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E-Learning Services Evaluation – Wrap-Up of the Requirements Phase

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1 Introduction

Based on the decision by the Rectors' Conference of the Swiss Universities (CRUS) and the Conference of the Universities of Applied Sciences (KFH) of September 2005, the Swiss Virtual Campus (SVC) started a project in April to evaluate a national open source (OS) e-learning platform for the time following the SVC consolidation program.

The project goals are:

- to evaluate an open source e-learning platform which
 - meets the requirements of the Swiss institutions of higher education and
 - can be provided by SWITCH as a national service supplementary to WebCT Vista;
- to define the service model; and
- to outline the costs for the implementation and the service provisioning as well as the funding.

An e-learning platform refers to a tool or a set of tools such as a learning management system (LMS), repository, conferencing, video streaming, etc. This means that an e-learning platform does not necessarily include an LMS (see also Appendix B: E-Learning Services Embedded in the e-Academia Framework).

In order to achieve these goals, four working groups were formed from representatives of all Swiss institutions of higher education: technology & architecture / pedagogy / organization & finance / users. These groups were asked to identify their requirements towards a national e-learning platform service from their specific points of view and name evaluation criteria for open source software candidates.

After the working groups had all held their first sessions, project management provided a brief synthesis of the main topics that appeared to crystallize. Like this, the groups were encouraged to take into account each other's views and – only if desired – focus further discussions accordingly.

This document summarizes the final output of the working groups and gives an outlook to the next project phase. It is sent to all reported members of the four working groups, the members of the advisory board, the SVC steering committee, the CSCPs, the rectors of all HE institutions, and the IT services. The detailed results are also posted at <http://www.edutech.ch/wiki/pmwiki.php/SWITCHHelp/HomePage> on the project's wiki. A selection of links to the most important documents can be found in Appendix A.

2 Results / Main Topics

2.1 Learning Management Systems

What turned out to be the determining factor with regard to an LMS was that most institutions have already installed their own LMS today. The most frequently used OS LMS's are Moodle, OLAT, ILIAS, or Dokeos/Claroline. In addition, some universities offer hosting services: e.g. OLAT by UniZH.

Due to this situation, most institutions have little to no interest in a nationally hosted LMS. Implementation and operation of an LMS do not pose any major problems and in most cases, data for full costs are not available. Therefore, most institutions showed no inclination to outsource their existing systems; more so as local operation of an LMS has the advantage of increased flexibility because it allows for proprietary developments or integration with local systems.

However, there are also reasons which speak in favor of a national LMS service:

- First and foremost institutions that have not yet made strategic decisions in the area of LMS's (e.g. FHNW, HES-SO) are greatly interested – for obvious reasons;

- a national LMS service gives institutions which happen to have the same LMS the make or buy choice;
- an institution with a different LMS might consider changing to the national service as soon as their own system is end of life (e.g. IBM LMS of UniSG);
- national manpower for further development of the OS platform would strengthen the dynamic of the overall OS community and the position of Swiss institutions of higher education in the community;
- a national service might have a standardizing effect in the long run with its positive side-effects: not only would it bring about economies of scale, but it would also increase the institutions' market power vis-a-vis vendors of commercial products (especially WebCT);
- a national service would provide „neutral ground“ for the collaboration among organizations, avoiding the „not invented here“ syndrome.

2.2 Repository

The opportunities a national repository offers are manifold:

- It may reduce the workload of authors because they can revert to existing content instead of producing it themselves; in particular teachers at smaller institutions do not have the means of doing everything themselves.
- Triggered by the Bologna reform, especially content of foundation courses will become highly exchangeable.
- It supports collaboration across institutions – e.g. for UAS offering joint Master's study programs or small institutes of universities with intercantonal degree courses.
- Publications reach a larger audience, thus enhancing the reputation of authors as well as institutions (which is why the MIT, e.g., is paying authors for contributions).

