



# The Re-use and Adaptation of Open Educational Resources (OER)

*An Exploration of Technologies Available*

Prepared for the Commonwealth of Learning  
By Ishan Sudeera Abeywardena

May 2012

A REPORT ON:

## **The Re-use and Adaptation of Open Educational Resources (OER)**

### **An Exploration of Technologies Available**

May 2012

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## **1. Executive Summary**

Open Educational Resources (OER) are a relatively new phenomenon which is fast gaining academic credibility as well as the attention of policy makers on a global scale. With increased funding by governmental and non-governmental organisations paired with generous philanthropy, the volume of rich OER available freely to the masses has grown exponentially. As with any new academic movement, the initial challenge for the OER movement was to spread this new philosophy into mainstream academia whereby the use of OER in teaching and learning becomes accepted practice. With strong advocacy by Open Distance Learning (ODL) institutions buttressed by organisations such as the Commonwealth of Learning (COL) and UNESCO, OER is currently achieving this objective and is rapidly gaining acceptance as a credible source of knowledge in many an academic community.

The whole philosophy of OER rests on a foundation consisting of two fundamental concepts which are (i) free and open access to knowledge; and (ii) the ability to freely adapt and re-use existing pieces of knowledge. Even though the OER movement has been quite successful in firmly planting the first concept in the academic community, the second concept of re-use and adaptation is still to take flight on a larger scale. Although there are many inhibitors to the wider adoption of the re-use concept of OER, one of the major inhibitors is the current lack in capacities among the various stakeholders to effectively utilise existing technologies to adapt and re-use OER. This in turn has created a community of passive OER consumers who are not contributing to the expansion of the movement.

The objectives of this report are to (i) explore the current technology landscape with respect to both proprietary as well as Free and Open-source Software (FOSS) technologies; (ii) identify techniques, actual and in development, for re-use of OER materials; and (iii) discuss the implementation in the context of a typical ODL agency.

This peer-reviewed report is a detailed catalogue of technologies available to teachers as well as learners for the re-use of OER material in the forms of text, HTML, audio, video and data. It also compares the technologies based on access, openness, usability and availability. The report will serve as a resource for teachers and learners for re-using OER material.

## 2. Re-use and Adaptation of OER

### 2.1 What are Open Educational Resources (OER)?<sup>1</sup>

The concept of Open Educational Resources (OER) describes any educational resources (including curriculum maps, course materials, textbooks, streaming videos, multimedia applications, podcasts, and any other materials that have been designed for use in teaching and learning) that are openly available for use by educators and students, without an accompanying need to pay royalties or licence fees. See *Basic Guide to OER*, for more information on OER –

<http://www.oerafrica.org/ResourceResults/tabid/1562/mctl/Details/id/39016/Default.aspx>.

The content in this section drew on the following resources:

- Wikipedia: *Copyright*. <http://en.wikipedia.org/wiki/Copyright>
- Julien Hofman (2009) *Introducing Copyright: A plain language guide to copyright in the 21st century. Commonwealth of Learning (COL)*.  
<http://www.col.org/resources/publications/Pages/detail.aspx?PID=312>
- WIPO: *Berne Convention for the Protection of Literary and Artistic Works* (1886).  
<http://www.wipo.int/treaties/en/ip/berne/index.html>
- WIPO: *Limitations and Exceptions*.  
<http://www.wipo.int/copyright/en/limitations/index.html>
- The African Copyright and Access to Knowledge Project. <http://www.aca2k.org/>
- Open.Michigan: *License your Work*. <http://open.umich.edu/share/license>
- University of the Witwatersrand: *Copyright Guidelines for Staff & Students of the University of the Witwatersrand, Johannesburg (WITS)*.  
<http://libguides.wits.ac.za/content.php?pid=227586&sid=1883163>
- UNESCO/COL: *A Basic Guide to Open Educational Resources*.  
<http://www.oerafrica.org/ResourceResults/tabid/1562/mctl/Details/id/39016/Default.aspx>

### 2.2 Desirability of OER for Re-use<sup>2</sup>

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<sup>1</sup> “What are Open Educational Resources (OER)?” is an adaptation of “What are Open Educational Resources (OER)?” (OER COPYRIGHT AND LICENSING TOOLKIT [http://www.saide.org.za/resources/newsletters/Vol\\_18\\_no.2\\_2012/Content/Toolkits.htm](http://www.saide.org.za/resources/newsletters/Vol_18_no.2_2012/Content/Toolkits.htm)) © 2012 by South African Institute for Distance Education, used under a Creative Commons Attribution license: [Creative Commons Attribution 3.0 License \(CC BY 3.0\)](https://creativecommons.org/licenses/by/3.0/)

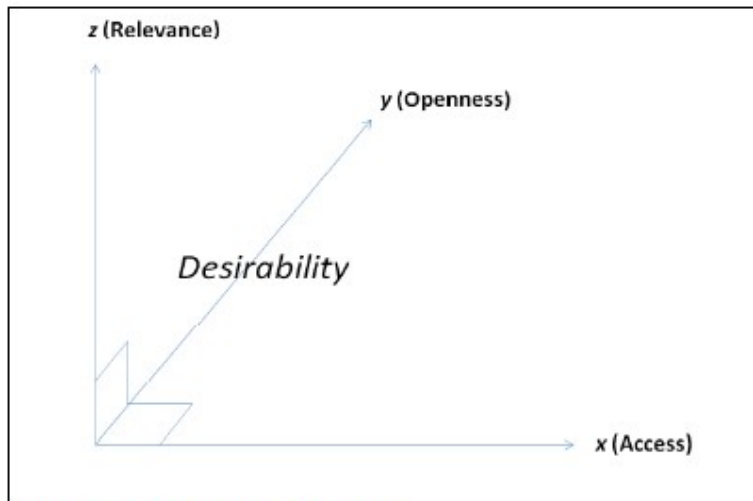
When considering the use and reuse of an OER, there are other aspects of a resource that are fundamental to the usefulness of that particular resource and can be parametrically identified by a software-based mechanism. The first aspect is whether a resource is relevant to a user's needs. This can be assessed by the search ranking of a resource when searched for with a search mechanism. The search mechanism will compare the title, description, keywords, and sometimes the content of the material to find the best match for the search query. The second aspect is whether the resource is open enough for using, reusing, remixing and redistributing. This becomes important depending on what the user wants to accomplish with the resource. The third aspect is the accessibility of the resource with respect to technology. If the user cannot easily use, reuse and remix a resource with available technology, the resource becomes less useful. Therefore, the usefulness of an OER with respect to (i) the level of openness, (ii) the level of access, and (iii) the relevance can be defined as the desirability of an OER, indicating how desirable it is for use and reuse for one's needs. Within the requirement of being able to use and reuse a particular OER, these three parameters can be defined as follows:

1. *level of openness*, the permission to use and reuse the resource;
2. *level of access*, the technical keys required to unlock the resource; and
3. *relevance*, the level of match between the resource and the needs of the user.

As each of these mutually exclusive parameters are directly proportionate to the desirability of an OER, the desirability can be expressed as a three-dimensional measure as shown in Figure 1.

---

<sup>2</sup> "Desirability of OER for Re-use" is an adaptation of "Conceptual Framework for Parametrically Measuring the Desirability of Open Educational Resources using D-Index" (<http://www.irrod.org/index.php/irrod/article/view/1177/2142>) © 2012 by Ishan Sudeera Abeywardena, Choy Yoong Tham and S. Raviraja used under a Creative Commons Attribution license: [Creative Commons Attribution 3.0 License \(CC BY 3.0\)](#)



**Figure 1** Desirability of an OER

### The Scales

In order to parametrically calculate the desirability of an OER, each of the parameters discussed above needs to be given a numeric value based on a set scale. These scales can be defined in the following ways.

The level of openness can be defined using the four Rs of openness (Hilton, Wiley, Stein, & Johnson, 2010) as shown in Table 1. The four Rs stand for *reuse*, the ability to use all or part of a work for one’s own purposes; *redistribute*, the ability to share one’s work with others; *revise*, the ability to adapt, modify, translate, or change the form of a work; and *remix*, the ability to combine resources to make new resources. The values 1 to 4 were assigned to the four Rs where 1 corresponds to the *lowest level of openness* and 4 corresponds to the *highest level*.

Permission	Value
Reuse	1
Redistribute	2
Revise	3
Remix	4

**Table 1** The Level of Openness Based on the 4R’s of Openness

The level of access can be defined on a scale of 1 to 16 using the ALMS analysis (Hilton, Wiley, Stein, & Johnson, 2010), which identifies the technical requirements

for localisation of an OER with respect to access to editing tools, level of expertise required to revise or remix, ability to meaningfully edit and source-file access. As shown in Table 2, the value 1 corresponds to the *lowest accessibility* and value 16 to the *highest accessibility*.

<b>Access</b> (Access to editing tools   Level of expertise required to revise or remix   Meaningfully editable   Source-file access)	<b>Value</b>
Low   High   No   No	1
Low   High   No   Yes	2
Low   High   Yes   No	3
Low   High   Yes   Yes	4
Low   Low   No   No	5
Low   Low   No   Yes	6
Low   Low   Yes   No	7
Low   Low   Yes   Yes	8
High   High   No   No	9
High   High   No   Yes	10
High   High   Yes   No	11
High   High   Yes   Yes	12
High   Low   No   No	13
High   Low   No   Yes	14
High   Low   Yes   No	15
High   Low   Yes   Yes	16

**Table 2** The Level of Access Based on the ALMS Analysis

The relevance of a resource to a particular search query can be measured using the rank of the search results. According to Vaughan (2004) users will only consider the top ten ranked results for a particular search as the most relevant. Vaughan further suggests that users will ignore the results below the top 30. Based on this premise, the scale for the relevance was defined as shown in Table 3, where the value 1 is the *least relevant* and value 4 is the *most relevant*.

Search rank	Value
Below the top 30 ranks of the search results	1
Within the top 21-30 ranks of the search results	2
Within the top 11-20 ranks of the search results	3
Within the top 10 ranks of the search results	4

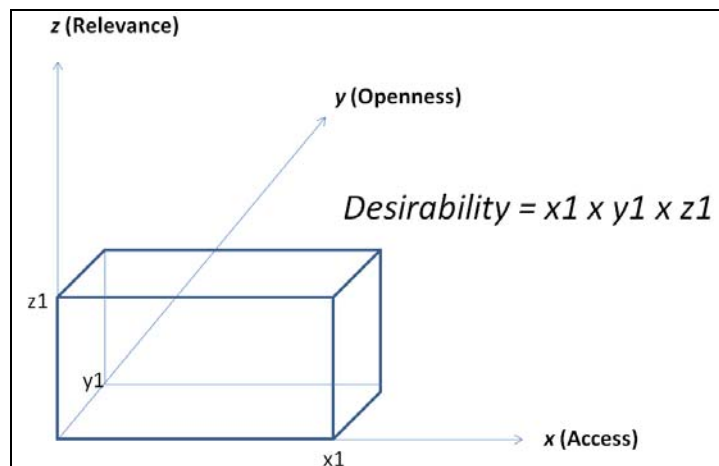
**Table 3** The Level of Relevance Based on Search Rank

### Calculation

Based on the scales, the desirability of an OER can then be defined as the volume of the cuboid, as shown in Figure 2, calculated using the following formula.

$$\text{Desirability} = \text{level of access} \times \text{level of openness} \times \text{relevance}$$

As a result, the desirability becomes directly proportionate to the volume of the cuboid.



**Fig 2** Calculation of desirability

By normalising the values indicated in Table 1, Table 2, and Table 3 to make the scales uniform for the calculation, the D-index of an OER can be calculated using the following formula.

$$\text{D-index} = (\text{level of access} \times \text{level of openness} \times \text{relevance}) / 256$$

Based on the above calculation, a resource becomes more desirable as the D-index increases on a scale of 0 to 1, where 0 is the *least desirable* and 1 is the *most desirable*.

When applying the D-index to an OER repository, the level of access, discussed in Table 2, needs to be implemented using the file formats of the OER, where their features are mapped against the ALMS. The level of openness, based on the four Rs discussed in Table 1, needs to be measured using the copyright licensing scheme under which the resource was released. The de facto scheme used in most repositories is the Creative Commons (CC) (see section 3) licensing scheme, which has six derivations based on the level of openness. However, other specific licensing schemes such as the GNU Free Documentation License<sup>3</sup> can also be used for this purpose as long as they can be categorised into the four levels of openness constituting the desirability. Table 4 maps the six CC licenses to the four Rs of openness. However, it should be noted that the level of openness of the CC licenses starts at the redistribute level.

Permission	Creative Commons (CC) licence	Value
Reuse	None	1
Redistribute	Attribution-NonCommercial-NoDerivs ( <b>CC BY-NC-ND</b> ) Attribution-NoDerivs ( <b>CC BY-ND</b> )	2
Revise	Attribution-NonCommercial-ShareAlike ( <b>CC BY-NC-SA</b> ) Attribution-ShareAlike ( <b>CC BY-SA</b> )	3
Remix	Attribution-NonCommercial ( <b>CC BY-NC</b> ) Attribution ( <b>CC BY</b> )	4

**Table 4** Mapping the CC licenses to the 4 R s

### 2.3 Categorisation of Software Available for Re-use of OER<sup>4</sup>

When considering software, many of us are aware that there are (i) free of charge software which can be downloaded over the internet; and (ii) proprietary software which need to be purchased. However, the confusion starts when we come across software marked as open source being sold and others which are marked as proprietary being made available free of charge. So what is free and what is not?

By definition proprietary software are solely owned by an individual, a group of developers or an organisation. This means that the developing body holds the intellectual property (IP) rights for the idea behind the software application, the

<sup>3</sup> <http://www.gnu.org/copyleft/fdl.html>

<sup>4</sup> "Categorisation of Software Available for Re-use of OER" is an adaptation of "Proprietary, Free and Open Source Software: How are they different?" (<http://cnx.org/content/m43536/latest/>) © 2012 by Ishan Abeywardena, used under a Creative Commons Attribution license: [Creative Commons Attribution License \(CC-BY 3.0\)](https://creativecommons.org/licenses/by/3.0/)

source-code, the algorithms used as well as any graphical user interface (GUI) designs. These software are usually sold as products under specific licensing schemes but maybe provided free of charge as trial or evaluation versions which have limited features. Even though these might be mistaken to be free software, they are only “free to use” software which cannot be copied, shared, repurposed, improved or sold without the permission of the IP owners.

Before discussing free software, Open Source Software (OSS) and Free and Open Source Software (FOSS), the term “free” needs to be clarified. In the context of these three types of software, the term “free” doesn’t necessarily mean that the software application is provided free of charge (FOC) but rather that the user has the “freedom” to modify and/or improve the source code.

There are only very subtle differences between free software, OSS and FOSS. Free software are usually software applications developed by a single body such as organisations, universities, research groups etc. which are released along with the source code. OSS are mostly public collaborative development projects which involve a large number of developers voluntarily contributing to a single project. These projects make the complete source code freely available. FOSS are the larger umbrella which covers both free software as well as OSS. Under FOSS the users have the right to copy, share, repurpose, improve or even sell the software application provided that it is released under the same original guidelines.

This report discusses some of the widely used FOSS and proprietary applications available for repurposing (i) text based resources; (ii) image resources; (iii) audio resources; (iv) video resources; (v) data resources; and (vi) slideshows.

More details:



Free software

- [http://en.wikipedia.org/wiki/Free\\_software](http://en.wikipedia.org/wiki/Free_software)
- <http://www.gnu.org/philosophy/free-sw.html>



Open Source Software

- [http://en.wikipedia.org/wiki/Open\\_source\\_software](http://en.wikipedia.org/wiki/Open_source_software)
- <http://opensource.org/>



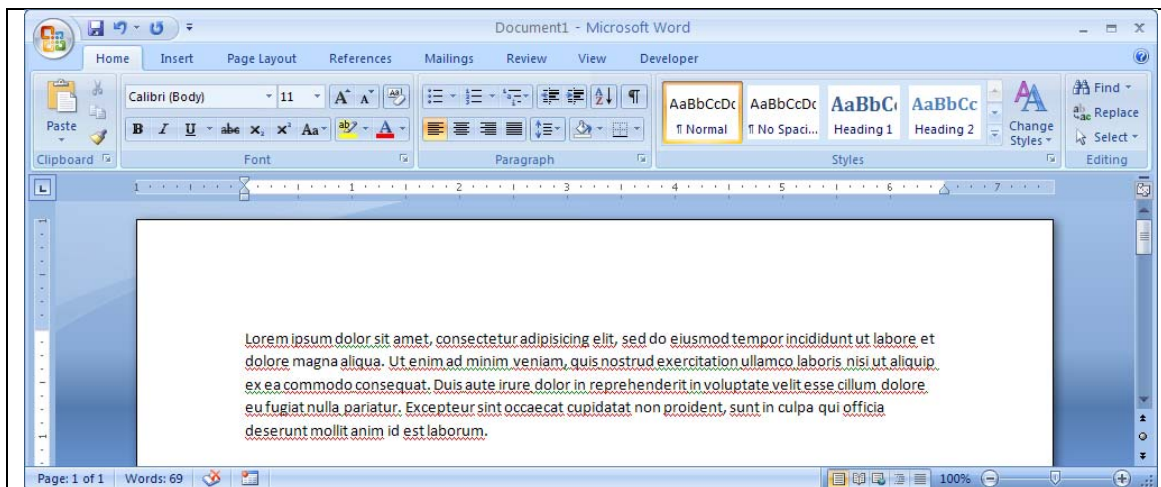
Free and Open Source Software

- [http://en.wikipedia.org/wiki/Free\\_and\\_open\\_source\\_software](http://en.wikipedia.org/wiki/Free_and_open_source_software)
- <http://foss.org.my/>

### 2.3.1 Text based resources

#### (a) Microsoft Office Word

Microsoft Office Word (MS Word) is by far the most commonly used software application for creating and repurposing text based content. It is part of the MS Office suite of applications. Although MS Word is accessible to most of us by virtue of our institutions and organisations purchasing the necessary licences needed to use MS Word legally, this software application is a proprietary application of the Microsoft Corporation and is very dear to purchase. MS Office is primarily meant for the Microsoft Windows operating system. However due to the popularity of the application and compatibility issues, a MacOS based version is also available for purchase. Being one of the more powerful word processors in the market, MS Word supports easy formatting, object inclusion, type conversion, a large library of fonts, bibliographic entries as well as programmable macros which allow various aspects of the editing to be automated. The newer versions of MS Word support the Office Open XML format (.docx) which is a document format based on completely open standards promoting interoperability, i.e. a .docx document can be created, opened, used and saved using other word processors such as OpenOffice Writer (see section 2.3.1(b)).



**Figure 3** Microsoft Word 2007 Interface

 More details on MS Word can be found at [http://en.wikipedia.org/wiki/Microsoft\\_Word](http://en.wikipedia.org/wiki/Microsoft_Word)

(b) OpenOffice Writer

OpenOffice Writer is the free software ([GNU Lesser General Public Licence](#)) counterpart of word processors such as MS Word (see section 2.3.1(a)). Released as part of the OpenOffice suite of applications which are open source, this word processor encapsulates almost all of the features available in the more proprietary versions. Being cross-platform, the OpenOffice Writer primarily supports the .odt file extension but is capable of supporting open document formats such as the Microsoft .docx. One of the major highlights of this particular word processor is its ability to export documents in .pdf format without a third party converter. OpenOffice Writer features worth noting are the page-layout methods including frames, columns and tables; embedding or linking of graphics, spreadsheets and other objects; built-in drawing tools; master documents (to group a collection of documents into a single document); and the equation editor.

