Title:

Open Access eXchange (OAeX): an economic model and platform for fundraising open scholarship services

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Abstract
This paper describes the Open Access eXchange (OAeX) project, a pragmatic and comprehensive economic model and fundraising platform for open scholarship initiatives. OAeX connects bidders with funders at scale and right across the open scholarship spectrum through crowdfunding: financial expenditure is regulated by a market of freely competing providers and financial transactions and transparency are assured by a clearinghouse entity. Specifically, OAeX seeks to facilitate open access publishing without the barrier of article processing charges (APCs), as well as contribute to solving challenges of transparency and economic sustainability in open scholarship projects in the broader sense.

Introduction
Open access (OA) to the scholarly record is not only progressively on the rise but here to stay – for good (Schiltz 2018; Schöpfel et al. 2016; Lawson 2019; Ayris et al. 2018; ACRL 2019). Between the years 2000 and 2018, members of the Open Access Scholarly Publishers Association (OASPA) published over 1.3 million articles; notably, 18.8% of that share was produced in 2018 alone (Redhead 2019). This steady rise in output is backed up by policies and practices at national and institutional levels (eifl n.d.). At European level and beyond, Science Europe recently proposed Plan S (Science Europe 2019c), emphasising that:

> …the transition [to open access] must take place in an efficient and sustainable way, avoiding unnecessary costs. It also requires strong engagement of the research community, in order to adapt the system to a culture of sharing (Science Europe 2019a).

Specifically, Principle 4 of Plan S affirms that: "Where applicable, Open Access publication fees are covered by the Funders or research institutions, not by individual researchers" (Science Europe 2019b). Plan S Open Access Champion Johan Rooryck (Science Europe 2019d) states further that more cost-effective and DORA-compliant academic-led publishers hold equal Plan S status to established commercial publishers. ('San Francisco Declaration on Research Assessment' n.d.; Rooryck 2019; Buranyi 2017; Kallio 2017).

However, beyond avoiding unwarranted costs towards realising open access to the formal academic record, other factors are just as important to academic libraries and research

funders. LIBER (LIBER n.d.), Europe's leading association of research libraries, argues that the following principles should apply when negotiating with publishers:

1. licensing and open access go hand-in-hand (resist double dipping) (Prosser 2015);
2. no open access, no price increase (ensure return on investment);
3. transparency for licensing deals (reject non-disclosure agreements);
4. keep access sustainable (secure perpetual access to paid-for resources); and
5. usage reports should include open access (capture downloads of open access resources) (LIBER 2017).

In the realm of research funding, the Wellcome Trust applies stringent conditions to successful grantholders, including mandatory compliance with grant audits, regular progress descriptions and end-of-grant reports, in addition to other clearly defined requirements Wellcome n.d.). Essentially, such provisions aim to achieve a sense of transparency in business practice. But beyond recommendations and enforcement, collective goodwill and willingness for genuine change is required on behalf of all stakeholders taking part in the research and scholarly communication lifecycle to achieve mutually agreeable circumstances (ACRL 2019b; European Commission 2018; Cryer 2011; Harley 2013; Johnson 2018; Roehrig et al. 2018).

This paper seeks to contribute to addressing the various open scholarship funding challenges from the perspective of economic modelling. It does so by proposing a marketplace mechanism for open scholarship projects that seek funding. For the purpose of conceptual clarity, the emphasis in this paper is placed on the example of open access journal publishing.

The state of communal play: open access business models and approaches
Much is written about the ethical and practical challenges around publicly funded and subscription based (paywalled) publications excluding broad readerships (May 2019; Jubb Consulting, United Kingdom et al. 2019, 30–37). The same applies to questions around pay-to-publish journals, potentially excluding authors without the ability to pay for article processing charges (APCs) (or access to respective funding, agreements or waivers), as well as potentially increasing prices upwards in an unequitable fashion (Schneider 2019; University of California Libraries 2016; Knöchelmann 2019; Khoo 2019; Brembs 2018; Green 2019). The APC model also triggers considerable administrative load for university systems and libraries.