On the other hand, there were strong concerns that the idea behind such a service was too visionary and some people doubted that the expected effects would occur. Experience has shown that it is difficult to motivate authors to prepare content for uploading for various reasons:

- The process of uploading, especially the entry of metadata, is perceived as too time-consuming (see also below).
- Today there are no incentives for uploading – neither is there recompense, nor are one's efforts perceived as paying off in the long run; a person's willingness to share strongly depends on the expected and perceived benefits of the exchange.
- Some authors are generally unwilling to share content.
- Possible external quality control is deterring (complicates the process).
- The national scope and thus the basic set of people who are interested in the same sort of content is too small; consequently, content is often too specific to be of use to others.

Yet not only the uploading process poses some problems – also the reuse of content raises some issues that need to be addressed:

- Depending on the granularity of metadata, finding content of good quality gets difficult.
- The required adaptation efforts (regarding content or look and feel) are too big.

- Format incompatibilities may make reuse difficult or impossible.
- Efforts for quality control are required.
- Mere copying does not permit authors to distinguish themselves.

While most groups were in favor of a national repository service, there was no common view on the specifications. The main aspects under discussion were the following:

Central or distributed repository:

Especially the organization/finance group favors the implementation of a distributed repository for reasons of quality. Like this, institutions could use their own repository or a national repository hosted by SWITCH, while SWITCH would define the interfaces between the local and national repositories. As regards the search function, it would have to look as if there was only one single repository.

Metadata:

On the one hand, as little metadata as possible should be required in order to keep the barriers for uploading low; on the other hand, a lot of metadata about an individual object improves the search results. As for the granularity, the finer it is, the better for those who are searching content, but also the more complex the process of uploading. As a consequence, some sort of quality assurance (at a technical level) would be required. In any case, authors should have the freedom to choose at which level they would like to add metadata – for entire courses or individual pictures, e.g. Furthermore, data entry support by an editorial department should be available on request. It was recommended that the project management mandate a team of specialists with the definition of a set of mandatory and optional metadata.

In addition to metadata, **full-text search** is required.

Quality assurance:

There are two sorts of quality: formal aspects, including metadata, and content. The former could be dealt with through mandatory editorial departments, the latter through peer reviews or ranking possibilities, e.g. One must bear in mind, however, that quality control might be keep authors from depositing their content.

Access rights:

Authors need to be able to control of who is granted what kind of access to their content. In principle, the repository should be as open as possible, and at least metadata should be accessible to anyone.

Ease of use:

The service should comprise the integration of the repository with LMS's in order to enable one-button export to repository.

Repository and LMS:

Last but not least, one group held the view that a national repository only makes sense in connection with a national LMS.

2.3 Integration and Development

The integration of LMS's with surrounding tools is a prerequisite for their widespread use. Institutions of higher education as well as SWITCH currently develop (or already have developed) services like authentication and identity management services, shared file repositories, shared calendaring systems, virtual meeting software, videoconference and streaming applications, weblogs, wikis, instant messaging, etc. Such tools are used by teachers primarily for research, but also for teaching. LMS's often implement their own versions of these tools and force users to maintain several parallel versions and use redundant tools.

One way of addressing this issue would be a development service which would accomplish developments in the following domains:

- Integration into federated identity management by means of AAI (different contexts and roles); ideally, all applications provided by SWITCH in the e-Academia framework would use the AAI mechanism.
- Development of “middleware” services relying on widely accepted standards:
 - Between existing LMS’s and services implemented by SWITCH (e-collaboration, video-conferencing, streaming, etc.); and
 - between LMS’s and services not directly supported by SWITCH (webservice, protocols).

2.4 Community Services

Throughout all groups, there appeared to be a strong demand for some sort of exchange podium for the various aspects of e-learning. Indeed, it appears that CCSPs do not have all the skills and knowledge required to develop complex content or to solve every problem with their LMS’s. As the topic of e-learning is so multi-faceted, the diversity of requirements for support does not come as a surprise. Put in a nutshell, the general requirement is to never have to invent something anew and to never have to waste time searching for help.

