

## *Chapter Six*

# **Managing Digital Rights in Open Access Works**

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Librarians, researchers using scholarly works, and consumers using popular media generally think of digital rights management (DRM) as only a limitation on their access and use of digital resources. DRM and open access (OA) works would strike one as a very unlikely combination.

In almost all cases, we would agree; however, we note two instances in which DRM and OA may be compatible. The first case is DRM used to enable more accessible and durable rights information and proper attribution for a work. The second case is DRM that limits some uses as an appropriate part of a compromise to make works OA that would not otherwise be so.

This overlap between DRM and OA is narrow compared to the set of non-OA works equipped with DRM, but understanding this overlap is useful for at least three reasons. First, librarians may use DRM to better manage rights in OA works; second, librarians may persuade a reluctant author or publisher to make a work OA with appropriate DRM; and, third, librarians may recognize when DRM negates access to an ostensibly OA work.

This chapter will review OA and discuss cases in which DRM can complement OA objectives. We organize these cases by two roles played by many academic librarians: collectors and publishers. By considering the relationship between DRM and OA, one may better recognize when DRM should be adopted or resisted in projects involving OA materials.

### OPEN ACCESS

Once thought to be an experiment, OA scholarly literature is now produced by large, mainstream academic publishers—including Elsevier, Taylor &

Francis, Wiley, Springer, Sage, and many more. In fact, OA is the fastest growing segment of the academic publishing market.<sup>1</sup> OA publishing options are now available in some form to creators of any educational, scholarly, cultural, or professional work—including textbooks, monographs, classroom materials, models and diagrams, images, tests and measures, tutorials, data sets, and journal articles. If a work can be made available in digital form, it can be published as an OA resource.

Given the rise of OA, most readers will already be familiar with the idea. Nonetheless, when thinking about the role of DRM in OA publishing and dissemination, it is useful to reflect on the origins of the OA movement and the many routes to OA that are now available.

At the end of the twentieth century, the Internet became a common feature in academic and medical libraries in the United States and other developed countries. This changed how librarians accessed information and provided services to their patrons. For example, the MEDLINE database was launched in 1964.<sup>2</sup> For many years it was accessible only to those with specialized searching skills, typically medical librarians, but in 1997 it was made available for free to any Internet user through the PubMed website.<sup>3</sup> A database that was once available to only a few was now available to the many at no cost to its users. While PubMed was providing free access to bibliographic information, others were also providing free access to the scholarly literature. The OA repository arXiv (<http://arxiv.org>) began in 1991 and showed that scholars in mathematics and physics were willing to share their research and writings at no cost to their readers.

Following arXiv's model, Harold Varmus and others in the National Institutes of Health (NIH) proposed a similar OA repository for the health and life sciences.<sup>4</sup> This repository launched in 2000 as PubMed Central and now provides free access to more than 3.6 million articles (<http://www.ncbi.nlm.nih.gov/pmc/>).<sup>5</sup> At roughly the same time, large and ultimately successful OA journal initiatives were created, most notably BioMed Central in 1998 and the Public Library of Science in 2000.

These OA archiving and publishing efforts developed in parallel with an advocacy movement. In 2001, with the support of the Open Society Institute, a group of prominent OA advocates met in Budapest to write the Budapest Open Access Initiative (BOAI).<sup>6</sup> The declaration not only gave momentum to those who saw OA as a social value, but also helped define self-archiving and OA publishing. In the same year, Lawrence Lessig and others established the Creative Commons organization, which encourages the adoption of licenses to facilitate open sharing and permission for reuse of digital works by their copyright holders.<sup>7</sup>

In the decade and a half that followed, the OA principles envisioned by the BOAI and Creative Commons were promoted by the adoption of institutional policies. The NIH and other research-funding entities adopted public

access policies that mandated, at the very least, self-archiving in an OA repository, such as PubMed Central. Similarly, many universities adopted OA policies to require or to encourage their faculties to self-archive works in OA institutional repositories. As authors began to realize the benefits of OA distribution, libraries launched OA repositories and publishing systems and educational programming to support copyright practices that are friendly to authors and readers.