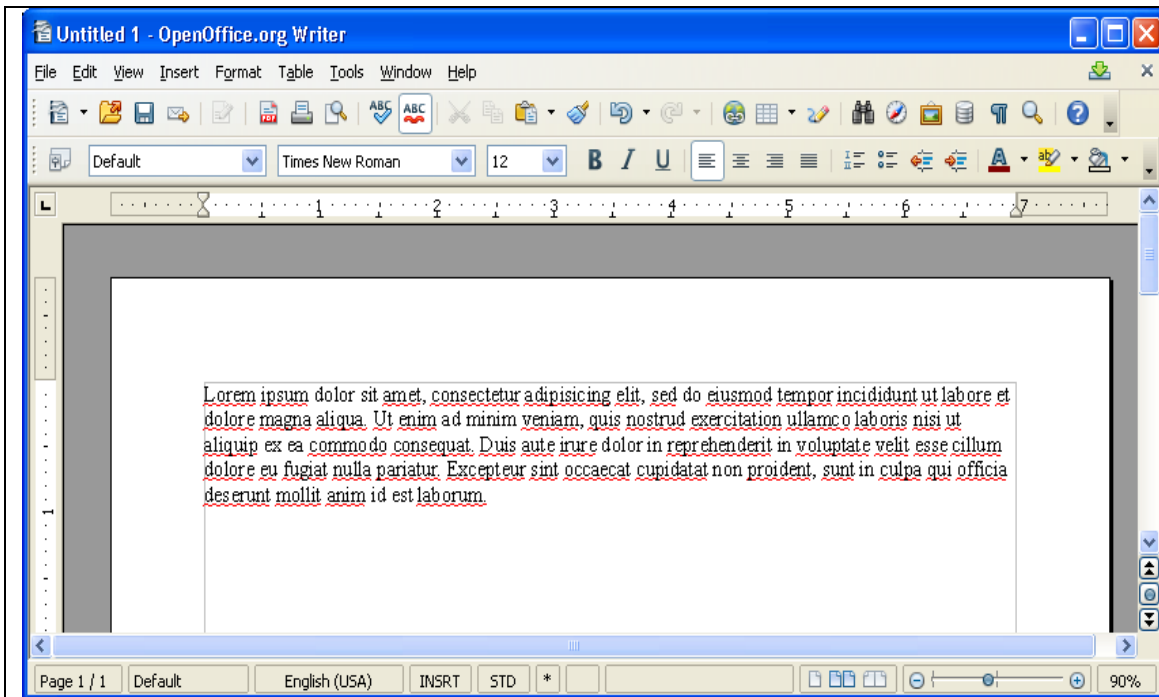


Figure 4 OpenOffice Writer Interface



More details on OpenOffice Writer can be found at <http://www.openoffice.org/product/writer.html>

### (c) LaTeX

LaTeX is a high quality typesetting system available as [free software \(LaTeX project public license \(LPPL\)\)](#). LaTeX is not a word processor but a high level implementation of the low level typesetting system TeX<sup>5</sup> which allows for precision formatting and typesetting of documents. The fundamental principle behind LaTeX is to allow the user to concentrate on the actual content rather than the formatting. Due to the precision of the formatting, LaTeX is the *de facto* standard for formatting scientific and mathematical documents which include graphs, charts, vector graphics and formulae. There are many editors which implement LaTeX. Many of these editors are available as free software. One of the major advantages of using LaTeX is that the content can be output in various formats such as HTML or PDF depending on the requirement.

```
\documentclass[12pt]{article}
\usepackage{amsmath}
\title{\LaTeX}
\date{}
\begin{document}
\maketitle
\LaTeX{} is a document preparation system for the \TeX{}
typesetting program. It offers programmable desktop publishing
features and extensive facilities for automating most aspects of
typesetting and desktop publishing, including numbering and
cross-referencing, tables and figures, page layout, bibliographies,
and much more. \LaTeX{} was originally written in 1984 by Leslie
Lamport and has become the dominant method for using \TeX; few
people write in plain \TeX{} anymore. The current version is
\LaTeXe.

% This is a comment; it will not be shown in the final output.
% The following shows a little of the typesetting power of LaTeX:
\begin{align}
E &= mc^2 \\
m &= \frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}
\end{align}
\end{document}
```

$\LaTeX$

$\LaTeX$  is a document preparation system for the  $\TeX$  typesetting program. It offers programmable desktop publishing features and extensive facilities for automating most aspects of typesetting and desktop publishing, including numbering and cross-referencing, tables and figures, page layout, bibliographies, and much more.  $\LaTeX$  was originally written in 1984 by Leslie Lamport and has become the dominant method for using  $\TeX$ ; few people write in plain  $\TeX$  anymore. The current version is  $\LaTeX_e$ .

$$E = mc^2 \tag{1}$$
$$m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}} \tag{2}$$

Figure 5 The LaTeX input and corresponding output<sup>6</sup>



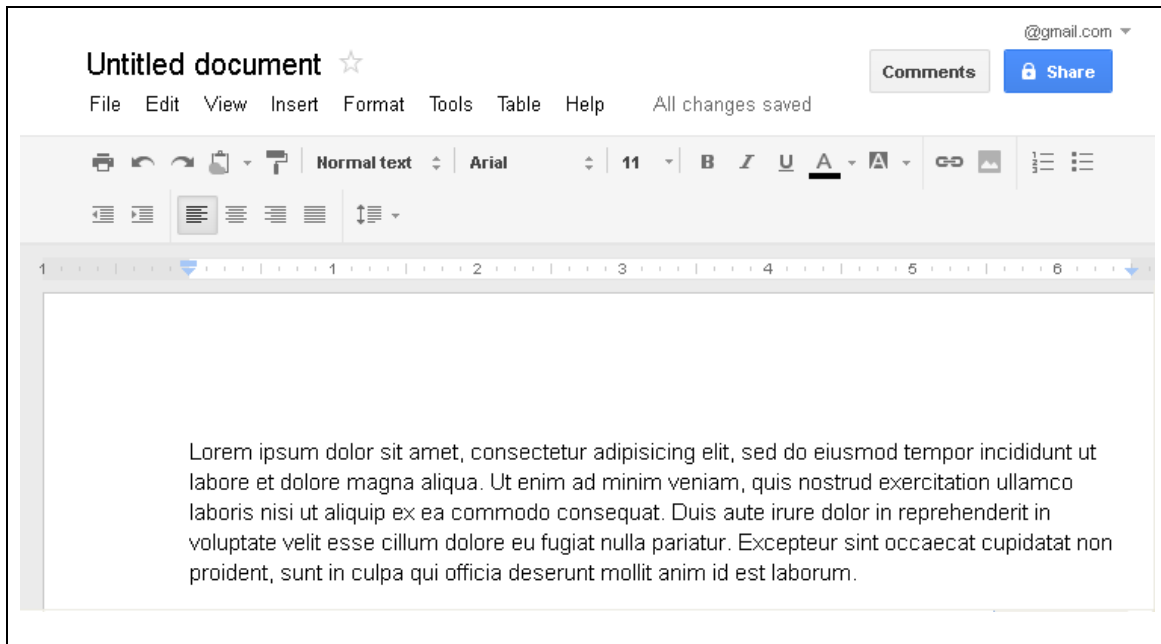
More details on LaTeX can be found at <http://www.latex-project.org/intro.html>

<sup>5</sup> <http://www.tug.org/>


<sup>6</sup> jacobolus. (2006). SVG version of LaTeX output, from the source file at the LaTeX article. Retrieved from [http://commons.wikimedia.org/wiki/File:LaTeX\\_Output.svg](http://commons.wikimedia.org/wiki/File:LaTeX_Output.svg) on 2 April 2012.

#### (d) Google Docs

Google Docs is a free to use web based word processor which encapsulates many of the features found in standalone word processors such as Microsoft Word and OpenOffice Writer. The only pre-requisite for using Google Docs is that the user must have a Google account. Google Docs can be used to edit text based documents of various formats such as .docx, .odt, .html and .txt. Each Google Docs account will receive 1GB of free online storage space where documents can be stored. One of the key features of Google Docs is its ability to facilitate collaborative content development. Users can share documents with other users so that the document can be edited collaboratively by a group of users. The end product can be easily made available to everyone using a hyperlink or by making it discoverable via Google search. The Google Docs suite further supports spreadsheets, presentations, drawings and forms as well.



**Figure 6** Google Docs Online Interface

 More details on Google Docs can be found at <http://docs.google.com> and [http://en.wikipedia.org/wiki/Google\\_Docs](http://en.wikipedia.org/wiki/Google_Docs)

(e) PDFedit

PDFedit is a free open source software ([GNU GPL version 2](http://www.pdfedit.cz/en/index.html)) which provides an editor and a library for manipulating PDF documents. The PDF library is multiplatform which allows it to work on Unix-like and Windows based operating systems. There are separate editors for the Unix based operating systems and the Windows based operating systems. PDFedit is a low-level tool for technical users that provides access to the internal structure of the PDF file. It may require familiarity with PDF specifications to be able to make substantial modifications.

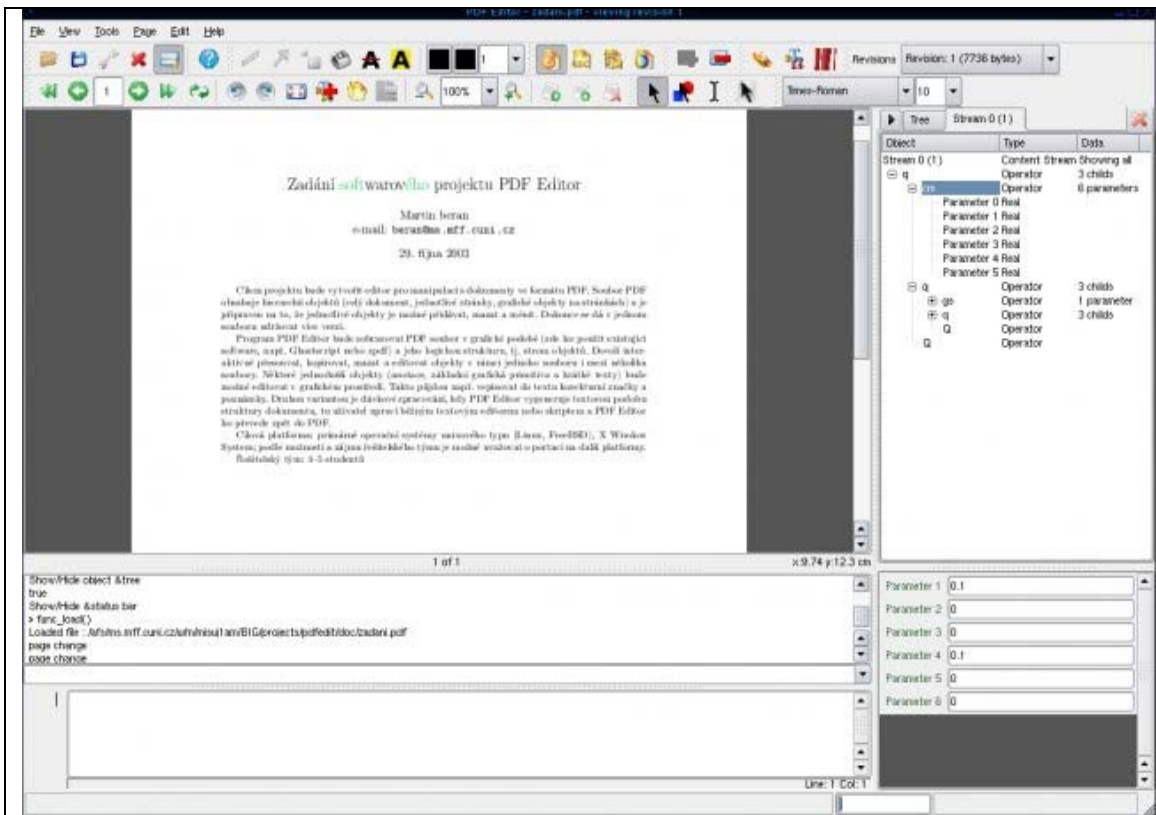


Figure 7 PDFedit Interface



More details on PDFedit can be found at <http://pdfedit.cz/en/index.html>

(f) PDFescape

PDFescape is a free to use service which allows the creation and editing of PDF documents on a completely online platform. Users can create a PDF document from scratch or upload an existing document to be edited. The rich online interface allows users to add text, shapes, whiteout; move, delete insert pages; create links to other PDF pages or web content; change PDF information tags; encrypt PDF contents using a password; and add images to PDF files. Users can use the service without registering and download the end product. However, registration is required if the user wishes to save the project and return to it at a later stage. The registration is free.



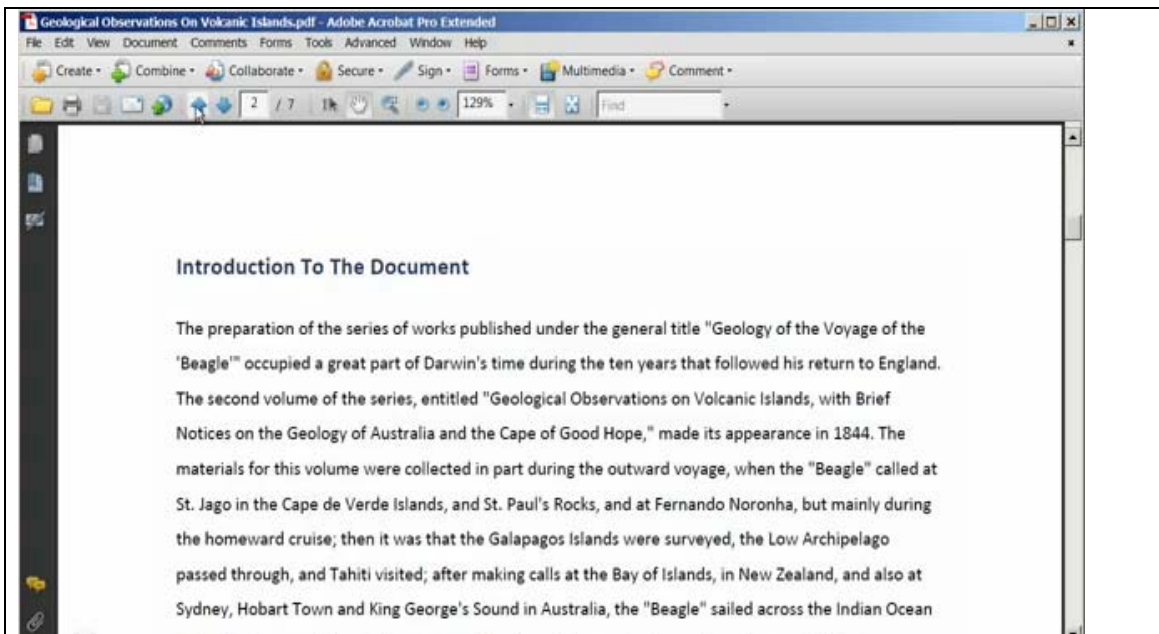
Figure 8 PDFescape Online Interface



More details on PDFescape can be found at <http://www.pdfescape.com/>

(g) Adobe Acrobat Professional

Adobe Acrobat Professional (Pro) is the feature rich version of the Adobe Acrobat Reader<sup>7</sup> which is used for reading .pdf documents and is free to use. Acrobat Pro however is a proprietary software application which comes with a licensing scheme for legal use. Due to the high licensing cost of this software application, not many individual users have access to the array of features such as convert or scan to PDF, export and edit PDF files, combine files from multiple applications, streamline online document reviews, collect data with fillable PDF forms, protect PDF files and documents, comply with PDF and accessibility standards; and reach, search, and share PDF files.



**Figure 9** Adobe Acrobat Professional Interface<sup>8</sup>



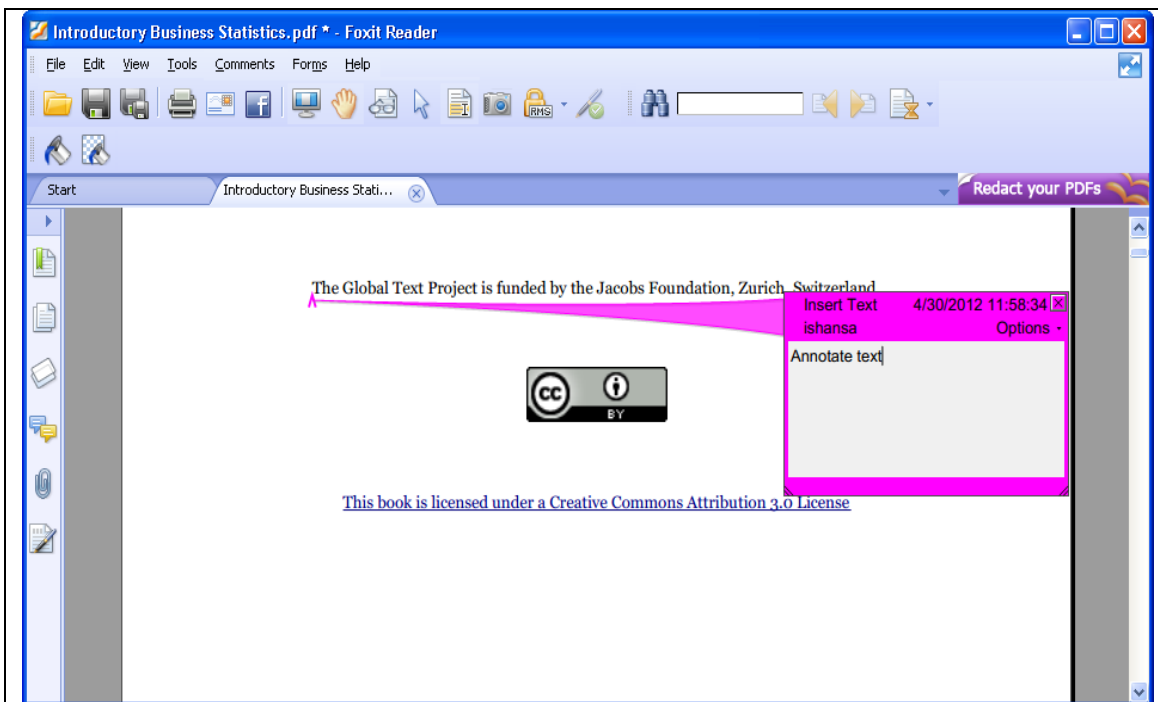
More details on Adobe Acrobat Professional can be found at <http://www.adobe.com/products/acrobatpro.html>

<sup>7</sup> <http://www.adobe.com/products/reader.html>

<sup>8</sup> titantechtraining. (2010). Editing PDF Document Pages in Adobe Acrobat 9. Retrieved from [http://www.youtube.com/watch?v=uxl5Qo27s\\_8&feature=related](http://www.youtube.com/watch?v=uxl5Qo27s_8&feature=related) on 30 April 2012.

(h) Foxit Reader

Foxit Reader is a proprietary but free to use software application which allows the viewing and annotating of .pdf documents. Supported only on the Microsoft Windows operating system, the software application is a light weight self-contained one which provides fast and smooth access to .pdf documents. Apart from allowing users to keep notes directly on the .pdf document using the annotate feature, the free to use version also allows the insertion of text and images directly into the document. It also allows for filling in of forms distributed in .pdf format. The Foxit suite also includes more advanced PDF readers/editors which allow full-scale creation and editing of .pdf documents. However, these advanced applications come with a licensing cost for legal use.



**Figure 10** Foxit Reader Interface

 More details on Foxit Reader can be found at [http://www.foxitsoftware.com/Secure\\_PDF\\_Reader/](http://www.foxitsoftware.com/Secure_PDF_Reader/)

(i) Adobe Dreamweaver

Adobe Dreamweaver is considered to be the de facto web design tool used in industry. In addition to being a smart HTML, XHTML, XML, Java Script, CSS and PHP editor which allows the designing of a website using lines of code, the powerful *what you see is what you get* (WYSIWYG) interface allows for graphical creation of webpages rich with multimedia such as graphics, animations and embedded audio/video. It further enables the designers to manage complete web based projects from a single interface and conduct testing directly via the application. Being a proprietary software application, a licence needs to be purchased for legal use. However, a trial version can be downloaded for limited use by teachers, students and researchers.

