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Maybe Persistent but Certainly Not Unique: On the Proliferation of DOIs in Open Access Book Publishing

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Copim

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It is part and parcel of Thoth Open Metadata's mission to make book dissemination more easily accessible to small- to medium-sized publishers of open access books. Broad dissemination to a variety of platforms such as the Directory of Open Access Books (DOAB), Project MUSE, or to Jisc's National Bibliographic Knowledgebase requires quality metadata, which is a task that Thoth Open Metadata is designed to facilitate.

Closely linked to good practice in metadata management is consistent usage of Persistent Identifiers (PIDs).[1] In general terms, PIDs are meant to provide reliable digital pointers to a resource (such as a document, data set, or publication). These digital pointers have two specific characteristics:

1. PIDs **should remain stable** over time. A PID counteracts link rot, which is the loss of working URLs over time. This happens, for example, when a publisher's site ceases to exist, or resources are moved elsewhere in the digital sphere as the result of redesign, website upgrades, and so on.[2]
2. PIDs **should be unique** to provide one single "source of truth." Names can be shared among multiple people, institutions may have multiple ways they are referred to. PIDs ideally provide a single, bijective relation between identifier and object.

The stability of PIDs is mainly predicated on their underlying infrastructure's governance structure and design decisions about maintaining backward compatibility. A case in point is the recent sunsetting of the GRID PID for institutions and its absorption into the ROR PID,[3] and a similar integration of FundRef PIDs into the ROR dataset.[4] A comparable process recently took place in the realm of controlled vocabularies, with the discontinuation of BIC in favor of Thema codes for subject classification.[5] The uniqueness of PIDs, however, is a much more complex question that touches not only upon issues of governance and design, but also broader – dare we say, metaphysical – questions of "objectness".

PIDs in open access book publishing

In open access book publishing, there are a variety of PIDs in use, with different ways in which they can be created and managed. Their adoption and implementation rates across the open access publishing landscape differ widely, but as of now Thoth natively supports and integrates ORCID, ROR, and DOI.[6]

For contributors, there is the ORCID PID. An ORCID is a persistent identifier linked to a specific contributor, such as the author of a publication. ORCIDs are created and managed by the contributor themself, without interference of its governing body. On the one hand, this has slowed the adoption of ORCIDs, especially within the Humanities and Social Sciences [1]. On the other hand, this has led to a proliferation of duplicate and empty profiles, thus basically undermining the uniqueness of ORCIDs and, arguably, their *raison d'être*. As a result, and dissimilar to the world of journals publishing, ORCIDs have so far been unable to displace more tightly-governed non-PID schemas such as the Library of Congress Name Authority File or the Virtual

International Authority File in the book publishing sphere. It is important to note here that LCNAF or VIAF also come with their own multiplicity of issues, e.g around governance, representation, privacy etc.[7]

For institutions and funding agencies, the ROR PID has become a unifying standard in recent years. ROR identifiers are centrally governed, which provides a guarantee for their uniqueness, and their record file provides multilingual support thus allowing a single ROR identifier to be connected to different appellations of the same institution. Nonetheless, and due to deduplication issues that seem not dissimilar to those identified for ORCIDs,[8] the adoption rate of ROR identifiers across the open access books landscape still lags behind. For example, both Project MUSE and JSTOR use proprietary institution lists without integration of any PID schema, making their usage data on an institutional level difficult to correlate [2].

