

Infrastructure and lightweight markup language for OER: *

The case of emacs-reveal

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Reality Check

- Open Educational Resources (OER), characterized by 5 Rs of openness (4 Rs in [Hil+10])
 - Permission to *retain, reuse, revise, remix, redistribute*
- Suppose that after this conference you aim to **remix** a presentation
 - As usual, you obtain a PDF version



Figure 1: “Conflict” by priyanka under CC BY 3.0 US; cropped from the Noun Project

- * How do you transfer **contents** into your OER?
 - PDF **layout** conflicts with your organization’s
 - Maybe, you obtain a Powerpoint source file

*This PDF document is an inferior version of an OER HTML page; free/libre Org mode source repository.

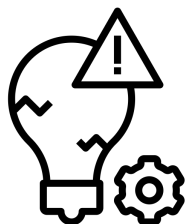


Figure 2: “mistake” by Kamin Ginkaew under CC BY 3.0 US; cropped from the Noun Project

- * Layout likely to be **destroyed** in LibreOffice and OnlyOffice
- * Even if you used Powerpoint, positioning of elements in your organization’s style likely to be **incorrect**
- Now, you **revise** the contents in a **silos**

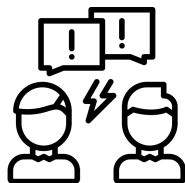


Figure 3: “Conflict” by lastspark under CC BY 3.0 US; cropped from the Noun Project

- * (E.g., fix typos, update contents based on more recent research)
- * Do you **notify** the author? Do you **collaborate**? How?
- * How and where do you **redistribute**?

Let’s briefly check how we might be using OER, for which we expect the 5 Rs of openness, which go back to a research paper by Hilton et. al (2010): Nowadays, we expect the freedoms to retain, reuse, revise, to remix, and to redistribute materials.

Agenda

Basic Terms

(OER: UNESCO Definition)

- **Open Educational Resources (OER)**
 - 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.” [UNE12]



Figure 4: “OER Global Logo” by Jonathasmello under Creative Commons Attribution 3.0 Unported; from Wikimedia Commons

- Usually, Creative Commons licensing
 - * Legal “standards” for **international/global** use
 - * Permit **5 Rs** of openness [Will14; Hil+10]: *retain, reuse, revise, remix, redistribute*
- Briefly, such licenses offer **freedoms** that would otherwise be prevented by copyright law

In this conference, I do not have to explain OER per se. Instead, let me just remind you of the 5 Rs of openness mentioned earlier, characterizing a culture of sharing, which uses appropriate licensing to overcome barriers of copyright law, granting freedoms to everyone.

(Free Software)

- Ideal of **sharing** in software development
 - Free Software = Free/Libre and Open Source Software (FLOSS)



Figure 5: “Photo of Richard Stallman” by Victor Powell under CC BY-SA 3.0; from Wikimedia Commons

- * Term coined in 1980s by Richard Stallman, Free Software Foundation
- * “Free” as in free speech or freedom, not free beer
- Four freedoms
 1. Run software (also changed versions)
 2. Study software
 3. Redistribute copies
 4. Distribute modified versions
- Note

- Those freedoms apply to OER
- All subsequently mentioned software is free software

In fact, such freedoms have a long tradition in software development under the term free software, which you might know as open source software. All software endorsed in this talk is free software.

Git

My approach is rooted in a version control system called Git.

Git as Decentralized VCS

- Version control systems (VCSs) keep track of shared repositories
 - Repository: Collection of documents (software, learning and teaching resources)
 - Keep track
 - * **Who changed what when why?**
 - * Synchronize (or restore) shared state
 - A popular VCS: **Git** as free software
- Git created by Linus Torvalds for development of kernel Linux
 - Reference: [Pro Git book](#)



Figure 6: “Git Logo” by Jason Long under CC BY 3.0; from [git-scm.com](#)

- Git as example of **decentralized** VCS
 - * Every author has **own copy** of all documents and their history
 - * Supports **offline** work without server connectivity
 - Of course, collaboration requires network connectivity
 - * Distributed trust/control/visibility/surveillance

Version control systems empower us to manage shared repositories, i.e., collections of documents with their histories, keeping track of who changed what, when, and why. Importantly, Git is a decentralized version control system, which enables us to work independently on own copies of our documents, even offline, and to synchronize our work with others as we wish and control.

