal*. This approach allows for a fluid definition of field that changes over time as science progresses and journals evolve. In contrast, the JCI still relies on the subject classification assigned to a journal when it was first added to the *Web of Science* database" (Davis, 2021).

A further limitation on our data relates to the foci of the InCites database, namely a heavier focus on the natural sciences than on the social sciences or humanities. Delta Think provides APCs for a balanced range of journals (including approximately 12,000 titles not included in InCites) in that it aims to provide all data for all journals with APCs, but it does not include information at the individual author and article level as InCites does.

Keeping these limitations in mind, we found that in annual year 2022, UO researchers published in hybrid OA journals at nearly twice the rate as in fully OA journals. InCites listed UO corresponding authors as publishing at least 692 articles in hybrid journals, and 358 articles in fully OA journals. When combined with the APC prices we found in Delta Think, university wide spending estimates were astounding, and we felt a need to explore our publishing and expenditures further.

EXPLORING OUR APC VS IMPACT METRICS MODEL

Awareness of all these varied measures and the limits of our data helped inform the types of charts we created for our Power BI model. We aimed to represent the wide variety of data, and compare what is comparable in useful ways, without losing useful and interesting data due to a lack of ability to compare it all in one chart. Thus, we created 12 separate tabs presenting 14 manipulable charts, allowing a user to dive into the range of data of use to them for their questions and research support needs. The visualizations cover APCs from 2016 to 2023 sorted into most expensive and least expensive breakdowns; APCs costs as compared to SNIP, costs over time by subject area, costs of fully OA versus hybrid; comparisons of SNIP to JCI by title as well as by subject area; subscription costs versus APC fees; JCI versus APC by title as well as publisher; and finally, an estimate of total university spending on APCs. Some of the charts relay the same data in slightly different arrangements, for the ease of the user. We will focus on the most relevant visualizations for this article.

The first four tabs of this tool provide context to UO librarians, the primary users of this tool. They orient the user to navigating Power BI and its filters, and provide an overview of APC Fees and the metrics we use and address. We applied filters to give quick views of the data, for instance to see the top ten most expensive APCs as well as the bottom ten. We also added subject filters so the user can focus on these within subject areas. These tabs provide a quick glance, that may be all a subject librarian needs to be able to answer questions like "what is the range of APC fees in my subject area?" or "is this fee typical?". Finding a journal that is on the less expensive end of the range is one strategy for determining what might be a good deal, with the caveat that it is only really a good deal if it matches the researcher's other needs, such as being on relevant topics and having reasonable impact, the latter topic we will address when explaining our visual on "APC (USD), JCI by Title".

This orientation section of the model also shows three visualizations of APC trends. The first is "Average of APC (USD) Cost Over Time by Subject Area (Delta Think)" (shown in Figure 2), a ribbon chart of APC costs over time grouped by subject area. There are no filters on this visualization, rather it is a timeline of how APCs are rising and falling across subject areas, and relative to other subject areas. When a user hovers over one of the ribbons, tooltips pop up with the average price for the year (at which the user's curser is pointing). Interestingly, when using the tooltips, one can see that the average APC for the most expensive subject area in 2016 - 2017 is about $2,800, which is about the same as the least expensive area in 2022 - 2023. The visualization therefore demonstrates the change in the relative expense across subject areas, and the overall trend is that APCs are rising. Some subject areas hold steady relative to their peers, and others, such as Life Sciences, see high variability. Physical Sciences started out with higher average fees yet is now about average in comparison to other areas.