As this short history is meant to illustrate, OA is both pervasive and multifaceted. When thinking about DRM, it is best to keep in mind the ways authors, publishers, libraries, and readers participate in OA. Peter Suber has articulated OA as “digital, online, free of charge, and free of most copyright and licensing restrictions.”<sup>8</sup> To provide a structure for understanding both the rights and the models of open access distribution, we rely on Suber’s terminology of green and gold OA and, more to our point, gratis and libre OA.

### Green and Gold OA

OA resources are often categorized as either green or gold. This vocabulary, used by Suber and attributed to Stevan Harnad,<sup>9</sup> is widely used by OA advocates and librarians. Green OA refers to the practice of self-archiving—uploading a work to an open website. The work may or may not have already been published elsewhere, and as a result the copyright holder may have placed limitations on its use beyond the author’s initial act of self-archiving. In Harnad’s vocabulary, this is green OA because the publishers have given the author the “green light” to post the work on an OA website. Typically, green OA works are uploaded to an institutional repository or a disciplinary repository.

On the other hand, gold OA refers to the practice of publishing a work in an OA venue, such as a journal. In gold OA, the work is free to all readers at the point of publication. To recover their costs, some gold OA publishers require processing charges from the authors or their institutions. The gold in gold OA is often presumed to be associated with the exchange of funds, but most OA journals require no fees for publication.<sup>10</sup> Because gold OA works are published with the original intention to never require payment for access, gold OA copyright holders are more likely to permit others to redistribute and reuse the work through an open license.

### Gratis and Libre OA

*Free* is an ambiguous word in the English language. Struggling with this ambiguity, Richard Stallman, a founder of the free software movement, insisted that he meant “‘free’ as in ‘free speech,’ not as in ‘free beer.’”<sup>11</sup> The former is a liberty to be exercised, the latter a gift to be consumed. Although

a memorable analogy, it's not without its own complicated interpretations. Thus, to bring some clarity to the meaning of "free," the words *gratis* and *libre* were used to describe varieties of free software. The OA movement adopted these terms—with, one might argue, fewer complications. Suber describes *gratis* OA as "free of charge, but not more free than that."<sup>12</sup> In essence, one may have access to read or view an item at no cost, but she may not be free to do much of anything else with the work. For any use that exceeds fair use, one must seek permission from the copyright holder. Thus, as Suber writes, "*Gratis* OA removes price barriers but not permission barriers."<sup>13</sup> By this definition, most of the manuscripts available to readers in PubMed Central are *gratis* OA. Readers may read them at no cost, but they do not have permission to reproduce, redistribute, adapt, or repurpose. Such uses, when beyond fair use, require additional permissions from the copyright holders.

In contrast, Suber describes *libre* OA as "free of charge and also free of some copyright and licensing restrictions."<sup>14</sup> *Libre* OA gives the user permission to move beyond the limits of fair use in one or more ways. This permission is granted prior to and without any written exchange between the user and the copyright holder. Thus a *libre* OA work might be available for reposting to a public website or for modifications or for repurposed reuse or for all of the above. Varieties of *libre* OA permit text mining and mashups in ways that *gratis* OA does not. While *libre* OA offers more freedoms to the user, it is less common than *gratis* OA and, given that there will be fewer prior copyright issues to accommodate, more likely to be a feature of gold OA publishing.

## CREATIVE COMMONS

For *libre* OA to work, the user must know the permissions that have been granted. This is usually accomplished with a license, most commonly a Creative Commons license. Creative Commons licenses may be assigned by the copyright holder to an OA work to permit others to use the work beyond the usual constraints of copyright and without having to receive individual permission from the copyright holder. Meant to enable reuse for works found online, the licenses include three layers: a Legal Code, a "human readable" Commons Deed, and a "machine readable" Rights Expression Language (REL).<sup>15</sup>

Creative Commons licenses give rights holders a prepackaged assortment of permissions that they can grant to others. This takes some of the burden of permissions development away from the copyright holder and also alleviates confusion about the terms of reuse for users. Most Creative Commons licenses have an attribution (BY) requirement to ensure the creator is appropri-

ately credited. Creators can also add a combination of a noncommercial (NC) requirement to prevent commercial uses and no derivatives (ND) requirement to specify that derivative works cannot be made under the license. Finally, the share-alike (SA) condition requires that works incorporating content under a SA license also have the same license. (This is the license favored by Wikipedia.) One can also waive all intellectual property rights with a Creative Commons Zero (CC0) Public Domain Declaration. CC0 is most open, while the Creative Commons BY-NC-ND is most restrictive. Because this license allows unlimited copying as long as attribution is given, no derivative works are made, and the purpose is noncommercial, it is only slightly less restrictive than mere gratis open access, which would not authorize unlimited copying.

