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ASPECT

IMS Common Cartridge and SCORM Demonstrator

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e*Content*plus

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[1] OJ L 79, 24.3.2005, p. 1.

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1 Executive Summary

The ASPECT best practice network supports content providers interested in packaging content using open specifications, which ensure compatibility and reusability of the content packages.
The demonstrator, described in this document, has been developed to help content providers select and use appropriate tools for all parts of the content package lifecycle - packaging, validation and content rendering. The demonstrator consists of a web-based portal describing a range of tools.
Common tasks for the use of open content packaging specifications are described in section 2. Comparing these tasks with the actual situations faced by each content provider will help these organizations to select the right specification for each purpose as well as the right tools for the intended user group. Section 3 of the document then describes some freely available authoring tools for creating content packages. Section 4 and 5 respectively deal with validation tools and players.

All the tools described in this document are non-commercial and can be freely used by project partners and associate partners. In a second version of the demonstrator, commercial tools will also be referenced. A further tool for creating content that uses the QTI specification will be available soon. The set of tools presented in this demonstrator as well as the screen casts contained in this document are available on the ASPECT project web site at http://www.aspect-project.org/

2 Tasks

The following tasks should be considered when packaging content. They are described here to help content providers to identify appropriate tools for packaging content. Some content providers may already have their resources in web-based formats and these resources can be reused for content packaging by utilising some of the tools described below. Content developers who are confident in the use of XML and technically proficient can use more complex programs to create their content packages. For those with lower levels of technical competence, a number of user-friendly tools are available that enable users to create their own content packages without having any knowledge of technical specifications.

2.1 Planning for content packaging

Before starting to create a content package in SCORM or Common Cartridge format, content developers need to consider a number of issues, particularly who creates a content package and how complex it is. Tools for content packaging should also only be selected when content developers have considered the following:

What do you want to do with the content package?

- For use primarily in a LMS:

Many learning management systems like Moodle or ILIAS have interfaces to upload and play SCORM packages. This is an easy way to start working with the SCORM specification. Many LMS providers, for example Moodle and Blackboard, have announced support for the Common Cartridge specification as well. Unless the LMS is certified as being compliant with SCORM or Common Cartridge, it is advisable to contact the LMS provider in order to be sure that all the specification features relevant to a given application are supported.

- For a Web-based Player:

  For Common Cartridge and SCORM, web-based players are available to play cartridges and SCORM packages.

What are the steps if you have or do not have prepared resources?

- If the resources are web-based like html pages, Flash videos, pictures and documents:

  Compile them together in a sequence with RELOAD or MOS Solo for SCORM or use Mir Common Cartridge system for Cartridges

- If you do not have existing resources that are prepared in any way:

  The add on “Learning Essentials” for Microsoft Office can be used to create html pages and SCORM resources.

  With MOS Solo it is possible to create the html pages while building a content package. It means: writing text and uploading pictures or other media data.

- If the resources are SCORM packages:

  Validate them with the test tools

  Convert them to a Common Cartridge

  Edit existing packages with the tools (reusability!)

How does the knowledge and skills’ levels of users affect the choice to tools?

- Teachers for example can use MOS Solo for small content packages for their lessons and upload them into an LCMS or play them in a player.

  If they have some experience using web-based formats, content developers can also use the Learning Components’ toll and create Common Cartridges.

- Professional programmers can use RELOAD to create comprehensive SCORM content packages and test it with the ADL Test Suite.

The new content packages should be validated with the tools that are introduced later in chapter 4.

2.2 Creating SCORM content packages

The primary consideration here is who will do it? Developers are able to use professional tools and produce a lot of comprehensive content packages. Others with less technical expertise need user-friendly tools to create content packages for themselves.

Professional or experienced Developers
Professional developers mostly build their resources with typical programs like Dreamweaver, Photoshop and other professional tools. Content developed using these tools can be compiled with the RELOAD Editor to professional SCORM packages.
The ADL Test Suite covers the different versions of SCORM that are available. It is important to note that a special version of Java is required to run the Test Suite.
The valid content packages can be uploaded to a LMS/LCMS or played with the integrated ICODEON SCORM player at the ASPECT portal.

Non-professionals
Non-professional users can start by preparing their own resources with, for example, the MS Office family and the add-on Learning Essentials for MS Office. A standard module is available for Word, Excel and PowerPoint. The professional version includes add-ons for VISIO, FrontPage and Learning Objects Manager.
The prepared resources can be uploaded and compiled with MOS Solo. It is also possible to create with MOS Solo html pages by “drag and drop” and a right mouse click without any deeper knowledge being required.
With MOS Solo everybody is able to create new content, questionnaires, presentations etc.
The RUSTICI Software validates the content packages. Users just upload and test the content packages. Valid SCORM packages can be rendered by the ICODEON player integrated in the ASPECT portal.

A video clip for developing a SCORM package step by step with MOS Solo is also available at the ASPECT project website.

2.3 Creating Common Cartridge content packages

As Common Cartridge is a new specification, the number of tools currently available is limited. However, already existing authoring tools to create cartridges are user-friendly and can be used by almost everyone. These tools are web-based and only require users to register before using them.

An easy way to create cartridges from existing resources is to use the MIR Common Cartridge tool. Resources in web-based formats like html can be used. Uploading the resources and a clicking on “Build” produces a new cartridge that can be immediately played and tested in MIR. However, it is not possible to create resources with this tool; a condition of MIR’s use is the availability of existing web-based resources. For validating the new cartridge one can the CC testing tool, described below in chapter 4.2. The cartridge can also be played with the ICODEON player.

With the LC IDE authoring tool, it is possible to produce sequences with predefined functions. New rules for the sequences can be defined. Actions like “YouTube Video Activity” or “Multiple Choice Activity” can be strung together. The behaviour of the students

is constrained by such sequences. The latter can be built using a graphical designer whereas a “preview” function allows playing and testing new sequences.

Both these tools are very user-friendly and laoo both professional and non-professionals to develop their own cartridges.

3 Authoring tools

3.1 SCORM editors

Many authoring tools have been developed to build SCORM content packages although not all of them implement the whole specification. Some authoring tools also do not fully meet the requirements of SCORM conformance, in particular with regards to the sequencing of metadata. Here we present two tools for creating SCORM packages referenced on the demonstrator website.

3.1.1 MOS Solo Editor

MOS Solo is an application to create learning courses, presentations, assessments and surveys. All created courses are SCORM 2004 conformant and can be viewed in a Browser. MOS Solo is a tool to build easy and fast content packages. It is possible to add pages, several documents, pictures, flash files and activities with a simple right mouse click. A preview function helps to control the state of a course.

Starting the program opens the Home Page, see figure 1.

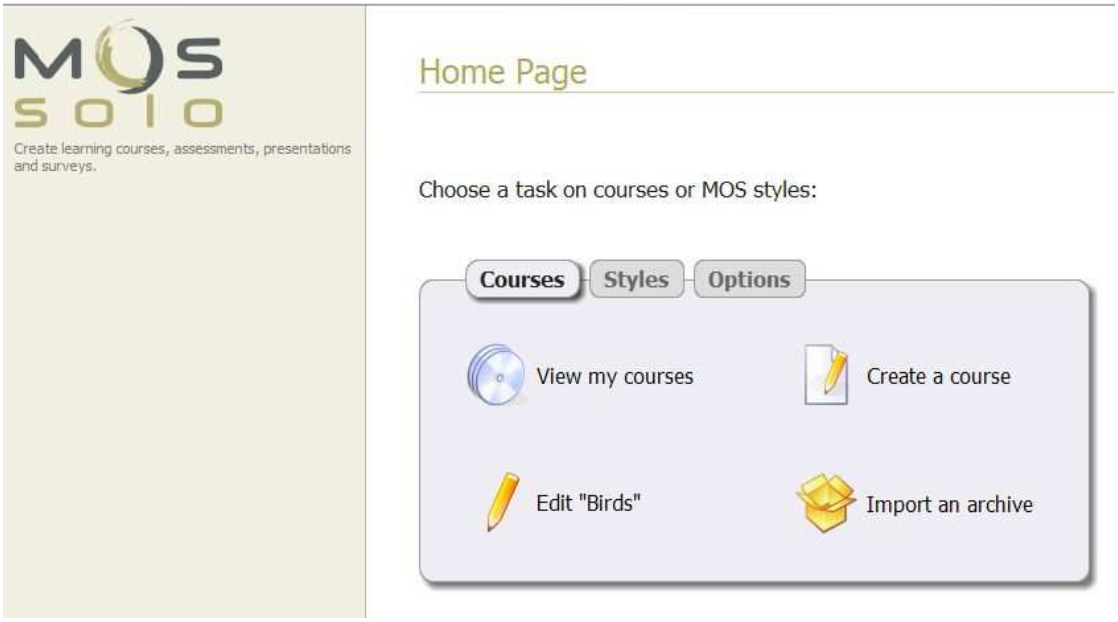


Figure 1: MOS Solo Home Page

Some tasks can be chosen now. Start with a click on “Create course”. The title and other settings can be made now. Choose one of six types and one of five styles for the new course.

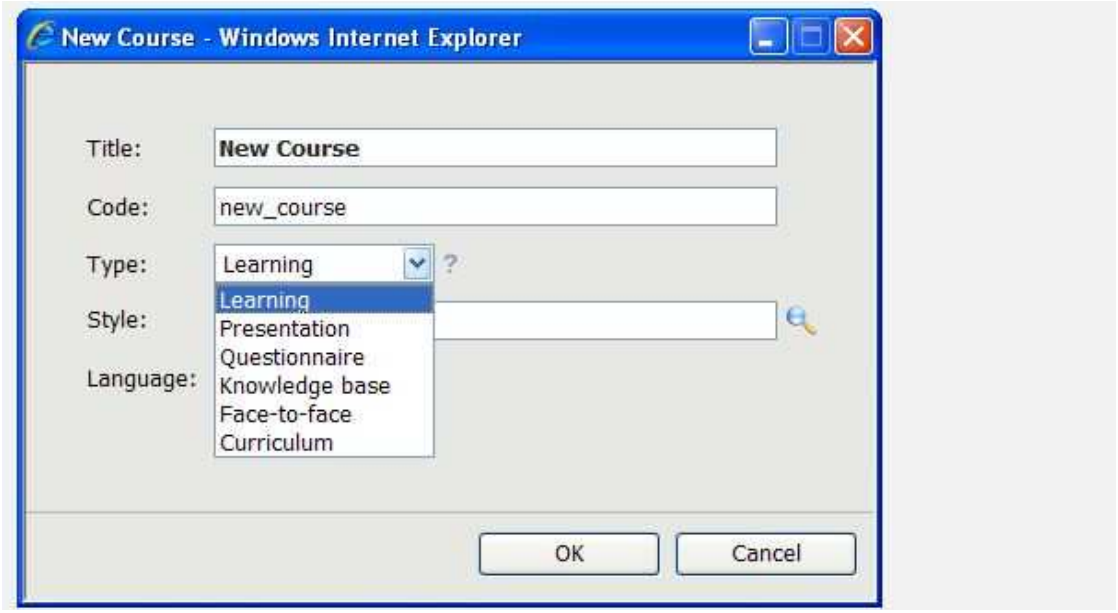


Figure 2: Types of courses

After saving the course with a name, the content can be added. With a right mouse click on the title a menu opens. Now it is possible to add sequences, activities and documents. The course can be created with this tool or by uploading prepared pages.