No-fee OA initiatives, on the other hand, which impose neither pay-to-read nor pay-to-publish charges, such as the Open Library of Humanities (OLH) ('Open Library of Humanities' n.d.), SciPost (scipost.org/), arXiv (arxiv.org/), SCOAP3 (scoap3.org/), Amelica (amelica.org/), amelica.org/), SciELO (https://scielo.org/en/), the Subscribe to Open initiative by Annual Reviews (Annual Reviews 2019) or learned-society led journals, such as TEANGA ('TEANGA - The Journal of the Irish Association for Applied Linguistics' n.d.), face an uphill struggle to maintain stable funding (Eve 2018). Generally, non-commercial, no-fee open access journals tend to operate on uncertain financial foundations (Abad 2009; Adema and Stone 2017).

The status quo presents a continuing challenge to further opening up access to published research, as well as to creating a sense of equity within the knowledge commons: cost-effective publishers struggle to sustain themselves and prosper for the benefit of the wider scholarly and public good (Rittman 2018). At the same time, academic libraries continue to

face tensions between supporting open access while prioritising funding for closed-subscription access through Big Deals (Nabe 2017). More recently, libraries are entering transformative open access agreements with publishers (Max-Planck-Gesellschaft n.d.), although doubts remain regarding equity and the ability to control prices within this model (Scott Morton 2001; Poynder 2009).

Against this backdrop, commercial publishers seek to maintain the initiative by controlling the direction that academic publishing reform may take, within the context and the possibilities of a fast-moving digital ecosystem (Giles 2007; Bullini Orlandi et al. 2019; Willinsky 2018; Chen, Posada, and Chan 2019). Both subscription and APC models are heavily debated in the academic community and are hermeneutically contested in praxis and in the literature (see for example Machovec 2019; Baquero-Arribas, Dorado, and Bernal 2019; Brainard 2019; Kromp and Koren-Wilhelmer 2019; Eve 2014). Other challenges relate to entrenched socio-cultural publishing and research-assessment practices, such as the misuse of bibliometrics (Saenen and Borrell-Damián 2019) and the prevalence of prestige economies in academia (Fyfe et al. 2017), are well documented and will therefore not be further discussed here (see for example Jamali et al. 2014; Barron 2019; Oravec 2017; Herman 2018; Lee 2014).

This leads to the question of what alternative open access publishing models presently exist, or may exist in the future, beyond APCs.

Crowdfunding and beyond
The practice of crowdfunding (Belleflamme, Lambert, and Schwienbacher 2014) in non-scholarly digital marketplaces is established and a common occurrence: examples include Kickstarter (2019), Indiegogo (2019) and Crowdcube (2019) among other players. It also finds creative application in publishing: Unglue.it ('Unglue.It' n.d.) supports free ebook publishing and has been active since 2012 (Hane 2012; Christou 2016).

In scholarly publishing, the Sponsoring Consortium for Open Access Publishing in Particle Physics (SCOAP3) successfully works with publishers to convert high-energy physics journals to open access at no cost for authors, regardless of their affiliation, using a central funding and administration mechanism to cover costs (SCOAP3 n.d.). Formed in 2017, the Global Sustainability Coalition for Open Science Services (SCOSS) utilises a crowdfunding model for open science infrastructure it recommends: funding applications from non-commercial providers of services are assessed by the SCOSS board before a funding bid is launched (Borchert and Proudman 2018; SCOSS n.d.). The Kotilava project, on the other hand, asks library-funders to regularly contribute a fixed amount for flipping Finnish scholarly journals to open access and sustaining them; critically, the market plays no competitive decision-making role in regulating levels of funding and commitment – libraries are presented a fixed fee for a fixed package of journals to support (Kotilava n.d.; 'Journal.Fi' n.d.; Ilva 2018). Since 2015, LIBRARIA works through an open access publishing cooperative model to circumvent market mechanisms, whilst also providing consultancy and advocacy around publishing in the social sciences (LIBRARIA 2019).

Open Access eXchange (OAeX)
OAeX's main goal is to provide current and potential open scholarship initiatives (journals, publishers, services) with a flexible economic model and a platform to seek and receive

funding. It builds on and attempts to scale up the existing no-fee OA models mentioned above (Open Library of Humanities etc.). Its mission is to engage all players in the research and scholarly communication services sphere, to not only kick-start but also maintain their diverse projects. Specifically, OAeX offers a tangible route for existing and aspiring open access journal publishers seeking secure and sustainable funding.

OAeX envisions doing this through a one-stop online marketplace. This enables funders (mainly libraries and their institutions) to make evidence-based decisions in accordance with their constituents' needs and broader institutional interests. Financial transactions are facilitated through a clearinghouse which oversees marketplace activities. This clearinghouse provides the added benefit of bundling all essential components – central payment facilitation, transactional transparency, archiving of project-funding bids – within one entity.