Basically, there are two groups of people requesting support for different kinds of problems: people from IT departments and from e-learning centers. Accordingly, there are also two sorts of questions, i.e. technical and usage-oriented ones. End users are not seen as a target group but will continue to contact their local support centers.

Again, there was no common view on the details of such a service. The most frequently mentioned features are the following:

- Community building, which includes the organization and moderation of events about topics of interest, connecting people formally and informally, providing a technical platform for exchange etc.; such a community should be both for questions arising from daily business as well as bigger issues.
- „Yellow pages“ service, where SWITCH itself does not have any technical/pedagogical know-how but acts as an agent for experts and/or administrator of expert know-how.
- „Strike force(s)“: either direct support from SWITCH experts or the coordination of community members with expert know-how; the “strike forces” should be capable of giving hands-on support at the requester’s site at short notice; it goes without saying that the first scenario with SWITCH providing its own experts would only be possible if the institutions agreed on a single OSS.

Questions of financing of such a service and form of organization are yet to be clarified.

3 SWITCH

There are two aspects which need to be considered regarding a new SWITCH OS software service: On one side, additional resources and new know-how are required, which is why SWITCH can only provide such a service if there is sufficient demand. On the other side, building-up know-how is only possible if SWITCH can gain hands-on experience with an LMS. Therefore, it is necessary that at least some sort of consensus is reached, because it is not possible to meet specific requirements for all kinds of OS software (question of costs).

In any case, the nature of SWITCH’s activities will have to be examined in more detail and depends on the further specification of requirements (see also Chapter 4: Conclusions and Next Steps).

Also, it has to be mentioned that SWITCH would need a certain start-up time to be able to provide the service features in the same quality as the institutions are doing this today (e.g. support).

As for development services, it is clear already now that due to shortcomings in know-how and resources, SWITCH will not be in a position to provide fully-fledged software development services, but will have to restrict itself to integration support with other SWITCH services.

4 Conclusions and Next Steps

It appears that the requirements have changed considerably since they were analyzed in April 2004 by the SVC task force. One explanation for this may be that the situation has changed, e.g. because many organizations have implemented their own LMS in the meantime. However, it also seems likely that at least some of the differences can be put down to different people being involved in the analysis process, and that personal perceptions of the topic have affected the results to a certain extent.

Based on the discussions and the outcome of the working groups, as described in chapters 1 to 3 above, the project management draws the following conclusions for the testing phase:

4.1 Invitation for Clarification of Demand for LMS Services

As the working groups haven't identified an immediate and clearly defined need for a nationally hosted OS LMS, such a service could still be feasible under certain conditions bi- or multilaterally for some universities. A scenario is thinkable with the service starting on a small-scale with the option to extend the service later on and integrating it into the other OS services.

- If institutions have a demand for external hosting of an LMS, they are invited to get directly in touch with SWITCH (martin.sutter@switch.ch) to discuss the details.

4.2 OS Repository Services Integrating Existing LMS's

The focus during the testing phase will be on a national repository with interfaces to two widely used OS LMS's "Moodle" and "OLAT" and one commercial LMS "WebCT Vista", the latter already being nationally hosted by SWITCH. The repositories will be designed as to easily integrate into the landscape of other SWITCH services, predominantly AAI. A more detailed plan can be found in Appendix C: Tentative Test Scenario.

Goal of this testing phase will be to test the feasibility of different scenarios of national repository services. The testing team of edutech and SWITCH is looking for concrete cases that may serve as test candidates.

- Projects and/or institutions interested in using a repository are invited to apply for participation in the testing. The test candidates will profit from conceptual and programming services, linking their LMS's to different OS-repositories. Please contact Rolf Brugger of edutech (rolf.brugger@edutech.ch) if you are interested in this offer.

4.3 Coping With Integration and Development Needs

The testing phase, as described in section 4.2 above, includes the integration into AAI, which is considered to be a major prerequisite for a successful national learning object repository.