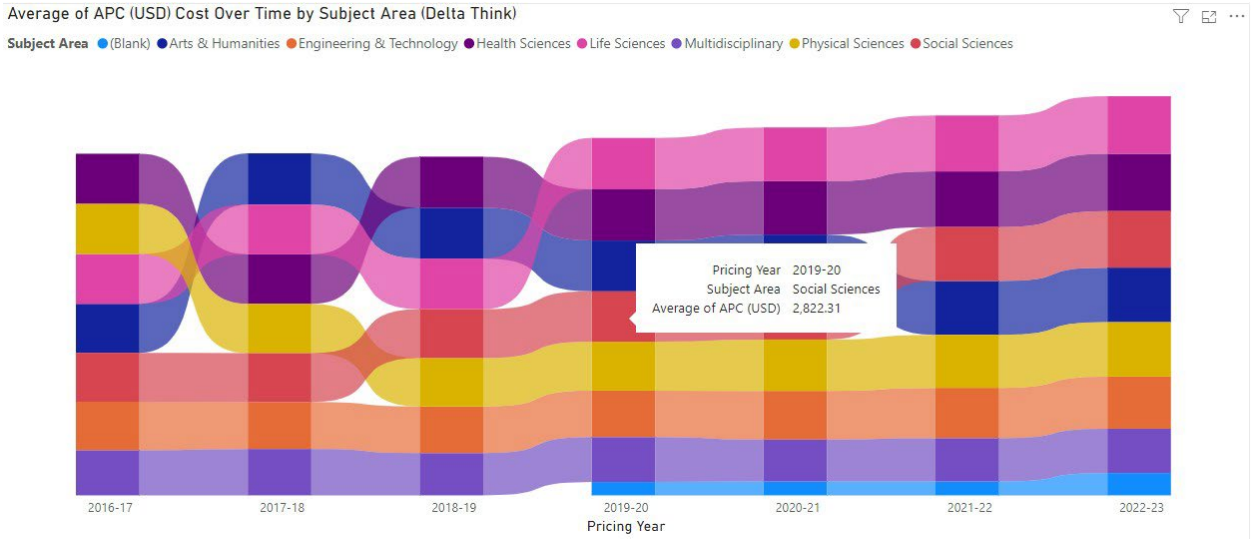

Figure 2. Average of APC (USD) Cost Over Time by Subject Area (Delta Think)

Moving forward, the next tab contains a visualization on "Average of APC (USD) for Fully OA vs. Hybrid by Subject Area (Delta Think)" which provides at a quick glance, the clear picture that average APCs are higher for hybrid journals than for fully OA journals, across all subject areas. [Figure 3] The user can hover over the bars to see the precise dollar amounts for each.

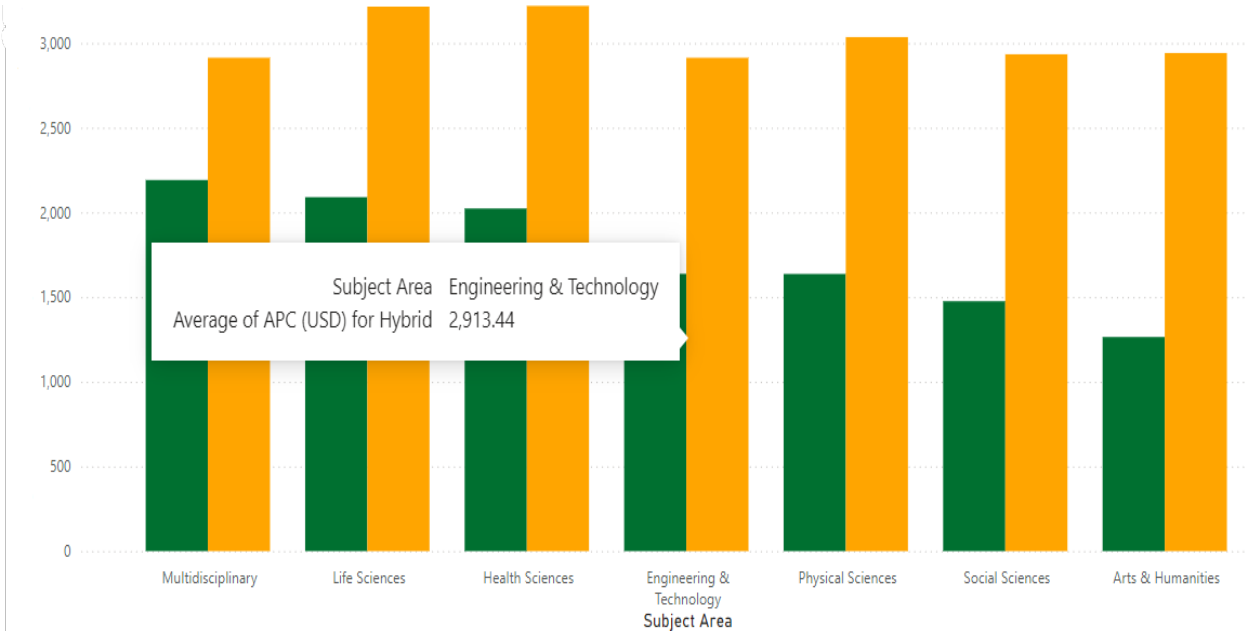

Figure 3. Average of APC (USD) for Fully OA vs. Hybrid by Subject Area (Delta Think)