Creative Commons licenses help implement libre OA by clearly stating permissions granted by the author. Keeping these licenses attached to digital copies of works can be accomplished by DRM.

## DRM FOR ATTRIBUTION AND USAGE LIMITS

We take a more expansive view of DRM, in which any technological measure that indicates or enforces intellectual property rights and licenses counts as DRM. Some of these devices have also been called technological protection measures (TPMs).<sup>16</sup> Generally, TPM refers to relatively strong access and usage restrictions on digital works applied to non-OA works. In this chapter we will use DRM as a broader umbrella under which TPMs fit.

Other chapters discuss the wide variety of types of DRM. We focus on DRM options that are compatible with OA, so the range of possibilities is smaller. For instance, we consider neither DRM that limits accessing a work on computers registered in particular countries or institutions nor DRM that prevents accessing more than a sample of the work until a fee is paid. Applying such DRM to a work makes that work non-OA.

### Attribution

While open licenses like Creative Commons are not necessary for a work to be gratis OA, many authors and publishers apply open licenses to their works, making them libre OA. A crucial part of properly using libre OA works is attribution, which is giving appropriate credit to the work's creator. Digital copies of a work may circulate, and new copies may be posted in places beyond the original publication site. The work may be translated, reformatted, or mashed up with other content. If metadata is lost in any way, future users may not know what rights have been granted or how attribution should be made. For instance, suppose an article is published in an OA journal with a Creative Commons Attribution license. A professor down-

loads the article and emails it to a fellow professor. The second professor wants to add the article to a digital packet of readings she is assembling for a course. This use is permitted by the license, but unless the file sent by the first professor contained all necessary information about the license and article citation, it may be difficult for the second professor to follow the license through appropriate attribution.

DRM can reduce these difficulties by embedding rights information into the digital work, making it less likely that this information would be lost as the work is copied or reused. One option is applying watermarks to the digital files. One often sees visible watermarks on PDF files downloaded from licensed databases; the watermarks generally indicate the licensing institution and time of download. This is an example of using a watermark to monitor and enforce license terms, but watermarks can display rights or attribution information instead.<sup>17</sup> For OA works using Creative Commons licenses, the watermark could list the license URL and preferred citation. The watermark could be placed in an unobtrusive spot in the margins on each page so that if the file is broken up, the rights information will still be visible on each part.

Watermarks can also be invisible. This type of watermark is generally used for enforcing rights in non-OA works, but if a visible watermark seems unattractive or otherwise undesirable, an invisible watermark may be suitable. The attribution information would have to be readable by software, such as a citation management program, or have a visible notice telling users how to view the rights watermark when needed. Some watermarks are easier to remove than others without disrupting the file contents, but for OA works, there is not much incentive to wipe off information that helps one use the work appropriately (assuming the watermark does not hinder reading the work).

Another option is embedding rights information in the file metadata. Creative Commons has proposed the Creative Commons Rights Expression Language (CC REL),<sup>18</sup> a standard for a rights expression language that enables computers to detect what license or rights apply to a digital object. CC REL can be embedded in most files, including PDF and image formats, using the Extensible Metadata Platform (XMP) standard. The metadata embedded in the file is invisible to a human reader unless she looks for it in the metadata, but computers can read the CC REL data when needed. Examples of software using such rights data are a search program looking for works with a given license or a citation management application creating citations to quoted works.

A relatively new option is registering rights in digital work on a public blockchain. The blockchain is a public register that is maintained, updated, and verified by a distributed network on computers performing complex cryptographic calculations. Blockchains are most well known for the role

they play in the Bitcoin payment system. Some benefits of a public distributed ledger are that anyone can verify a transaction and the ledger does not depend on a central server. The Bitcoin system uses a blockchain to record transfers of bitcoin units from one user to another, but the same technology can be used to record rights claims in a digital file.