The integration of e-learning services into the overall e-Academia framework is likewise an extremely important issue. It will be taken into account while designing the testing scenario, but it cannot be tested directly as it would surpass the scope of the OS software evaluation.

Appendix B: "E-Learning Services Embedded in the e-Academia Framework" depicts significant interrelations. A number of tools and tool categories are already nationally offered in today's SWITCH

portfolio (e.g. e-conferencing and e-collaboration), while other components are still under development (e.g. calendaring) for national or local deployment.

Development of “middleware” services as a general need cannot be addressed during the testing phase. Project management doubts whether such services will ever be feasible, as SWITCH neither has the necessary resources nor the broad knowledge necessary to cope with the extremely heterogeneous IT environments of institutions of higher education.

4.4 Addressing Community Services

The topic of community building will be pursued further, yet not in the context of this project. The project management will recommend to the steering committee of the SVC that the feasibility of

- establishing a national competence center for “new learning technologies”, addressing both technically and usage oriented issues,
- thereby integrating the existing activities of edutech
- and bearing in mind the need for development services

in a national platform services environment provided by SWITCH after 2007 be assessed.

4.5 Next steps

The timeline for the next steps foresees

- Test/evaluation from July to September, and
- Project closure in the last quarter of 2006.

A final report, including recommendations, will be presented to the steering committee of the SVC and the SWITCH foundation council for approval.

Implementation of the selected OS services can start in the first quarter of 2007, provided that the involved parties will have agreed on the financing model.