Finally, and this will be our focus for the remainder of this blog post, there are DOI PIDs for digital publications. Within scholarly communication, DOIs are currently widely in use for journal articles, while usage is lagging behind for monographs and book chapters – a discrepancy that Thoth Open Metadata is intent on addressing. The 2019 *State of Open Monographs* report highlights the importance of DOIs as a foundation for a wide range of tools and relationships that allow authors to gain recognition for their work. In case these are provided via corresponding metadata, DOIs can link to other PIDs such as ORCIDs and RORs, and feed these into academic profile systems, review recognition tools, knowledge graphs, and public engagement indicators. In open access publishing, DOIs can reinforce quality by signalling the peer review process of an academic book. The report suggests that publishers are doing their authors a disservice when DOIs are not properly assigned to their ebooks and ebook chapters. (Grimme et al., 2019, p.9)

The governance model for DOIs can be understood as sitting somewhere in between the models used for ORCID and ROR. There is neither a fully open nor a centrally-governed way of creating or registering them. Rather, there are a number of official so-called Registration Agencies (RA) that are centrally authorised to create DOIs, with Crossref and DataCite probably being the most widely-known in open-access publishing.[9] In turn, Crossref and DataCite offer avenues to various organisations, such as Thoth Open Metadata, to create DOIs through them. As a result, the implementation of a consistent practice with regards to DOI registration has been fraught with a variety of issues, some of which we will be exploring in more depth in the following paragraphs, with a closer focus on Crossref-provided DOIs.

DOI creation through Thoth vs. other platforms

Since late 2023, Thoth Open Metadata is registered as an official Sponsor with Crossref, and as such is able to provide Crossref membership to small- to medium-sized book publishers. The benefits for a publisher seeking Crossref membership through Thoth Open Metadata's sponsorship include the waiving of annual membership fees as well as per-DOI registration fees, which Thoth covers on behalf of the publisher. Connected to this, the publisher can make use of Thoth's advanced metadata management capabilities to automatically register and subsequently update a book and its individual chapters with Crossref, and that registration will also include

other PIDs such as RORs and ORCIDs, should the publisher choose to record them within their metadata. Through this service, Thoth creates the DOI of a digital publication on behalf of the publisher, who will have their own individual DOI prefix with Crossref. The publisher thus retains full control over the use of their DOIs.

It is our view that maintaining publisher control is key to the functioning of a DOI, which among other things is technically designed to point to the version of an academic output as it appeared in its final published form, generally referred to as the "Version of Record" (VoR).[10] Within the context of book publishing, we would argue that the concept of VoR generally refers to the publisher's version of a book. In this context, a persistent and unique identifier such as a DOI issued for this VoR affords publishers the advantage of easier tracking of citations. In a similar fashion, by staying in control over the scholarly record of the VoR, book publishers are able to keep track of usage on behalf of individual authors. Usage of DOIs hence purports reliability and trust by pointing readers to the VoR, whilst reinforcing the VoR as the version to be cited. (Okune & Chan, 2023, p.8)

Linked to the DOI, Crossref's *Crossmark* service – which is now also available as a direct implementation in Thoth – enables readers to quickly discover the most recent status of a research output and additional information pertaining to the editorial process, indicating if any changes have been made to a research output, such as corrections, retractions or updates.

At the same time, and alongside the book publisher, there exist a variety of platforms within the wider open access ecosystem that also create DOIs for their platform-specific version of a given book. This is established practice with major ebook aggregators such as JSTOR, Project MUSE,[11] or ScienceOpen. Repositories including Zenodo or Figshare also tend to apply a similar practice. In all these cases, and in contrast with Thoth, the prefix of the created DOI "belongs" to (i.e. is claimed by, and assigned to) that particular platform and *not* to the publisher. So when e.g. JSTOR registers a DOI for a specific publication, the original publisher of this work has no control of that DOI.[12]

This DOI creation service is comparable to the practice of Kindle Digital Publishing (KDP), which offers free ISBNs to publishers who do not have the means to create their own. When using this service, the ISBN will be registered by KDP, but not on behalf of the publisher. As a result, KDP is being displayed in ISBN records as the "publisher" of that specific publication. Similarly, a DOI created by JSTOR does not include the publisher's DOI prefix, but the JSTOR-controlled one. In the complex landscape of standards and infrastructure, this subtle but essential distinction between how platforms like JSTOR and Thoth register DOIs – ***instead of*** rather than ***on behalf of*** – is often not well communicated or understood.