OAeX contains the following features as part of a comprehensive economic model for open access services:

1. OAeX provides the infrastructure for an online marketplace to serve funders and bidders;
2. The market (funders) decides which services or projects receive investment based on detailed funding bids, allowing an element of competition between journals, in contrast with the status quo of bundled journals collections, "Big Deals", which limit choice;
3. Multiple funders can converge and share funding for a single or multiple bids
4. OAeX acts as a neutral facilitator of transactions between bidders and funders.
5. All transactions are open and transparent, allowing funders to take credit for their investments, while also 'nudging' non-funding bodies to participate.

The OAeX model from a funder and bidder perspective appeals to:

1. taxpayer arguments for open access (Suber 2003);
2. societal-impact arguments (Smart et al. 2019);
3. open educational practices (OEP) (Koseoglu and Bozkurt 2018);
4. positive cultural change (Kraker et al. 2016); and
5. arguments against pay-to-publish and pay-to-read models (Green 2019).

Importantly, OAeX does not depend on a rapid transformation of funding for scholarly communications (Green 2019). Instead, it can coexist alongside current funding practices, allowing for steady transitions to no-fee open access as journals and their funders are ready to do so. For example, OAeX can help pre-print servers and overlay journals for sciences, while also supporting established society journals in the humanities to flip to no-fee OA on a Subscribe-to-Open type model (Annual Reviews 2019).

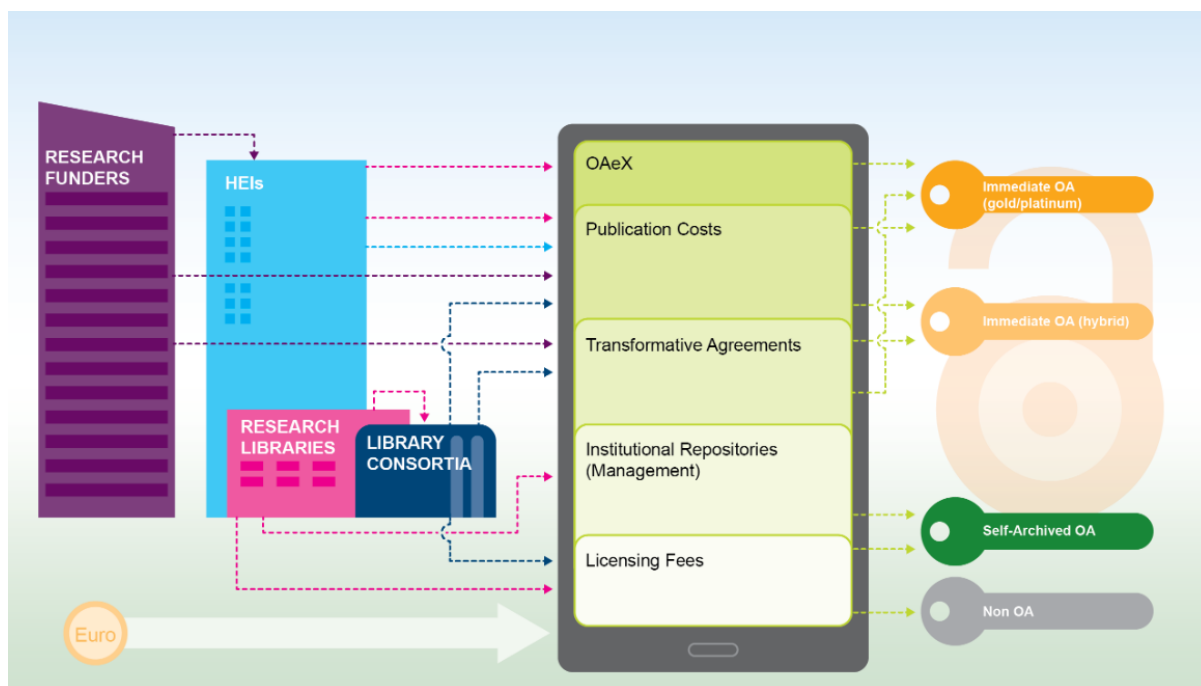The diagram below visualises the place of OAeX within the current ecosystem of funding-models.

Illustration by Maria de Maré. Used under CC-BY license from the National Library of Sweden. Text modified from original.

