

Simplifying license attribution for OER with *emacs-reveal*

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Abstract: Open Educational Resources (OER) come with different license terms that require different forms of attribution. Properly attributing OER with licensing information has previously been identified as one of the most time-consuming factors of OER projects. As shown in this paper, the semantic annotation standard CC REL lacks features that are necessary for correct attribution with popular Creative Commons licenses. The software *emacs-reveal* addresses this gap in the context of OER slideshows, which may contain figures under different licensing terms: For each figure, a simple text file stores metadata building upon the vocabulary of CC REL (with pragmatic extensions) and can be shared along with the figure. From that metadata, the software generates attribution statements, both in machine-readable form (based on RDFa) and in human-readable form. The novel resulting process avoids manual copying of relevant license information, which is time-consuming and error-prone.

Keywords: Open Educational Resource, OER, Attribution, Creative Commons, RDFa, FLOSS

1 Introduction

According to the *Ljubljana OER Action Plan 2017* [Un17], “Open Educational Resources (OER) support quality education that is equitable, inclusive, open and participatory.” A cornerstone of goals such as equity, inclusiveness, openness, and participation is proper licensing of educational resources. Indeed, following the *2012 Paris OER Declaration* [Un12], OER are “teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions.” Despite the widespread adoption of Creative Commons licenses for OER [AS16,ES18,Hi10], only few tools exist to help creators and users of OER with proper license attribution, which is among the most time-consuming factors for OER projects [Fa16].

This paper addresses challenges when creating, re-using, and mixing OER that are published under diverse licenses and presents the approach taken by the free/libre and open source software (FLOSS, see [Cr08] for a survey) *emacs-reveal* for proper license attribution of figures in slideshows. This software has been developed and used by the author since April 2017 to create OER presentations (HTML slideshows with audio explanations; to be viewed with standard Web browsers, either on- or offline). Users of *emacs-reveal* write source files for presentations in the lightweight markup language Org mode in the text editor GNU Emacs (see [SD11] for a general introduction to Org mode).

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As sketched in [Le19], *emacs-reveal* is FLOSS that supports Single Sourcing [Ro01] of OER and meets the requirements of the ALMS framework by Hilton et al. [Hi10], which aims for the freedoms to reuse, redistribute, revise, remix educational resources; later Wiley [Wi14] added retain, leading to the “5 Rs of openness” of OER.

With *emacs-reveal*, figures can be accompanied by metadata files that specify licensing information based on standard Semantic Web vocabularies, notably the Creative Commons Rights Expression Language (CC REL) based on RDF [Ab12]. When using a figure in a presentation, proper human-readable license attribution is generated automatically from the corresponding metadata file and embedded in machine-readable RDFa format in the HTML presentation. An example for the generated HTML code is shown in Fig. 1, while Fig. 2 and Fig. 4 are screenshots of Browser windows rendering that code. (See [Na18,NL18] for the role of semantic annotations on educational resources in general.)

```

1  <div about="./Global_OER_Logo.svg.png">
2  
3  <span property="dc:title">The Global OER Logo</span>
4  by <a rel="cc:attributionURL dc:creator"
   href="https://commons.wikimedia.org/wiki/User:Jonathasmello"
   property="cc:attributionName">Jonathasmello</a>
5  under <a rel="license"
   href="https://creativecommons.org/licenses/by/3.0/">CC BY
   3.0</a>;
6  from <a rel="dc:source"
   href="https://commons.wikimedia.org/wiki/File:Global_Open_E
   ducational_Resources_Logo.svg">Wikimedia</a>
7  </div>

```

Fig. 1: HTML code for figure with RDFa licensing attribution generated by *emacs-reveal* (simplified excerpt; selected lines explained subsequently)

The *Ljubljana OER Action Plan 2017* [Un17] identifies challenges and proposes actions to mainstream OER. The first challenge, “Building the capacity of users to find, re-use, create and share OER” is to be addressed by ten actions ((a) – (j)), among which action (c) reads as follows:

“Disseminate the findings of research on OER to support models of good practice with a focus on cost-effectiveness, sustainability, exploration of new tools and technologies for the creation and sharing of OER;”

The present paper answers the following research question to address that first challenge in view of action (c): *What attribution requirements are imposed by typical OER licenses and how can they be met in a tool-supported manner that avoids manual efforts and mistakes?* To make that question more precise, in Section 2, OER licensing with Creative Commons is reviewed, pointing out shortcomings related to best practices advertised by

Creative Commons and to the use of CC REL in practice. An attribution approach addressing these shortcomings, which is implemented in the software *emacs-reveal*, is sketched in Section 0. As such, a *usable* practice for the creation and sharing of OER with a *sufficient* amount of machine-readable licensing metadata is advocated.