Hybrid journal APCs are of course fees in addition to subscription fees for these journals, which leads us to the visualization, "UO Libraries Subscription Cost (Hybrid) vs APC Fee (Delta Think) by Title", pictured in Figure 4. Here the user can move beyond generalizations by subject area, to view and search for expenses related to specific hybrid-OA journals that are subscribed to by UO Libraries.[5] It is noteworthy that many of the APC fees are significantly higher than the subscription fees for these journals. Not only do researchers often pay more for an APC in a hybrid journal than a fully OA journal, but the journals are potentially being paid many times their subscription rates for individual articles to be made open access. Among many uses, this visualization can be useful to librarians in assessing where they might want to direct their collections budgets, selecting publishers to pursue specialized agreements with to manage APCs, identifying affordable places to publish, and in demonstrating to researchers how some journals or publishers charge fees (and in explaining the fee structures of different forms of OA publishing.)

[5] This visualization is of hybrid journals only, and does not include fully oa publications, as we do not pay subscription fees for fully oa publications that are supported by APCs alone.

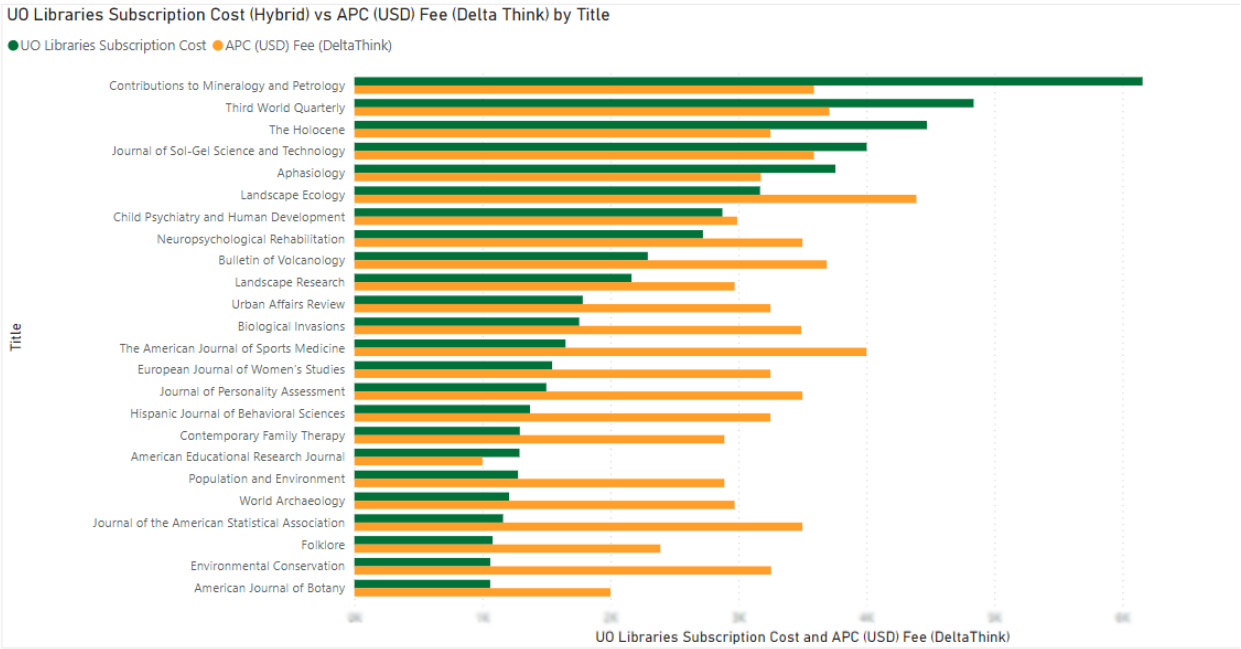

Figure 4. UO Libraries Subscription Cost (Hybrid) vs APC Fee (Delta Think) by Title