This has been done by an organization called ascribe (<https://www.ascribe.io/>). Using ascribe's system, a rights holder uploads a digital file and enters their intellectual property claim. The system creates a hash (essentially, a digital fingerprint) for the file and enters the hash and rights information onto a public blockchain. The rights holder now has a public, time-stamped claim on a digital work.

This service was initially designed for creators wishing to sell digital works of art,<sup>19</sup> but Creative Commons France and ascribe have adapted the system to also register Creative Commons licenses.<sup>20</sup> Authors and publishers can register the rights information in OA works, whether most rights are reserved or granted through a Creative Commons license, in a verifiable way. This option does not embed the rights information in the file, but one can link to a page for each work that displays the rights registration in the ascribe system.

Each of these options can be used singly or in combination. The author of a work published OA could select a Creative Commons license, register that license in ascribe's blockchain, embed rights information in the file's metadata, and apply a watermark with rights information or a link to that information. Through these uses, DRM is furthering OA and open licenses by making rights information about OA works more available and facilitating proper use and attribution.

## Use Limits

Perhaps a publisher is interested in making a publication gratis OA, but with some limitations on how the files are used. DRM can make a work freely readable but prevent uses like downloading, copying and pasting text, or breaking the work into pieces for reuse. For some OA advocates, this approach may seem an unacceptable compromise. This reaction is understandable, but our view is that gratis OA is often better than no OA, and some forms of DRM applied to gratis OA works are acceptable.

The set of DRM that can be used to limit some uses of OA works is fairly small. First, PDF files can be locked to prevent copying and pasting text, editing, or printing.<sup>21</sup> Second, works could be displayed in Flash or HTML5, a format that permits readers to access and read a work in a web browser but prevents downloading or copying and pasting. This option could be used to control uses of an entire work or, for works published in HTML, to control

copying of figures or images. For audio and video works, streaming provides access but prevents users from keeping a copy or editing it.

To further OA goals, these technologies should be deployed only if an author or publisher is unwilling to publish their works OA without DRM. Some readers may expect to be able to make certain uses of OA works, so libraries or publishers should include appropriate notices of the DRM restrictions and means for contacting the rights holders to request permission and more usable copies.<sup>22</sup> To the extent possible, librarians should seek to set expiration dates on DRM restrictions or try to revisit the issue with authors or publishers in the event their experience with OA publishing has reduced their concerns.

Having reviewed OA and how DRM can be used to further OA objectives, let us now consider how librarians can apply this information when building library collections and publishing works of authorship.

### LIBRARIANS AS COLLECTORS

All budgets have limits, but the gap between available funds and the rising expense of subscription-based library resources continues to grow. The cost of subscribing to health science journals has increased by 7 percent annually,<sup>23</sup> and library expenditures on subscription resources have more than quadrupled in the last three decades.<sup>24</sup> At the same time, library shares of institutional budgets are shrinking,<sup>25</sup> and a growing number of medical libraries have shut their doors.<sup>26</sup> While OA resources are not an immediate solution to this problem, they are the fastest growing segment of the scholarly publishing market and a welcome respite from the budget crunch.

Furthermore, OA resources are, by nature, readily available and often easy to use. They can be particularly useful when serving visitors and other patrons without institutional credentials, especially when these patrons need ongoing access to a source. OA resources are often a better source for these patrons and may be the preferred tool even when subscription-based alternatives are available. For example, MedlinePlus, a free online consumer health reference tool, is preferred for patient use in the medical library over any number of subscription-based databases that might be available on-site.

Given these factors, from budgets to usability and patron needs, libraries of all sizes add OA resources (in one way or another) to their digital collections. In some cases, OA resources are merely listed on a web page or included with other works in a topical guide to library resources. In other cases, OA resources are supplemented with bibliographic description and added to the library's online catalog. In either case, there are at least three DRM-related issues that librarians should consider while collecting or linking to OA resources: metadata, usability, and preservation.

## Metadata

When adding an OA resource to an online finding guide or catalog, the library will want to investigate the resource's DRM characteristics. How are the rights managed? What are the rights available to the user? If some form of libre OA is provided, what rights are restricted or what conditions are imposed on reuse? Communicating these rights in an item's metadata record or in the finding aid will help readers identify works that fit their needs. It will also assist the library in efforts to maintain reliable access to the works. This may be as simple as adding a work's Creative Commons license to a metadata field. In addition, rights information may have been directly embedded (by watermarking or other technologies) in the work itself. These DRM features can be communicated to the user to assist with efforts to select works available, for example, for educational reuse or data mining.