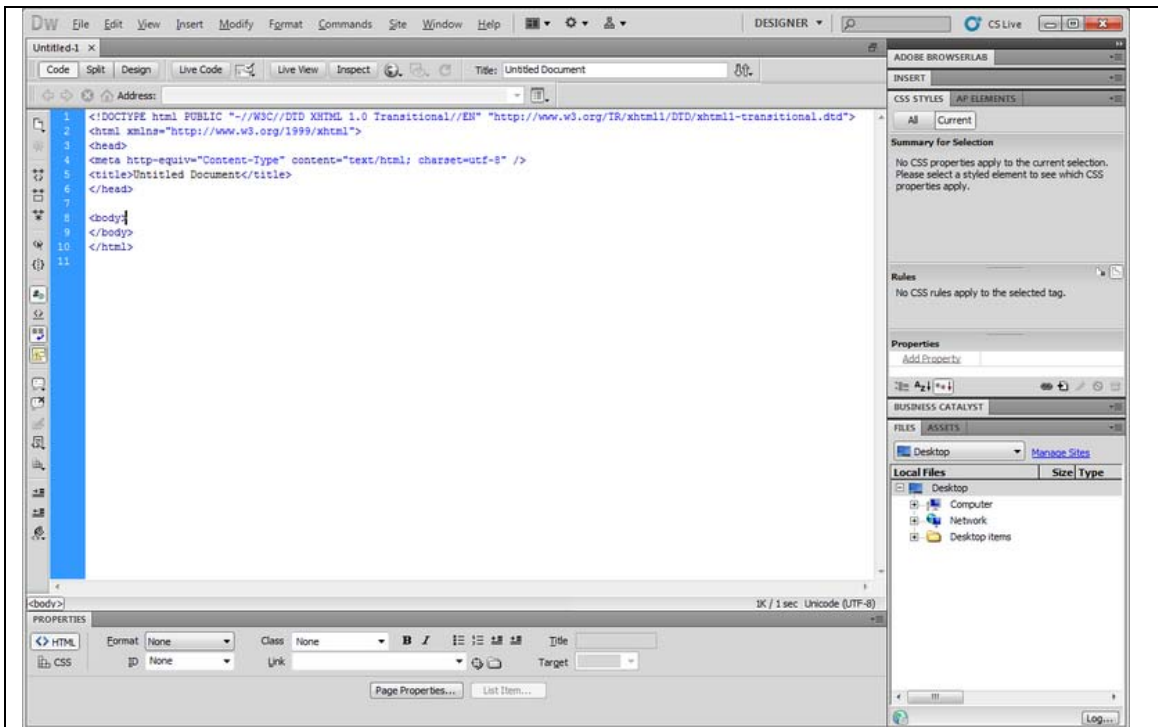


Figure 11 Adobe Dreamweaver Interface<sup>9</sup>



More details on Adobe Dreamweaver can be found at <http://www.adobe.com/products/dreamweaver.html>

<sup>9</sup> DuffDudeX1. (2010). Screenshot of Adobe Dreamweaver CS5. Retrieved from [http://en.wikipedia.org/wiki/File:Dreamweaver\\_CS5\\_screenshot.png](http://en.wikipedia.org/wiki/File:Dreamweaver_CS5_screenshot.png) on 30 April 2012.

(j) Coffee Cup HTML Editor

The Coffee Cup HTML editor is another proprietary HTML editor tool which allows the creation of HTML based content. However, this powerful tool only allows the editing of web content through lines of code whereas the Adobe Dreamweaver software application (see section 2.3.1(i)) supports both code driven as well as *what you see is what you get* (WYSIWYG) content creation. The Visual Site Designer version of this editor is a separate software application which allows WYSIWYG content creation. Being a proprietary software application, a licence needs to be purchased for legal use. However, trial versions of the software applications can be downloaded from the website for non-commercial use.

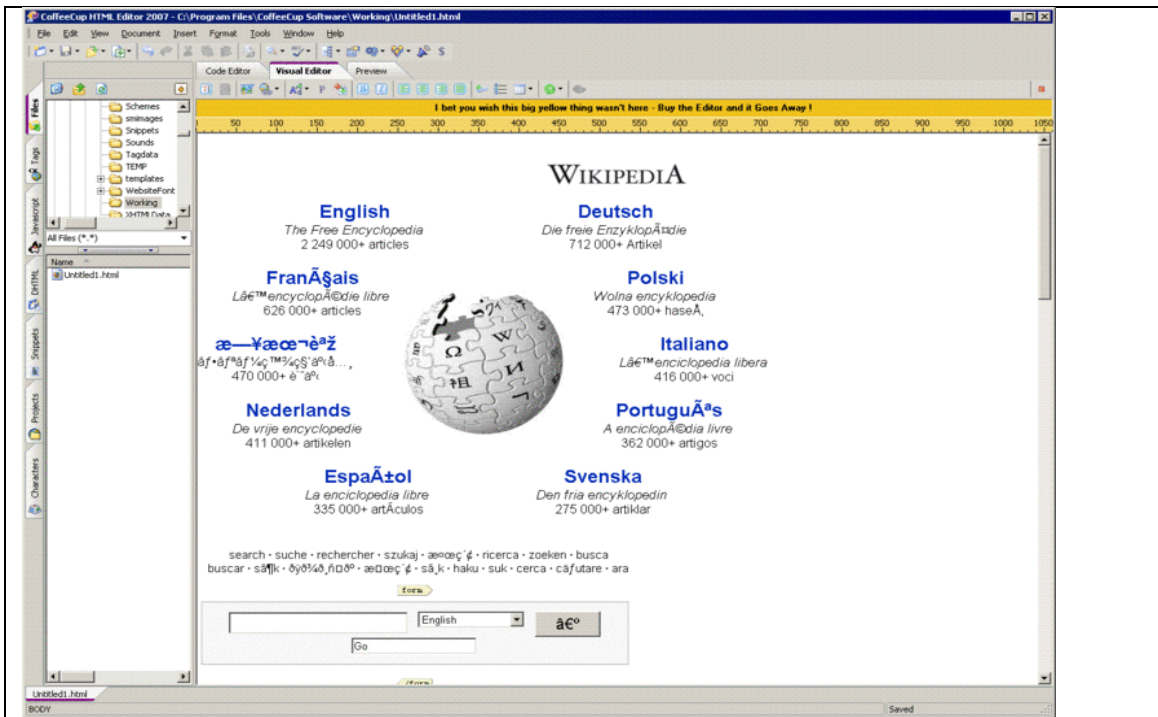


Figure 12 Coffee Cup HTML Editor Interface<sup>10</sup>



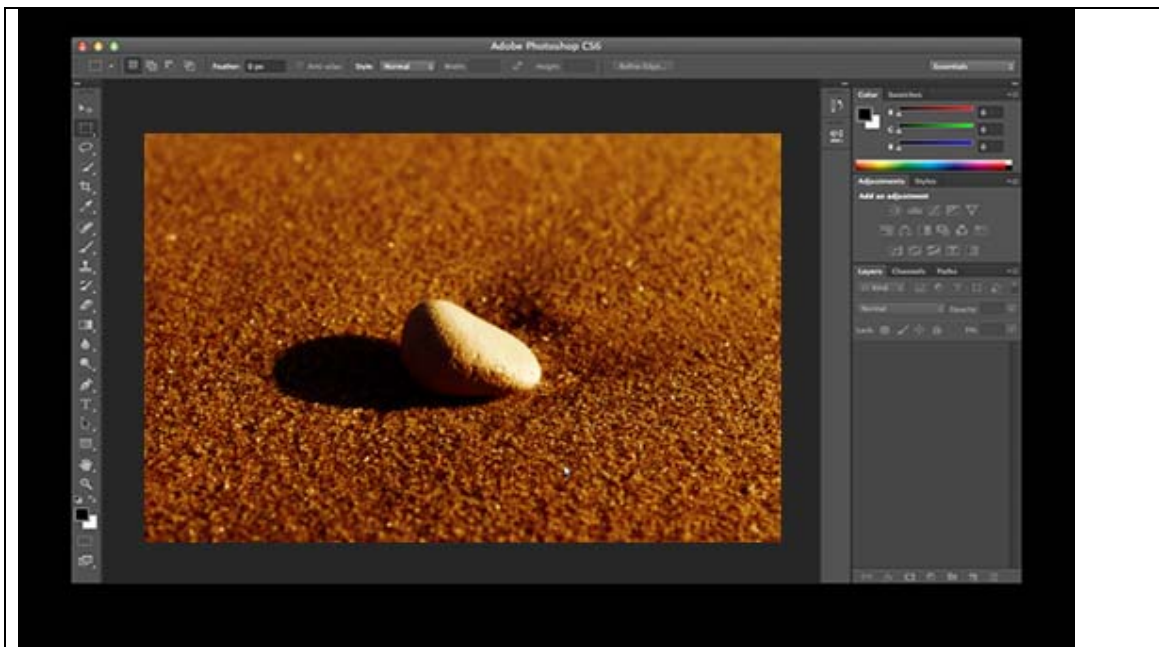
More details on Coffee Cup HTML editor can be found at <http://www.coffeecup.com/>

<sup>10</sup> Cupids wings. (2008). CoffeeCup HTML editor screenshot. Retrieved from [http://en.wikipedia.org/wiki/File:Coffee\\_Cup\\_HTML\\_Editor\\_2007.GIF](http://en.wikipedia.org/wiki/File:Coffee_Cup_HTML_Editor_2007.GIF) on 30 April 2012.

### 2.3.2 Images

#### (a) Adobe Photoshop

Adobe Photoshop is arguably the most widely used image editing software application used in industry. Some of the applications of the software include web design, advertising, desktop publishing and enterprise publishing. Photoshop is also used for creating graphics for 2D/3D animations and the cinema industry. Armed with an assortment of plugins created by both Adobe and third party vendors, the software application is capable of seamlessly performing cropping and slicing; drawing; painting; measuring and navigation; selection; typing; and retouching in addition to colour correction, special effects and 3D effects. Photoshop is a proprietary software and needs a licence for legal use. A basic version of the software can be downloaded for evaluation purposes.



**Figure 13** Adobe Photoshop Interface<sup>11</sup>



More details on Adobe Photoshop can be found at [http://en.wikipedia.org/wiki/Adobe\\_Photoshop](http://en.wikipedia.org/wiki/Adobe_Photoshop) and <http://www.adobe.com/products/photoshop.html>

<sup>11</sup> Zach Vega. (2012). Adobe Photoshop CS6 running on Mac OS X Lion. Retrieved from [http://en.wikipedia.org/wiki/File:Photoshop\\_CS6.png](http://en.wikipedia.org/wiki/File:Photoshop_CS6.png) on 30 April 2012.

(b) GIMP (GNU Image Manipulation Program)

GIMP is a free and open source software ([GNU General Public License](http://www.gnu.org/licenses/gpl.html)) which functions as a comprehensive editor for raster graphics. Similar to the Adobe Photoshop (see section 2.3.2(a)) image editor, GIMP allows for detailed image retouching and free-form drawing in addition to the basic image processing tasks such as resizing, editing, and cropping photos, photomontages combining multiple images, and converting between different image formats. It can also be used to create animations in GIF or MPEG format. GIMP is available for Microsoft Windows, Linux and Apple Mac OS X platforms.

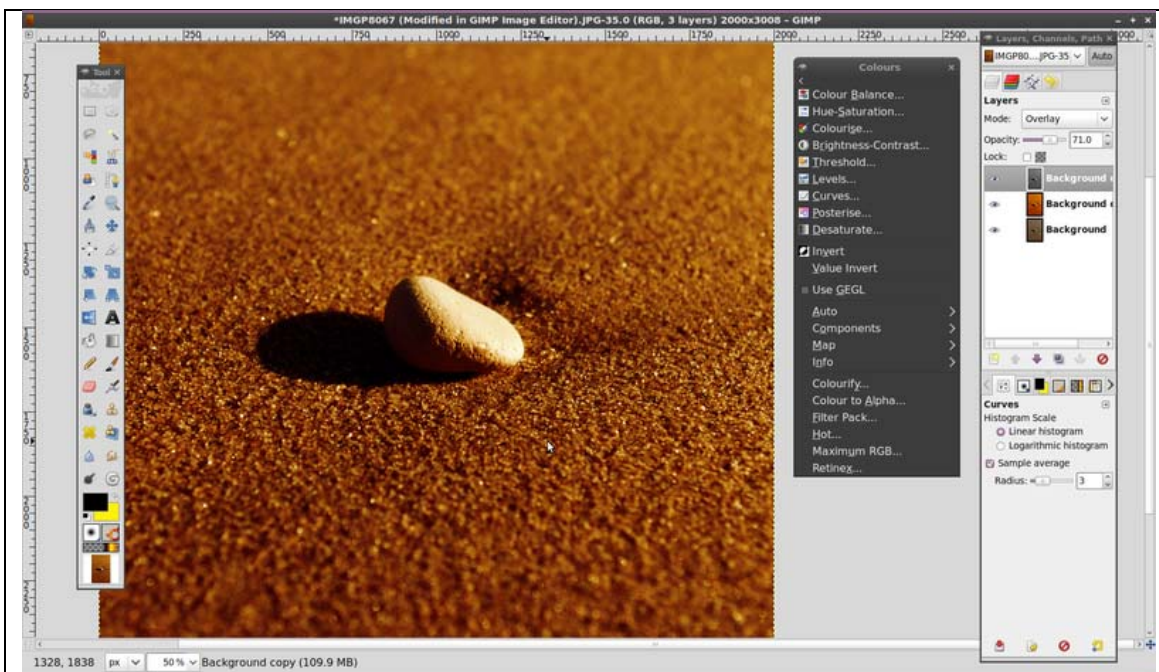



Figure 14 GIMP Interface<sup>12</sup>

 More details on GIMP can be found at <http://www.gimp.org/> and <http://en.wikipedia.org/wiki/GIMP>

<sup>12</sup> AnonyGnome. (2010). GIMP 2.6 being used to manipulate a digital photo. Retrieved from <http://en.wikipedia.org/wiki/File:Gimpscreen.png> on 2 April 2012.

(c) Open Office Draw

Draw is a vector graphics editor made available under the OpenOffice suite of [free software \(GNU Lesser General Public License v3\)](#). Draw allows you to import various image file types such as BMP, GIF, JPEG, PNG, TIFF and WMF; and manipulate them by rotating, adding 2D and 3D effects. The final output can be saved in [OpenDocument format](#) which allows for it to be used and edited in any *OpenDocument* compliant editor. The output can also be exported in various file formats according to the requirements. One of the most interesting features of Draw is its ability to edit PDF documents. Although the editing is not identical to the editing process in a word processor, the PDF document can be manipulated and re-mixed using an object approach. Refer to [Appendix A](#) for more information on how to edit PDF documents using Draw.

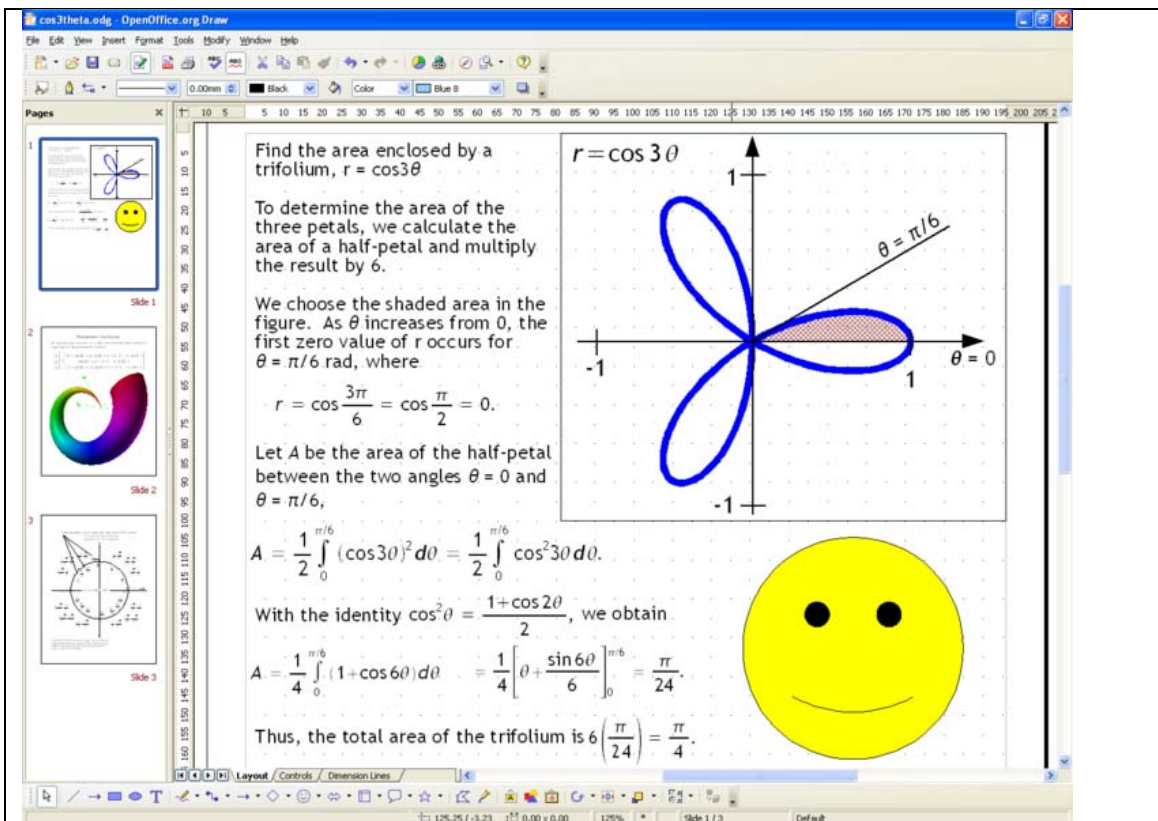

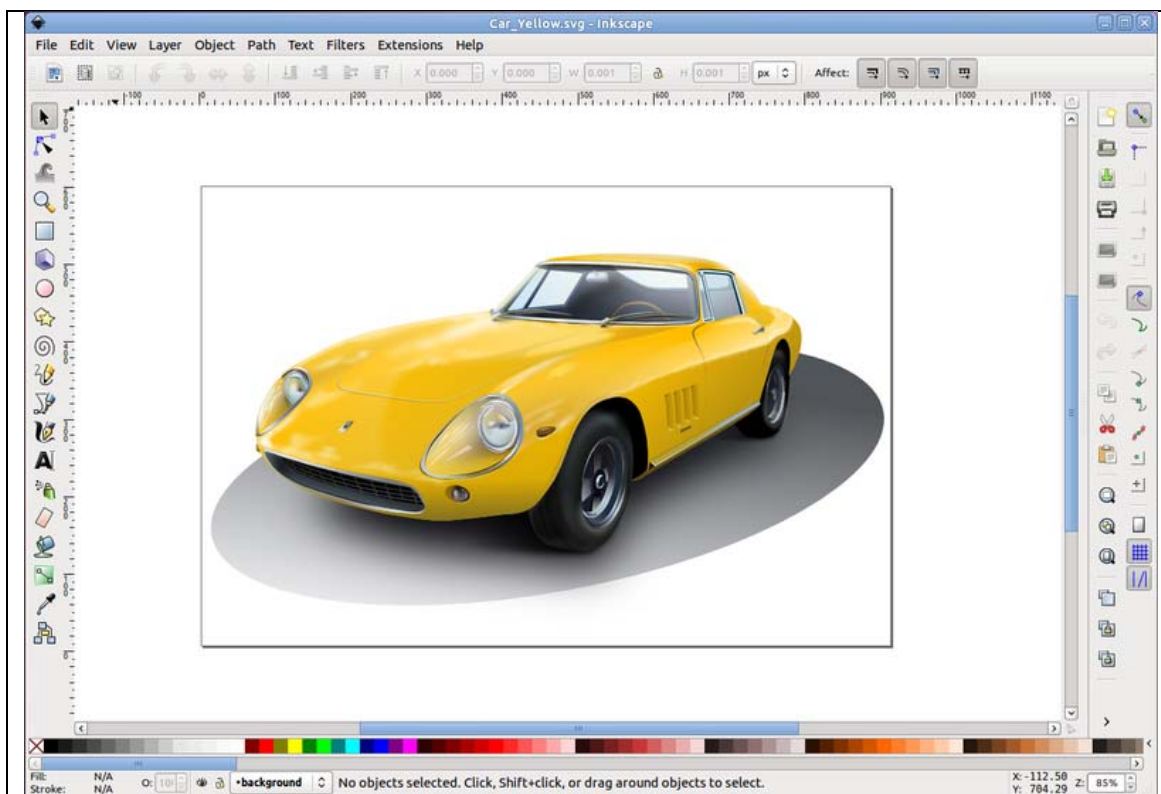


Figure 15 Open Office Draw Interface

 More details on Draw can be found at <http://www.openoffice.org/product/draw.html>

(d) Inkscape

Inkscape is a free software ([GNU General Public License](https://www.gnu.org/licenses/gpl-3.0.html)) which allows the creation and editing of Scalable Vector Graphics (SVG). Inkscape is a cross-platform software application which can be run on Unix-like operating systems, Microsoft Windows operating systems and Apple Mac OS. The ability to conduct complex object creation, object manipulation, styling, operations on paths, text support and rendering makes Inkscape one of the more powerful SVG tools available. It also supports the export of graphics in raster formats. Inkscape can also be used to edit PDF documents.