The next section of visualizations in our model (Figure 5) are designed to let liaison librarians help researchers select the most advantageous publishing venue given their goals and funding level. While many have problematized reliance on impact metrics for judging a publication, researchers often want to use this information, and it is often important in their tenure and promotion processes as they currently stand, so we have provided ways to explore that factor. We have options for librarians to optimize JCI versus APC fee by Title and then by Publisher. UO Libraries' small APC Fund can subsidize fees up to $2,000, so we can select options such as "is less than $2,000" into the APC filter if researchers want to find something within this budget. We can also set the JCI to a certain range, to say that we want a JCI of at least 1 (normal), for example. A librarian could search by Subject Area to retrieve an expected range of metrics, or zero in on a specific title that a researcher is thinking of publishing in. We can also filter by OA Model, Subject Area, Publisher, or Title to customize results to a researcher's needs and interests. It is worth noting again that we are using fiscal year 2022-2023 (July-June) for Delta Think / SNIP, and annual year 2022 (January-December) for JCI, because those were the two most recent full years, we could get from each of those organizations. The peak covid years were odd years for publications and statistics, so a journal that usually performs well might take a dip and then climb back up again this year, which is why it can better to step back for a broader look at the landscape, and not just look at the metrics for a single journal, but how journals compare across a field of study. With all the above filters in action, the user may have only a handful of relevant titles to choose from, and the researcher may need to either find additional funding sources for an APC fee or accept a potentially lower impact metric. Our model helps researchers assess the landscape and have a sense in advance of submission, of the price to publish in the journals they are considering, to avoid potentially squandering resources on journals with high APCs and low impact – especially avoiding discovering this at the moment their article is accepted and they receive a large invoice.

The tool offers a structure for conversation between librarians and researchers to review the publishing landscape and articulate priorities.

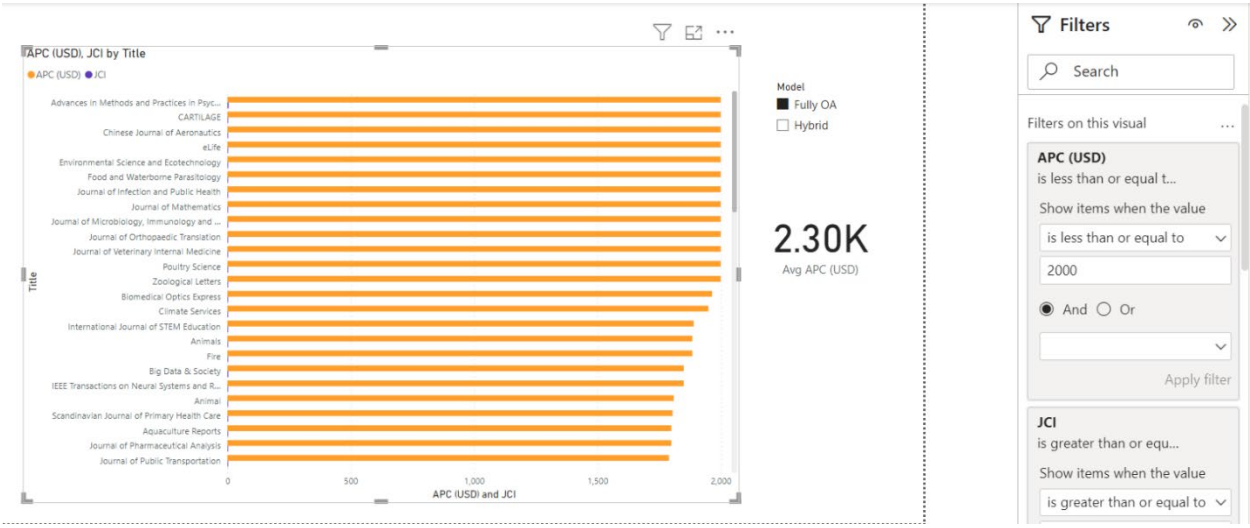

Figure 5. APC (USD), JCI by Title

Our last visualization zooms out for a broader scope, looking beyond the library, toward the university as a whole. This page (Figure 6) features three interactive charts on estimates of what the UO has paid in APC fees to publishers in 2022, grouped by Publisher, Subject Area, and Title. We searched InCites for articles with corresponding authors from the UO, and then matched them up with the stated APC fee from Delta Think for the journal that that article was published in. Using this process, we found 692 articles in hybrid journals, and 358 in fully OA journals, with the corresponding author based at the UO. The visualizations in Figure 6 show the number of articles published in a year multiplied by the standard APC fee for each publishing-journal. Added up, UO – not just the libraries, but the whole university campus – is shown to have paid millions of dollars to publishers by way of APC fees in just one year. The source of the funds could be money written into grants, general funds from state appropriations, gifts and endowments from donors, or tuition dollars, but there is no way to tell from the data we have. This estimate has many limitations. There are the possibilities of APC waivers or discounts, and fees could have been paid by other institutions, for instance by coauthors. We assume these are offset by the data set being weighted toward the sciences, as InCites does not contain as many publications in the humanities and social sciences, so while we may overcount some APCs, we are likely missing other APCs from undocumented publications.[6] It is possible the data in 2022 is not typical, as research and publications were impacted by the covid-19 pandemic, and future iterations of this project will need to be completed in order to gather a larger sample. Perhaps in more typical years and with

[6] It is worth noting, the 2023 report from OSTP states, "Social science researchers publish through the APC-based Gold and Hybrid routes considerably less than researchers in Technology, Physical Sciences, and Life Sciences and Biomedicine. Federally funded Arts and Humanities researchers published an average of only 370 articles per year during the period under study and published more paywalled content than other disciplines." (White House Office of Science and Technology Policy, 2023, p. 32)

more comprehensive data across all fields of study, significantly higher expenditures could be noted.