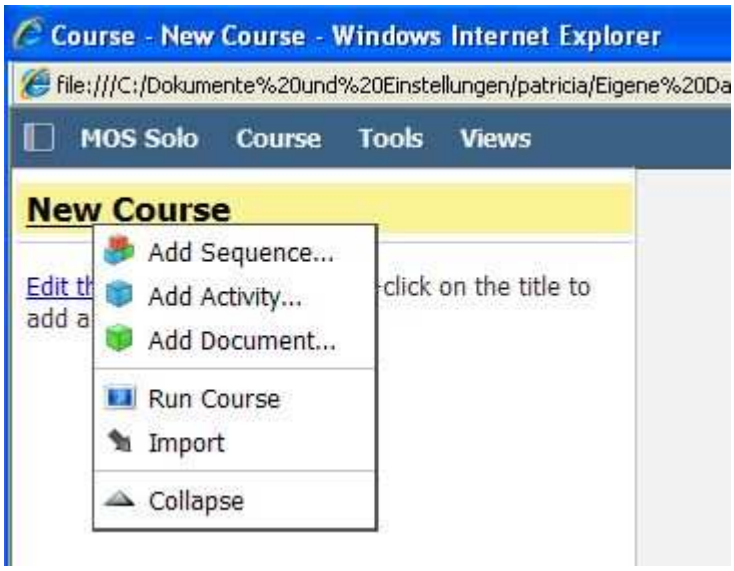


Figure 3: Add Sequences, Activities or Documents

A preview function makes it easy to control the pages or the whole course. Also the content can be exported, notes can be added or a spelling check can be done. Without any knowledge about techniques or specifications, it easy for virtually anyone to build SCORM packages with this tool.

With a further function new styles can be created and existing styles can be adapted for an individual style. Just changing the background colours or layout of the windows modifies styles.

Be aware of the demonstration videos! At the starting page of MOS Solo are some demonstration videos. Choose “Options” and the yellow button “Getting Started”. These video clips run with Adobe Flash Player and can be stopped and started again. Every step for creating content or work with the tools can be watched and done at the same time.

Example courses can be found at the website from MOS Chorus. For registered users is it possible to get more information and manuals. Just send a request for a free account to support@mindonsite.com.

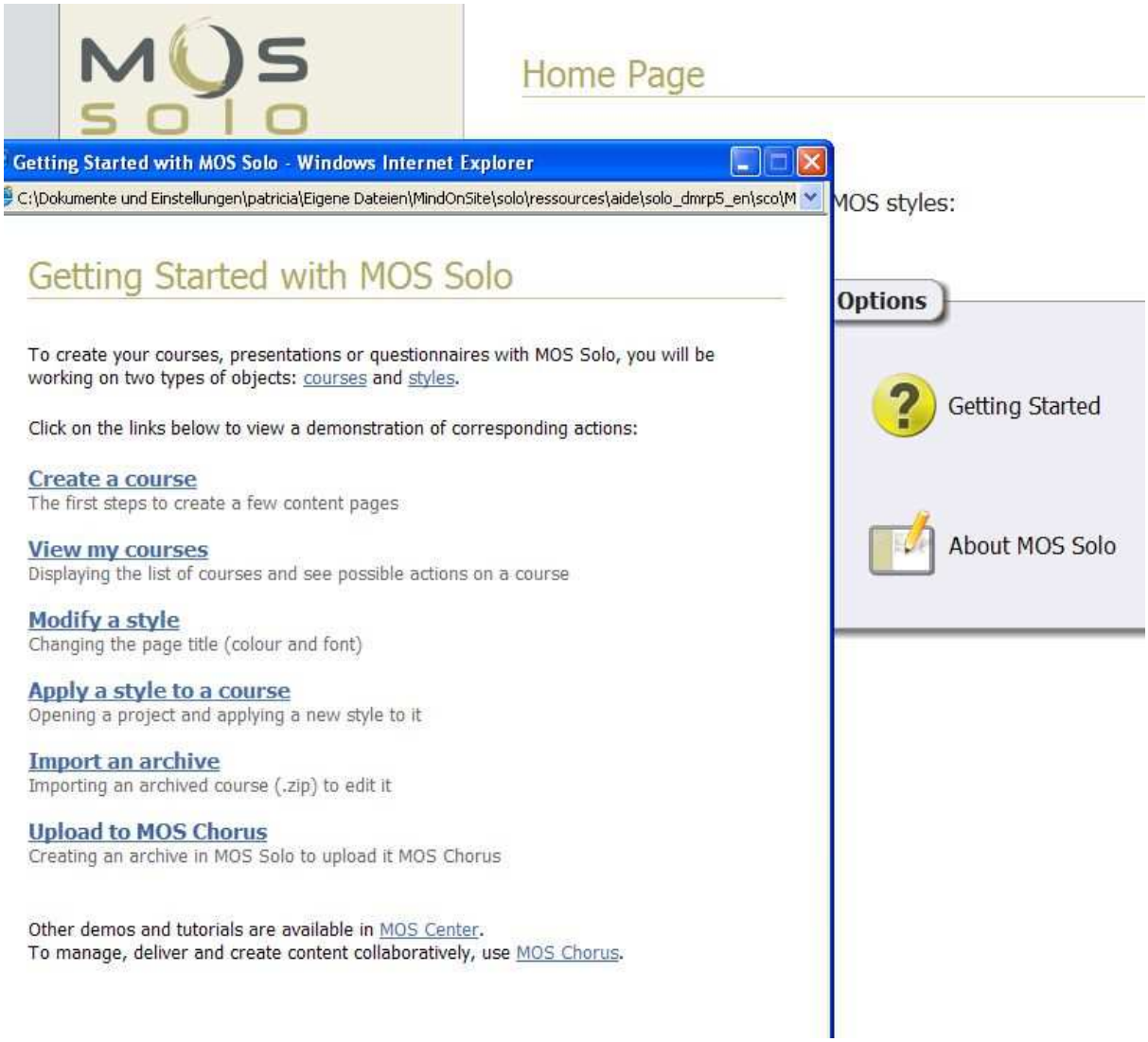


Figure 4: Getting started with video clips

MOS Mind-onsite offers the LCMS MOS Chorus R1. The cost of the service depends on the number of users and number of authors.
The tool is for a local installation. (http://www.moschorus.com)

3.1.2 The RELOAD Editor

RELOAD is a project funded under the JISC Exchange for Learning Programme. The project focuses on the development of tools that are based on emerging learning technology interoperability specifications and is managed by the University of Bolton in the UK.
The RELOAD editor provides support for IMS Metadata, IEEE LOM, IMS Content Packaging 1.1.4, SCORM 1.2, and SCORM 2004. There are versions for Windows, Mac OS X and Linux. It is Java based and for a local installation.

A later release of the classic Reload Editor is based on the Eclipse Rich Client Platform and 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 2004 (3rd edition) specifications. There are versions for Windows, Mac OS X and Linux.
The tool is made for professional developers and experts. Practical experience shows that developers build comprehensive content packages with RELOAD. Many language packages are available. The tool helps to assemble different prepared resources and build a SCORM package. The tool is for a local installation. A RELOAD player for SCORM 1.2 is also available.
(http://www.reload.ac.uk/)

After starting the editor a blank window appears. To create a content package, the first step is to choose under “File” the format of the new package. The format options are displayed at figure 1.

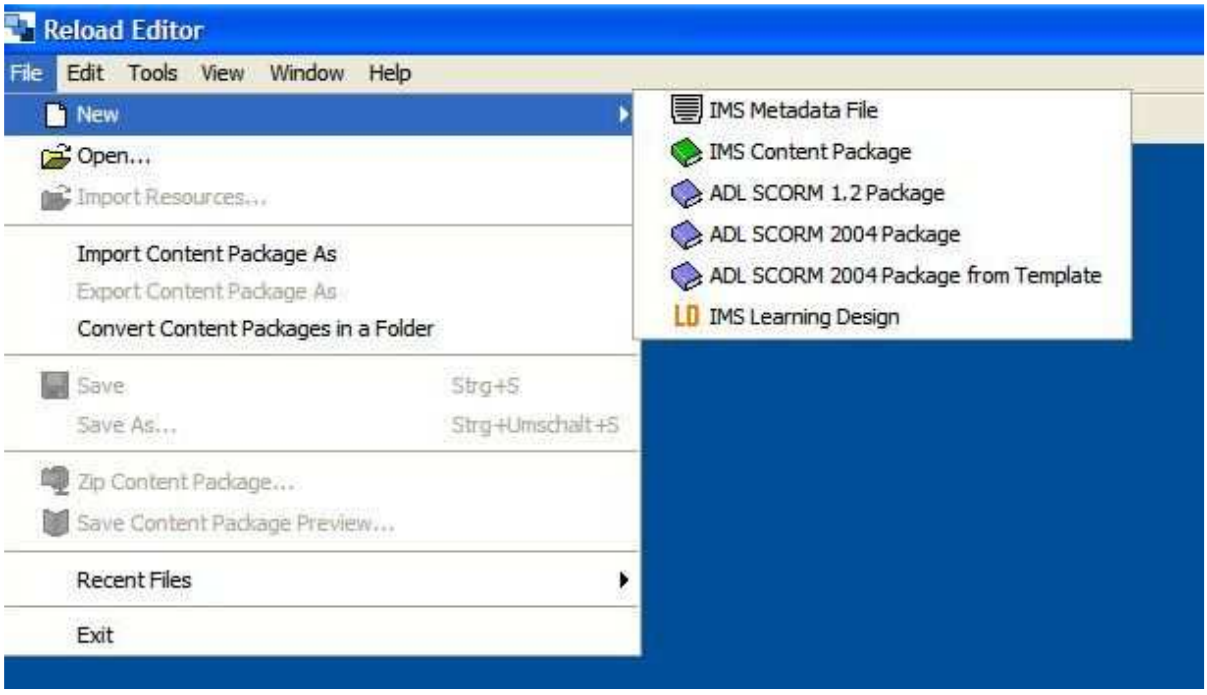


Figure 5: Starting the RELOAD Editor

In this example the “ADL SCORM 2004 Package from Template” is chosen. The RELOAD editor extracts the template and prepares it for filling it with the users own content.
The left hand explorer panel lists the extracted files. The resources and the all predefined files for building a SCORM are now ready to use.

On the right hand side is the working area with the Metadata files, the Organizations files and the Resources files. Here the resources will be assigned to these files. The attributes and values are listed under the content package icons. The values can be changed. At the end the template files are filled with the own resources. For example: The html pages are assigned to the SCO files of the template.