**Figure 16** Inkscape Interface

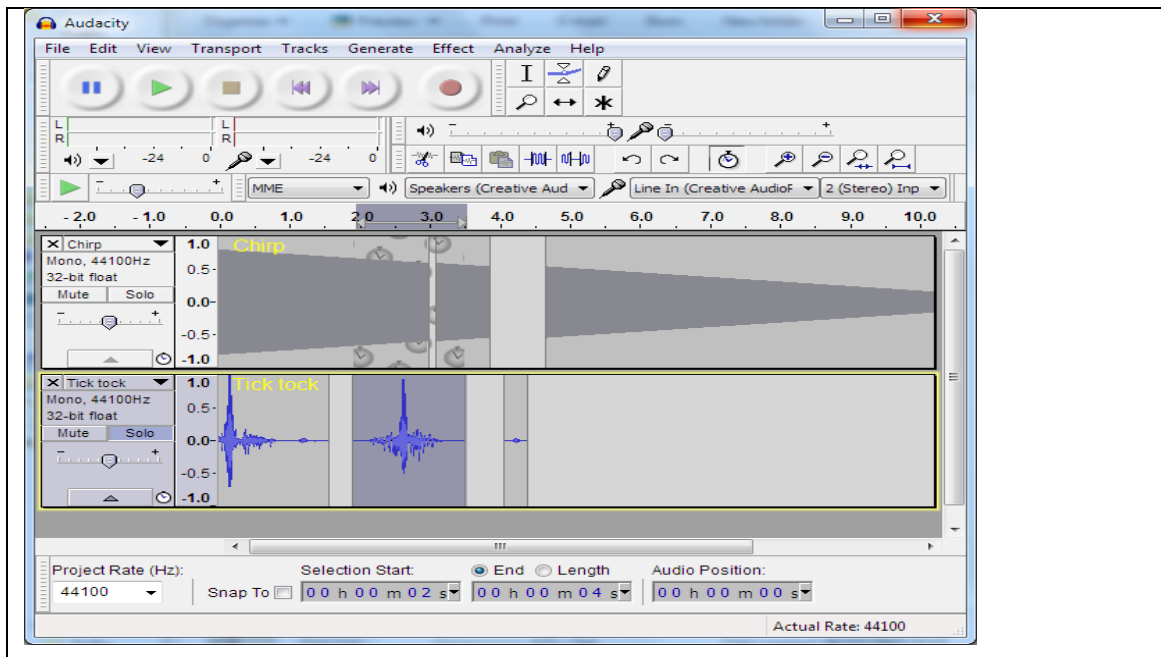


More details on Inkscape can be found at <http://inkscape.org/> and <http://en.wikipedia.org/wiki/Inkscape>

### 2.3.3 Audio

(a) Audacity<sup>13</sup>

Audacity is a [free software](#) ([GNU General Public License \(GPL\)](#)) instructional tool for digital audio recording and editing. This tool allows users to easily record, edit and share audio files. Audacity can be run on Windows, Mac OS and Linux. The program offers many audio editing features ranging from basic to expert. Some of the editing features allow users (i) to cut out unwanted sounds such as pauses, coughs and hisses; (ii) to copy, paste and delete sections; (iii) to undo and/or redo an unlimited number of times; (iv) to rearrange the order of sounds clips; (iv) to adjust volume levels before, after and while recording; (vi) to fade and amplify sounds; (vii) to mix multiple clips together and fuse them into one track; and (viii) to change the speed or pitch of clips. Audio files can be saved in the WAV format to be put on CDs or be exported as MP3 files.



**Figure 17** Audacity Running on Windows<sup>14</sup>



More details on Audacity can be found at <http://audacity.sourceforge.net/>

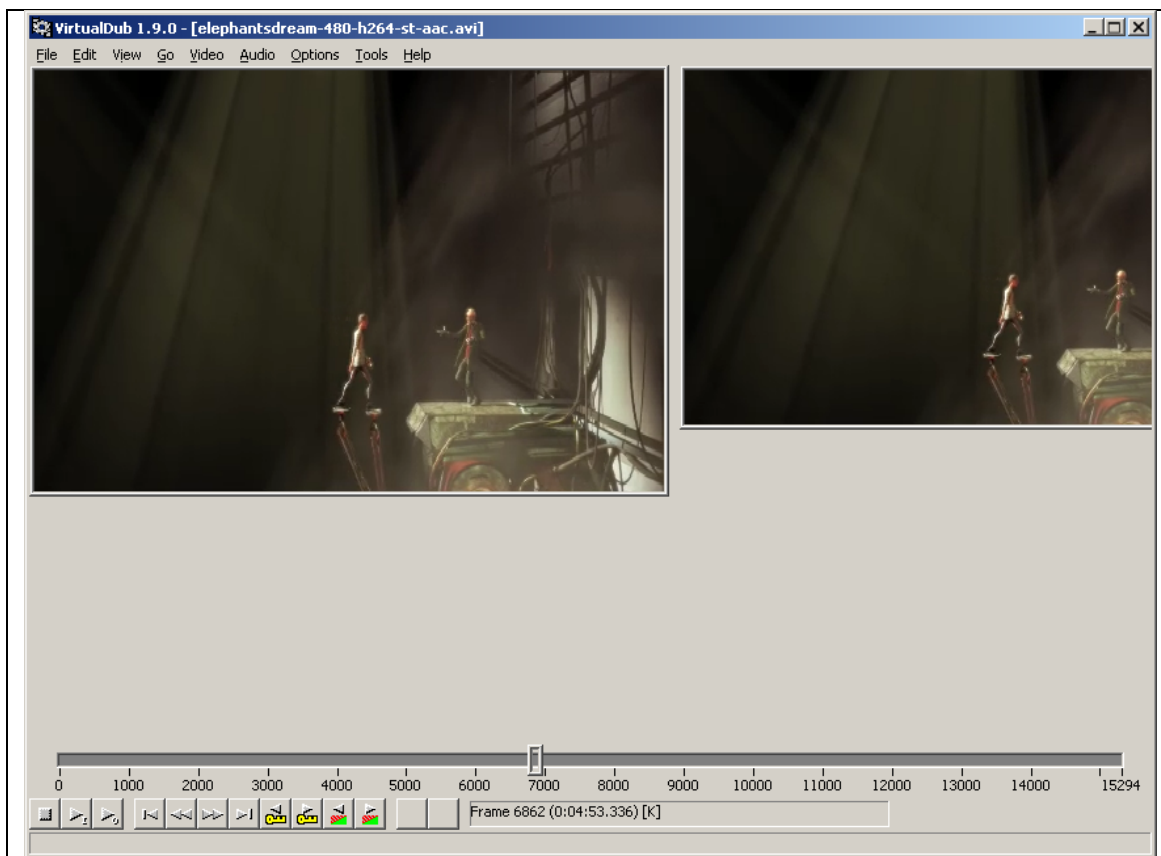
<sup>13</sup> "Audacity" is an adaptation of "Digital Audio Recording and its Applications in the Foreign Language Classroom" (<http://cnx.org/content/m18046/latest/>) © 2008 by Catherine Schwenkler, used under a Creative Commons Attribution license: [Creative Commons Attribution License \(CC BY 2.0\)](#)

<sup>14</sup> Audacity Running on Windows. Retrieved from <http://audacity.sourceforge.net/about/images/audacity-windows.png> on 21 March 2012.

## 2.3.4 Video

### (a) VirtualDub

VirtualDub is a [free software](#) ([GNU General Public License \(GPL\)](#)) tool for video capture and processing. It supports both 32-bit and 64-bit Microsoft Windows operating systems. VirtualDub is streamlined for fast linear operations on video. Although it might lack the editing capabilities of more general purpose proprietary editors, VirtualDub is equipped with batch-processing capabilities for processing large numbers of files. Its capabilities can be further extended through third-party video filters. VirtualDub is mainly geared toward processing AVI files, although it can read (not write) MPEG-1. It can also handle sets of BMP images.



**Figure 18** Editing Video in VirtualDub<sup>15</sup>



More details on VirtualDub can be found at <http://virtualdub.org/>

<sup>15</sup> Lee, A. (2009). Orange Open Movie Team and contributors (Elephants Dream). Retrieved from [http://upload.wikimedia.org/wikipedia/commons/2/22/VirtualDub\\_1.9.0.png](http://upload.wikimedia.org/wikipedia/commons/2/22/VirtualDub_1.9.0.png) on 21 March 2012.

(b) Adobe Premiere Pro

Adobe Premiere Pro is a time-line based non-linear editing system preferred for scale video editing projects. Being supported on both MacOS and Microsoft Windows, Premiere Pro is one of the few cross platform editors available in the market. The application supports high resolution video editing, audio sample-level editing and surround sound mixing. Premiere Pro's plug-in architecture enables it to import and export formats beyond those supported by QuickTime or DirectShow, supporting a wide variety of video and audio file formats and codecs on both MacOS and Windows. When paired with external plugins, Premiere Pro can support 3D editing as well. It can be integrated into Photoshop and After Effects for advanced features. Premiere Pro is a proprietary software and requires a license for legal use.



**Figure 19** Adobe Premiere Interface<sup>16</sup>

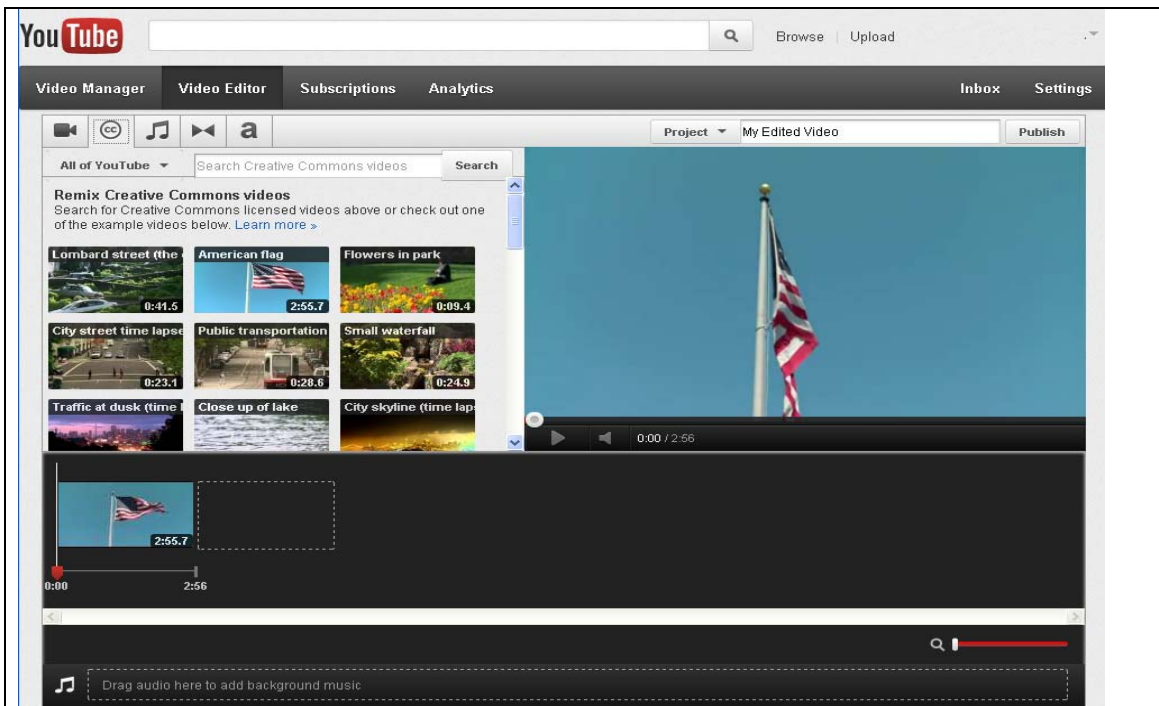


More details on Adobe Premiere Pro can be found at [http://en.wikipedia.org/wiki/Adobe\\_Premiere\\_Pro](http://en.wikipedia.org/wiki/Adobe_Premiere_Pro) and <http://www.adobe.com/products/premiere.html>

<sup>16</sup> Thompson.matthew. (2011). Adobe Premiere Pro CS5.5 Screenshot (on Mac). Retrieved from [http://en.wikipedia.org/wiki/File:Adobe\\_premiere\\_pro\\_cs5\\_mac.png](http://en.wikipedia.org/wiki/File:Adobe_premiere_pro_cs5_mac.png) on 30 April 2012.

### (c) YouTube Video Editor

Since its inception in 2005, YouTube ([www.youtube.com](http://www.youtube.com)) has transformed how content is delivered via the web through the introduction of a cloud based service which offers free hosting space to host short video clips. As it stands today, YouTube has grown into a global phenomenon which hosts millions of amateur as well as professionally developed video clips documenting a large array of subject matter from various domains such as education, science, technology, travel and variety. Recently YouTube has provided users with the option of sharing their video material openly under the Creative Commons (see section 3) attribution license enabling the repurposing and remixing of the video material to create new video material. To facilitate the remixing and repurposing process, a new online video editor has been introduced which allows users to combine multiple videos they've uploaded to create a new longer video, trim their uploads to custom lengths, add a soundtrack from the library of approved tracks and customise clips with special tools and effects.



**Figure 20** YouTube Video Editor Interface



More details on YouTube Video Editor can be found at <http://support.google.com/youtube/bin/answer.py?hl=en&answer=183851> and <http://www.youtube.com/editor>

(d) Adobe Flash Professional

Adobe Flash is a popular multimedia platform used to add animations, interactivity, games and video into web based content. The movies and animations created using flash are played through a free to use plugin available from Adobe known as the Flash Player<sup>17</sup>. The Flash Professional software application allows for the creation and editing of flash animations and movies. Flash manipulates vector and raster graphics to provide animation of text, drawings, and still images. It supports bidirectional streaming of audio and video, and it can capture user input via mouse, keyboard, microphone, and camera. Flash contains an object-oriented language called ActionScript and supports automation via the JavaScript Flash language (JSFL). Adobe Flash Pro is a proprietary software and requires a license for legal use. However, a trial version can be downloaded for evaluation purposes.

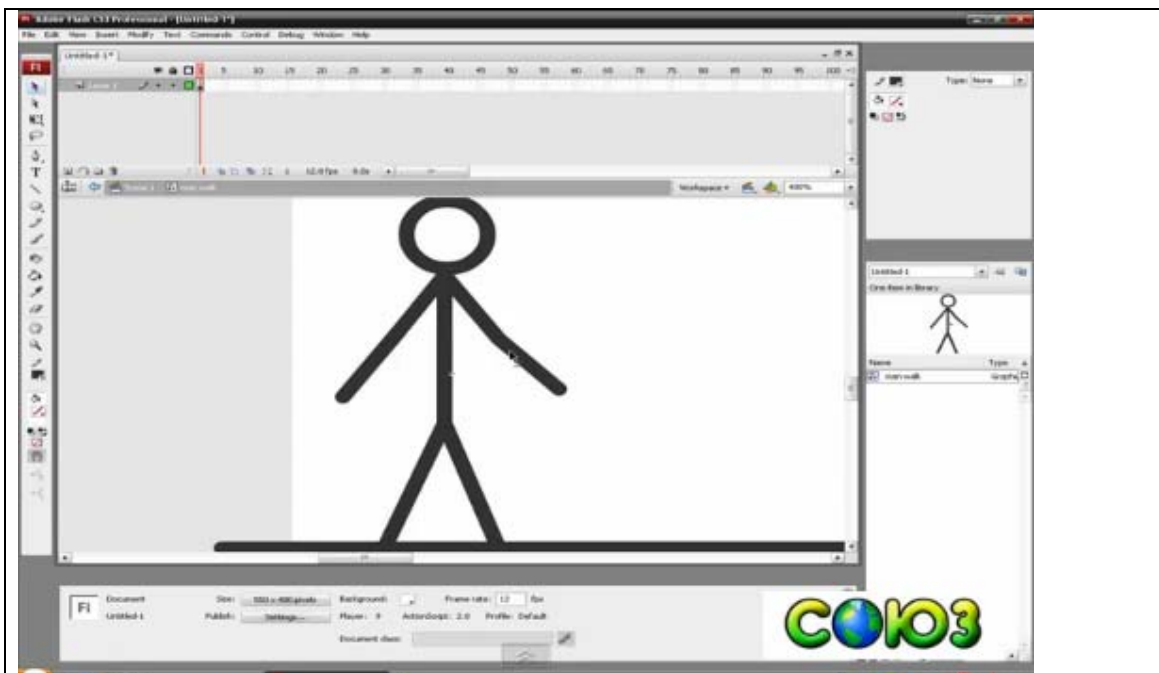


Figure 21 Adobe Flash Interface<sup>18</sup>



More details on Adobe Flash can be found at

[http://en.wikipedia.org/wiki/Adobe\\_Flash](http://en.wikipedia.org/wiki/Adobe_Flash) and

<http://www.adobe.com/products/flash.html?promoid=DJDTE>

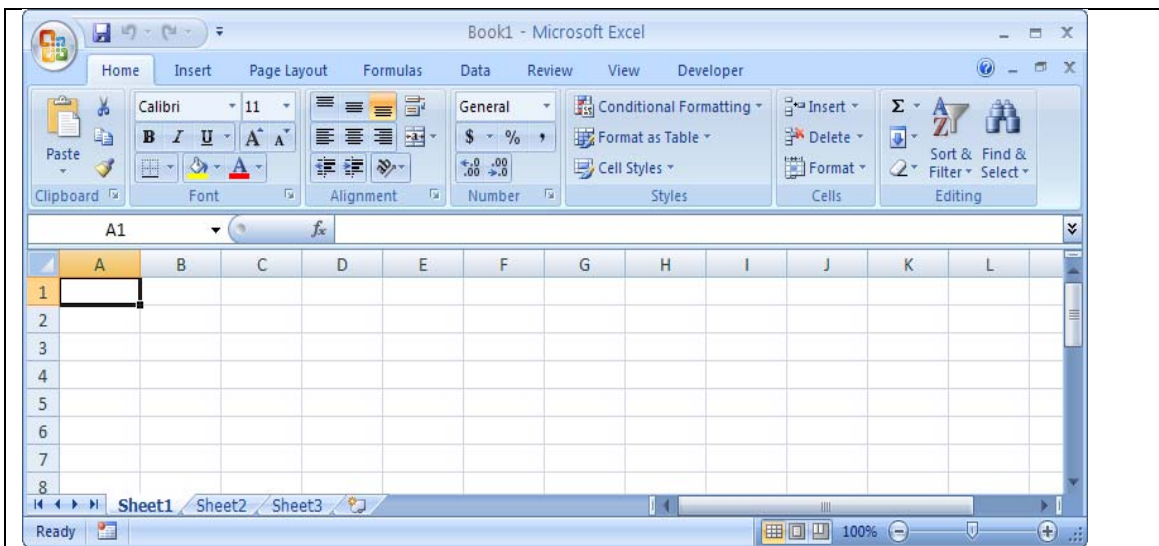
<sup>17</sup> <http://www.adobe.com/products/flashplayer.html>

<sup>18</sup> zelibober. (2008). How to do easy Animation in animation on Flash CS3 Pro. Retrieved from <http://www.youtube.com/watch?v=FNSAC9lyM6s&feature=related> on 30 April 2012.

### 2.3.5 Data

#### (a) Microsoft Excel<sup>19</sup>

Microsoft Excel is a part of the Microsoft Office suite of applications and is widely used for data analysis and presentation. Excel is all about numbers! There's almost no limit to what can be done with numbers in Excel, including sorting, advanced calculations and graphing. In addition, Excel's formatting options makes the presentation of the analyses very professional. Data files created with Excel are called workbooks (in the same way as Word files are called documents). Excel files are referred to as spreadsheets. This is a generic term, which sometimes means a workbook (file) and sometimes means a worksheet (a page within the file). Excel is a propriety software application similar to the MS Word (see section 2.3.1(a)) and requires a license for legal use. Although it is primarily built for the Microsoft Windows based operating systems, a version for MacOS is also currently available.