Qualifications aside, we estimate that the UO paid $3.32M to publishers for APC fees in one calendar year. Wiley, Elsevier, and Springer Nature were at the top of the list for total fees. Life Sciences, Physical Sciences, and Social Sciences were the top three Subject Areas. Life, eLife, and Journal of the American Chemical Society were the top three most expensive titles.

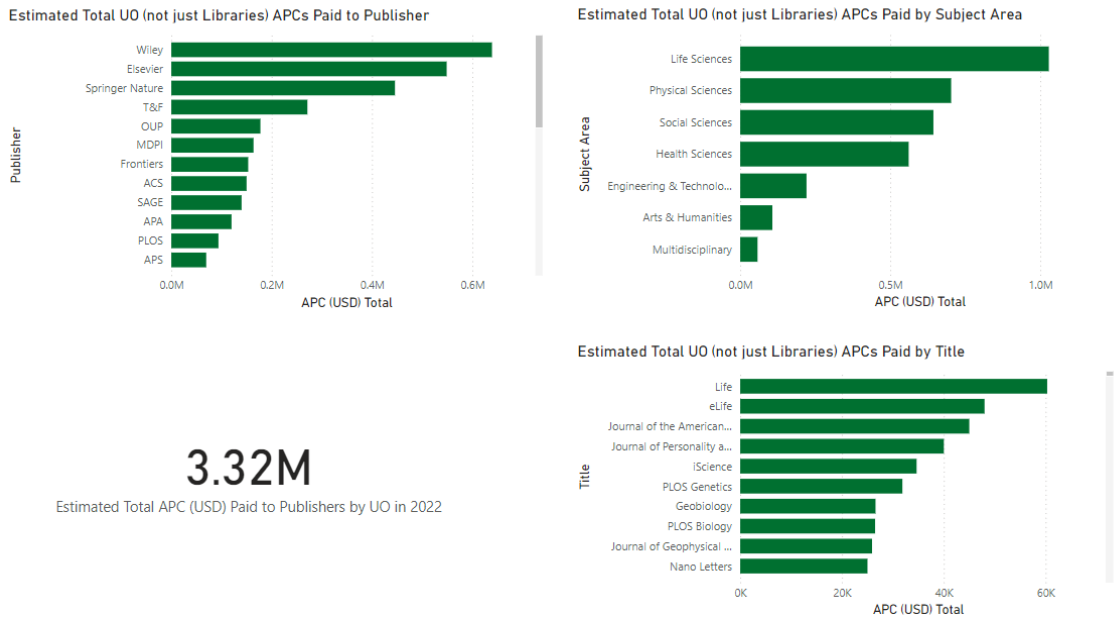

Figure 6. Estimated Total APC (USD) Paid to Publishers by the University of Oregon in 2022

DISCUSSION

Iterative investments in open access become normalized over time, as part of the matrix of choices that simultaneously seek to meet nuances of the environment and obfuscate the return on investment. Reliance on APCs perpetuates the existing publishing ecosystem, wherein public university dollars are given to private industry (Butler et al., 2022). It took some effort to gather this information about OA at the university. Both Delta Think and Clarivate's InCites were resources that our library paid for, and the irony is not lost on us that we paid even more money to obtain information about our own institution's open access footprint on top of the university already paying for the research, APCs, and journal subscriptions.

OA is just one of our many priorities in the library, in the age of doing more with less, our strategy has been to fold OA into resources already in place. This strategy unintentionally and consequently made it difficult to uncover the total library spend on OA in a given year. By putting together disparate data into our Power BI model, we discovered that OA appears deceptively inexpensive within the library, whereas the bulk of the cost happens outside the library, among publishing researchers across campus. This result is surprising because many people in and out of

the library world consider OA to be a "library problem," whereas our data show the bulk of institutional spending on OA happens outside of the library. UO Libraries hosts faculty outreach opportunities, workshops, awards, journals, and a repository for scholarly work, but clearly this is not enough to move the needle of our whole campus.