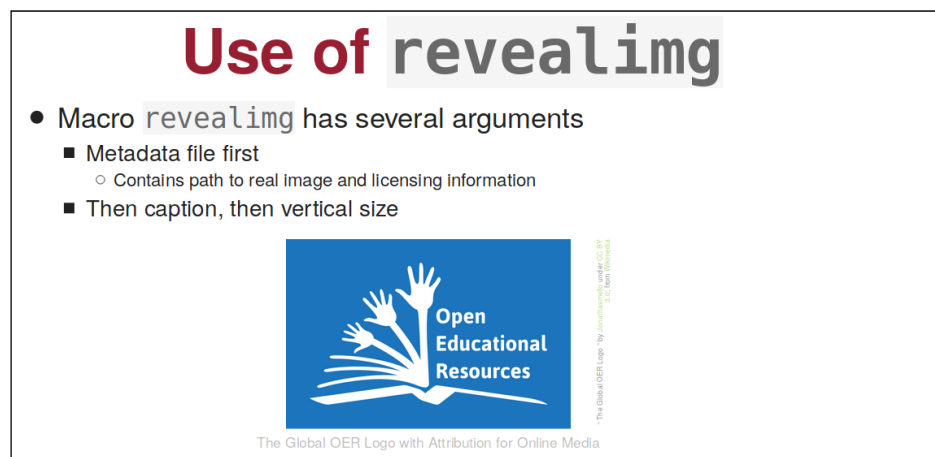


Fig. 2: Sample slide with figure and caption; see Fig. 1 or Fig. 5 for licensing information. (Note that in contrast to the small font size in this screenshot, licensing information to the right of the logo is readable when viewing this slide in a web browser; similarly for Fig. 4.)

2 Background

2.1 Licenses for OER

As mentioned in the Introduction, OER need to be published under licenses that grant certain freedoms to (re-) users, in particular the 5 Rs of openness, for which typically different forms of Creative Commons (CC) licenses are applied. Among the CC licenses only “CC0” (for resources released into the public domain, without any restrictions on future use), “CC BY” (requiring attribution of the creator) and “CC BY-SA” (requiring attribution and redistribution under same license, “ShareAlike”) are “free” licenses according to Creative Commons’ licensing considerations [CC19] and “open” licenses as defined by Open Knowledge International [Op19]. Consequently, only those are recommended for OER in [ES18], and only those are considered in the following in their most recent international versions as summarized in Tab. 1. (The subsequent analysis could be extended for any set of licenses, though.)

Short Name	Full Name	Requirements for use
CC0	CC0 1.0 Universal (CC0 1.0) Public Domain Dedication ²	None
CC BY	Attribution 4.0 International (CC BY 4.0) ³	Attribution to give credit
CC BY-SA	Attribution-ShareAlike 4.0 International (CC BY-SA 4.0) ⁴	Attribution and re-use with same license

Tab. 1: Free and open CC licenses for OER

2.2 Practical observations

CC licenses are *copyright* licenses, which do not grant patent, trademark, publicity, privacy, or moral rights.⁵ For example, if a slideshow under any CC license contains a logo of the publishing organization (say, on its title slide), the rights granted by the CC license to reuse and revise the slideshow and its embedded contents do *not* necessarily extend to the logo, which may be a (trade-) mark that forbids modifications and restricts usage contexts.

Furthermore, a slideshow under one CC license, called primary license subsequently, may reuse OER under different licenses, each of which may need proper attribution. For such compilations, Creative Commons suggests wording such as “Except otherwise noted this work is licensed under [...]”⁶ to indicate the primary license of the work. Then, only embedded resources with deviating attribution requirements need additional attribution. Given such a situation, an embedded resource without license notice could fall under three different cases:

1. The resource may have been created by the compilation’s author, to be covered by the primary license. This should be the typical case.
2. The resource may not be affected by the primary license but come with its own rights and restrictions (e.g., trademarks). Users need to figure this out on their own.
3. The resource may not need attribution if it was released into the public domain (e.g., via CC0). Although the resource’s creator does not require attribution, the compilation’s author should still indicate the resource’s source and license (a) to avoid plagiarism and (b) to enable others to benefit from public domain rights. Hence, authors should avoid this case.