**Figure 22** Microsoft Excel 2007 Interface



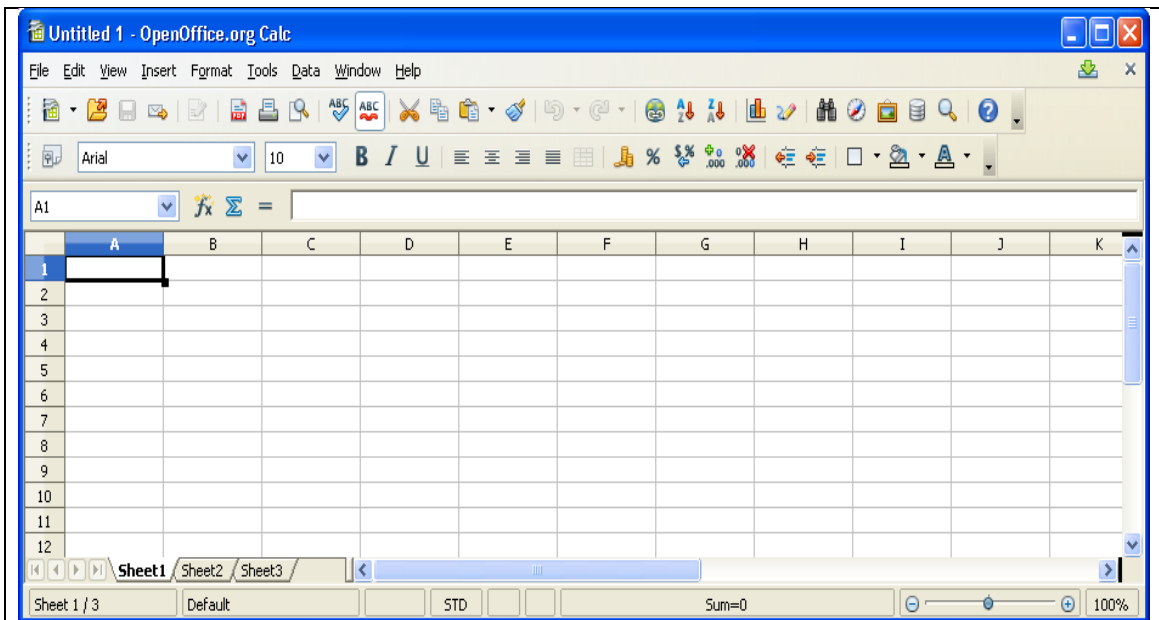
More details on Microsoft Excel can be found at

<https://vula.uct.ac.za/web/learnonline/manuals/CET%20MS%20Excel%202007%20Training%20Manual%20v1.1.pdf> and [http://en.wikipedia.org/wiki/Microsoft\\_Excel](http://en.wikipedia.org/wiki/Microsoft_Excel)

<sup>19</sup> "Microsoft Excel" is an adaptation of "Introduction to MS EXCEL 2007 – What is Excel?" (<https://vula.uct.ac.za/web/learnonline/manuals/CET%20MS%20Excel%202007%20Training%20Manual%20v1.1.pdf>) © 2009 by Centre for Educational Technology, University of Cape Town, used under a Creative Commons Attribution license: [Creative Commons Attribution Licence \(CC BY 2.5\)](https://creativecommons.org/licenses/by/2.5/)

(b) Calc

OpenOffice Calc is the free software ([GNU Lesser General Public Licence](#)) counterpart of spreadsheet software such as MS Excel (see section 2.3.5(a)). Released as part of the OpenOffice suite of applications which are open source, this all-purpose spreadsheet application encapsulates almost all of the features available in the more proprietary versions. Being cross-platform, OpenOffice Calc is capable of supporting open document formats such as the Microsoft .xlsx as well as CSV, HTML, SXF, DBF, DIF, UOF, SLK and SDC. One of the major highlights of this particular application is its ability to export documents in .pdf format without a third party converter. Among the many features, Advanced DataPilot technology which makes it easy to pull in raw data from corporate databases; cross-tabulate, summarise, and convert it into meaningful information; Natural language formulas which lets you create formulas using words; and the Intelligent Sum Button which inserts a sum function or a subtotal automatically, depending on context are worth noting with respect to ease of use.



**Figure 23** OpenOffice Calc Interface



More details on OpenOffice Calc can be found at

<http://www.openoffice.org/product/calc.html> and  
[http://en.wikipedia.org/wiki/OpenOffice.org\\_Calc](http://en.wikipedia.org/wiki/OpenOffice.org_Calc)

(c) PSPP<sup>20</sup>

The most popular software for statistical analysis is SPSS which stands for “Statistical Package for the Social Sciences”. SPSS is a proprietary software application which can be afforded only by large institutions or organisations due to its high cost of licensing. PSPP is a [free software](#) (GPLv3 or later) alternative to SPSS which provides almost the same functionality as the expensive SPSS suite. PSPP supports both the variable view (Fig24) which shows the attributes of each variable (column) as well as the data view which lists all the records (rows). Four of the key features of SPSS are (i) the large array of inbuilt statistical tests which can be run on the data; (ii) the ability to conduct descriptive statistical analysis; (iii) the ability to display the analysis in both numerical and graphical formats; and (iv) the ability to export the analysis into other file formats such as .html, .odt, .txt and .pdf. The datasets created in PSPP are interoperable between SPSS and vice versa.

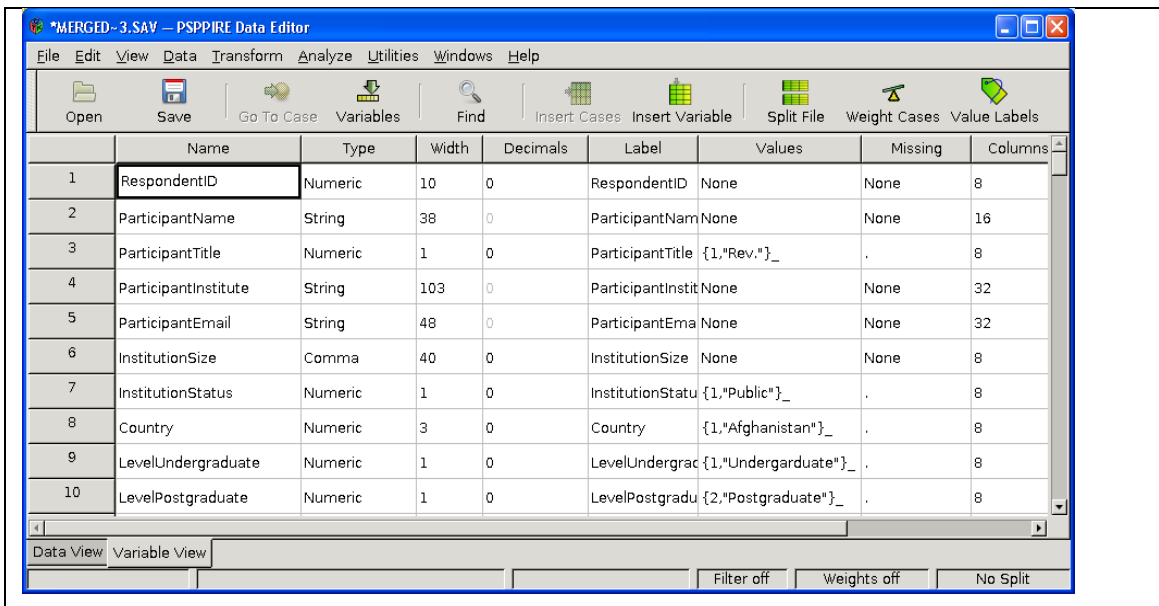


Figure 24 PSPP Variable View



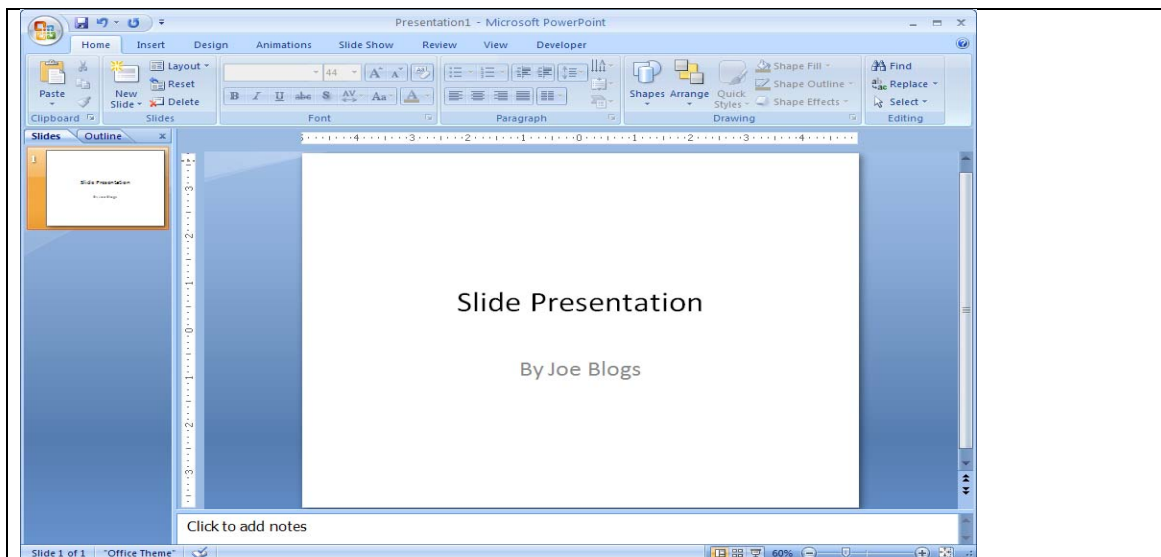
More details on PSPP can be found at <http://www.gnu.org/software/pspp/>

<sup>20</sup> “PSPP” is an adaptation of “PSPP: a free and open source alternative to SPSS – Part 1 (Introduction)” (<http://www.ishantalks.com/learning-resources/98-pspp-a-free-and-open-source-alternative-to-spss-part-1-introduction>) © 2011 by Ishan Abeywardena, used under a Creative Commons Attribution license: [Creative Commons Attribution License \(CC BY 3.0\)](https://creativecommons.org/licenses/by/3.0/)

## 2.3.6 Slideshows

### (a) Microsoft PowerPoint

Microsoft Office PowerPoint (MS PowerPoint) is by far the most commonly used software application for creating and repurposing slideshow presentations. It is part of the MS Office suite of applications. Although MS PowerPoint is accessible to most of us by virtue of our institutions and organisations purchasing the necessary licences needed to use it legally, this software application is a proprietary application of the Microsoft Corporation and is very dear to purchase. MS Office is primarily meant for the Microsoft Windows operating system. However due to the popularity of the application and compatibility issues, a MacOS based version is also available for purchase. Being one of the more powerful slideshow presentation software in the market, MS PowerPoint supports easy formatting, drag and drop operations, object inclusion (e.g. audio, video and animations), a large library of clipart, smooth slide transitions, narrations, voiceovers as well as custom animations. The newer versions of MS PowerPoint support the OpenOffice XML format (.pptx) which is a document format based on completely open standards promoting interoperability. i.e. a .pptx document can be created, opened, used and saved using other slideshow presenters such as OpenOffice Impress (see section 2.3.6(b)).



**Figure 25** MS PowerPoint Interface

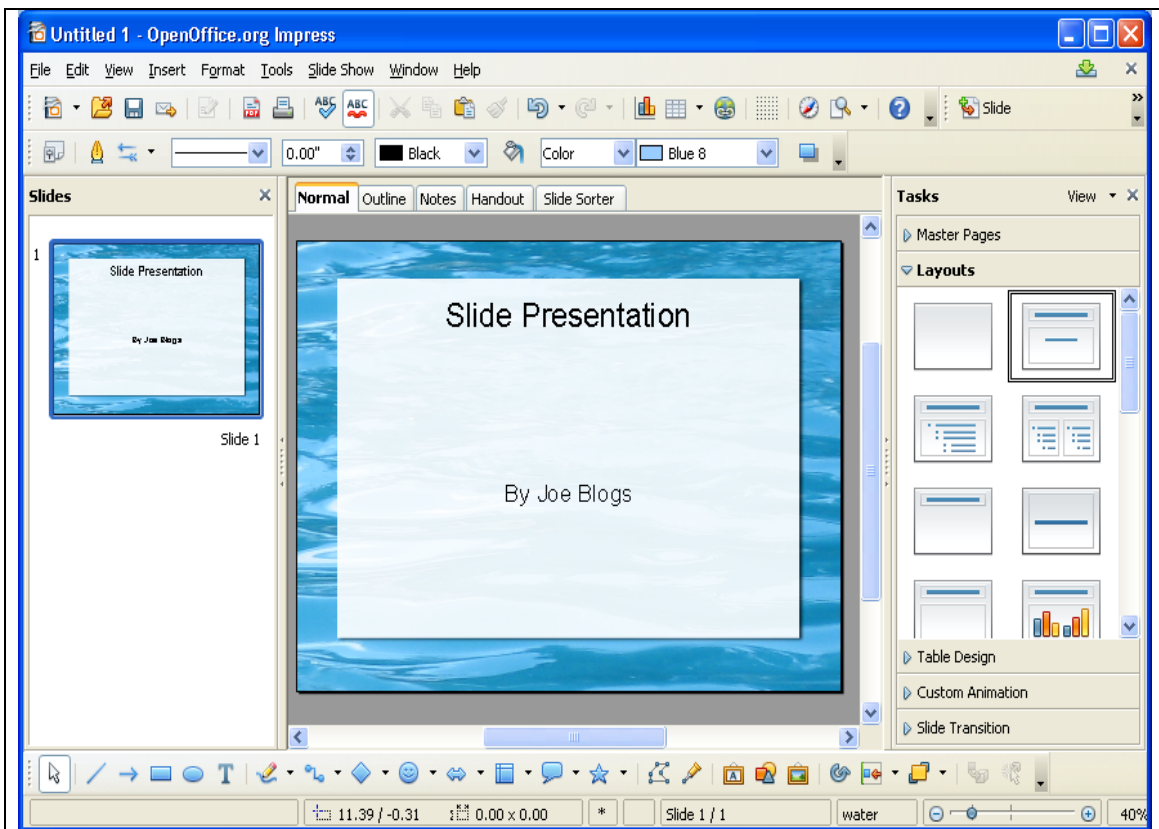


More details on MS PowerPoint can be found at

[http://en.wikipedia.org/wiki/Microsoft\\_PowerPoint](http://en.wikipedia.org/wiki/Microsoft_PowerPoint)

(b) OpenOffice Impress

OpenOffice Impress is the free software ([GNU Lesser General Public Licence](http://www.gnu.org/licenses/old-licenses/lgpl-2.0.html)) counterpart of slideshow software such as MS PowerPoint (see section 2.3.6(a)). Released as part of the OpenOffice suite of applications which are open source, this word slideshow presentation software encapsulates almost all of the features available in the more proprietary versions. Being cross-platform, OpenOffice Impress is capable of supporting open document format such as the Microsoft .pptx. One of the major highlights of this particular slideshow presentation software is its ability to support multiple monitors, so that presenters can look at something else while presenting their slides on a projector. Impress also allows the conversion of the presentation into a Flash SWF format without the use of third-party converters enabling the slides to be placed on web pages.



**Figure 26** OpenOffice Impress Interface



More details on OpenOffice Impress can be found at

<http://www.openoffice.org/product/impress.html>

## 2.3.7 Other Tools

### (a) Rhaptos<sup>21</sup>

Rhaptos is the open source content management software that powers Connexions<sup>22</sup>, the world's foremost open education site. Rhaptos is a fully developed content delivery platform that supports all types of educational content, from traditional textbooks to the latest interactive game-based multimedia content. The platform's technology and licensing structure facilitate frictionless remixing which allows users to customise content to meet the needs of individual teachers and learners. Rhaptos features a powerful licensing system for post-publication quality control, customised tagging, and community-based search and discovery are the engine behind a truly reusable repository of knowledge and learning. Enterprise Rhaptos is an installable version of the Rhaptos software.

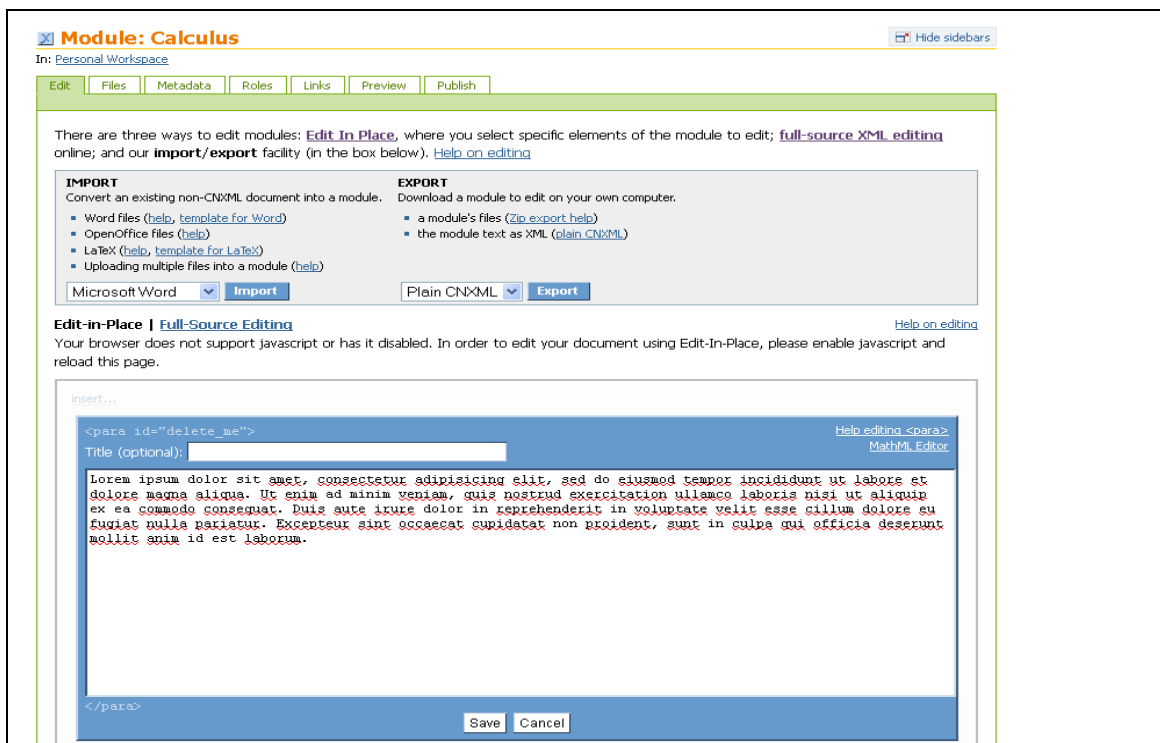


Figure 27 Rhaptos Interface on cnx.org



More details on Rhaptos can be found at <http://cnx.org/aboutus/overview> and <http://enterpriserhaptos.org/>

<sup>21</sup> Software. Retrieved from <http://cnx.org/aboutus/overview> on 30 April 2012.

<sup>22</sup> <http://www.cnx.org>

(b) MediaWiki

MediaWiki is an Open Source wiki platform which is used as the base for popular wiki based content repositories such as Wikipedia<sup>23</sup> and WikiEducator<sup>24</sup>. The fundamental concept behind wiki is to allow users to communally collaborate on a single platform to create, peer-review and re-use content. Until recently, users had to use Wiki markup, which is a special markup language similar to HTML, to create or edit content on MediaWiki based repositories. However, MediaWiki has now introduced a *what you see is what you get* (WYSIWYG) editor which allows content to be created and edited more easily. Although there are many wiki technologies available as proprietary as well as Open Source applications, MediaWiki is a robust technology platform which can be easily setup at an institution either internally or externally. Backed by a comprehensive records keeping mechanism, the platform automatically creates versions and archives of the content for better quality control.