## Usability

Some DRM technologies limit a user's ability to work with a text, image, or other digital resource. As with subscription-based electronic books, DRM can provide access to the item but prevent file downloads, copying blocks of text, or printing a high-resolution image file. Although, read-only, gratis OA may be better than no access, there may be some circumstances in which the usability barriers are such that including the work in a finding aid is not advisable. The library will want to weigh these usability problems against the value of using the resource as a supplement to its holdings on a given topic.

## Preservation

Some OA resources will prove to be core items regularly used by a library's patrons. In these cases, an OA resource has the potential to outlive its original publisher and online provider. The library may want to include a copy of the work in its own digital archives or download a backup for offline use or preservation. Unfortunately, many OA resources (as with the majority of PubMed Central's articles) have gratis OA licenses that prohibit these practices. As with the potential usability barriers of DRM, licenses or technologies that restrict the ability to preserve access to a work should be weighed against the value of adding an OA item to a library's holdings.

## LIBRARIES AS PUBLISHERS

Many libraries now recognize that they serve a role identical or similar to that of a publisher for their constituents. Libraries are publishers in that they participate in a "set of activities . . . to support the creation, dissemination,

and curation of scholarly, creative, and/or educational works.”<sup>27</sup> While some libraries may have participated in print-based publishing in one form or another for their organizations in the past, many now host or build digital collections that would not otherwise be available to users. In their most common forms, these publishing activities take place in library-facilitated digital collections, institutional repositories, and other online publishing platforms, such as Open Journal Systems (OJS).

Using these tools, a library may find that it is the first and only provider of digital access to materials about its community or organization; previously unpublished scholarly works by its patrons; or entire peer-reviewed journals, monographs, thesis collections, or conference proceedings. In all these cases and others, the library is effectively the publisher of record—participating in the “production process . . . and apply[ing] a level of certification to the content published, whether through peer review or extension of the institutional brand.”<sup>28</sup> Most of these library publishing services seek a broad audience and aim to be as openly accessible as possible.

In whatever way libraries participate in publishing activities, copyright concerns and approaches to managing these concerns will be common. At the very least, the library will want to ensure that it has sufficient rights to distribute the work. At the same time, the publishing collaborator (an author, creator, editor, or organization) may have a strong interest in retaining selected rights. These details are typically communicated in copyright agreements and nonexclusive permissions to distribute. DRM also can be used to reiterate and clearly communicate the rights status of a library-published OA work and, as described above, restrict use to read-only gratis OA.

### **OA Library Publishing and DRM for Rights Expression**

CC REL, a widely used rights expression language, is currently integrated in the submissions systems for many library publishing tools, including DSpace, DigitalCommons, and OJS. In these publishing systems, the information about the rights status of an OA work is included in a published item’s metadata and displayed on the landing page describing the item. In turn, when coupled with a metadata exchange standard, such as the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH), this practice permits other search tools to identify OA works and to display them with reference to the Creative Commons license. This communication of rights reduces uncertainty about the exact rights of an OA work, enabling reuse when it is permitted and discouraging uses that overstep the limits of the license.

Although this expression of rights in library publishing systems is useful, it does not ensure that all users will see these communications. When a user downloads and saves a file to their personal collection, it is likely that it will

be separated from the original metadata. Furthermore, even if the file includes a statement and icon displaying the terms of the license, it is possible that these may be removed during reuse. The DRM tools mentioned above, including watermarking, embedding rights information in file metadata, and registering rights information in ascribe's blockchain ledger, all make rights information visible and more persistent and should be considered alongside rights information displayed in library publishing systems.

## OA Library Publishing and DRM for Reuse Restrictions

While Creative Commons is a method for expressing the rights associated with an OA object published by a library, it does not enforce those terms. It is difficult to imagine how DRM technologies could be used to enforce the exact terms of a Creative Commons or other OA license on reuse. The terms might be fully embedded and watermarked in the file in a way that enables others to quickly identify a use that oversteps the limits of the license—for example, the rights holder might be notified when their work was uploaded to another site or to a selected list of sites prohibited by the license. This notification, however, would occur after the fact and would not have prohibited the initial violation of the terms.