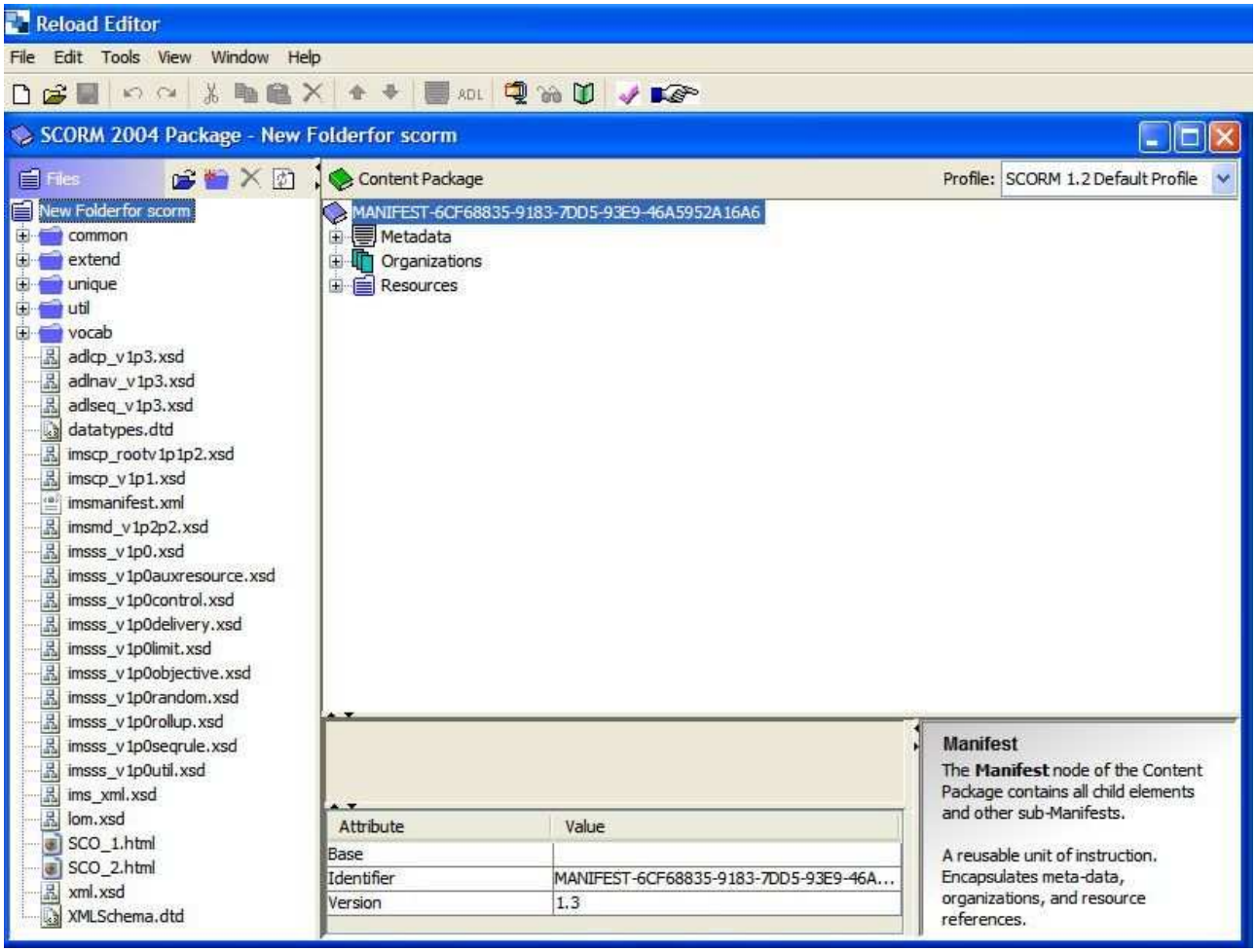


Figure 6: Loading a template

Now the resources can be imported by choosing under “Files” the option “Import Resources”. It’s possible to import content packages as well.

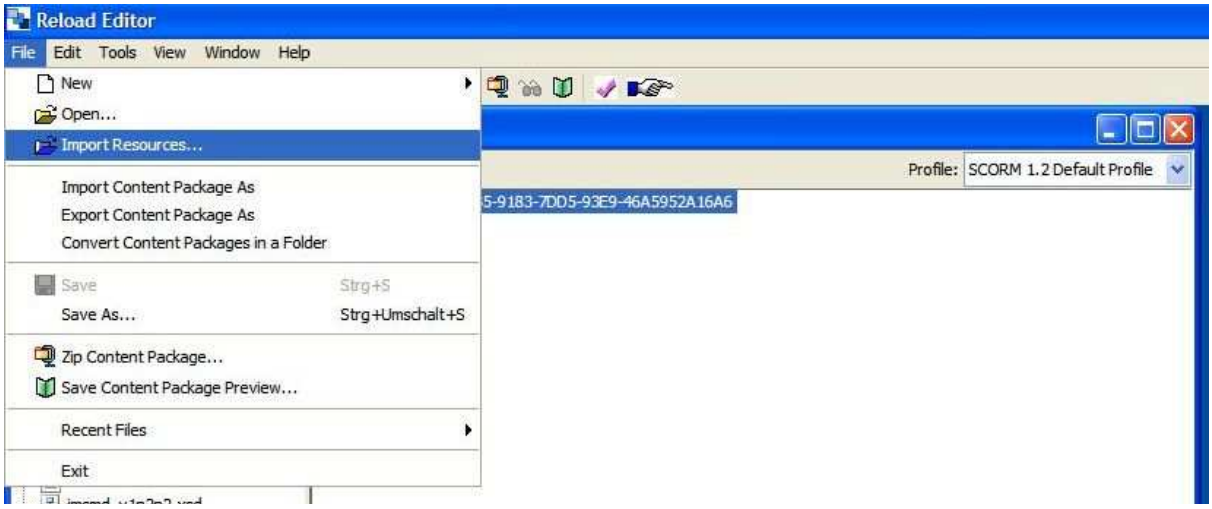


Figure 7: Importing resources

Now some resources are chosen and imported. On figure 8 the imported resources are listed on the left side.

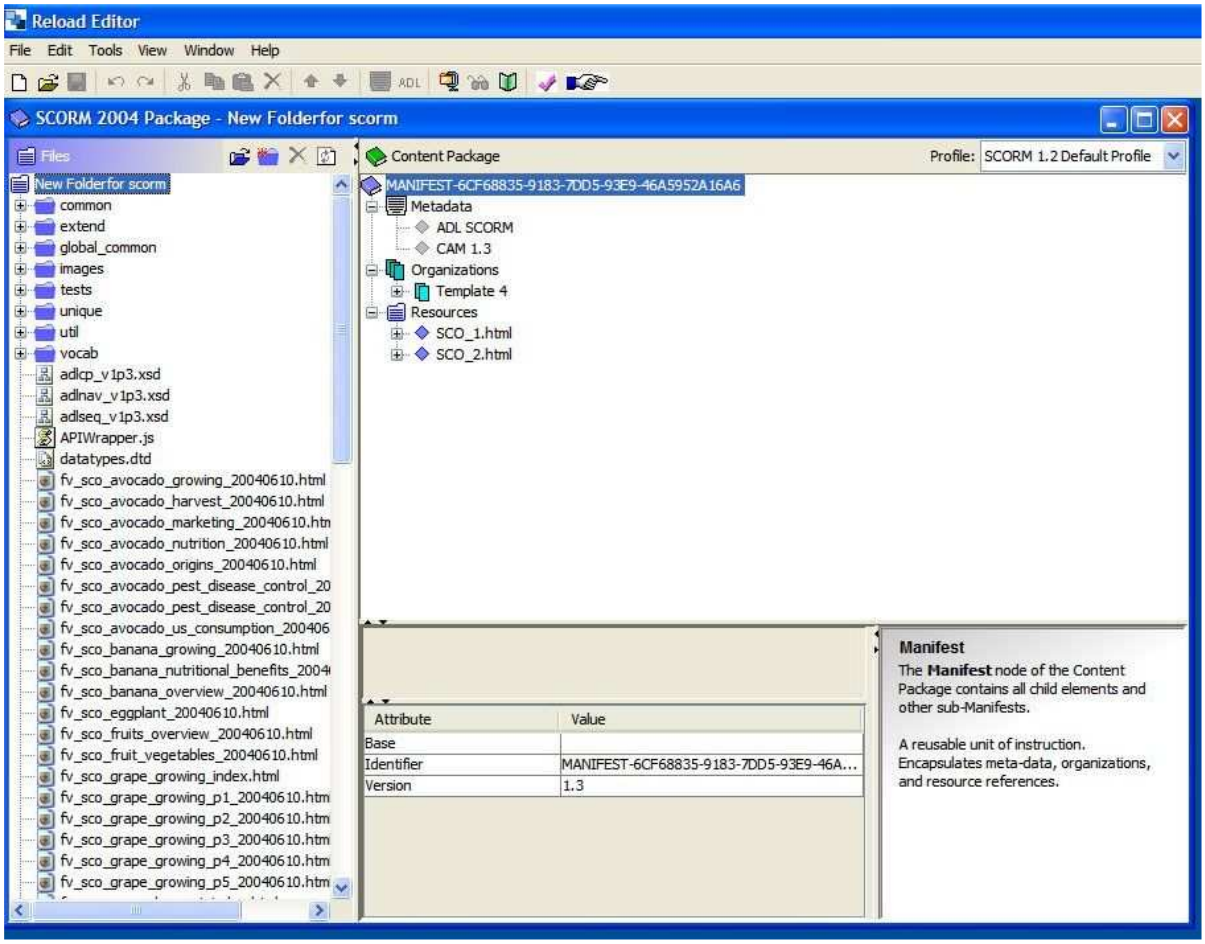


Figure 8: Drag the resource files to the Resource icon

The resources can be attached to the Resources' icon on the right. Users just drag the files by holding down the mouse.

Use the properties panel at the bottom of the editor for attaching the resource files to the SCOs. In this template two SCOs are defined. Here the SCOs can be renamed. The next figure shows the results of changing the names of the SCOs and the template name.

Adding Metadata can be done by clicking on Metadata and choosing the last point “Edit Metadata” under the “Edit” menu.

Figure 9 shows the assigned resources and names in the template.

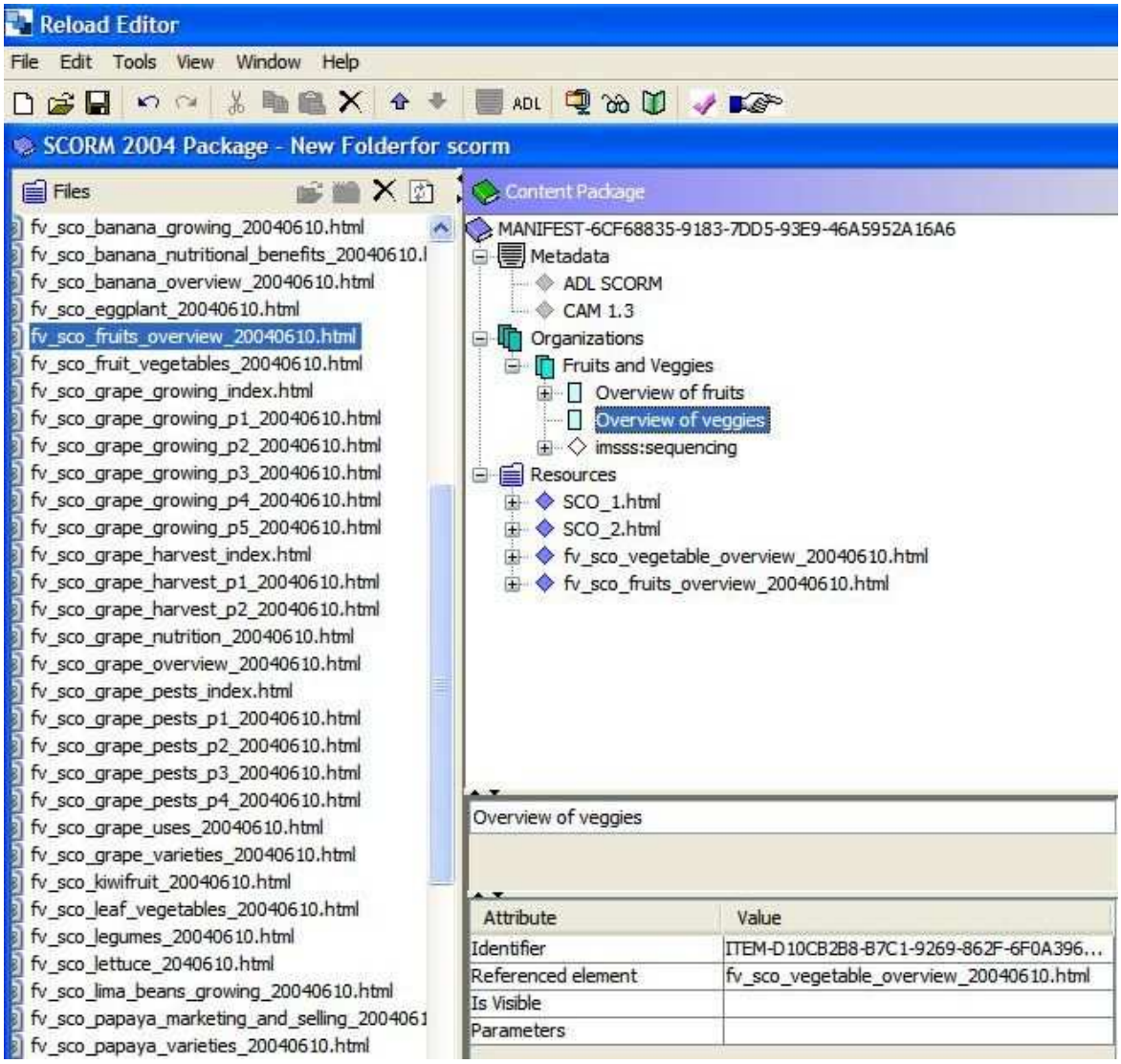


Figure 9: Assigned Resources

Now, a SCORM zip file can be created by choosing the menu item “Files” and “Zip Content package”. The file is ready to be used.