GitLab

- Various companies offer to host Git repositories on the web
 - [GitLab](#) is one of them



Figure 7: “GitLab Logo” by GitLab under CC BY-NC-SA 4.0; from [gitlab.com](#)

- Free software, which you could run on your own server
- DevOps platform
 - * CI/CD (continuous integration, continuous deployment)
- Manage Git repositories
 - Web GUI for forks, commits, pull requests, issues, and much more
 - Notifications for lots of events

In my approach I use GitLab, a platform to manage Git repositories on the web, where lots of actions can be performed in the web browser.
If you do not know GitLab yet, there is lots to explore.

Git and We

- I believe that we should learn version control when we learn digital writing
 - This includes (digital) OER
- See [Ova19] for discussion in OER context with Git commands
 1. Notification of original author if content changed
 2. Showing how the content was changed
 3. Linking changed content to original
- OER self-study introduction to Git

I believe that we should learn version control when we learn digital writing. Thus, we need to teach it.

This slide contains a reference to an academic paper discussing Git in an OER context and a link to a self-study introduction that I use with my students. (As a side note, that Git introduction is an OER generated with emacs-reveal.)

Requirements for OER

(Licensing)

- Sample licenses **in line** with 5 Rs
 - **CC0**, public domain: Creator waives all rights
 - * Beware! Proper academic conduct requires attribution anyways
 - **CC BY** (Attribution): License and creator need to be credited
 - **CC BY-SA** (Attribution and ShareAlike): License and creator need to be credited and derived works must be distributed under “same” license terms
- Other licenses, **incompatible** with 5 Rs
 - Non Commercial: Does **not** grant right to **reuse**, e.g., on Wikipedia or at university
 - No Derivatives: Does **not** grant rights to **revise** and **remix**

The choice of an appropriate license is crucial for OER, but beyond the scope of this talk.

(ALMS Framework)

- Criteria for OER and software proposed in [Hil+10]
 - In brief, software and resources should be **freely** accessible

ALMS criterion	Examples	Counter examples
Access to editing tools	Free/Libre and Open Source Software (e.g., LaTeX, LibreOffice)	Powerpoint Google Docs
Level of expertise required to revise or remix	Not only for nOERds Challenging topic ...	
Meaningfully editable	LaTeX, Org mode (HTML)	(Scanned) PDF, flash, video
Source-file access	LaTeX, Org mode (HTML)	PDF for LaTeX PDF for office presentation

The paper by Hilton et al. (2010) mentioned earlier not only proposed the Rs of openness but also the ALMS framework to characterize the openness of OER. I suggest that you read it on your own. In a nutshell, not only OER but also production software and source material should be free and open.

More OER Requirements

- Extension of ALMS framework [Lec19b]
 - Requirements for “A”: Free/libre and open source software (FLOSS)
 - * Free software for learners and teachers, OER users and creators
 - * **Platform independent**
 - * Also **mobile** and **offline**
 - Requirements for “M” and “S”: **Single sourcing** [Roc01]
 - * **Single**, collaboratively maintained source, **no** copy&paste
 - * **Separation** of contents and layout
 - * Source files with **lightweight markup** for collaboration with comparison and integration with **version control systems** such as Git



Figure 8: “Git Logo” by Jason Long under CC BY 3.0; from git-scm.com

The paper cited here presents my interpretation of the ALMS framework (in German).

The A for **access** to editing tools is best characterized by free software, and it should be extended to include access to OER on any device, also mobile and offline.

I suggest to extend M and S of the ALMS framework by the concept of single sourcing from technical writing. With single sourcing, we collaboratively maintain documents without the need for copy&paste. Recall that copy&paste is bad as it creates isolated duplicates in silos. Besides, contents should be developed independently of layout concerns, for which so-called lightweight markup languages are a good technical starting point.

Briefly, lightweight markup languages are just text documents that pose no barriers to editing and that harness the full power of version control systems such as Git.