From the perspective of Crossref,[13] when platforms or providers (e.g. JSTOR, Project MUSE, Thoth) register DOIs for content produced by another publisher, it is assumed that whatever contractual agreement has been made between the publisher and the platform/provider explicitly allows for the platform to do as they wish. In

practice, this means that e.g. JSTOR will register DOIs for anything they host by default, with the caveat that a publisher can opt out of this if they contact JSTOR to record their preference.

In light of this, and to enable publishers to keep in control of the DOIs they register through us, Thoth is deliberately choosing to opt out of additional DOI registration and multiple resolution with the ebook aggregator platforms we are establishing distribution agreements with — this is done to try and prevent duplicate registration of DOIs for the same publication and potential conflicting records, such as one DOI registered with the print ISBN and another with the ebook ISBN.

It is worth noting that on top of everything else, the creation of multiple DOIs to identify the exact same scholarly object also dilutes the publisher's ability to assess the impact of the work through citation tracking.

Multiple sources of truth

As can be surmised from the above, the particular governance structure of DOIs, with multiple Registration Agencies allowing multiple Sponsors to create DOIs and lacking a central disambiguation protocol, makes the DOI system prone to multiple registrations for (multiple instances of) a particular digital object.

The complexity of this situation is further compounded by the nature of these objects, as it remains not at all uncontroversial to define the actual digital object in the context of open access book publishing: is this to be thought of as a digital analog of a print book, thus making a DOI redundant as a literal copy of an ebook ISBN (in the case of publishers only registering one eISBN for all digital formats)?[14] Or are different instances of an ebook with the same eISBN on different platforms different digital objects? Considering the different ways in which ebooks are treated on different platforms (for example, the way in which full book PDFs may be split up in separate parts or chapters by those platforms, as they are on e.g. JSTOR), this may not be an unreasonable position. But the result of this would be a further proliferation of DOIs linked to the same ebook ISBN.

In the world of journal articles, this is nothing remarkable. A single article may have different DOIs, for example a DOI of the journal where it was published and a DOI issued by Zenodo for the version that an author chose to self-archive their article. But when a DOI has already been registered that is not a publisher's own (whether via Thoth or by the publisher itself), Crossref claims that from an infrastructural perspective, they have no way of knowing who the "real" publisher is, and there are no means to check a member's registration attempts against any other kind of "source of truth".

The DOI record is then locked to which registrant gets to the DOI first. This is centred on a presumption that all relevant parties will be in communication with each other and are aware of which collaborating organisations are assigning and registering DOIs. Additionally, Crossref policy assumes that for books, their uniqueness *qua* digital object is determined by another identifier that is not its DOI, namely its ISBN — rather than its existence as a unique digital object in a particular form on a particular platform.

Disentangling legacy DOIs: The case of punctum books

To provide a concrete example, let us have a closer look at the publishing activities of punctum books, one of Thoth's client publishers: punctum originally registered their DOIs with DataCite via the EZID platform of the University of California, using a punctum-owned DataCite DOI prefix. Later on, they became a member of Crossref and registered their books directly via the Crossref online interface (their Web deposit form), again under punctum's own (newly-assigned) DOI prefix. And once Thoth started with implementing automated DOI registration, punctum moved their original Crossref DOI prefix to be managed by Thoth on their behalf under Thoth Crossref sponsorship.

In 2020, punctum books also started to distribute their publications via JSTOR, which was before JSTOR began creating DOIs for books and chapters for their hosted content. JSTOR then subsequently started to do so for punctum books' publications, and most likely under the assumption that this was allowed under a contractual clause allowing JSTOR to "use any technology, media, or means now available, or that may become available in the future, in connection with reproduction, archiving, modification and distribution of the Content Archive." For a small part of the punctum catalogue which has Datacite DOIs, JSTOR thus became the first-past-the-post registrant of corresponding Crossref DOIs — thus making updating of the Crossref DOI via Thoth impossible. A workaround has been devised through which the management of the earlier Datacite DOIs are transferred to Crossref, which as a result would allow their updating through Thoth. For presses that have created their DOIs initially directly through JSTOR, this solution is, however, not available.