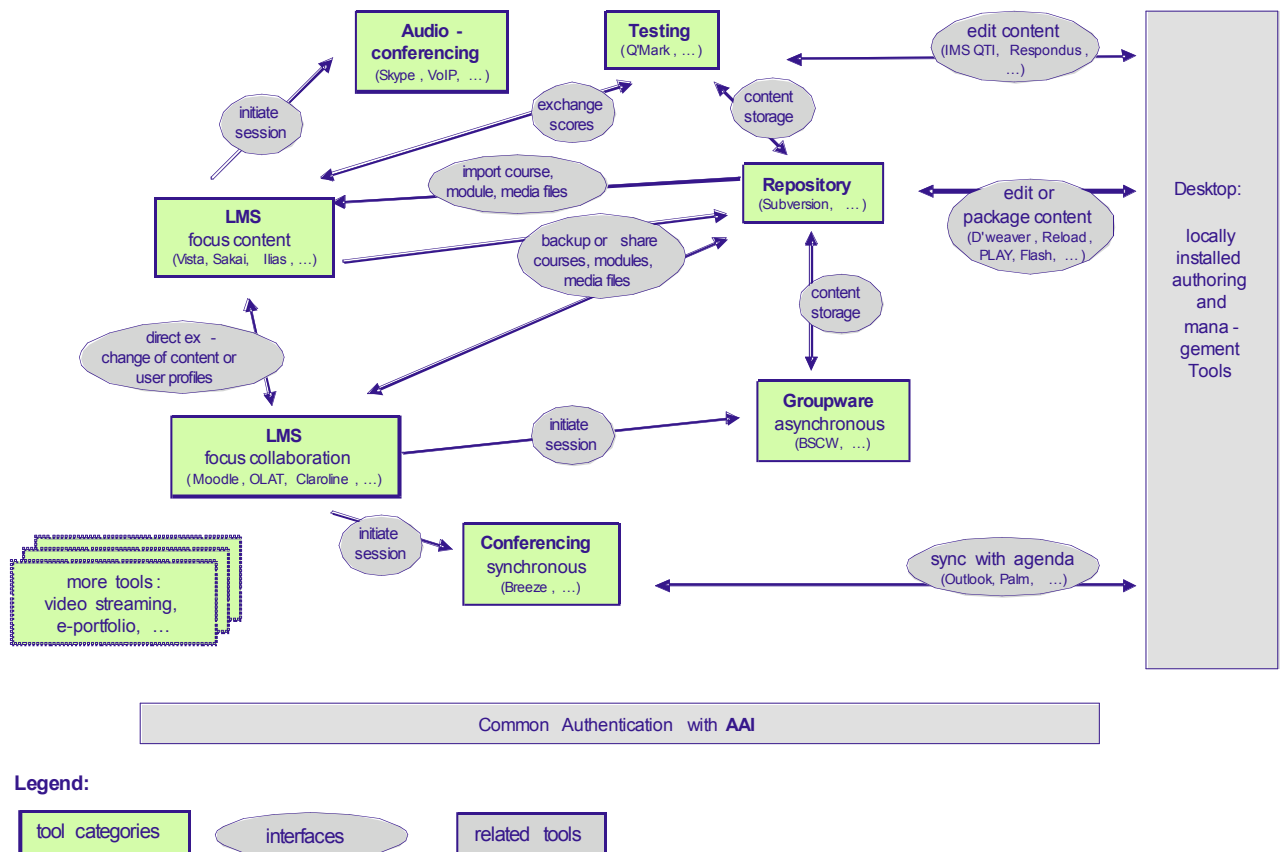
Appendix A: References

In order to make it easier to find detail information produced by the working groups, the table below gives a selection of links to the most important documents such as summaries, lists of requirements, particular meeting minutes containing decisions, etc. All documents are posted on the project's wiki at <http://www.edutech.ch/wiki/pmwiki.php/SWITCHHelp/HomePage>.

ID	Link	Description
1	http://www.edutech.ch/wiki/uploads/SWITCHHelp/OSS-technical-summary.pdf	Working group IT/Architecture: Synthesis
2	http://www.edutech.ch/wiki/pmwiki.php/SWITCHHelp/UsersWG	Working group Users: results and conclusions
3	http://www.edutech.ch/misc/WG_Org_Fin_Req_Spec.html	Working group Organization & Finance: list of requirements
4	http://www.edutech.ch/wiki/uploads/SWITCHHelp/WG_Org_Fin_Minutes_060626.pdf	WG O&F: minutes of the second meeting with comments on the above list
5	http://www.weiterbildungsportal.ch/switch/pedagogy.pdf	Working group Pedagogy: First list of requirements
6	http://www.edutech.ch/wiki/uploads/SWITCHHelp/minutesPeda2.pdf	WG Ped: Minutes of the second meeting
7	http://www.edutech.ch/wiki/uploads/SWITCHHelp/scenariosAH.doc	WG Ped.: Suggestions about non-technical services (by Andrea Helbach, HGKZ)

Appendix B: E-Learning Services Embedded in the e-Academia Framework

The figure exemplifies possible and significant combinations of tool categories, interfaces and related tools.



Appendix C: Tentative Test Scenario

Learning Objects Repository (LOR): Feasibility Project

Context

Build a content repository that allows sharing and searching of electronic educational resources on a national platform. A main target is to build a lightweight and easy-to-use system.

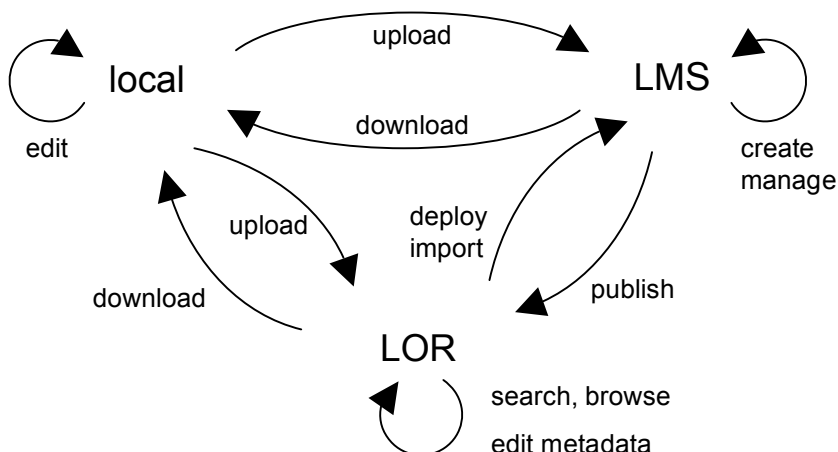
Presently, there are only few solutions available that integrate LMS with open-source repository systems. In order to get significant evaluation results, prototypes have to be developed that integrate the most popular LMS's (OLAT, Moodle, WebCT Vista) with currently available open-source repository systems (Dspace, Door, COL-LOR, WebDAV, Subversion).