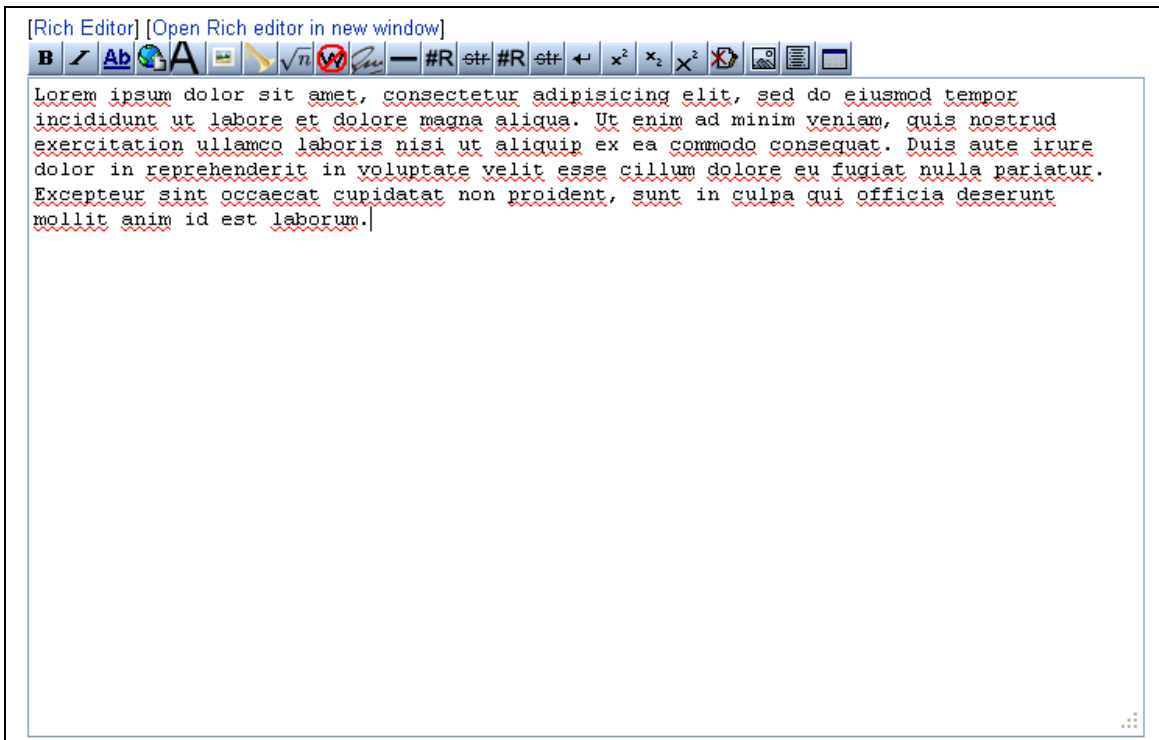


Figure 28 MediaWiki Editor Interface



More details on MediaWiki can be found at

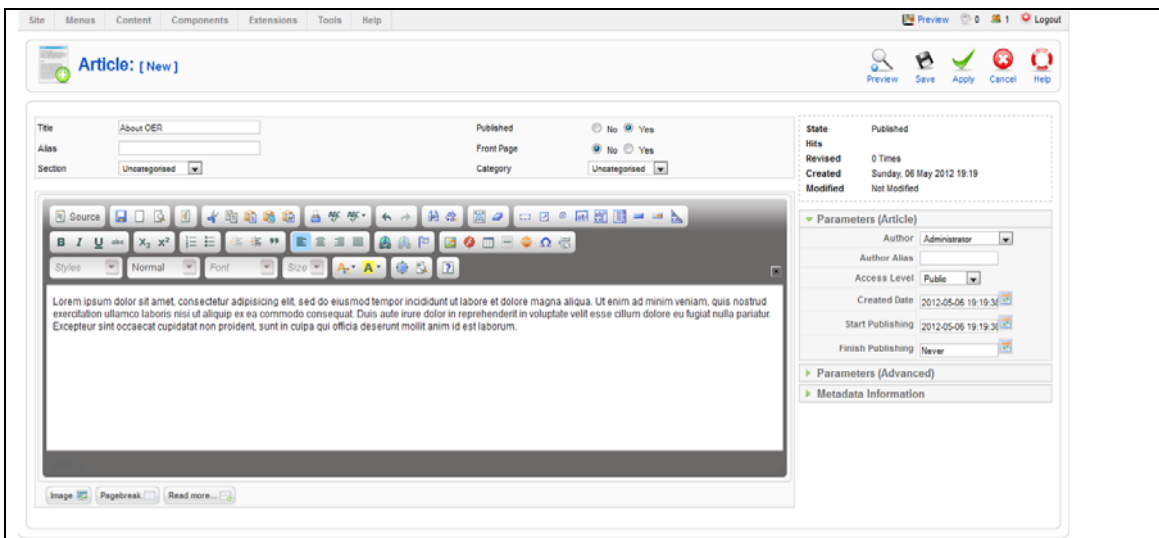
<http://www.mediawiki.org/wiki/MediaWiki>

<sup>23</sup> <http://www.wikipedia.org/>

<sup>24</sup> [http://wikieducator.org/Main\\_Page](http://wikieducator.org/Main_Page)

### (c) Content Management Systems (CMS)

A content management system (CMS) is an online or offline system which allows users to easily create, modify, update and manage the content of a database driven dynamically created content page with minimum or no use of programming code. CMS can be broadly categorised into two cohorts; (i) Enterprise content management systems (ECMS) which are large scale management tools (e.g. Microsoft SharePoint Server<sup>25</sup>) for organisational data, document and knowledge management. These systems are mostly proprietary systems managed by specialist vendors; and (ii) Web content management systems (WCMS) which facilitates the management of dynamic web based content of websites, blogs and wikis. There are many free and open source (FOSS) WCMS available such as Joomla!<sup>26</sup>, Mambo<sup>27</sup>, Drupal<sup>28</sup> and Wordpress<sup>29</sup>. WCMS can be easily setup on an intranet or the internet. Once setup, these systems allow content creators to collaboratively create interactive content for public/private use through intuitive content editors similar to a WYSIWYG word processor interface (see sections 2.3.1(a) and 2.3.1(b)).



**Figure 29** Joomla! New Article Editor View



More details on WCMS can be found at

[http://en.wikipedia.org/wiki/Web\\_content\\_management\\_system](http://en.wikipedia.org/wiki/Web_content_management_system)

<sup>25</sup> <http://sharepoint.microsoft.com/en-us/Pages/default.aspx>

<sup>26</sup> <http://www.joomla.org/>

<sup>27</sup> <http://www.mamboserver.com/>

<sup>28</sup> <http://drupal.org/>

<sup>29</sup> <http://wordpress.com/>

## 2.3.8 Authoring and Delivery

### (a) eXe

eXe, which stands for *eLearning XHTML editor*, is a freely available cross-platform Open Source software application developed as a result of a number of educational initiatives in New Zealand. eXe acts as a platform for educators to create HTML based content quickly and easily without any technical knowledge in HTML programming. The intuitive *what you see is what you get* (WYSIWYG) interface allows content such as web pages, video material, images and animations to be seamlessly incorporated into the content being developed. The finished content can be previewed and directly uploaded to a learning management system (LMS) in IMS Content Package format, SCORM 1.2 format or IMS Common Cartridge format. eXe also allows for the content to be uploaded onto a website as simple HTML pages or placed on a local device, mobile device or network device facilitating offline local access. Being a cross-platform application, eXe is supported on Windows, MacOS and Linux. It is also available as a ready-to-run application which can be installed on a USB stick.

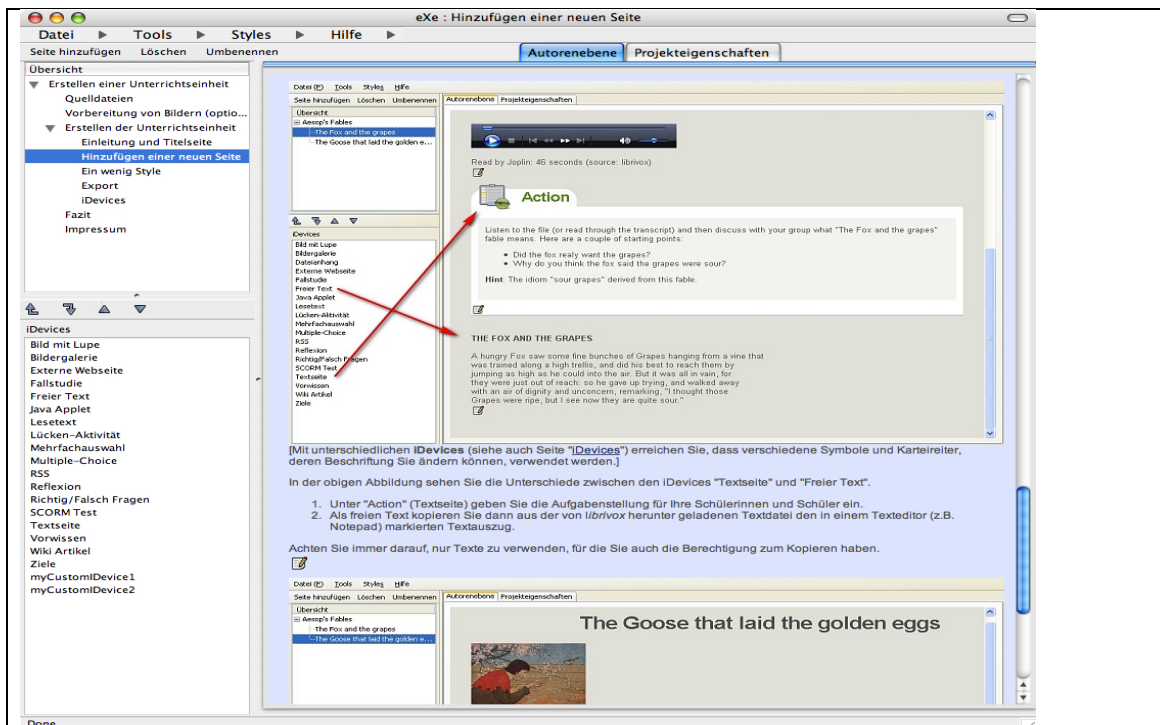
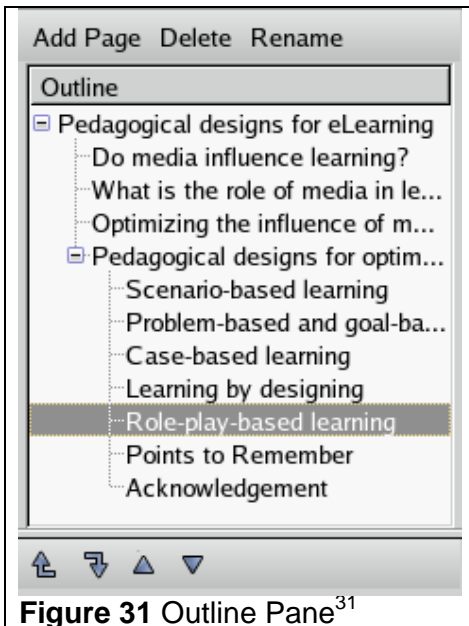


Figure 30 eXe Editor Interface<sup>30</sup>

<sup>30</sup> Source: <http://exelearning.org/attachment/wiki/Screenshots/authoringAesopsAgainInGermanMac.jpg>



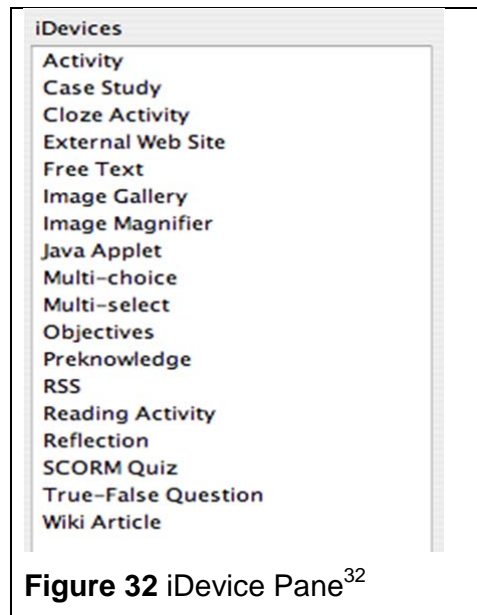
**Figure 31** Outline Pane<sup>31</sup>

Among the many benefits of eXe one of the more prominent is its ability to setup content in a pedagogically sound format. The *Outline Pane* allows content creators to exercise proper instructional design by structuring the content in a manner suitable for distance or online learning.

Another important feature found in eXe is the *iDevice Pane* (instructional device) which is a collection of structural elements that describe learning content. Examples of these include, objectives, pre-knowledge, case studies, free text. Learning content is created by selecting

iDevices from the iDevice menu and entering your learning content.

Even though there are many proprietary software applications such as Adobe Dreamweaver (see section 2.3.1(i)) which allows users to create sophisticated web pages, these applications require a fair amount of understanding of HTML programming. However, eXe is purpose built for educators and content creators who are sound in instructional design but may not be very familiar with HTML programming. By writing the appropriate HTML code on its own, eXe allows content creators to concentrate more on the pedagogical aspect of the content rather than the formatting. Refer [Appendix B](#) for case study on how to use RELOAD and eXe in a practical scenario.



**Figure 32** iDevice Pane<sup>32</sup>



More details on eXe can be found at <http://exelearning.org/wiki> and [http://wikieducator.org/Online\\_manual](http://wikieducator.org/Online_manual).

<sup>31</sup> Helena. (2006), example of Outline pane. Retrieved from <http://wikieducator.org/File:Exe-outline-pane.png> on 11 May 2012.

<sup>32</sup> Jim Tittsler. (2007), example of idevice pane. Retrieved from <http://wikieducator.org/File:Exe-idevice-pane.png> on 11 May 2012.

(b) RELOAD

RELOAD, which stands for *Reusable eLearning Object Authoring & Delivery* is a JISC (<http://www.jisc.ac.uk/>) funded initiative which primarily concentrates on (i) facilitating the creation, sharing and reuse of learning objects and services; and (ii) enhancing the range of pedagogical approaches realisable through the use of lesson plans. RELOAD achieves these aims through a suite of software tools for authoring and delivery of standard-compliant learning objects incorporating comprehensive user guides and exemplar resources.

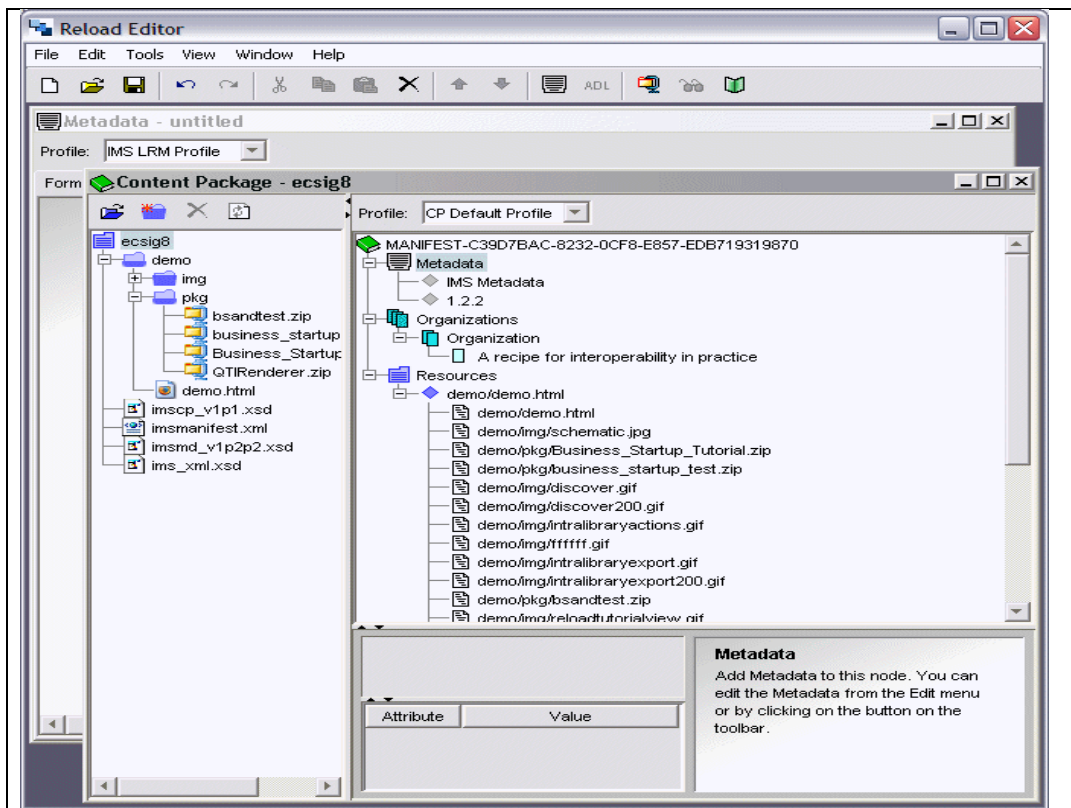
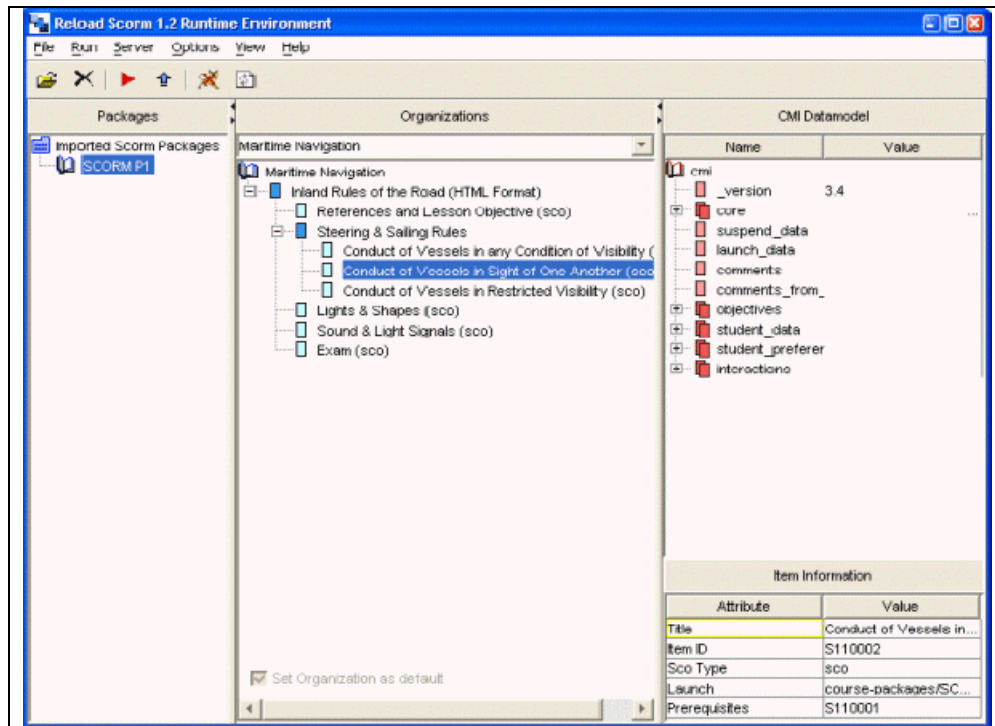


Figure 33 Classic RELOAD Editor Interface<sup>33</sup>

The suite of tools include (i) **Classic RELOAD Editor** which is a Java Swing-based application that provides support for IMS Metadata, IEEE LOM, IMS Content Packaging 1.1.4, SCORM 1.2, and SCORM 2004 and is supported on Windows, MacOS X and Linux; (ii) **The Eclipse-based RELOAD Editor**, built on the Eclipse Rich Client Platform, which supports IMS MD (versions 1.1, 1.2.1 and 1.2.4), IEEE LOM, IMS CP (versions 1.1.1, 1.1.2 and 1.1.4) as well as SCORM 1.2 and SCORM

<sup>33</sup> Source: [http://www.reload.ac.uk/supp/reload\\_scrshot.gif](http://www.reload.ac.uk/supp/reload_scrshot.gif)

2004 (3rd edition) specifications; (iii) **Learning Design Editor** which support for IMS Learning Design version 1.0; (iv) **SCORM 1.2 Player** which is a cross-platform desktop application that lets content creators “play” or preview SCORM 1.2 packages; and (v) **Learning Design Player** which is a cross-platform desktop application that lets content creators “play” or preview LD Units of Learning.



**Figure 34** SCORM 1.2 Player<sup>34</sup>

The standalone tools of this suite can be used collectively to create content by compiling resources, structuring and organising resources; defining metadata and previewing the content. As such, the complete suite of RELOAD tools allows educators and content creators to create pedagogically sound learning material which are compliant with standards such as SCORM and IEEE LOM. This allows the material to be delivered via learning management systems (LMS) as well as viewed on desktop using the SCORM players. The complete suite of tools is released as Open Source software by RELOAD allowing them to be further customised to the needs and wants of a particular institution. Refer [Appendix B](#) for case study on how to use RELOAD and eXe in a practical scenario.