Following on from that, where DOIs have already been registered with Crossref by other platforms, and those records are locked, Crossref has indicated that they will not edit the metadata record (to replace the DOI with the publisher's) or delete any existing record. The proposed alternative is the provision of Co-Access.[15] In a nutshell, this option allows the record to be "unlocked", and a secondary DOI can then be added for the book. As Crossref will not include previously-registered DataCite DOIs on a Co-Access page, for punctum, that would mean taking the books that have already-assigned DataCite DOIs and again register these with Crossref, which in turn would result in two publisher-registered DOIs for one book (the DataCite DOI is printed on the book title page).

Alongside these two DOIs, one can see a book very quickly accruing between four (if additional DOI creation is being done through JSTOR and Project MUSE) and six or even more DOIs (taking into account the depositing in a generalist repository such as Zenodo, which has the option to create its own DOIs), plus another deposit in an institutional repository at one's home institution (as might be required by some funder mandates) – with the latter also likely to again create their own DOI.

With Thoth, we have seen these and similar issues emerge with at least two other presses, and assume further cases will arise as we onboard more publishers to Thoth that may have legacy DOIs registered with other agencies or platforms.

It's complicated: An open call for well-defined governance processes for OA book PIDs

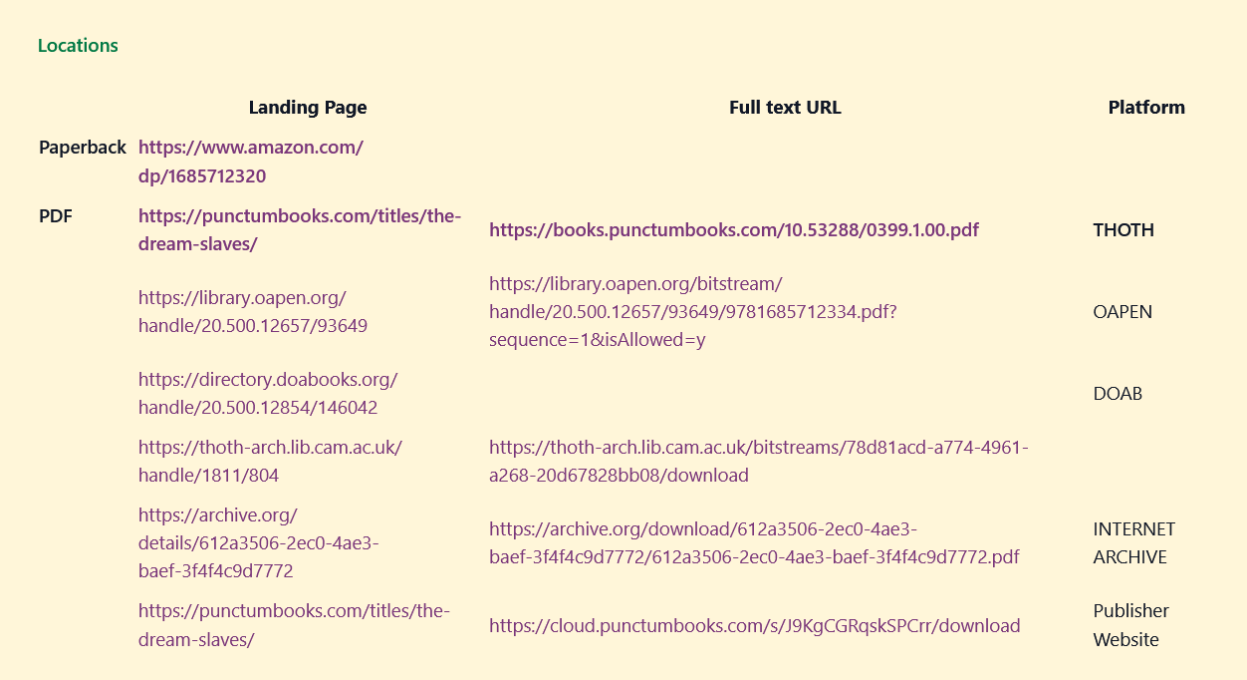
So to summarise, it appears that from the perspective of Crossref as one of the registration agencies, DOI registration for ebooks on the one hand is predicated on the idea of a "unique" digital object that appears to be identified via its ISBN (which in itself seems problematic[16]), while on the other hand also allowing for multiple DOIs to exist that may point to different yet – from a perspective of version and authority control – *indistinguishable* digital objects with presumably similar, if not identical, content with different target URLs.