² <https://creativecommons.org/publicdomain/zero/1.0/>

³ <https://creativecommons.org/licenses/by/4.0/>

⁴ <https://creativecommons.org/licenses/by-sa/4.0/>

⁵ <https://creativecommons.org/faq/#rights-other-than-copyright>

⁶ https://wiki.creativecommons.org/index.php?title=Marking_your_work_with_a_CC_license&oldid=116977

2.3 Attribution challenges

When sharing (possibly modified) OER, the two CC licenses of Tab. 1 that require attribution, namely CC BY and CC BY-SA, come with the same set of requirements, abbreviated from their license texts' respective "Section 3(a)(1)":

- Retain if supplied with the OER (a) identification of creator(s), (b) copyright notice, (c) license notice, (d) notice for disclaimer of warranties, (e) hyperlink to OER
- Indicate (previous) modifications
- Indicate license, with text or hyperlink

Notably, a title of the OER is not required with the license versions listed in Tab. 1. Nevertheless, prior versions of those licenses differ in this regard, which lead to the common practice of including the title as well, e.g., under the acronym TASL that is advertised as best practice by Creative Commons [CC18]:

- Title: Include title, if provided
- Author: Name author(s); if specified, use given information
- Source: Include hyperlink to source
- License: Name license and provide hyperlink

Compared to the requirements of "Section 3(a)(1)" listed above, TASL is clearly incomplete as it neither instructs licensees to reproduce notices for copyright and disclaimers nor indications of modifications. Actually, none of the sample attributions advocated as best practices in [CC18] are concerned with these pieces of information. This finding is summarized in the first two columns of Tab. 2.

Finally, note that even the "simple" requirements to include the title or to name the author can be surprisingly difficult in practice. E.g., the OER logo embedded in Fig. 2 was downloaded from Wikimedia Commons⁷, which names "Jonathasmello" as author but does not specify a title for the logo. Now, the Wikimedia page links to a UNESCO Web site, where a logo manual⁸ can be found. The manual in turn specifies a title and an author. However, the author named in the manual is "2012, Jonathas Mello", contradicting the information on Wikimedia Commons (also the attribution URLs specified at both places disagree). Hence, this logo, which represents the essence of OER, serves as example for incompleteness and inconsistency that is to be expected for manually shared, textual licensing information. Standards for machine-readable metadata promise to reduce such quality issues.

⁷ https://commons.wikimedia.org/wiki/File:Global_Open_Educational_Resources_Logo.svg

⁸ https://en.unesco.org/sites/default/files/global_oer_logo_manual_en.pdf

2.4 Semantic annotations with RDFa

The goal of the Semantic Web is to make Web contents machine-readable by relying on semantic annotations based on standard vocabularies and ontologies. The Resource Description Framework (RDF) is the major language to express knowledge about resources (entities) in the form of so-called RDF triples, consisting of subject, predicate, and object [Ho08]. In our context, a specific OER might be the subject of some triple, its predicate might indicate a creator relationship, and its object might be the creator.

RDF triples can be represented (serialized) in different forms, and RDFa (Resource Description Framework in Attributes) [He15] specifies how to embed RDF triples in HTML attributes. Examples for machine-readable Creative Commons licensing with RDFa in HTML documents are given in [CC14] and in Fig. 1. E.g., line 6 in Fig. 1 demonstrates the use of RDFa to annotate a usual hyperlink with semantic information in the `rel` attribute, indicating that the hyperlink identifies the source of some figure.

2.5 CC REL

CC REL (The Creative Commons Rights Expression Language [Ab12]) is a standard for license terminology based on RDF (with HTML embedding via RDFa). For example, line 4 of Fig. 1 shows how a hyperlink can be used to attribute an author with name and hyperlink.

The vocabulary offered by CC REL to indicate license and attribution information (the so-called “Work properties” of CC REL) is listed in the third column of Tab. 2. Apparently, CC REL enables OER *authors* as licensors to specify licensing information according to TASL, but is not sufficient to express all attribution requirements that could be demanded when licensees (re-) *use* OER. In particular, CC REL lacks means to indicate modifications of OER.

For example, suppose that Alice publishes a figure with attribution license. Bob improves that figure and publishes his improved version with a different title at a different place, possibly under a different (compatible) license that also requires attribution. The attributes offered by CC REL could either record license information provided by Alice or by Bob. As Bob has created a new work, he uses the CC REL attributes for his information, leaving no place to record Alice’s information, or, more generally, a description of the figure’s *provenance*. In lack of a standard, this gap is addressed in a pragmatic way with *emacs-reveal* as explained subsequently.