<sup>34</sup> Source: <http://www.reload.ac.uk/new/scormplayer.html>



More details on RELOAD can be found at <http://www.reload.ac.uk/>

### 3. OER and Copyright

With opening up of content to a global audience come the challenges of managing copyright and intellectual property rights (IPR). According to Fitzgerald (2006) “*while the new digital technologies possess an enormous capacity to disseminate knowledge, copyright law will play a key role in determining the legality of any such act*”. Currently there are several completely open content licensing (OCL) schemes such as the Creative Commons<sup>35</sup> and the GNU Free Documentation Licensing<sup>36</sup> among others (Hylén, 2005). These schemes introduce certainty and clarity in terms of obtaining permission to use the work of others. There is also institution or group specific licensing such as the BC Commons (Stacey, 2006) which limits the usage of resources published under it. As the use, re-use and sharing of OER are largely dependent on the licensing scheme under which they are published, the location of relevant OER which allow free sharing and reuse has become imperative.

#### **What is copyright?**<sup>37</sup>

The term “copyright” refers to laws that govern the use of the creative works of an author or creator.

Intellectual Property Rights (IPR) are a mechanism for encouraging people to create innovative works, processes, designs or brands by granting them a limited monopoly on their creations. IPR enable creators to take ownership of their works and possibly to earn money, fame or other rewards from their creations.

Copyright is a type of intellectual property that protects original expression. Copyright does not protect effort or ideas, but rather the expression of those ideas. A work must be in some tangible form (e.g. written, recorded, drawn, painted, sculpted, built) in order to qualify for copyright.

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<sup>35</sup> <http://www.creativecommons.org>

<sup>36</sup> <http://www.gnu.org/licenses/fdl.html>

<sup>37</sup> “What is copyright?” is an adaptation of “What is copyright?” (OER COPYRIGHT AND LICENSING TOOLKIT [http://www.saide.org.za/resources/newsletters/Vol\\_18\\_no.2\\_2012/Content/Toolkits.htm](http://www.saide.org.za/resources/newsletters/Vol_18_no.2_2012/Content/Toolkits.htm)) © 2012 by South African Institute for Distance Education, used under a Creative Commons Attribution license: [Creative Commons Attribution 3.0 License \(CC BY 3.0\)](http://creativecommons.org/licenses/by/3.0/)

The works of writers, artists and musicians are usually governed by copyright, whether this is explicitly stated or not.

In most countries, copyright is automatic; creators do not need to register or even mark their work with the © symbol to be granted copyright.

### **What rights are associated with copyright?<sup>38</sup>**

Under copyright, exclusive rights are granted to the author or creator of an original work (such as literary, scientific and artistic works), including the right to access, use, print, copy, display, distribute, perform, modify or sell the work.

Copyright is also associated with moral rights related to author's integrity.

Moral rights include the author's right to be recognised as the author, the right to the integrity of the work and the right not to have the work adapted, modified or distorted in a way that would lessen the author's reputation.

Moral rights may be waived or transferred in some jurisdictions and what they comprise varies by jurisdiction. Moral rights can also be transferred through inheritance.

### **What is a licence?<sup>39</sup>**

The exclusive rights granted to a copyright holder can all be licensed, but they vary depending on local law.

Only the copyright holder/owner can grant permission (known as a "licence") to others to use, print, copy, display, distribute, perform, modify or sell the work.

Even when a work is licensed, the copyright and moral rights of the work all remain with the copyright holder. An individual may obtain a licence from the copyright holder to copy the work, but the terms of the licence will vary with the nature of the

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<sup>38</sup> "What rights are associated with copyright?" is an adaptation of "What rights are associated with copyright?" (OER COPYRIGHT AND LICENSING TOOLKIT [http://www.saide.org.za/resources/newsletters/Vol\\_18\\_no.2\\_2012/Content/Toolkits.htm](http://www.saide.org.za/resources/newsletters/Vol_18_no.2_2012/Content/Toolkits.htm)) © 2012 by South African Institute for Distance Education, used under a Creative Commons Attribution license: [Creative Commons Attribution 3.0 License \(CC BY 3.0\)](https://creativecommons.org/licenses/by/3.0/)

<sup>39</sup> "What is a licence?" is an adaptation of "What is a licence?" (OER COPYRIGHT AND LICENSING TOOLKIT [http://www.saide.org.za/resources/newsletters/Vol\\_18\\_no.2\\_2012/Content/Toolkits.htm](http://www.saide.org.za/resources/newsletters/Vol_18_no.2_2012/Content/Toolkits.htm)) © 2012 by South African Institute for Distance Education, used under a Creative Commons Attribution license: [Creative Commons Attribution 3.0 License \(CC BY 3.0\)](https://creativecommons.org/licenses/by/3.0/)

work and what the individual seeking the licence (i.e. the licensee) wishes to do with it.

These licences may be complex, because the exclusive rights granted by copyright to the copyright owner can be split in terms of jurisdiction/territory, or with respect to language. Also, the sequence of uses may be fixed, and the number of copies to be made and their subsequent adaptation and/or use may also be specified.

Through licences or other contracts, the copyright owner may transfer or assign his/her entire interest in all or some of the rights in the copyrighted work.

### **What is the public domain?<sup>40</sup>**

In many countries, the term “public domain” actually has two meanings.

The first meaning refers to public knowledge or making something publicly available.

The second meaning is a legal term that refers to the collection of works that are not copyrighted. This is the meaning that we use in this toolkit. This includes works with copyright terms that have expired, works that were dedicated originally to the public domain, and works that are not eligible for copyright. These works are “no rights reserved” – people may use them freely for any purpose without requesting permission.

### **What is fair practice?<sup>41</sup>**

International copyright treaties and national copyright legislation include provisions for using portions of copyrighted content under certain conditions without seeking permission.

Many countries have copyright exceptions and limitations that allow for the use of copyrighted content under certain circumstances – e.g. for teaching purposes in a classroom. This is often called “fair practice”, “fair dealing” or “fair use” depending on

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<sup>40</sup> “What is the public domain?” is an adaptation of “What is the public domain?” (OER COPYRIGHT AND LICENSING TOOLKIT [http://www.saide.org.za/resources/newsletters/Vol\\_18\\_no.2\\_2012/Content/Toolkits.htm](http://www.saide.org.za/resources/newsletters/Vol_18_no.2_2012/Content/Toolkits.htm)) © 2012 by South African Institute for Distance Education, used under a Creative Commons Attribution license: [Creative Commons Attribution 3.0 License \(CC BY 3.0\)](https://creativecommons.org/licenses/by/3.0/)

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the country. However, in most countries the concept of fair practice is somewhat vague and indefinite.

In South Africa, although not specified in copyright legislation, fair dealing allows the reproduction of 10% of (or one chapter from) a book, or one article of a journal, to be copied by a person for the purposes of research or private study.

### **What are open licences?<sup>42</sup>**

Traditionally, copyright ranged from full copyright where “all rights are reserved”, to the public domain (pd) or “no rights reserved”.

Over the past decade, there has been a movement towards creating more freely accessible materials and documents. This is due to advances in digital technologies and the internet where works can be made accessible to a much larger group of people on different continents.

Open licences were created to make it easier for a creator to share works freely with the public.

An open licence is any licence that applies to copyrighted content that allows any person to reuse that content without asking for prior permission. Open licences apply a “some rights reserved” status to a work, and so they fall between copyright © and public domain (pd).

Open licences are public licences and allow anyone worldwide to use a copyrighted work without necessarily having to pay a fee or royalty or ask permission as long as they adhere to the conditions specified in the licence. It is only if a person desires to use a work in a way other than that specified in the licence that permission needs to be sought from the copyright holder.

### **The Creative Commons<sup>43</sup>**

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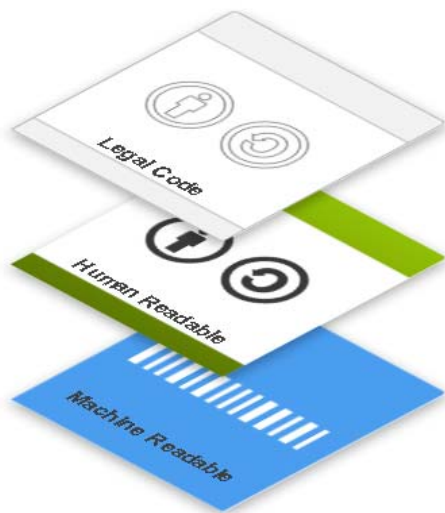
<sup>42</sup> “What are open licences?” is an adaptation of “What are open licences?” (OER COPYRIGHT AND LICENSING TOOLKIT [http://www.saide.org.za/resources/newsletters/Vol\\_18\\_no\\_2\\_2012/Content/Toolkits.htm](http://www.saide.org.za/resources/newsletters/Vol_18_no_2_2012/Content/Toolkits.htm)) © 2012 by South African Institute for Distance Education, used under a Creative Commons Attribution license: [Creative Commons Attribution 3.0 License \(CC BY 3.0\)](https://creativecommons.org/licenses/by/3.0/)

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The infrastructure the Creative Commons provide consists of a set of [copyright licenses and tools](#) that create a balance inside the traditional “all rights reserved” setting that copyright law creates. The tools give everyone from individual creators to large companies and institutions a simple, standardised way to keep their copyright while allowing certain uses of their work – a “some rights reserved” approach to copyright – which makes their creative, educational, and scientific content instantly [more compatible with the full potential of the internet](#).

The Creative Commons copyright licenses and tools forge a balance inside the traditional “all rights reserved” setting that copyright law creates. The tools give everyone from individual creators to large companies and institutions a simple, standardised way to grant copyright permissions to their creative work. This combination of tools and users is a [vast and growing digital commons](#), a pool of content that can be [copied, distributed, edited, remixed, and built upon](#), all within the boundaries of copyright law.

### Three “Layers” Of Licenses<sup>44</sup>



The Creative Commons public copyright licenses incorporate a unique and innovative “three-layer” design. Each license begins as a traditional legal tool, in the kind of language and text formats that most lawyers know and love. They call this the Legal Code layer of each license.

But since most creators, educators, and scientists are not in fact lawyers, they also make the licenses available in a format that normal people can read – the Commons Deed (also known as the “human readable” version of the license). The Commons Deed is a handy reference for licensors and licensees, summarising and expressing some of the most important terms and conditions. Think of the Commons Deed as a user-friendly interface to the Legal

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Code beneath, although the Deed itself is not a license, and its contents are not part of the Legal Code itself.

The final layer of the license design recognises that software, from search engines to office productivity to music editing, plays an enormous role in the creation, copying, discovery and distribution of works. In order to make it easy for the Web to know when a work is available under a Creative Commons license, they provide a “machine readable” version of the license – a summary of the key freedoms and obligations written into a format that software systems, search engines and other kinds of technology can understand. The Creative Commons developed a standardised way to describe licenses that software can understand called [CC Rights Expression Language](#) (CC REL) to accomplish this.

Searching for open content is an important function enabled by our approach. You can use [Google](#) to search for Creative Commons content, look for pictures at [Flickr](#), albums at [Jamendo](#), and general media at [spinpress](#). The [Wikimedia Commons](#), the multimedia repository of [Wikipedia](#), is a core user of our licenses as well.

Taken together, these three layers of licenses ensure that the spectrum of rights isn’t just a legal concept. It’s something that the creators of works can understand, their users can understand, and even the Web itself can understand.

## The Licenses<sup>45</sup>



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## **What are ported and unported licenses?<sup>46</sup>**

When looking at a particular CC-licensed document or work, you may find that it refers to ported or unported licenses. This refers to the underlying legal code.

The verb “port” applies to the adaptation of data to suit a particular technological or policy jurisdiction/territory/environment.

Unported licenses are licenses that are not associated with any specific jurisdiction (e.g. country). They do not mention any particular jurisdiction’s law.

The unported versions are written according to international copyright treaties and are, therefore, in theory, compatible under all copyright legislation in various countries. Due to subtle differences in both legal systems and how various countries interpret the various international treaties on copyright, the unported version may include or exclude clauses that are either not legally binding, or are legally meaningless, in any specific jurisdiction – and thus, some aspects of the license may not align perfectly to a particular jurisdiction’s laws.

Creative Commons partners with lawyers around the world to localise or port its licences to different copyright legislations around the world.

The porting process involves both linguistically translating the licenses and legally adapting them to particular jurisdictions. These licenses are designed to have the same effect anywhere in the world, while at the same time following the legal conventions of particular jurisdictions, so that they can be more easily understood and used by the local community. Thus, usage of these jurisdiction-specific licenses has started replacing unported licenses in some instances.

In deciding whether to use a ported or unported license, consider your primary audience. Are they located within one country?

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Regardless of whether you select a ported or unported license, all of the Creative Commons licenses are public licenses, which mean anyone worldwide may use the work as long as they follow the conditions of the license. The legal code differs, but the only difference in the human-readable version of the license is the presence of the country name and flag.



More details on how to attribute work properly can be found at [http://wiki.creativecommons.org/FAQ#How do I properly attribute a Creative Commons licensed work.3F](http://wiki.creativecommons.org/FAQ#How_do_I_properly_attribute_a_Creative_Commons_licensed_work.3F)



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#### **4. Conclusion**

The use of OER in teaching and learning is fast gaining credibility and is becoming accepted academic practice. The substantial amount of public and private funding which has been made available to the whole OER movement has resulted in the creation of a high volume of quality resources made available openly and freely across the globe. However, the re-use aspect of OER is yet to pick up momentum due to a number of inhibiting factors. One of the major inhibitors is the lack of accessible technologies and the lack of technical capacities among the academic communities to effectively and meaningfully re-purpose OER material for their teaching and learning needs.

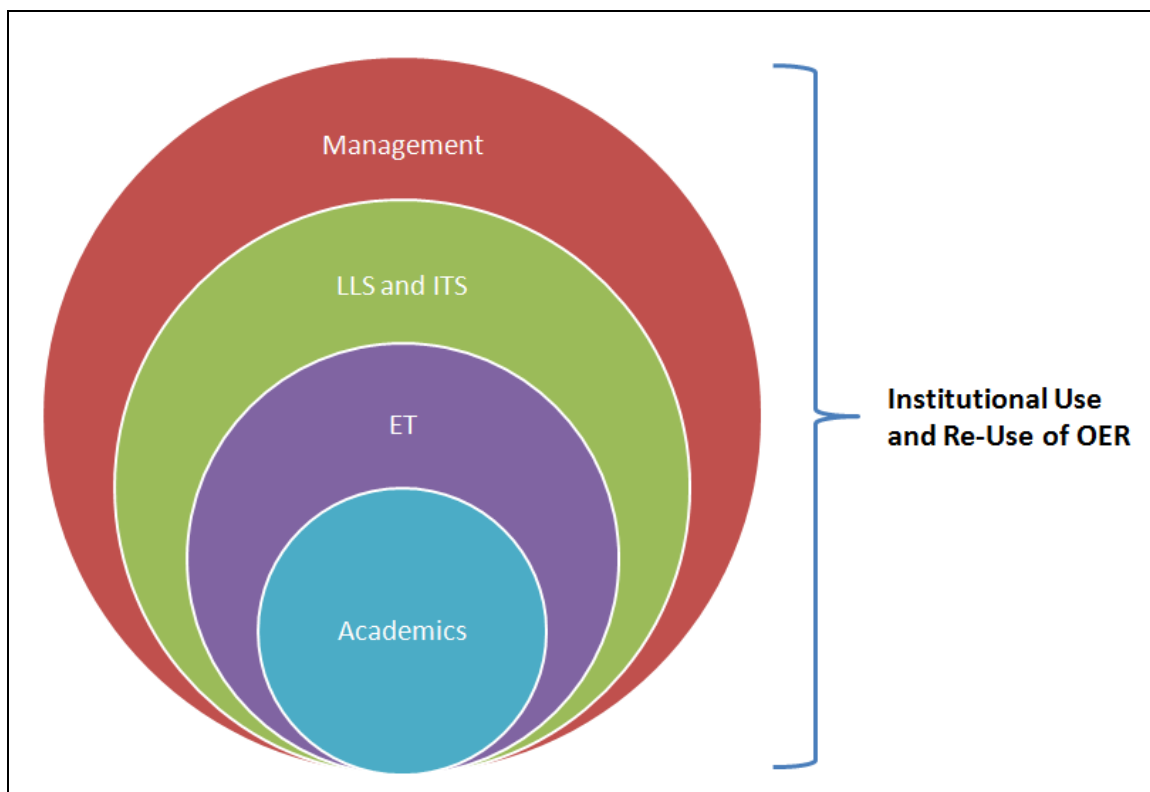
In order to promote the wider re-use of OER, strong advocacy by organisations such as the Commonwealth of Learning (COL) and UNESCO; standardisation efforts by organisations such as the Creative Commons; and the advanced research being conducted on search mechanisms and metadata standards should be given prominence in the new OER landscape. It is also important to encourage the creation of new technology platforms or updating existing technology platforms such as Wordpress or Eclipse facilitating content re-use. To achieve the goal, the Free

and Open Source (FOSS) movement should be developed and promoted parallel to the OER movement.

## 5. Recommendations

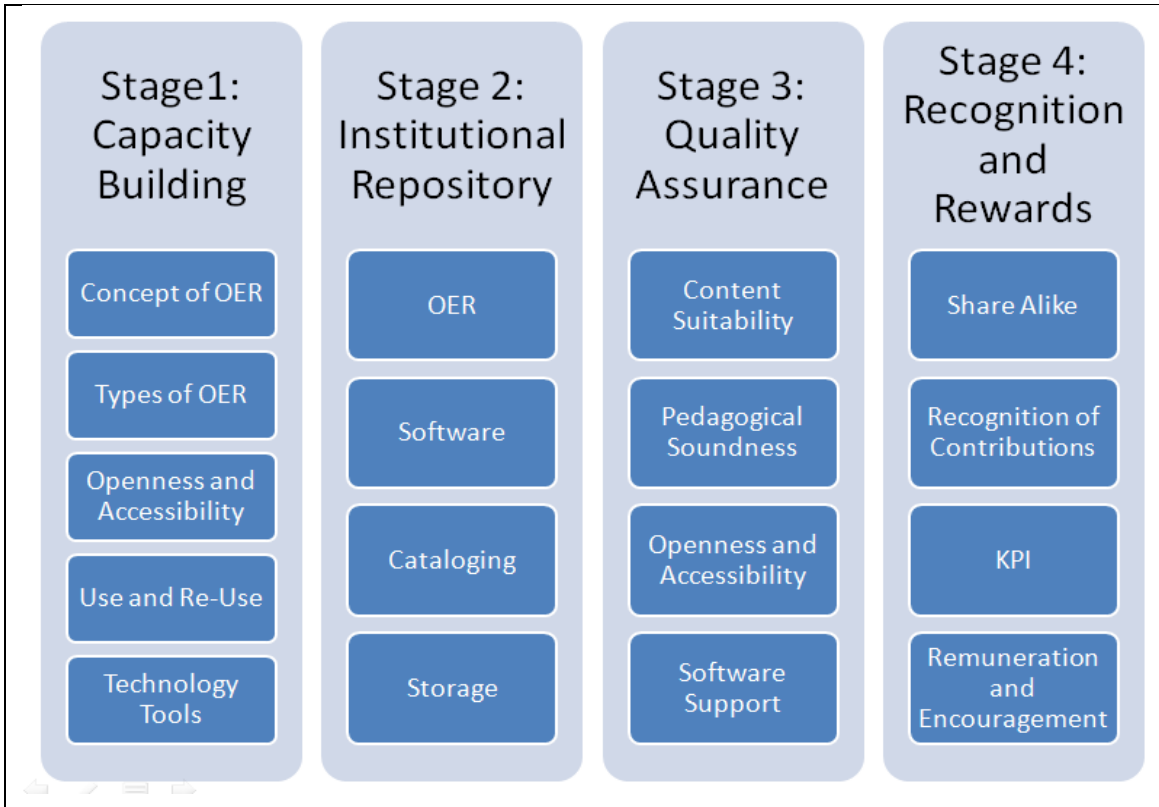
### Re-use and Adaptation of Open Educational Resources in an Open Distance Learning Institution

Arguably, at present, the largest group of OER creators and consumers consist of ODL practitioners. However, the uptake of the wider adoption of OER in teaching and learning is slow from the perspective of an ODL institution due to the lack of understanding of how to implement the use and re-use of OER across the various interconnected departments. This has become especially challenging with respect to re-use as the institution needs to implement policies and procedures holistically adopting a top-down approach encapsulating the key stakeholders which include (i) management; (ii) academics; (iii) educational technologists (ET); (iv) library and learning support services (LLS); and (v) information technology support services (ITS). In this approach, the academics are at the core of the implementation exercise supported by the various other stakeholders as shown in Figure 35.