It also seems noteworthy that the Crossref Best Practices for Books and Chapters page apparently used to have guidance on books on multiple platforms, but this appears to have been removed in the guide's most recent version.[17]

In Thoth's view, the current situation, with multiple DOIs and intermediate (and often incomplete) "Co-Access" index pages not only impedes publishers' control over their digital book files, it also undermines the very definition of what a PID should be: a stable, single pointer to a well-defined, unique digital object.

Cases such as that of Crossref not accepting links to pre-existing DataCite DOIs, or the "locking" of records to whichever institutions gets to create a DOI first — which in turn means that no other institution will be able to rectify metadata of that DOI that might have previously been entered incorrectly — for us also raise more fundamental questions that point to a need for further conversations across stakeholders from all parts of the DOI ecosystem. Such conversations could hopefully foster uptake of a more equitable governance that would help underpin an open, community-governed and interoperable DOI ecosystem.

One possible way to address the proliferation of multiple DOIs being created for often-indistinguishable digital objects would be to implement a way to record multiple location URLs within a given DOI metadata record.[18] Thoth's extended data model already enables publishers to keep records of all platforms of a given publication within their metadata so as to ensure that the relationship between a publisher's primary version of a publication, and its multiple versions existing at multiple platforms will be documented — hence enabling a "record of versions" (Cope & Kalantzis, 2009) for books on the level of metadata. This in turn could then also be registered as part of the publisher's DOI registration data, and would make sure both the platform derivatives and the publisher's Version of Record are represented in the data of one unique and commonly publisher-controlled DOI of a given book.



Locations

	Landing Page	Full text URL	Platform
Paperback	https://www.amazon.com/dp/1685712320		
PDF	https://punctumbooks.com/titles/the-dream-slaves/	https://books.punctumbooks.com/10.53288/0399.1.00.pdf	THOTH
	https://library.oapen.org/handle/20.500.12657/93649	https://library.oapen.org/bitstream/handle/20.500.12657/93649/9781685712334.pdf?sequence=1&isAllowed=y	OAPEN
	https://directory.doabooks.org/handle/20.500.12854/146042		DOAB
	https://thoth-arch.lib.cam.ac.uk/handle/1811/804	https://thoth-arch.lib.cam.ac.uk/bitstreams/78d81acd-a774-4961-a268-20d67828bb08/download	
	https://archive.org/details/612a3506-2ec0-4ae3-baef-3f4f4c9d7772	https://archive.org/download/612a3506-2ec0-4ae3-baef-3f4f4c9d7772/612a3506-2ec0-4ae3-baef-3f4f4c9d7772.pdf	INTERNET ARCHIVE
	https://punctumbooks.com/titles/the-dream-slaves/	https://cloud.punctumbooks.com/s/J9KgCGRqskSPCrr/download	Publisher Website

Fig. 1: An excerpt of multiple location URLs being recorded within Thoth's extended data model.
Sample record.

This of course would only help to (potentially) alleviate the technical implementation side of the puzzle. As with any socio-technical thinking infrastructure, and in line with Okune & Chan, 2023, we deem it crucial to also continue working towards well-defined processes and workflows so as to ensure the infrastructures active in the DOI ecosystem are serving the scholarly community.