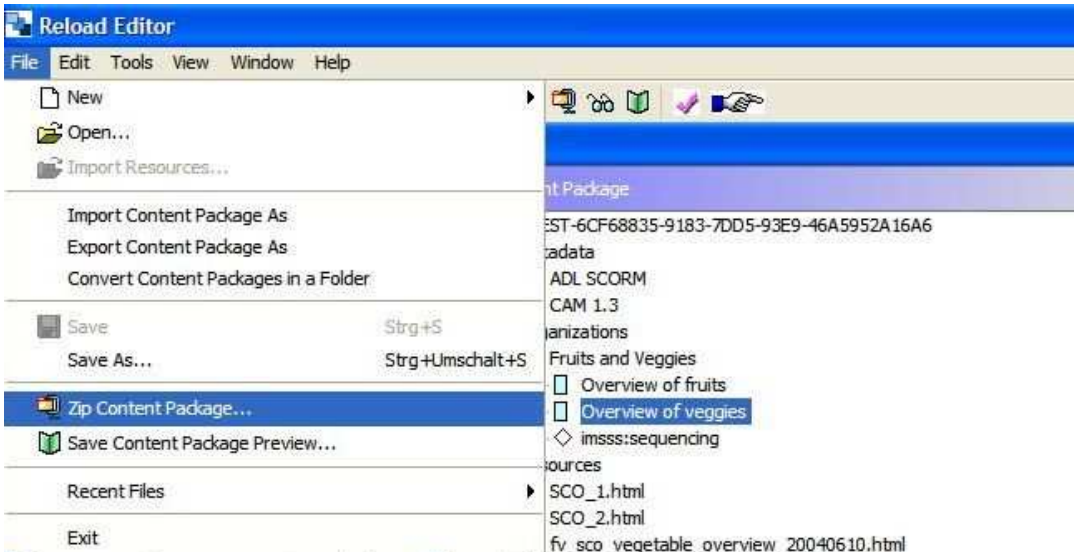


Figure 10: Save as a SCORM Content Package

3.2 Common Cartridge editors

As Common Cartridge is a new specification, there is a limited number of available tools. Two web-based editors for creating and playing cartridges are described.

3.2.1 MIR Common Cartridge system

MIR is a simple and user-friendly web-based tool to build content packages in Common Cartridge format and play them. With a few clicks it's possible to create a folder, upload the resources, give the cartridge a name and build the new cartridge. A registration is necessary to use the tool. (http://dev.learngauge.com/MCCR/)

Figure 11: MIR login page

After registration at the website, login is possible. The starting page appears and the available courses are listed. With a click on "System Administration" a menu appears.

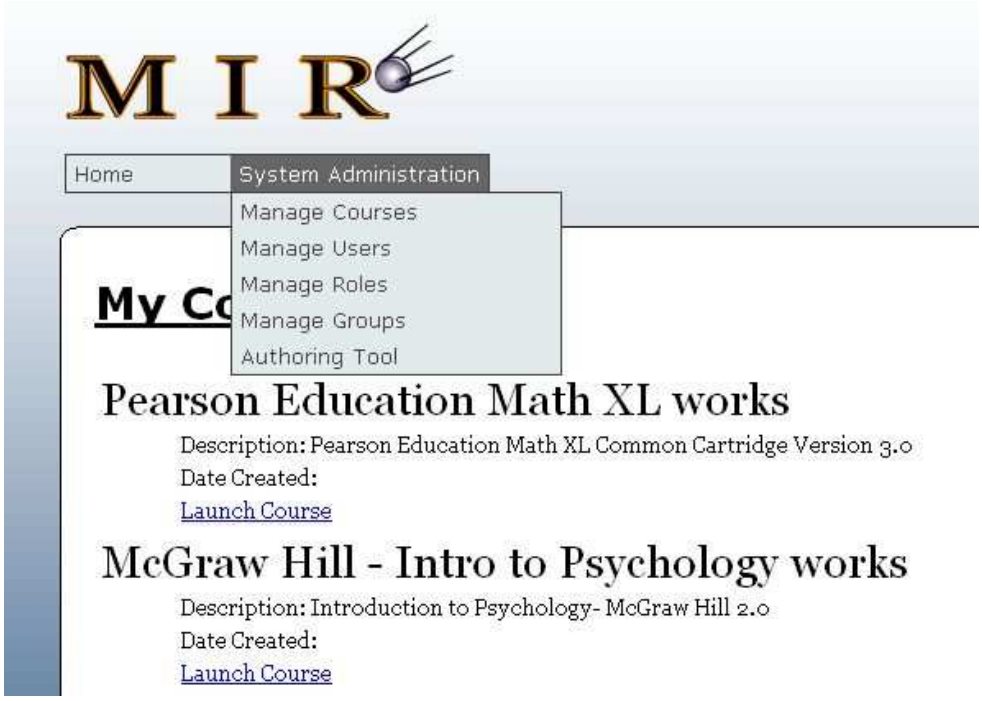


Figure 12: System Administration

Choose the "Authoring Tool " to create a new content package. The view then changes to the authoring tool with three tabs. Choose the tab "Resources" to upload resources.

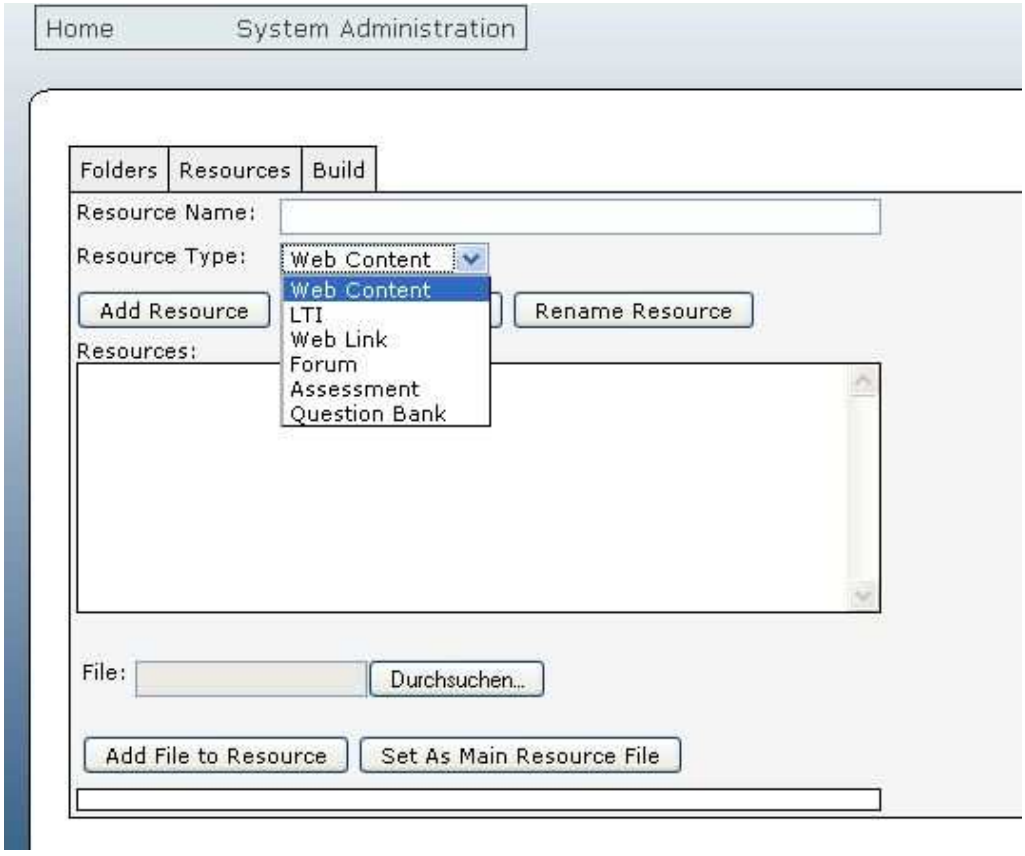


Figure 13: Add resources to a cartridge

At this step different content can be uploaded and added to the cartridge. It is not possible to create pages, but one can put prepared pages together in a content package.

Last step is to choose the tab “Build” and create the package with a name. The new zip file will be saved on the local computer, not at the MIR website.

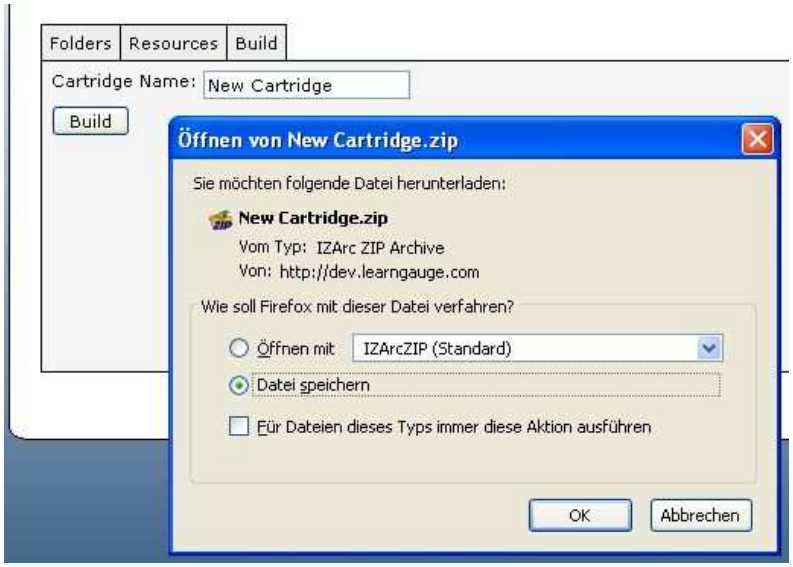


Figure 14: Build a zip file (new cartridge)

To test the new cartridge, it must be uploaded. Choose “System Administration” and “Manage Courses”. The courses are listed on the left hand side. Click on “Add New Course”.