3 Attribution in *emacs-reveal*

The software *emacs-reveal* supports the creation of OER slideshows (HTML based on the presentation framework *reveal.js*⁹ with audio explanations) and meets the following technical requirements (subsuming the ALMS framework of [Hi10] as argued in [Le19]):

- OER should be usable (for learning) with FLOSS on (almost) any device, also mobile and offline.
- OER should be editable with FLOSS (this requires source file access).
- OER should be re-usable under the Single Sourcing paradigm (see [Roc01]), which enables reuse and revision from a single, consistent source without copy&paste (copy&paste creates isolated copies, where the reconciliation of changes and improvements by different individuals would be almost impossible).
- OER should offer a separation of contents from layout (then, experts for content do not need to be design experts as well; also, cross-organizational collaboration is supported where each organization can apply its own design guidelines).

Requirement	TASL	CC REL	<i>emacs-reveal</i>
Name creator(s)	A(uthor)	cc:attributionName, cc:attributionURL	cc:attributionName, cc:attributionURL
Reproduce copyright notice	-	-	copyright
Reproduce license notice	L(icense)	license	licenseurl, licensetext
Reproduce disclaimer of warranties	-	-	copyright, permit
Include hyperlink to OER	S(ource)	dc:source	dc:source, sourcetext
Indicate modifications	-	-	imgadapted
Indicate license	L(icense)	license	licenseurl, licensetext
-	T(itle)	dc:title	dc:title, imgalt
-	-	cc:morePermissions	permit

Tab. 2: Comparison of CC attribution requirements and mechanisms

⁹ <https://revealjs.com/>

- OER should be defined in a lightweight markup language, which is easy to learn and which enables the use of industrial-strength version control systems such as Git for the management of OER collaboration (comparison, revision, merge).

Slideshows are defined in Org mode text files, where figures can be embedded using two macros `revealingm` and `reveallicense` as indicated in Fig. 3, whose code produces two slides, excerpts of which are shown in Fig. 2 and Fig. 4 (both display an OER logo). Both macros produce figures where licensing information is rotated to the right with the default CSS styling of *emacs-reveal*. With `revealingm`, the figure is horizontally centered and has a caption, while `reveallicense` embeds the figure in the surrounding paragraph or list (without caption). The first argument to both macros is the name of a file with metadata, here `"Global_OER_Logo.svg.meta"`, whose contents are reproduced in Fig. 5.

```
* Use of ~revealingm~
- Macro ~revealingm~ has several arguments
  - Metadata file first
  - Contains path to real image and licensing information
  - Then caption, then vertical size

{{{revealingm("Global_OER_Logo.svg.meta","The Global OER Logo
with Attribution for Online Media","30vh")}}}}

* Use of ~reveallicense~
- Here, the logo appears in reduced size without caption
  {{{reveallicense("Global_OER_Logo.svg.meta","15vh")}}}
- As part of a simple list
```

Fig. 3: Sample Org mode code to create two slides

Use of `reveallicense`

- Here, the logo appears in reduced size without caption
- As part of a simple list




Fig. 4: Sample slide with figure without caption (see Fig. 1 or Fig. 5 for licensing information)


```

1  ; Semicolon starts comment until end of line (Emacs Lisp).
2  ; Lines 13-16 occur in comments; they illustrate available
   options.
3
4  ((filename . "./Global_OER_Logo.svg.png")
5   (licenseurl .
6    "https://creativecommons.org/licenses/by/3.0/")
7   (licensetext . "CC BY 3.0")
8   (cc:attributionName . "Jonathasmello")
9   (cc:attributionURL .
10    "https://commons.wikimedia.org/wiki/User:Jonathasmello")
11   (dc:source .
12    "https://commons.wikimedia.org/wiki/File:Global_Open_Educational_Resources_Logo.svg")
13   (sourcetext . "Wikimedia")
14   (dc:title . "The Global OER Logo")
15   (texwidth . 0.2)
16   ; (imgalt . "If the title is not suitable as alt text.")
17   ; (imgadapted . "Indicate modifications/provenance.")
18   ; (permit . "Indicate special permissions/disclaimers.")
19   ; (copyright . "Reproduce copyright notice of source.")
20   )

```

Fig. 5: Sample metadata with license information

Note that the figures containing the OER logo are just screenshots in this document. In the corresponding slideshow, attributed author, source, and license name are hyperlinked as required by the license. Thus, in contrast to the slideshow, Fig. 2 and Fig. 4 are not self-contained and cannot be distributed without additional licensing information. For the purposes of this document, necessary information is shown in Fig. 1 as well as in Fig. 5.