**Figure 35** Key stakeholders in an ODL institution with respect to re-use of OER

The strategic implementation of re-use in ODL institutions can be segmented into four distinct stages which are (i) capacity building; (ii) creation of an institutional repository; (iii) quality assurance; and (iv) recognition and rewards. As shown in Figure 36, each of these stages consists of a number of activities which are performed by the various stakeholders.



**Figure 36** The four stages of strategically implementing re-use of OER

The first stage of an institutional plan for strategically implementing the re-use of OER consists of capacity building for the academics, ET, LLS as well as ITS. Each of these key stakeholders should be acclimatised to the concept of OER, the types of OER available with respect to the medium, the openness and accessibility of OER; the use and re-use of OER with respect to copyright and the technological tools available for the re-use and adaptation of OER. More extensive training should be provided to LLS with respect to the copyright and intellectual property rights associated with the re-use of OER; and to ITS with respect to the technology tools

used to adapt OER. This new understanding of the OER landscape will in turn underpin the next stages of the implementation plan.

The second stage of the exercise consists of the creation of an institutional repository for both OER as well as technology tools used to adapt OER. It would be the responsibility of the LLS to scout the various OER repositories available, extract resources relevant for the teaching and learning taking place at the institution, catalogue them using metadata which will facilitate more efficient search and retrieval, categorise them according to the medium and store them in an institutional repository which is accessible by all the key stakeholders. Similarly, the ITS will be responsible for locating, cataloguing, categorising and storing technology tools, user manuals and support materials to be used by the key stakeholders for re-using OER. This stage will enable the academics and the ET to easily and effectively locate OER for their teaching and course development purposes.

The third stage of the exercise concentrates on the quality assurance aspect of the institutional repository and involves the academics, ET, LLS as well as ITS. The academics will be responsible for evaluating the suitability of the OER material in the repository with respect to the technical soundness of the content. The ET will be responsible for evaluating the pedagogical aspect of the resources. The LLS will be identifying the level of openness of the content with respect to intellectual property rights and the ITS will be evaluating the level of access with respect to the technology tools required for re-use. The OER in the repository should then be annotated with the notes generated by each stakeholder. This, in turn, will act as a filtering process which will identify the most suitable OER for re-use within the context of the institution.

The fourth stage of the strategic implementation plan involves the management and policy makers of the institution. Even though stages one to three have established a stable working foundation for re-use of OER on an institutional level, the academics must be encouraged to adopt the re-use of OER in their teaching and research activities. In order to facilitate this, an institutional policy on “Share Alike” of OER needs to be established whereby the adapted OER are placed back in the institutional repository for re-use by others. Also this will act as an indicator of the contributions made by each academic towards the institutional directive of re-using

OER in its teaching and learning activities. Furthermore, the extent of re-use of OER in teaching and research activities can be considered as one of the key performance indicators (KPI) of the academics giving rise to the possibility of remuneration and rewards. This institutional policy will then promote the wider re-use of OER which will result in significant gains for the institution.

The aforementioned four stage implementation plan provides a strategic approach for the re-use and adaptation of OER in an ODL institution. However, it must be noted that there will be practical limitations which will be encountered during the implementation of this plan. It must also be noted that each of the stages need to be re-visited periodically to ensure the integrity of the whole institutional directive towards the re-use of OER.

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- Sir John Daniel, President & CEO, Commonwealth of Learning
- Prof. Asha S. Kanwar, President Elect, Commonwealth of Learning
- Prof. Dato Wong Tat Meng, Vice Chancellor, Wawasan Open University
- Prof. Dato Ho Sinn Chye, Deputy Vice Chancellor (Academic), Wawasan Open University
- Prof. Tham Choy Yoong, Dean, School of Science and Technology, Wawasan Open University
- All other colleagues at the Commonwealth of Learning

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## Appendix A

### Editing PDF using Open Office Draw

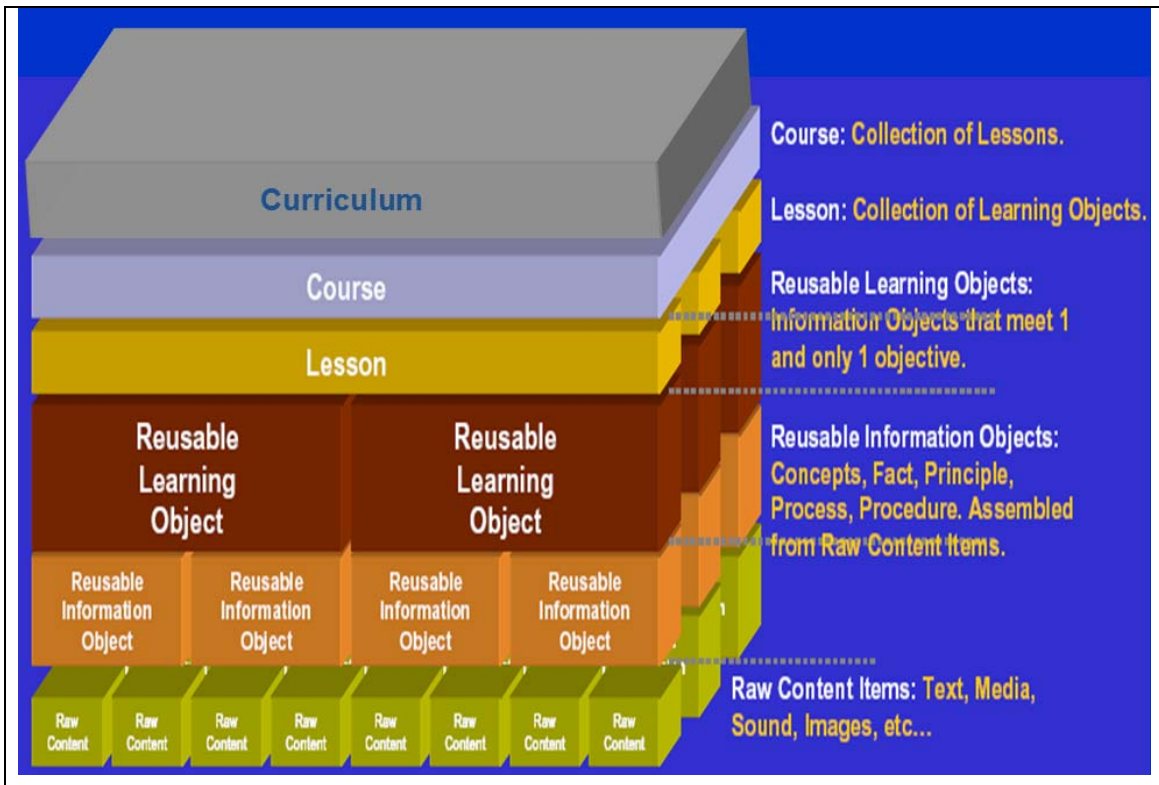
In order to manipulate PDF documents/fill in PDF forms in Draw, follow the steps below:

1. Download and install OpenOffice from <http://www.openoffice.org/>
2. Open the application “Draw” in your OpenOffice suite.
3. In order to edit .pdf in “Draw” you need to install a PDF import extension.  
Download this extension from  
<http://extensions.services.openoffice.org/project/pdfimport> . It’s free.
4. Navigate to *Tools > Extension Manager* of the Draw application.
5. Click on *add* and point to the file you downloaded in step 3.
6. Follow the installation process. Once complete, you can edit .pdf inside Draw.
7. Open a .pdf file in Draw using *File > Open*. This will allow you to edit it.
8. Save the project as .odg when you have finished editing your .pdf
9. Navigate to *File > Export as PDF* to convert the document back to a .pdf

## Appendix B

### Content Reuse through Reusable Learning Objects (RLOs)

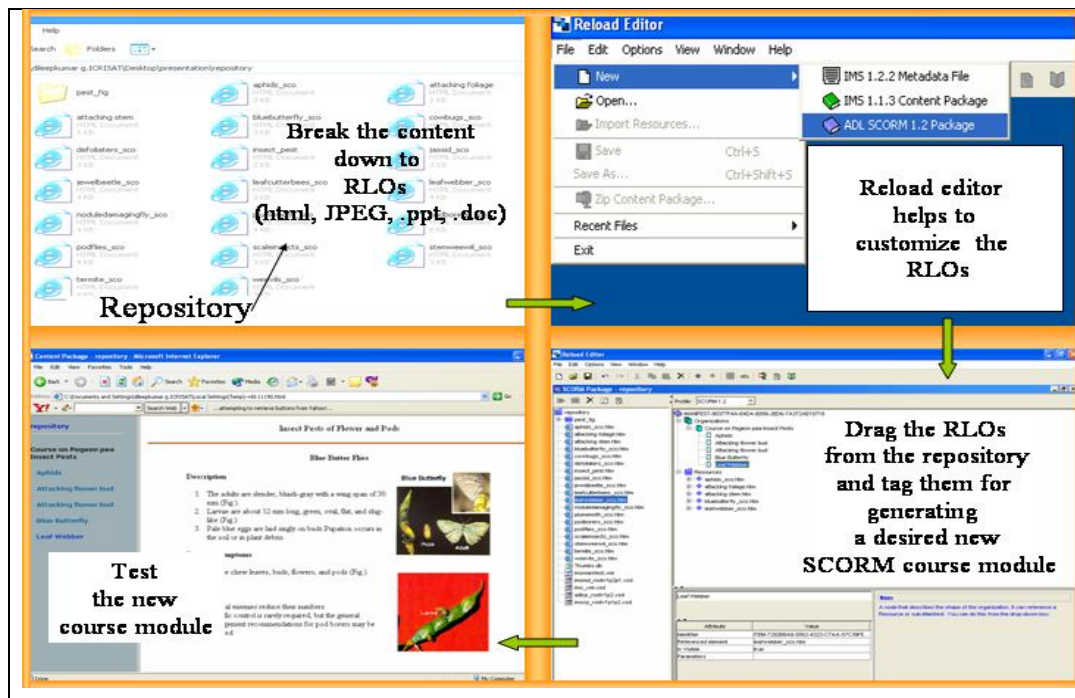
In recent years, content creation has taken a more granular approach venturing into the realm of Reusable Learning Objects (RLOs) which are small chunks of information which can be strung together to build a particular piece of content such as a lesson, course or curriculum.



Building Content Bottom-Up: the Reusable Learning Objects<sup>47</sup>

One of the major benefits of using RLOs is the ability to use a variety of technologies to compile them into larger pieces of content based on their reusability, interoperability, durability and accessibility. The following diagram illustrates how existing pieces of content which are in the form of RLOs are compiled into distributable content using RELOAD technologies.

<sup>47</sup> Balaji. V. (2008). AGROCURI. *Personal Communications*.

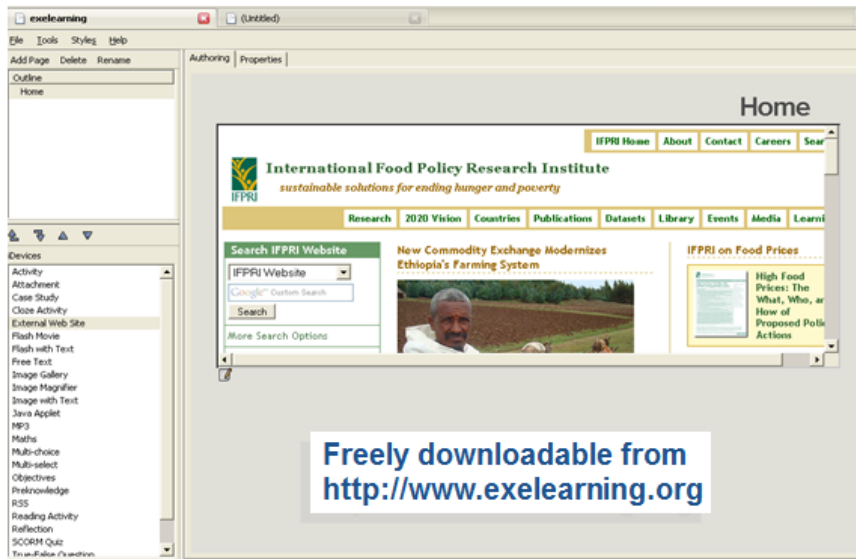


Process of customisation of RLOs for creating an electronic course<sup>48</sup>

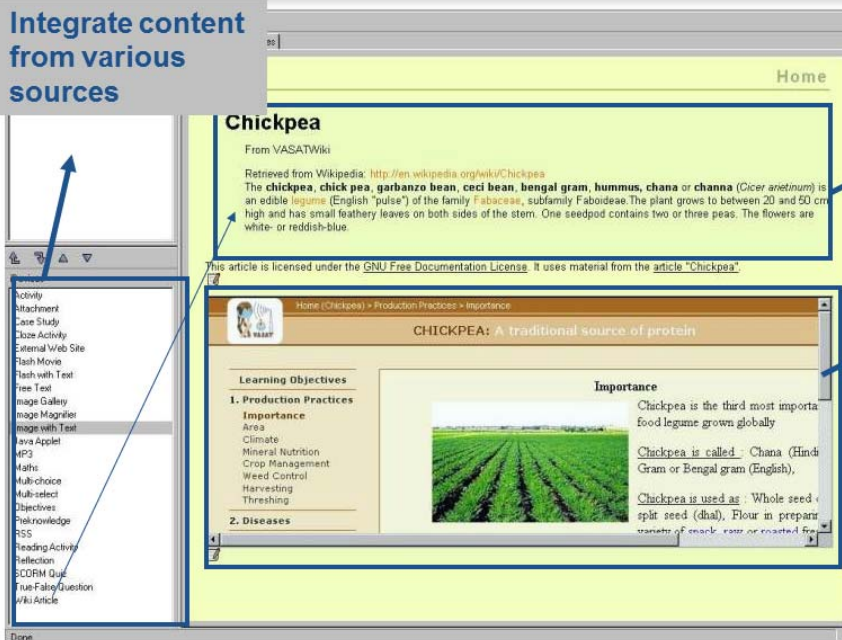
Furthermore, desktop technologies such as eXe can be used not only to reuse the content but to create the content as well. The next few diagrams demonstrate how eXe has been used to create and re-use content in a practical scenario.

<sup>48</sup> Guntuku, D.K.& Balaji. V. (2006). Rapid Customization of Reusable Learning Objects (RLOs): A new paradigm for Content Generation and Localization for Open Distance Agricultural Education and Extension. *Proceedings of the Fourth Pan Commonwealth Forum on Open Learning, Jamaica* (<http://pcf4.dec.uwi.edu/viewpaper.php?id=300>)

**RLOs are like academic putty – they can be aggregated and repurposed. A desktop tool readily available from the COL is demonstrated**



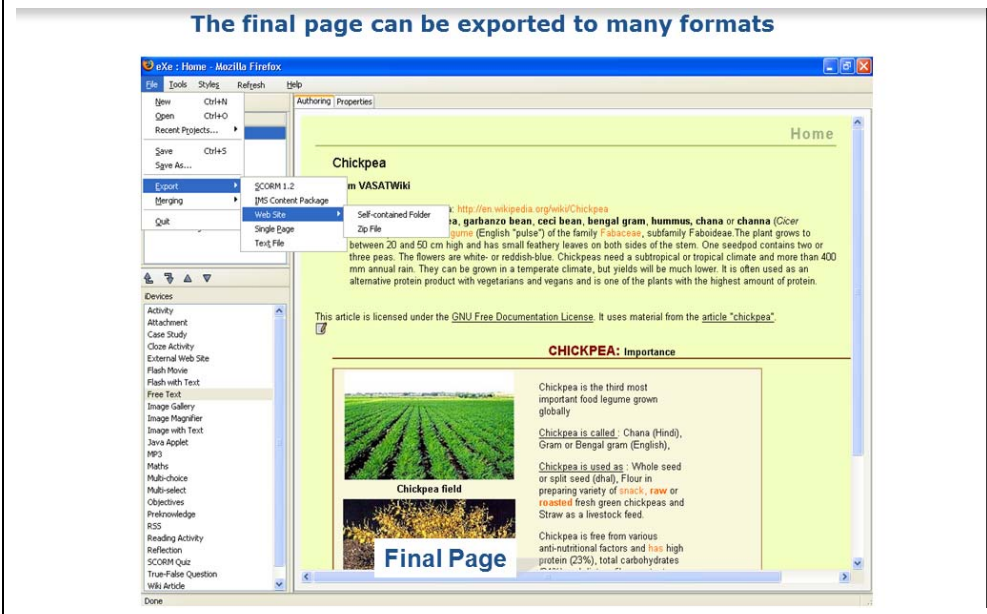
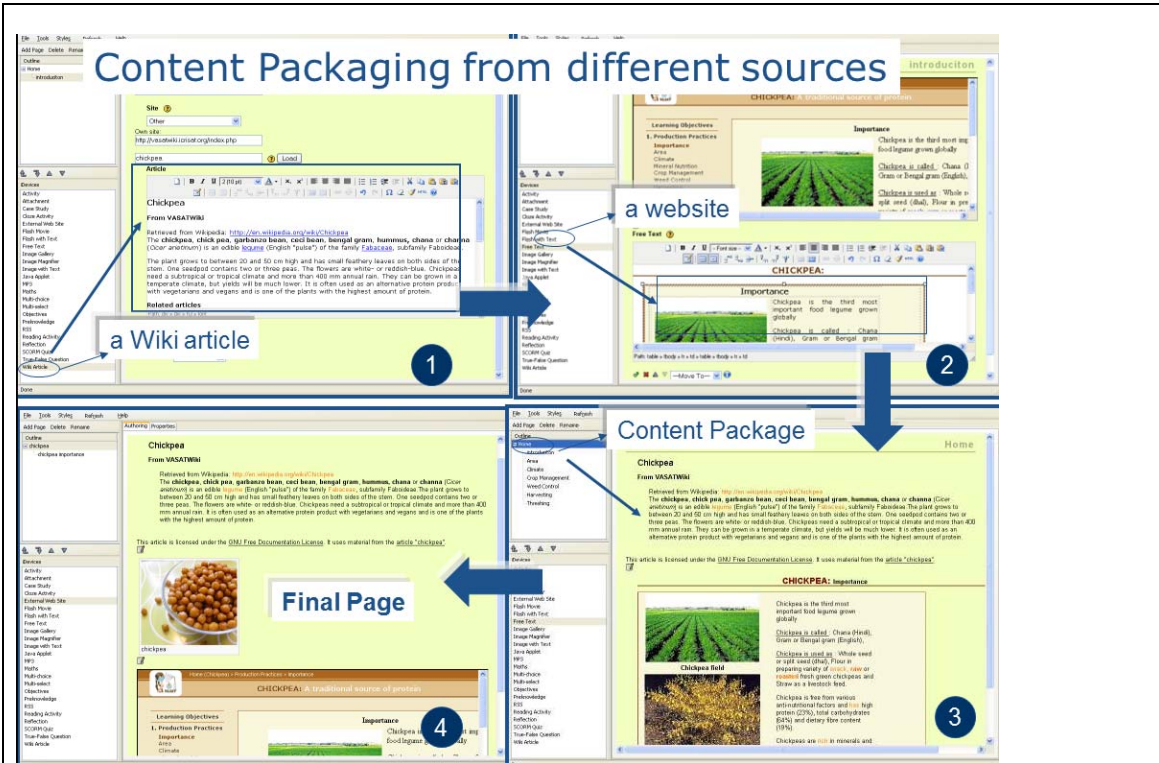
**Integrate content from various sources**



**Content aggregated from a Wiki**

**Content from standard a website**

Content aggregated thus could also be exported to various formats



Reuse of content using eXe<sup>49</sup>

<sup>49</sup> Balaji. V. (2008). AGROCURI. *Personal Communications*.