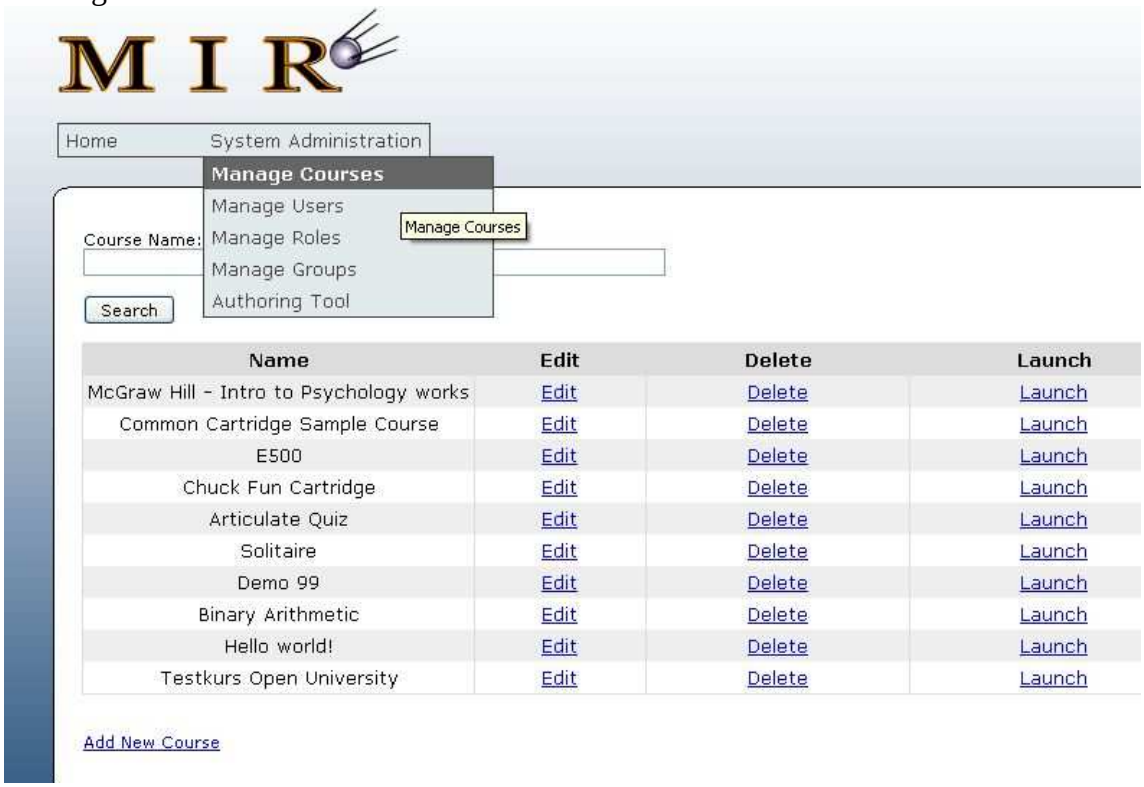


Figure 15: Manage courses and upload new courses

Now a new form appears. At first all gaps have to be filled and the new course has to be saved. Only after storing it, can the cartridge be uploaded. Cartridge upload is depicted on Figure 16.

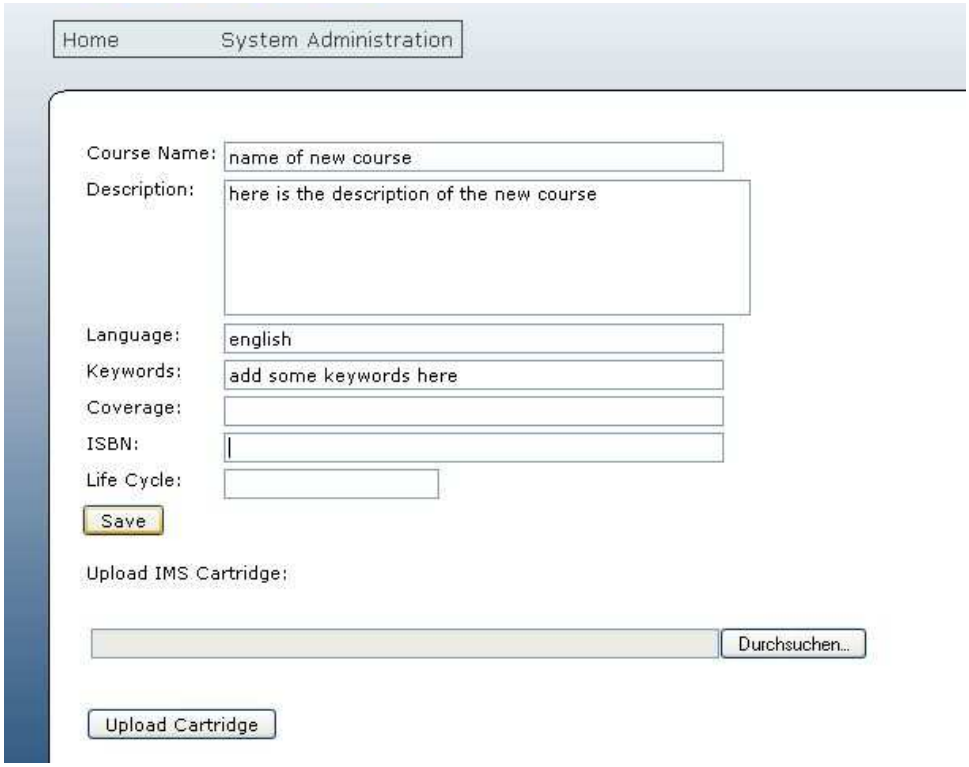


Figure 16: Create a new course

After having successful uploaded a cartridge, the corresponding course is listed with the other courses. Choose “Manage Courses” to get access to this list. From the list, it is possible to edit the description of a course, to delete it and to launch the course.
Editing means to open the cartridge and adapt the resources with an authoring tool. Changes like adding resources or deleting them can also be done.
With the MIR tool, cartridges can be developed, edited and played. It’s not possible to download an existing course, just by creating a course it can be stored locally.

3.2.2 Learning Components authoring tool

The LC IDE (Instructional Development/Design Environment) is a web-based tool to build Common Cartridges. With drag and drop functions is it easy to define rules’ driven runtime adaptation. The cartridges can be played with the integrated player.
Registration is necessary to use the tool. (https://www.learningcomponents.com/)

Figure 17: Website „Learning Components“

After registration and login on the website, the user starts in his working area, see figure 18. The first tab is the “Sequencer” where all cartridges can be produced.

Figure 18: Working area

To understand how it works. take a look at the example sequence “Just for fun”. The samples are to find with the components/Sequences Search. All existing components and sequences will be listed by this search.
The next figure shows the loaded sequence “Just for fun” and the activity palette with all implemented activities.

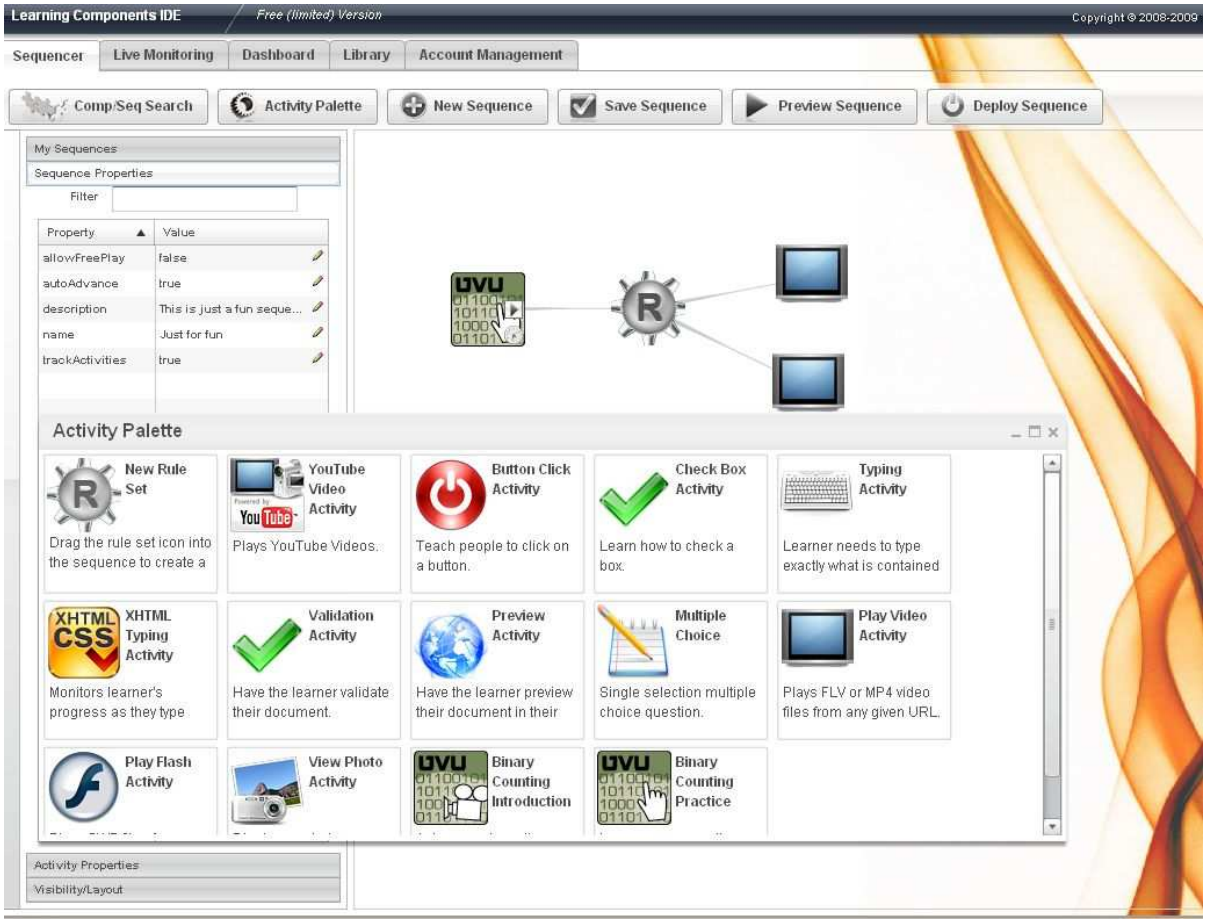


Figure 19: Activity Palette and example cartridge

A rule set is given to define the behaviour of the sequence when the user is playing it. See figure 19 with the rule set of the example sequence.

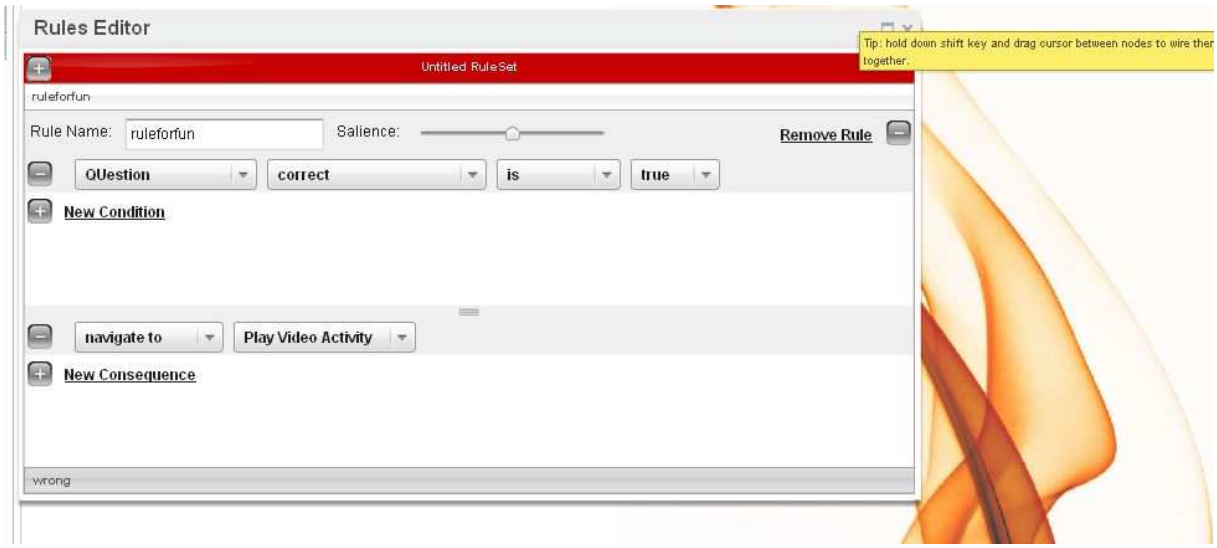


Figure 20: Rule set for a sequence

Creating new sequences starts with a click on the button “New Sequence“. Then the required activities and a rule set can be chosen. To connect the nodes, hold down the shift key and drag the cursor between the nodes. Edit every node/activity with a click on it. On the left hand side

the sequence properties appear. The resources can be uploaded and dedicated to the nodes/activities.
The button “Preview Sequences” plays the sequence in a new tab or window. The new sequences can be saved and exported, see figure 18.