Hence, and as indicated above, we believe it pertinent to establish broader conversations between the different stakeholders active in book publishing to address this and similar issues — and to define a community-led approach to governing these aspects around DOI management.

We welcome community feedback on the issues described, and hope to spark further discussions of the role that DOIs can play in making open access book publishing more transparent and equitable.

We are grateful to Crossref for their support of Thoth's mission to make OA book publishing easier for small, scholar-led and university publishers. We extend a particular Thank You! to Susan Collins, Kora Korzec, and Isaac Farley, who kindly provided feedback on the draft version of this blog post, and helped with clarifying details around the implementation of Multiple Resolution, and transfer of DOIs across registrars.

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Header image by Brendan Church on Unsplash.

Footnotes

1. As has recently been recommended e.g. by the German Working Group of University Publishers (Arbeitsgemeinschaft Universitätsverlage), see Arbeitsgemeinschaft Universitätsverlage (2023). Quality Standards for Open Access Books (Version 2). Zenodo. https://doi.org/10.5281/zenodo.7743833

   This is also in line with recent, more generalist efforts to boost the uptake of PIDs and open metadata globally and across all areas of scholarly communications e.g. by the Barcelona Declaration on Open Research Information community of practice, and the Collaborative Metadata Enrichment Taskforce (COMET) — both of which Thoth is involved in. ↩
2. As our WP7 colleagues Miranda Barnes and Gareth Cole have just recently noted, the issue of link rot is "particularly important for the scholarly record and the ability to build on the work of others, verify results, and identify the provenance of ideas, metadata, and research. Approximately 60-70% of links fail to resolve after 10 years." see Barnes, M., & Cole, G. (2024). Link rot: Archiving challenges for small publishers series. Copim. https://doi.org/10.21428/785a6451.4ce69019 ↩
3. https://ror.readme.io/docs/grid ↩
4. https://ror.readme.io/docs/funder-registry ↩
5. See the February 2024 "end of life" announcement here: https://bic.org.uk/wp-content/uploads/2022/11/Press-Release_BIC-Codes-obsolete-2024_FINAL-v.1.1.pdf. ↩

6. see Steiner et. al. (2024) for a more detailed overview of the different PIDs integrated with the Thoth data model. ↩
7. See e.g. Jennifer Martin, "When Public Identity Meets Personal Privacy," in *Ethical Questions in Name Authority Control*, ed. Jane Sandberg (Sacramento, CA: Library Juice Press, 2019).

And more broadly: H. E. Wintermute et al. 2024. *The DEI Metadata Handbook: A Guide to Diverse, Equitable, and Inclusive Description.* https://doi.org/10.31274/isudp.2024.153 ↩
8. As has been noted e.g. by a recently-published summary report by the COMET initiative: "affiliation metadata suffers from wide scale gaps and inaccuracies, particularly when it comes to the assignment of persistent identifiers, such as ROR IDs." (Dean et. al., 2025) ↩
9. For a fuller critical history of DOIs, from conception to organisations involved, and implications this has on the "infrastructuring of hegemonic power in knowledge circulation", we kindly refer the reader to Okune & Chan, 2019. ↩
10. See Crossref's outline of how to deal with different versions of a publication. https://www.crossref.org/documentation/principles-practices/best-practices/versioning/#00327 ↩
11. To provide an example, when investigating multiple registrations for punctum books, the Crossref co-access pages pointed to DOIs for JSTOR and MUSE, each using their own prefixes. JSTOR with Prefix 10.2307 and Muse - Johns Hopkins University Press with Prefix 10.1353 ↩
12. For the remainder of this blog post, we will focus on the interaction between Thoth and JSTOR as DOI-minting platforms, since this formed its original impetus. It stands to reason, however, that other platforms may interact in similarly complex manners. ↩
13. As Crossref states:

"Where book content is hosted on multiple platforms (such as NetLibrary, ebrary) and publishers can enable enable linking from a single DOI to those platforms, they should use multiple resolution, which allows multiple URLs to be associated with one DOI."

https://www.crossref.org/documentation/principles-practices/books-and-chapters/ (last update 2020-April-08) ↩
14. It seems worth noting that some publishers register individual eISBNs for each digital format they publish (i.e. one eISBN for html, one eISBN for epub, one eISBN for PDF), while others use just one eISBN

as a catch-all for all digital formats their publish. ↩

15.