OAeX in action: journal publishing

This section describes an instance of OAeX in practice, taking the example of a university press seeking funding to support the operations of a peer-reviewed journal intending to flip to no-fee open access.

1. Bidding (for funding) in OAeX

Funding bids are prepared and submitted via an OAeX online workflow-template, similar to those already used by the Joint Committee for Nordic research councils in the Humanities and Social Sciences (NOS-HS n.d.). Information relevant to a bid would include the journal's:

- Editorial board members
- Publisher entity (university press, learned society, commercial publisher etc.)
- Current funding model and source(s) of funding
- Timescale for required funding (one-off capital funding or operational funding for a fixed/repeat period)
- Technical standards supported (CrossRef membership, digital preservation strategy, etc.)
- Sustainability plan (future-proofing measures)

Funding bids are self-administered and posted to the online OAeX marketplace. OAeX operates on a rolling basis, with bids being published and closing continually.

2. Funding in OAeX

Academic libraries are the traditional funders of journal publications, with expertise in evaluating and selecting publications in collaboration with their faculty. In this sense, libraries are the natural funders targeted by OAeX bidders. However, any public or private actor benefitting from the service can be a potential OAeX funder, including but not limited to

research funding bodies. With the ability to reach large groups of private funders, companies and enterprises, OAeX is creating the potential for entirely new sources of funding not available to other models focusing on research institutions.

OAeX is designed to make the funding transaction process as straightforward as possible. The marketplace features a cross-searchable database allowing funders (and bidders) to filter bids against descriptive project metadata, such as geographical region, discipline, publisher etc. This enables funders to make evidence-based decisions and allocate funding accordingly. Committed funds are reported in the marketplace in real time. In addition, OAeX ranks funding bids along a financial success scale. This means that funders can choose to favour bids which already attract funding and are likely to meet their target threshold.

A further potential innovation of OAeX is the ability to match bidding projects to funding institutions based on authorship and citation data. Here, OAeX takes inspiration from the no-fee OA journal publisher Sci-Post ('SciPost' n.d.), which collates the affiliations of its authors and publishes lists of the institutions benefiting from it, thus distinguishing between those who fund and those who do not. With OAeX, it may be feasible for bidders to include metadata on authors' and citing authors' affiliations so funders can easily identify bids most relevant to their local interests. Such data would act as a powerful counter to arguments against spending limited institutional resources on shared goods.

3. Allocating funding in OAeX

For ease of administration, payments are centralised through the OAeX platform. The rationale for this is that multiple, small amounts from various funders committed to different bidders would place the onus of administration on the funder and the bidder, making the model less attractive. Once a funding bid has successfully reached its required funding threshold, OAeX issues a single invoice to each funder, which can cover pledged funding for multiple bids. If less funding than required is attracted, bidders may either abandon their bid or negotiate with already committed funders to seek support for a revised project.

Successful bidders enter an agreement with OAeX and commit to administering allocated funds in accordance with their bid, whilst also undertaking to provide openly available reports on their progress in achieving their stated funding goals. The bid's OAeX page contains dated placemarkers for reporting, which will act as incentives for bidders to comply.

4. Archiving funding bids

Every funding bid, successful or not, is archived in a central repository for legacy access. This allows funders to take credit for their funding activities: for crowdfunding to take off, it's not enough for funders to contribute, but also for them to be seen to do so, to promote their contributions and to motivate others to follow suit. Archived funding bids provide a permanent record for accountability, critical analysis and transparency purposes, as well as an information resource for future bidders and funders.

Sources of funding through OAeX

Libraries may choose to commit to specific journals on an ongoing basis from their annual budget. They could choose to adopt Lewis's suggestion (2017) to commit 2.5% of their e-

resources budget to open access initiatives. Alternatively, they could use any surplus at the end of their financial year to contribute to once-off OAeX project bids.

Another funding option could be a central and recurring grant allocated to academic libraries by government or funding bodies (possibly from CoalitionS members who have committed to "collectively establish incentives for establishing Open Access journals/platforms or flipping existing journals to Open Access" (Science Europe 2019b)). Central funders could choose to pledge directly via OAeX, but may prefer to devolve decision making to libraries with expertise in evaluating scholarly communications initiatives.