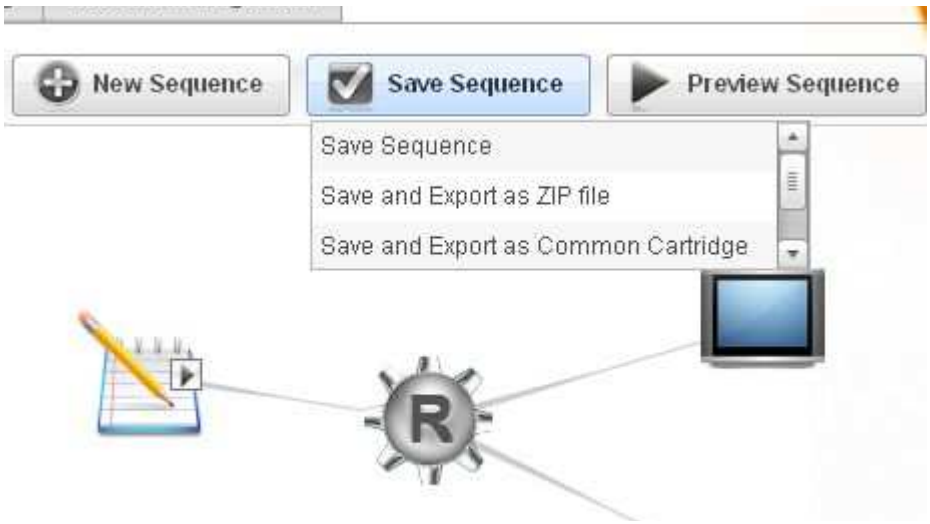


Figure 21: Saving and exporting cartridges

Two formats are available to export a cartridge, as zip file or a Common Cartridge.

To play a cartridge, click on “Preview Sequence”. A new window opens and an instruction pops up, then the task loads. Depending on the result of the task, a video clip or a learning unit starts.

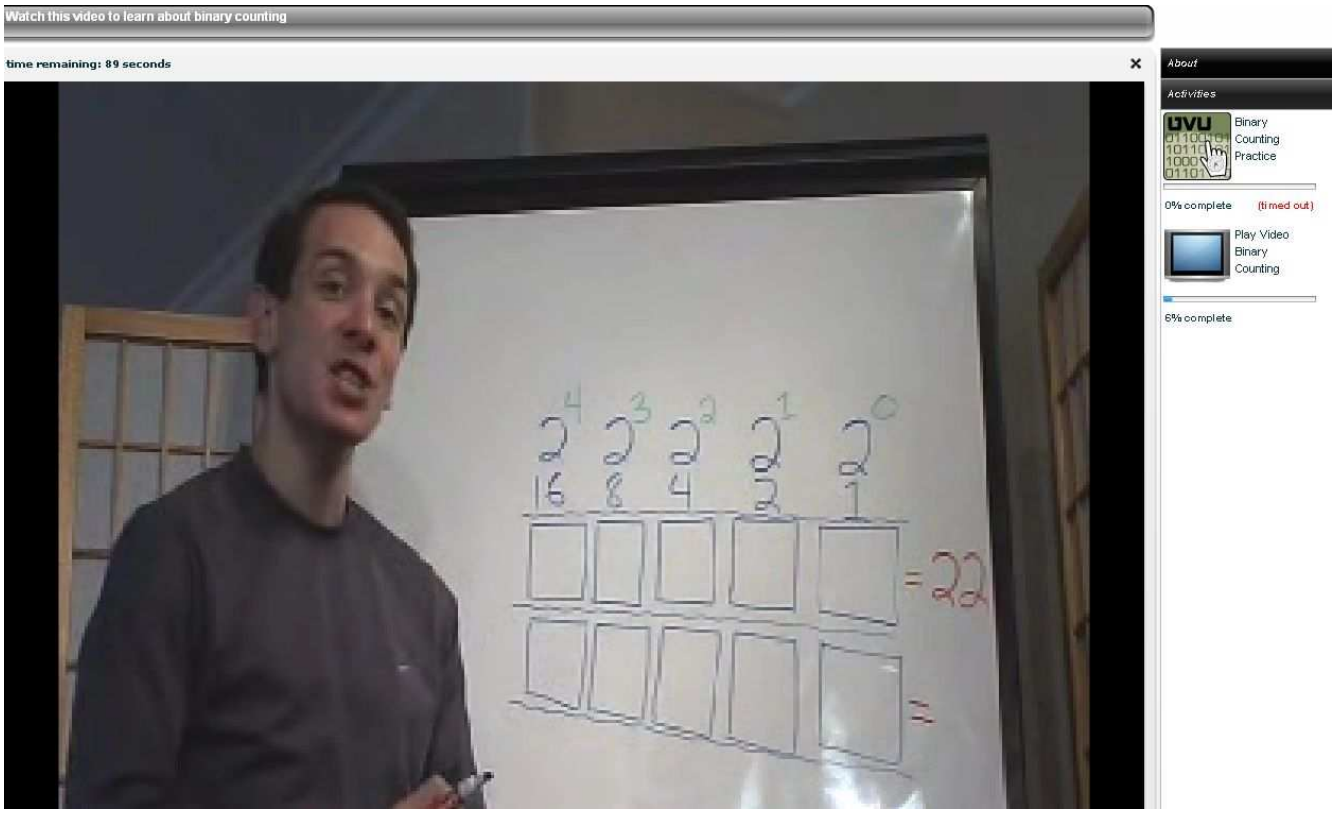


Figure 22: Learning unit

Figure 22 shows a learning unit with a status panel at the right hand side. The unit appeared after completing the task without success.

3.3 Learning Essentials for Microsoft Office

Learning Essentials includes curriculum-based templates and toolbars for Microsoft Office Word, Microsoft Office PowerPoint presentation graphics program, and Microsoft Office Excel spreadsheet software, plus academic tutorials from leading education publishers. Learning Essentials helps students get started, stay organized, and successfully complete high-quality assignments. And for educators, Learning Essentials can help them easily create effective instructional resources, complete administrative tasks, and implement new teaching strategies.
http://www.microsoft.com/learningessentials/default.mspx

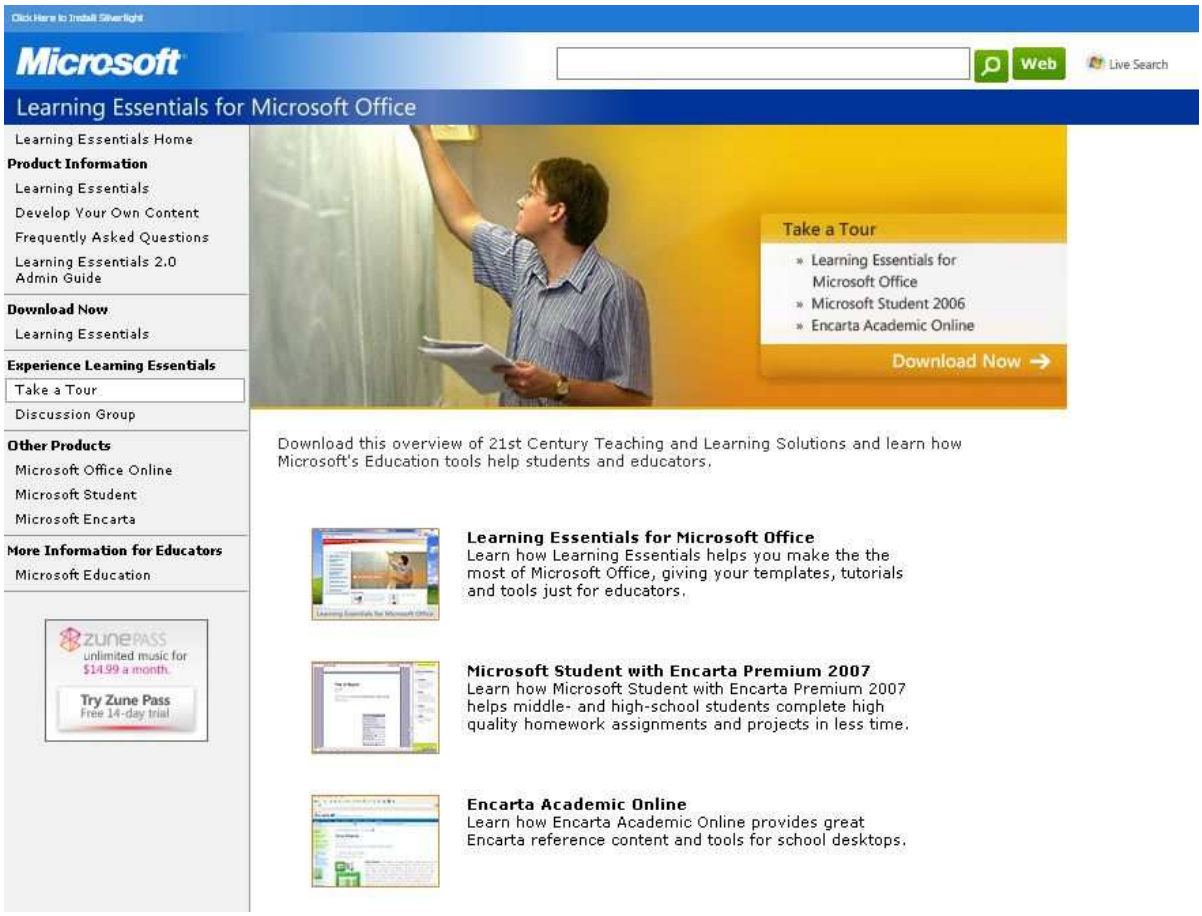


Figure 23: Microsoft Website Learning Essentials for MS Office

This add-on must be installed on a local machine and appears as a new tab in the Office programs. There are tools for teachers, students and learning objects. It is possible to import learning objects in the MS Office programs.
Additionally, a program can be installed locally. This program provides tools and templates for teachers and students too.

The tools support the creation of content resources with MS Office products. All content can be saved as a SCORM 1.2/SCORM 2004 content package.

4 Validators

Conformance testing is a major way to ensure interoperability and interchangeability of content packages. Testing SCORM and Common Cartridge packages can be done with the following tools.

4.1 RUSTICI Software "TestTrack" for SCORM content packages

The SCORM TestTrack from RUSTICI Software is an online tool to test SCORM packages and validate them. TestTrack has complete support for SCORM 1.1, 1.2 and SCORM 2004(2nd and 3rd edition). The use of the tool is free with some space and support limitations.

Make sure to check the TestTrack terms of use:
"The Site may permit the submission, hosting and publishing of certain User provided content (User Submissions). User is solely responsible for User's own User Submissions and any resultant consequences of posting User Submissions to the Site. By posting User Submissions to the Site, User hereby grants RUSTICI a worldwide, non-exclusive, royalty free transferable license: (i) to use, review and distribute the User Submissions, including any intellectual property contained therein, unless User provides RUSTICI written notice that it is revoking such license or removes the User Submission from the Site; and (ii) to use any technical aspects of the User Submissions. USER SHALL RETAIN ALL OF USER'S OWNERSHIP INTEREST IN THE USER SUBMISSIONS."