Emacs-reveal

- Free software to create OER presentations [Lec19a]
 - Howto of emacs-reveal (generated with emacs-reveal)
- Software on GitLab
 - Source code: <https://gitlab.com/oer/emacs-reveal/>
 - Docker images

Emacs-reveal is free software and an infrastructure to create OER presentations. Documentation and source code are available on GitLab.

Presentation Features

- HTML slideshows using reveal.js with audio explanations

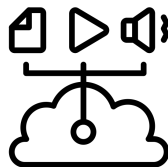


Figure 9: “Online Resources” by LUTFI GANI AL ACHMAD under CC BY 3.0 US; cropped from the Noun Project

- To be viewed with standard Web browsers (platform independent), either on- or offline
- Features include
 - * Animations and slide transitions; speaker’s view with preview, notes, and timer; embedding of images, audio, video, mathematical formulas; table of contents; bibliography; keyword index; hyperlinks within and between presentations; themes for different styling; responsive design with touch support; quizzes for retrieval practice; code highlighting and evaluation for programming languages
- Satisfies above requirements

HTML slideshows generated with emacs-reveal can be viewed in standard web browsers, and they include too many features to explain here. Notably, the requirements listed earlier are satisfied.

OER Presentations with Emacs-Reveal

- Presentations written in Org mode
 - Lightweight markup language coming with editor GNU Emacs
 - * Contents separated from layout
- Org mode converted to HTML with emacs-reveal via GitLab CI/CD

- With proper license attribution for images [Lec19c]



Figure 10: “licensing” by Ralf Schmitzer under CC BY 3.0 US; cropped from the Noun Project

- * Human-readable, e.g., images on this slide
- * Machine-readable with RDFa (in HTML source code)
- PDF variants as secondary formats

I write presentations in the lightweight markup language Org mode, which is native to the text editor GNU Emacs. Thus, the name emacs-reveal refers to Emacs as editor and reveal.js as presentation framework.

HTML presentations are generated from Org mode on a GitLab infrastructure.

Besides, this slide points to a paper describing the approach of emacs-reveal to handle license information of embedded images with machine-readable metadata.

Sample Markup

- Excerpt of Org mode source code for earlier slide:

```
** (OER: UNESCO Definition)
- *Open Educational Resources* (OER)
- OER are
“[[https://en.unesco.org/oer/paris-declaration][teaching, learning and research mater
{{{reveallicense("./figures/logos/Global_OER_Logo.svg.meta","30rh")}}}
- Usually, [[https://creativecommons.org/licenses][Creative Commons licensing]]
- Legal “standards” for *international/global* use
- Permit *5 Rs* of openness cite:Wil14,HWSJ10:
  /retain/, /reuse/, /revise/, /remix/, /redistribute/
- Briefly, such licenses offer *freedoms* that are restricted by
standard copyright law
```

- Note

- * Simple markup, e.g.:
 - ****** for 2nd-level heading; - with indentation for nested lists;
 - * and / for bold and italics
 - Citations to BibTeX bibliography with cite,
 - (Not shown here: animation of slide parts)
- * OER logo embedded with reveallicense
 - License metadata handled automatically

Sample OER Courses

- Presentations and courses with emacs-reveal: <https://oer.gitlab.io/>
- Take a look, contribute, join forces!

Separation of Contents and Layout

- Shown above: Contents specified in text files (Org mode)
 - Layout information separately in CSS files
- Consequences
 1. Content experts do not need to be layout experts
 2. Remixing independent of layout conventions (of, say, different collaborating institutions)

Include Mechanism

- Org provides an **include** mechanism
 - **Remixing** of smaller learning objects into larger units **without** copy&paste
 - E.g., a [Docker Introduction](#):

```
#+TITLE: Docker Introduction
#+DESCRIPTION: OER introduction to Docker and comparison of containerization with

#+INCLUDE: "programming/Docker.org"
#+INCLUDE: "programming/Docker-First-Steps.org" :minlevel 1
#+INCLUDE: "programming/Docker-Conclusions.org" :minlevel 1

#+INCLUDE: "~/emacs.d/oer-reveal-org/backmatter.org"
```
- Thus, updates and improvements do not exist in isolated silos but in shared repository
 - Single sourcing [Roc01]