In the immediate years after establishing OAeX – with previously successful bidders returning for new funding cycles and new projects joining in – the amounts of money available in the system will be constrained. While ideally libraries would have some capacity to expand commitments (perhaps starting with Lewis's 2.5% followed by incremental increases), budgetary constraints can also be seen as a virtue of OAeX's competitive market: limits to funding will ensure only high-quality projects (as judged by funder libraries) are successful. Libraries may choose to gradually increase their OAeX commitment and reduce spend with legacy economic models as circumstances and their strategic priorities evolve.

Administration
An existing library e-resources consortium, of which there are many globally (ICOLC n.d.) could act as operator of the OAeX platform. Such consortia possess the expertise and administrative resources to manage centralised transactions between publishers and libraries, so could adapt existing practices to facilitate relationships between bidders and funders.

In its initial stages, the OAeX host consortium would require seed-funding for implementation and establishing sound business practices and representative governance. In the long term, OAeX's operating costs could become self-sustaining by levying a transaction charge with each funding pledge.

The OAeX initiative will require significant advocacy efforts to identify and encourage potential bidders, as well as promote the concept (and marketplace) to potential funders. Promotional activities could be supported by OAeX ambassadors in participating institutions, e.g. librarians and academic colleagues facilitating local engagement and encouraging/advising open access projects to prepare for and submit funding bids.

Potential Challenges
The OAeX model presents several challenges:

1. "The free rider problem": libraries reluctant to pay for what they can "get for free"
Beside the prestige and visibility of being publicly acknowledged as an open access supporter, OAeX bidders can offer additional benefits to funders, such as allowing direct participation in governance decisions, à la SCOAP3's Governing Council, which is comprised of paying members (SCOAP3 n.d., 3). Another motivation is the risk that in the absence of sufficient crowdfunding, a journal could flip back to a more expensive model of either subscriptions or APCs. Existing crowdfunding open scholarship models, as listed above, have demonstrated

the willingness of libraries to move beyond supporting local needs and to contribute to a public good (Eve 2019). OAeX has the potential to scale this up by making it as easy as possible for bidders and funders to use with its services.

2. <u>Publishers concerned about losing revenue from migration to OAeX</u>

Any publisher – for-profit commercial, non-commercial – is welcome to engage with OAeX without any commitment or risk (provided money raised via OAeX is only used for services without reader or author restrictions, i.e. paywalls or APCs). For example, a subscription-based society journal could test the water by bidding for funding in OAeX, but would only flip to no-fee OA after a successful outcome, with the option to convert back to the old model in the event of funders dropping out in future years. As with the example of Annual Reviews Subscribe to Open pilot, new funders outside their existing subscription base could be invited to join, potentially leading to higher revenue. PLOS are currently considering moving away from APCs to such a "journal supporter-based model", which could be facilitated via OAeX (Rouhi 2019).

3. <u>Horizontal scalability to mitigate the risk of central point of failure</u>

If OAeX is successful and scales up, it is prudent to acknowledge the risk of a central point of failure of its business entity akin to the collapse of the journal subscription agent SWETS in 2015 (Mulhere 2015). However, this risk can be spread by multiple federated or independent OAeX organisations co-existing: successful services typically spawn imitators, so multiple OAeXs could compete with each other to ensure continued quality of service and value for the community.

4. <u>Bidders are concerned about waiting too long for funding</u>

Bidders do not need to seek exclusive funding via OAeX. OAeX can be utilised to supplement other income streams. In this sense, OAeX helps to accelerate transactions when needed or desired. Consider the example of a no-fee OA publisher established with seed funding from a single source: OAeX can assist with long-term viability when initial funding runs out, without forcing the publisher to move to the less advantageous subscription or APC models.

5. <u>Local funders supporting only local bids</u>

It is possible that bids in OAeX will primarily attract funding from affiliated libraries with knowledge of local projects and their personnel. While this is not necessarily a negative scenario, it may harbour the risk of real or perceived favouritism, or "populist" pressure to publish what their funders would favour. However, the built-in transparency and openness of OAeX can mitigate against this. Indeed, the ability to view and compare many bids within a single platform could prove helpful in transcending local bias.

Conclusion

Realising sustainable open access under competitive market conditions represents an ongoing challenge to all participants in scholarly communications: researchers, institutions, funders, publishers, society. Existing transaction models have not achieved sustainable universal access to the scholarly record under conditions that embrace true transparency and equity. As such, the OAeX economic model, as outlined above, represents an amelioration of existing good-practice, whilst also offering a measured proposal for collective action.

Acknowledgements

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