Given the difficulty of enforcing the exact terms of a reuse license, it is more likely that library publishers would use DRM to provide read-only gratis OA to a work. Libraries and their patrons are already familiar with this approach to DRM of electronic resources, particularly in e-book platforms and other page-turning display programs. Likewise, many digital image collections hosted by libraries provide free access to a low-resolution image file but do not permit users to download high-resolution images for easy reuse. It is also possible for authors or editors, prior to uploading a work to an OA repository or journal, to use common document creation software to protect the file from modifications without a password.

These and other enforced restrictions on reuse will frustrate readers and, potentially, the library that offers the publishing service. Therefore, as with collecting OA works with DRM restrictions, the library will want to carefully consider the costs and benefits of using DRM technologies in OA library publishing. Key factors for a library to consider prior to adopting a DRM for OA works should include honoring the mission of the library OA publishing program, reducing barriers to persistent access and resource preservation, and promoting the adoption of OA publishing.

*Does the DRM approach under consideration align with the mission of the library as an OA publisher?* Many library publishing efforts began with the expressed intention of providing OA to the works that they distribute. A DRM approach that overly limits reuse or dramatically reduces readability

may compromise the original intentions of many library publishers of OA works.

*Does the DRM introduce barriers to persistent access and resource preservation?* In order to provide persistent access to a published work, libraries will need to make digital copies. A DRM technology that interferes with this process would reduce the ability of the library to serve as a reliable publisher of OA works. In such cases, at the very least, the library should ensure that the rights agreement between the library and the publishing partner permits the library to keep a DRM-free version of the work in a dark archive.

*Does the DRM increase the adoption of OA publishing?* Even if DRM introduces features that restrict reuse of an otherwise OA work, there may be times when a library is willing to accept the restrictions. For some collaborators, providing gratis OA to a published work is a first step toward increasing access. Others may be transitioning from a subscription to a fee-based OA or another nonsubscription-based business model. Some authors may balk at the notion that others could adapt or redistribute their work without seeking direct permission. Likewise, the organizations that sponsor an OA publication may be interested in tracking and maximizing usage metrics at one Internet location. These limits to access and reuse are less than ideal for most OA advocates and publishers, and in fact some prominent OA publishing organizations have begun to adopt policies that encourage fewer restrictions on reuse.<sup>29</sup> Even so, gratis OA is better than no access at all—particularly when the former means that the library is serving the needs of one of its constituents or developing a relationship with a new publishing partner. Thus, despite the complications for users and for the library as a publisher, some DRM technologies that enable read-only gratis OA may warrant careful consideration.

## CONCLUSION

DRM, narrowly defined as an intervening technology that limits access and use of a digital publication, runs counter to the purpose of most OA publishing and against the better interests of the authors that chose an OA dissemination route. However, DRM, broadly defined as approaches to managing and communicating the rights associated with a digital publication, is a desired and necessary feature of all OA publishing activities. When the digital rights associated with an OA work are not fully communicated, libraries and users have to seek clarification from the rights holder or risk misjudging the limits to use. The most widely used DRM (broadly defined) approach in OA publishing is the Creative Commons license. Many OA publishing platforms currently embed Creative Commons licenses in web pages and communicate

them in their metadata protocols; however, these managed rights are often separate from the digital object that they describe.

Therefore, DRM technologies that watermark or integrate a Creative Commons license or other rights information across all aspects of a digital work may be a welcome addition to the OA publishing toolkit. Users and developers of these DRM technologies for OA works will want to weigh the benefits against any barriers to usability, preservation, and access. Even so, while collecting or publishing OA works, a library may have good reasons for applying DRM restrictions to OA works. A library that must choose between pointing to a DRM-restricted, gratis OA digital resource for its patrons and providing no access to the digital resource may decide that read-only access is worth the price of some frustration and limited utility. Likewise, an OA library publishing service may decide to accommodate the interests of authors and editors that are unfamiliar with OA and its benefits to rights holders; some of these potential partners may be more comfortable with DRM that limits reuse, perhaps even to read-only gratis OA. Finally, while DRM technologies are unlikely to be the primary focus of a library-supported OA initiative, those that collect or publish OA works will want to watch developments in DRM technologies, particularly those that facilitate open licenses without reducing the digital integrity of OA work.

## NOTES

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