RECOMMENDATION: Revoke the user submissions and remove the content packages from the RUSTICI Website after validating it if the content is not for public use!

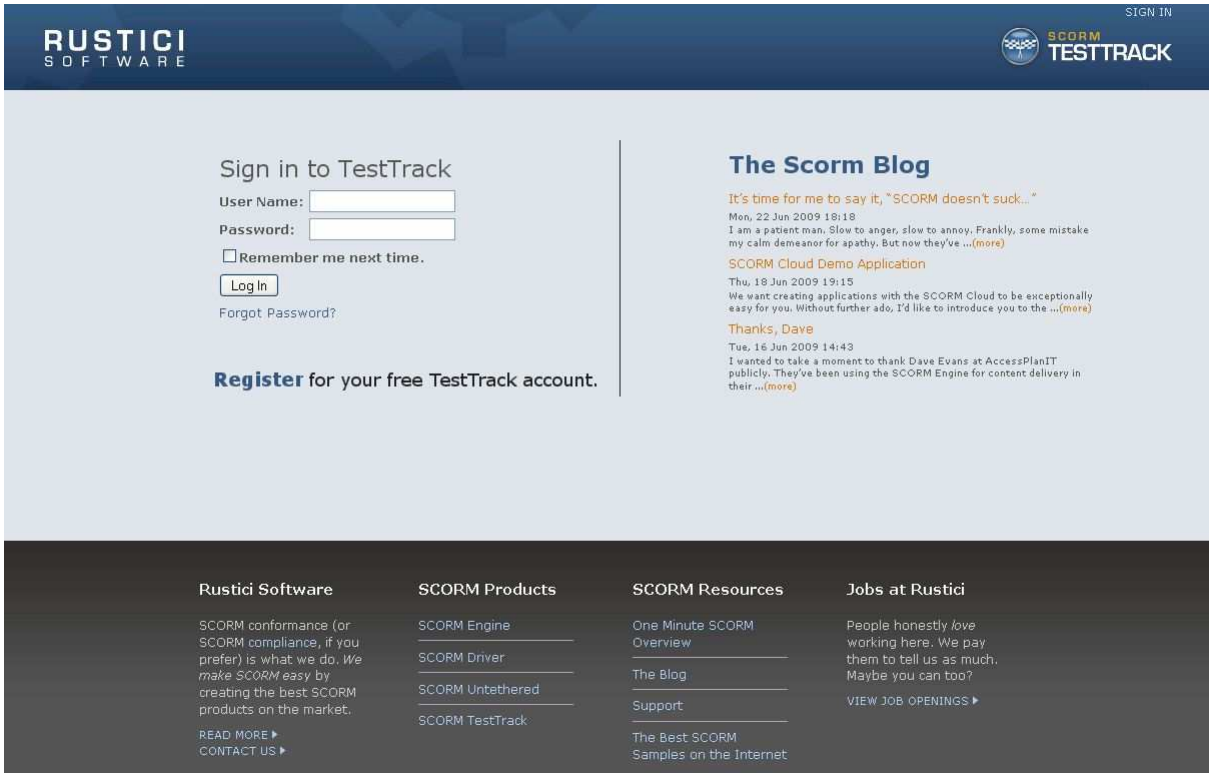


Figure 24: RUSTICI Home Page

First step is to create an account and log in to the homepage. After login, the following window appears.

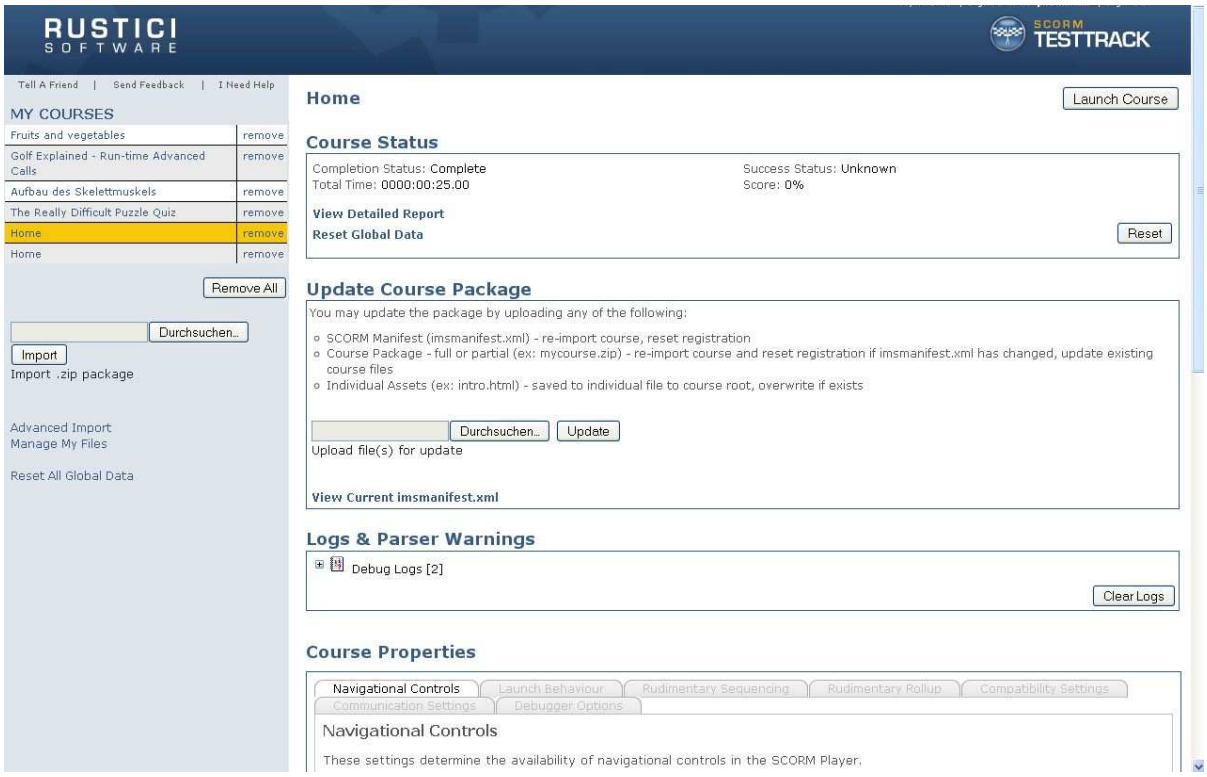


Figure 25: Working area of TestTrack

The uploaded courses appear on the left hand side. Choose “Remove” to delete them. Here the SCORM packages can be uploaded. If the content is valid, TestTrack will upload the file and parse the manifest file. Now one of the uploaded courses must be selected.

The right hand side reports the status of the current course after launching it. With TestTrack it is possible to launch a course and play it with all options offered by a player or LMS. Just one click on “Launch course” will start the course. The SCORM package properties on the right allows users to launch courses in a frameset with a menu on the left and other courses being launched in a new window. It’s possible to apply settings for navigation, compatibility and communication or use it with default settings. Debugger options can be set to control how much information is kept about every course.

If there is a need for using TestTrack on a local machine or network, Rustici sells special versions to install with the same features like the online version. Pricing varies depending on your situation, but generally falls between $800 and $1,000 per named user. That might be useful for big contents.
http://testtrack.scorm.com.

4.2 Common Cartridge IMS testing tool

The CC testing tool is for validating cartridges. It is easy to use and for a local installation. After extracting the zip-file, there are versions for Mac, Linux and Windows operating systems in the folder. Choose the right version and start the application.

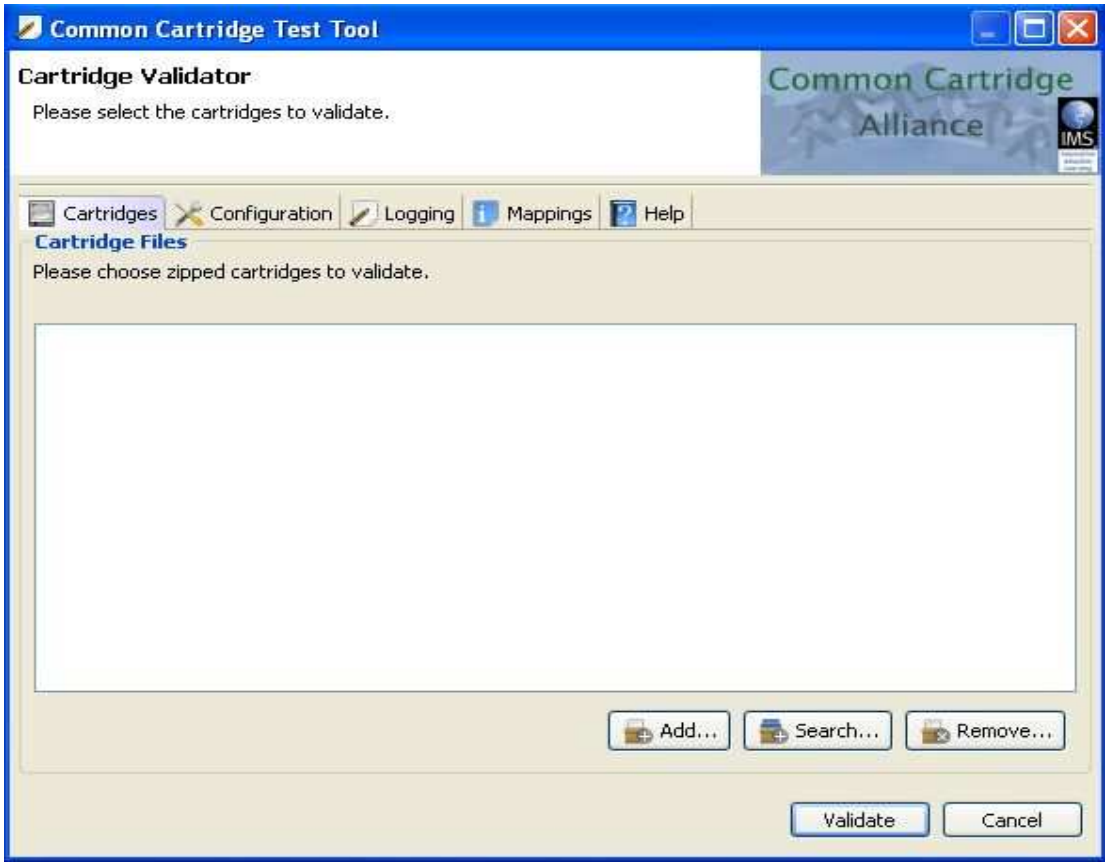
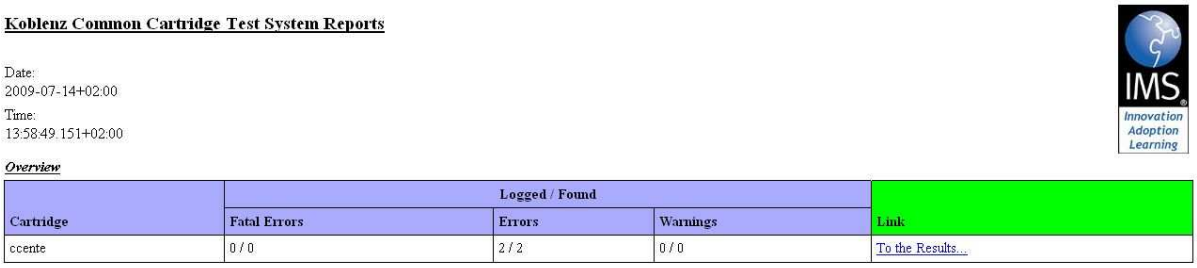


Figure 26: IMS Cartridge Validator

The following window shows the cartridge tab. Now cartridges can be added and validated. For every validation an html report will be generated. The window that appears shows the progress and state of the validation. Choosing the “show report” button opens a browser window with the result overview.