The different metadata attributes of *emacs-reveal* occurring in Fig. 5 are also sorted into column 4 of Tab. 2. Most extensions over CC REL have been created for pragmatic reasons: While CC REL can indicate a license URL for use in a hyperlink, in practice the hyperlink also needs a text, for which CC attribution requires reproduction; hence, *emacs-reveal* uses two attributes, `licenseurl` and `licensetext`. Similarly, a `sourcetext` is added as text for the `dc:source` hyperlink. As images in HTML should provide an `alt` attribute with a textual description for accessibility reasons, `imgalt` can be used to specify this information. In addition, modifications can be recorded with `imgadapted` (for provenance information as mentioned in Section 2.5), while `permit` and `copyright` allow licensors to document and licensees to reproduce additional licensing information. Actually, until now the author has not seen a need for `cc:morePermissions`, which is why this attribute is not part of *emacs-reveal* (adding it is left for future work). In addition, `copyright` has only been added to meet CC attribution requirements, but has not been used so far. Besides, `texwidth` hints at the fact that Org slideshows can also be exported via LaTeX to PDF; then width specifications for figures improve the layout.

The macros `revealimg` and `reveallicense` come with additional parameters that influence the result. In particular, license information can be displayed in short form, which is useful to cover case (3) of Section 2.2, namely a brief note documenting CC0 (public domain) licensing for a figure, or omitted entirely to cover case (1) of Section 2.2, namely figures whose licensing terms agree with those of the overall slideshow.

Finally, readers might wonder about the choice of the format for metadata files (such as the one shown in Fig. 5). A plain text file with a list data structure in Emacs Lisp was chosen for the simple reason that the bulk of *emacs-reveal* is running inside Emacs anyways, where such lists can be parsed easily. Besides, such simple text files can be created and edited by a wide range of users with any text editor. Regardless of which format might be chosen by other tools or future standards, essentially key-value pairs need to be recorded. Clearly, a variety of formats could be used, in particular RDF (in one of its serialization formats) or plain JSON. Whenever other tools would benefit from a different format, it should not be difficult to support such formats in *emacs-reveal* as well.

As of March 18, 2019, a public GitLab repository¹⁰, which the author created in March 2018 to share class material and talks, hosts 148 metadata files out of which 125 (attributed to 19 different creators) carry free and open licenses as shown in Tab. 3. Thanks to the sketched approach, the author does not need to track the various creators and licenses manually. New contributors to the repository are welcome. When re-using figures from that repository via *emacs-reveal*, the software accesses machine-readable, structured metadata. Thus, quality issues illustrated in Section 2.3 (which result from human interpretation and manual copying of textual licensing annotations) are avoided.

License	Usage count
Public domain	5
CC 1.0	49
CC BY 2.0	1
CC BY 2.5 Australia	4
CC BY 3.0	2
CC BY-SA 2.0	1
CC BY-SA 2.5	2
CC BY-SA 3.0	23
CC BY-SA 4.0	37
GPLv2	1

Tab. 3: Breakdown of metadata files on public repository by OER license

¹⁰ <https://gitlab.com/oer/figures>

4 Conclusions

Proper licensing when creating and reusing OER is a tedious task, if necessary metadata needs to be collected and applied manually. As argued in Section 2, metadata available in different places may be incomplete and inconsistent, and the standard vocabulary CC REL does not meet all requirements for the reuse of OER. Hence, the following research question arises: *What attribution requirements are imposed by typical OER licenses and how can they be met in a tool-supported manner that avoids manual efforts and mistakes?*

To answer this question, an approach towards creation and sharing of metadata was presented in Section 3, which is implemented in *emacs-reveal*. Here, simple text files store metadata describing figures, and metadata is shared along with figures. When embedding such a figure into a slideshow, license information is displayed automatically. Importantly, license metadata is both machine-readable (based on RDFa) and human-readable. Thus, all RDFa compatible tools (e.g., search engines or browser extensions such as OpenLink Structured Data Sniffer¹¹) can extract license information even if they are unaware of *emacs-reveal*.

The metadata vocabulary of *emacs-reveal* builds upon CC REL (summarized in Tab. 2), but has been extended to meet real-life requirements in pragmatic ways. Clearly, a need for further standardization exists, which is the subject of future work.

Finally, the need for sharing *two* files (image and metadata) requires some discipline which would not be necessary if metadata was embedded directly, e.g., with a standard such as XMP¹². Until such standards are more widespread, *emacs-reveal* offers a novel approach to gather experiences with OER and machine-readable license attribution in practice.

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¹¹ <http://osds.openlinksw.com/>

¹² <https://www.iso.org/standard/57421.html>

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