Building this Power BI model was a pursuit motivated by curiosity. Due to the lack of literature on institution-wide expenditures on OA and APCs in particular, we needed to forge our own path. Along the way we found contradictions in the current corpus on APC fees. There is a perception that paying APCs means that it is not scholarly, but predatory (Bryant & Thomas, 2024, p. 21). There are also perceptions that high APC fees are associated with high prestige (Butler et al., 2022, p. 2; Khoo, 2019, p. 2) and low APC fees are associated with predatory journals (Halevi & Walsh, 2021, p. 394; Khoo, 2019, p. 11). There is a cognitive dissonance in believing that paying to publish research is not scholarly, but if one does decide to pay to publish, they should pay top dollar. Our investigation has reinforced our distaste for participating in an environment of privatizing public work, and the hybrid OA model in particular.

When we set out with the idea for this project, we were not sure how far we were going to get in our project or where exactly the data were going to take us. We ended up creating an array of visualizations on APC fees, impact metrics, and how they interact at our institution. We noticed some unsurprising things about APC fees, for example, they go up over time. We found that average Hybrid journal APC fees are about the same regardless of subject area. Originally, we thought we would use this tool primarily to help researchers make informed decisions about publication venues, but in the process of analyzing the situation and information available to us, we realized that this tool could help inform us about nuances in our collection. For example, when reviewing social sciences, at first glance, they seem to have relatively expensive hybrid journals, as we were expecting to see hard science on the top of our list. Looking deeper, we determined that many of our science journals are bought in packages and not listed in our ILS as an individual expense, which artificially makes the social sciences group seem higher in comparison. Here we want to emphasize that it is important to know your data and to think critically about the results, as visualizations can be deceptive.

CONCLUSIONS AND RECOMMENDATIONS

We started our project attempting to answer the question of how much our library spends to support open access publishing. We soon expanded to ask how much is spent on open access across the whole institution. In our snapshot, UO Libraries spent relatively little, less than $150K, not including personnel and time, on open access. We found much more was being spent on APCs outside of the UO Libraries however, and much of this money was going to hybrid-OA journals, many of which UO Libraries pays subscription fees to as well. This brought up many more questions, including whether spending on APCs are the best use of the Libraries and researchers' funds, whether APCs are an effective and equitable way of supporting open access in the long term, and what better options might be out there.

The UO Libraries' OA APC Fund is a relative drop in the bucket, at a current amount of $60,000 per year, compared to the estimated $3.32M spent across the rest of the university. Our APC Fund could be redirected to support numerous membership-based open access publishing projects that result in publishing options that are free for researchers. If the landscape of open

access publishing continues to move in that direction, then some portion of that 3.32M of researchers' dollars at our institution could be freed up towards more research. Going a step further, if we pulled out of funding APCs now, intentionally repurposed those funds, and partnered creatively across the academic landscape, would that be enough money to provide a sustainable model to transform publishing as a whole?

In the meantime, the authors, along with many colleagues at UO Libraries are interested in investing more in S2O, infrastructure for our institutional repository, hiring an assistant for bringing in faculty works to the institutional repository, Open Education publishing (OER support), and other new OA models that present themselves in the future, which are amongst the OA trends identified in The White House OSTP report:

> "As more literature around the world becomes freely and immediately accessible, libraries may reduce spending on traditional subscription fees, opening up institutional budgets to support APCs, as well as non-APC-based publishing alternatives, such as community-driven publishing initiatives (e.g., Diamond OA journals) and Subscribe to Open (S2O)." (2023, p. 38)

It might be wise to get out of the APC game now. Khoo writes, "Unless funders and institutions leverage their negotiating and policy-setting power to constrain costs, author price insensitivity will ensure that APC-funded open access will merely be a sequel to the serials crisis" (2019, p. 14).

Given how much our university is spending on APC fees outside of the library, we encourage other libraries to do their own assessment of APC spending at their institutions as they may uncover surprises similar surprises as we did. And this could provide fodder for advocating for and encouraging a campus-level interest in solving the OA puzzle rather than maintaining the expectation that this is a library problem to fix. Perhaps what is missing in the university landscape is enough encouragement, direction, and motivation from the right places, including university leadership, and tenure and promotion committees, which requires education about the issue at the leadership level. The efforts applied by UO Libraries to participate in the OA movement would be well served by acquainting university administrators and faculty with a deeper understanding of the expenses and options for publishing, and how the library can be a partner for stronger financial stewardship.

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