An older version of the Co-Access service description dated 2017 December 11 provides more details on why this was deemed incompatible with Crossref's Multiple Resolution implementation:

"Multiple Resolution works well for our journal content because each publisher is obliged to assign DOIs to their journal content, as per their Crossref membership agreement. Once the publisher assigns a DOI, any other approved aggregator is then able to add their own resolution URL into the publisher's deposit metadata using our Multiple Resolution feature. However book publishing is different. Many of our members will in addition to publishing journal articles, also produce book content. Members are not obliged to deposit DOIs for their book titles in the same way they are for journal articles, and many prefer not to do so as they often do not host the content themselves on their own platform. Instead, book content is often provided by the publisher to a number of content aggregators who then distribute the publisher's content across a wider online environment. Without a publisher DOI, aggregators are not able to share their hosting location information.

These aggregators and third-party platforms are often Crossref members themselves with a desire to either participate in Multiple Resolution with the publisher, or to deposit their own DOIs for book content they host in cases where the publisher chooses not the make their own deposit. Co-access therefore provides members who host content on behalf of other Crossref publishers, with the flexibility to deposit identifiers and metadata for content hosted on their own platforms, in a timeframe which suits them best." ↩

16.

As Stone et. al. 2021 note, with regards to PIDs,

"[i]t is worth noting ISBNs at this point. They are certainly not PIDs and multiple ISBNs can exist for the same work, print, digital, vendor editions etc., but as noted above, publishers continue to rely on them instead of the DOI. Grimme et al. comment "that ISBNs were designed as retail identifiers" and this creates an issue for OA as there is no incentive for a retailer to distribute the OA version because there is no sales commission on the OA version. This is despite evidence to suggest that there is no impact on sales, and in some cases sales more increase ease (Ferwerda, Adema, and Snijder, 2013). ↩

17.

An older version of the section (see a snapshot from 12 March 2023 captured via the Internet Archive's Wayback Machine) reads:

"Multiple Resolution and Co-access are options for addressing books distributed across multiple platforms. Multiple Resolution ties together all locations where content might be hosted under a single DOI and represents the most comprehensive solution to ensure that metadata and citations are maintained and

provisioned together. In the event that those who host book content on behalf of other publishers cannot adopt the single DOI to content distributed across a number of different platforms, Co-access provides a last resort for these parties to independently assign DOIs and deposit metadata for such books." ↩

18.
Crossref offers a similar function through the creation of an intermediate "Multiple Resolution" page, which for a given DOI provides a list of related URLs. Further information on Crossref's provision of Multiple Resolution is provided via their documentation pages.

From Thoth's perspective, the issue we have with this approach is that rather than bringing the reader directly from the DOI to the version of record on the publisher's page, readers will have to sort through a list of links without any clear indication of the canonical version (i.e. usually the publisher's version). Crossref notes there is an additional option to "bypass" the intermediary Multiple Resolution page, so a canonical URL could be added to Crossref data as an individual per-title opt-in.

At Thoth, we appreciate Crossref's provision of the Multiple Resolution option, but note there are still a lot of manual steps involved to activate the option, and then implement the "bypass" to a canonical URL. In our view, a more efficient approach would indeed be to record multiple URLs directly in a title's (or chapter's) metadata — as is already being put into practice via Thoth — so as to help streamline the multiple negotiations that would otherwise be needed. ↩

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- https://doi.org/10.5281/zenodo.8339087 ↩
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