Koblenz Common Cartridge Test System Reports

Date:
2009-07-14+02:00
Time:
13:58:49.151+02:00

Overview

Cartridge	Logged / Found			Link
	Fatal Errors	Errors	Warnings	
ccente	0 / 0	2 / 2	0 / 0	To the Results...

Figure 27: Report after validating a cartridge

On the right hand side is a link to the results of the validation. Detailed information about non-valid cartridge documents and some reports about schema, reference and schematron follow.
General configurations can be made. In the configuration tab the log directory, proxy settings and the configuration can be saved. The logging tab allows users to set flags for error reports and messages. The namespaces and Schemas are listed at the mapping tab.
Common Cartridge Alliance Members are allowed to download the tool. There is an offer for ASPECT partners to participate in the CC Alliance at a reduced cost - 50% of the normal membership contribution.
(http://www.imsglobal.org)

4.3 ADL Test Suite

The SCORM 2004 4th Edition Test Suite (Self Test) contains the compliance testing software, procedures and supporting documents for organizations to perform self-testing on LMSs, SCOs and Content Packages.
The tool is for local installation and requires a special version of Java. It is a tool for experts/developers to test SCORM packages. Developers mostly use it in combination with the RELOAD Editor to create comprehensive content packages.
Further Test Suites for other versions are available at the ADL website. Links follow below.

After installing, the Test Suite is stored as “ADL” in the program folder. Starting the Test Suite will open a browser window with two compliance tests and two utility tests.

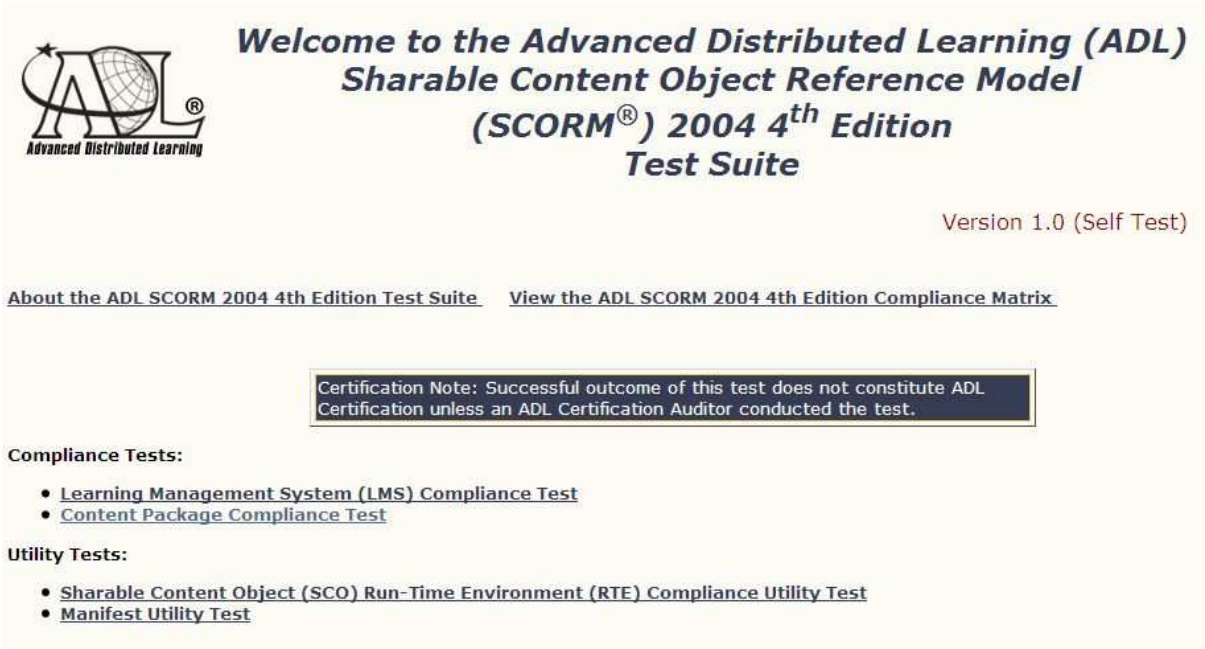


Figure 28: ADL Test Suite for SCORM 2004

Learning Management System (LMS) Compliance Test

The purpose of this test is to verify the compliance of an LMS to the Run Time Environment specification described in the SCORM 2004 4th Edition.

There are two options for a test: Choosing a new test or loading a saved previous test beginning at the last step it completed. Saved tests appear in a page which lists them.

Content package Compliance Test

The purpose of this test is to verify compliance of SCORM 2004 4th Edition Content Packages. Test subjects include Package in the form of a .zip extension and Package in the form of an imsmanifest.xml located at the root of the package.

The user first gives a name to the content package to identify it and then selects the type of the content package. Zip files or unpacked content packages can be run. Now the type of SCORM application profile must be selected. Finally the package can be selected and the test can start.

Sharable Content Object (SCO) Run-Time Environment (RTE) Compliance Test

The purpose of this test is to verify compliance of individual Sharable Content Objects (SCOs) to the Run-Time Environment specification described in the SCORM 2004 4th Edition.

By using the step-by-step instructions the test can be done. While testing, messages report the state of the progress in the Test Suite Lot on the right hand side. Any call to the API and tracking data encountered will be recorded.

Manifest Utility Test

The purpose of this test is to verify compliance of SCORM 2004 4th Edition IMS Manifest only. Test subjects include Packages in the form of a .zip extension and Package in the form of an imsmanifest.xml located at the root of the package.

In four steps it is possible to test content aggregation manifest or resource manifest. Just choose the options and load the file in the last step.

SCORM 2004 4th Edition Test Suite (http://www.adlnet.gov/Technologies/scorm/SCORMSDocuments/2004%204th%20Edition/Test%20Suite.aspx)

SCORM 1.2 Edition Test Suite (http://www.adlnet.gov/Technologies/scorm/SCORMSDocuments/Forms/All%20Documents.aspx)

5 Player

5.1 ICODEON player for CC and SCORM

At this stage of the project a CC player is available for ASPECT partners from ICODEON. Common Cartridge and SCORM players are web-based tools. Technical Support from ICODEON Customer Support is provided. After inserting login data from ICODEON, users can upload and play their own content. The relevant links are

ICODEON Common Cartridge player (http://www.common-cartridge.com/)

ICODEON SCORM player (http://www.scormlive.com/)

5.2 ASPECT Service Portal

The ICODEON players are integrated in the ASPECT service portal and learning content can be played in the service portal. Uploading and playing of developers' content at the ASPECT portal is not supported. If a content provider wants to play their content packages at the service portal, they have to follows the steps:

0. Content provider has contents in SCORM or in CC format
1. Content provider describes them in metadata (ILOX) and put them in an OAI-PMH target
2. Our harvester harvests them
3. The metadata are converted to ASPECT internal format and exposed in the portal
4. Users search and play the content

5.3 MOS Player for SCORM

The authoring tools for SCORM packages from MindOnSite described above is one tool of a family of tools. MindOnSite has also MOS Chorus, a LCMS and MOS player for free download.

MOS Player is a Windows application to play MOS courses locally and from MOS Chorus servers. You can configure MOS Player to play the courses and read the latest announcements from MOS Chorus. See figure 29, the home page of the MOS player.

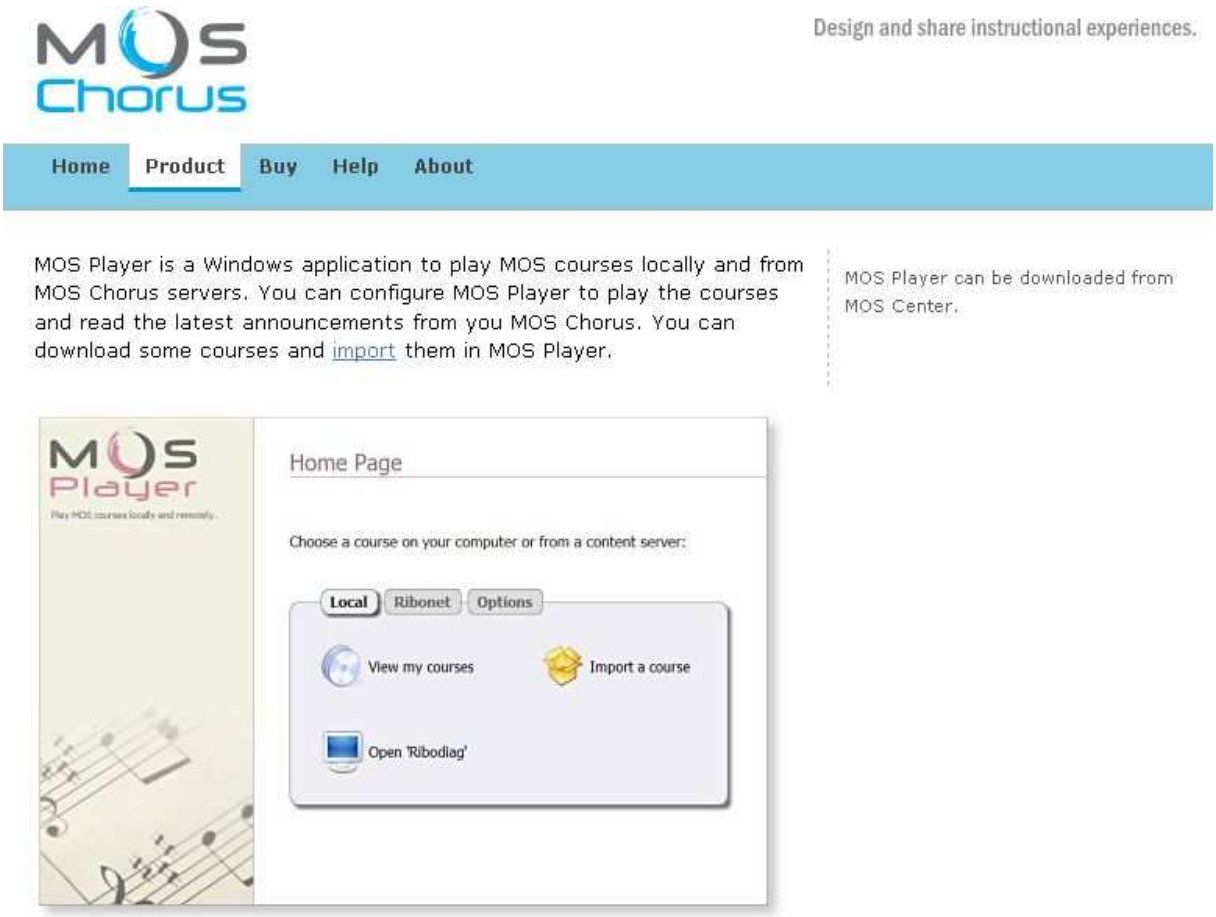


Figure 29: MOS Player for SCORM packages

5.4 MIR Common Cartridge System

Another player for Common Cartridges is the MIR Common Cartridge system as described above. For playing cartridges see chapter 3.2.1

6 References

http://www.adlnet.gov/

http://www.aspect-project.org/

http://www.icodeon.com/

http://www.imsglobal.org

https://www.learningcomponents.com/

http://www.learngauge.com/

http://www.microsoft.com/

http://www.mindonsite.com/

http://www.reload.ac.uk/

http://testtrack.scorm.com