Use of SPDX Headers

- Emacs-reveal adopts licensing recommendations of [REUSE](#) project
- Each source file contains so-called SPDX headers, e.g., [Docker.org](#) from previous slide:

```
#+SPDX-FileCopyrightText: 2018-2021 Jens Lechtenbörger <https://lechten.gitlab.io/#me>
#+SPDX-License-Identifier: CC-BY-SA-4.0
```

 - License information of remixed OER generated automatically
 - * With [backmatter.org](#) from previous slide
 - * Human and machine readable (with RDFa, based on extension of CC REL [Abe+12])

Conclusions

Reality Check Revisited

- Open Educational Resources (OER), characterized by 5 Rs of openness (4 Rs in [Hil+10])
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Figure 11: “Conflict” by priyanka under CC BY 3.0 US; cropped from the Noun Project

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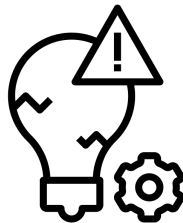


Figure 12: “mistake” by Kamin Ginkaew under CC BY 3.0 US; cropped from the Noun Project

- * Layout likely to be **destroyed** in LibreOffice and OnlyOffice
- * Even if you used Powerpoint, positioning of elements in your organization’s style likely to be **incorrect**
- Now, you **revise** the contents in a **silos**

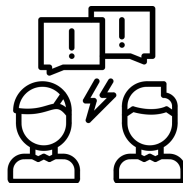


Figure 13: “Conflict” by lastspark under CC BY 3.0 US; cropped from the Noun Project

- * (E.g., fix typos, update contents based on more recent research)
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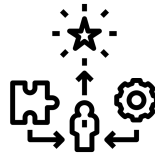


Figure 14: “experience” by Nithinan Tatah under CC BY 3.0 US; cropped from the Noun Project

- * Maintain **layout** separately from **contents**
 - Each organization with own layout
- Maybe, you obtain a Powerpoint source file

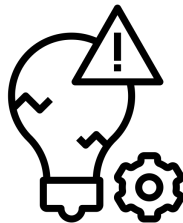


Figure 15: “mistake” by Kamin Ginkaew under CC BY 3.0 US; cropped from the Noun Project

- * Layout likely to be **destroyed** in LibreOffice and OnlyOffice
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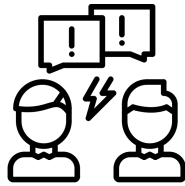


Figure 16: “Conflict” by lastspark under CC BY 3.0 US; cropped from the Noun Project

- * (E.g., fix typos, update contents based on more recent research)
- * Do you **notify** the author? Do you **collaborate**? How?
- * How and where do you **redistribute**?

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Figure 17: “experience” by Nithinan Tатаh under CC BY 3.0 US; cropped from the Noun Project

- * Maintain **layout** separately from **contents**
 - Each organization with own layout
- ~~Maybe, you obtain a Powerpoint source file~~



Figure 18: “infrastructure” by Nithinan Tатаh under CC BY 3.0 US; cropped from the Noun Project

- * Exchange **lightweight markup**, editable with any software, rendered into HTML

- * For **platform-independent** consumption, including offline and mobile
- Now, you **revise** the contents in a **silo**

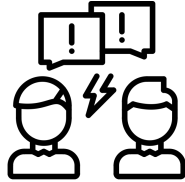


Figure 19: “Conflict” by lastspark under CC BY 3.0 US; cropped from the Noun Project

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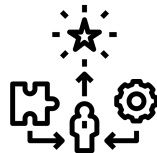


Figure 20: “experience” by Nithinan Tatab under CC BY 3.0 US; cropped from the Noun Project

- * Maintain **layout** separately from **contents**
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- ~~Maybe, you obtain a Powerpoint source file~~



Figure 21: “infrastructure” by Nithinan Tatab under CC BY 3.0 US; cropped from the Noun Project

- * Exchange **lightweight markup**, editable with any software, rendered into HTML
 - * For **platform-independent** consumption, including offline and mobile
- ~~Now, you **revise** the contents in a **silo**~~



Figure 22: “Society” by Nithinan Tatah under CC BY 3.0 US; cropped from the Noun Project

- * Now, we **collaborate** with version control

Contact information

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