Definition of learning objects

Type	Granularity	Content Formats
Course	1 semester, multiple related lessons	<ul style="list-style-type: none"> Proprietary LMS course archive IMS-CP
Module Complex object	1 lesson or activity, ~15-45 minutes study time, package of related files	<ul style="list-style-type: none"> IMS-CP SCORM zip, ...
File	single file that can be directly (re-)used	<ul style="list-style-type: none"> html, css, pdf, doc, ppt, jpg, png, mp3, mpeg, swf, ...
Quiz	Questions of a course or module	<ul style="list-style-type: none"> IMS-QTI

Actions and Workflow

In a common setup without LOR locally created content (files) can be uploaded to the LMS where it is integrated into a course. Inversely, content files can be downloaded from the LMS in order to re-use or modify them on the local computer.

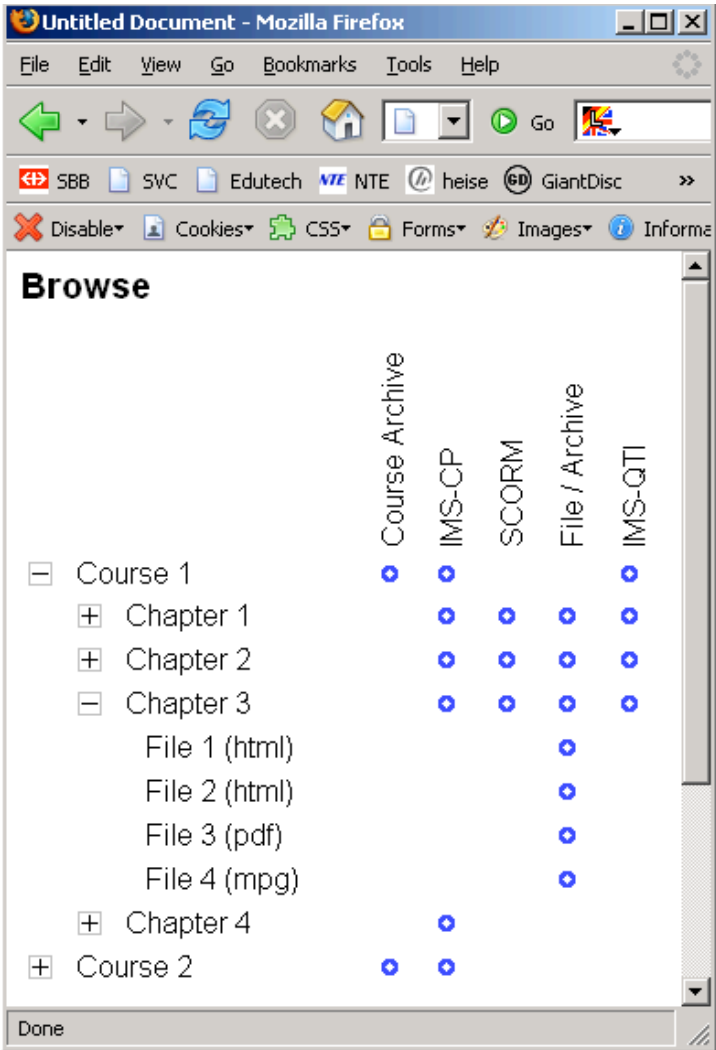


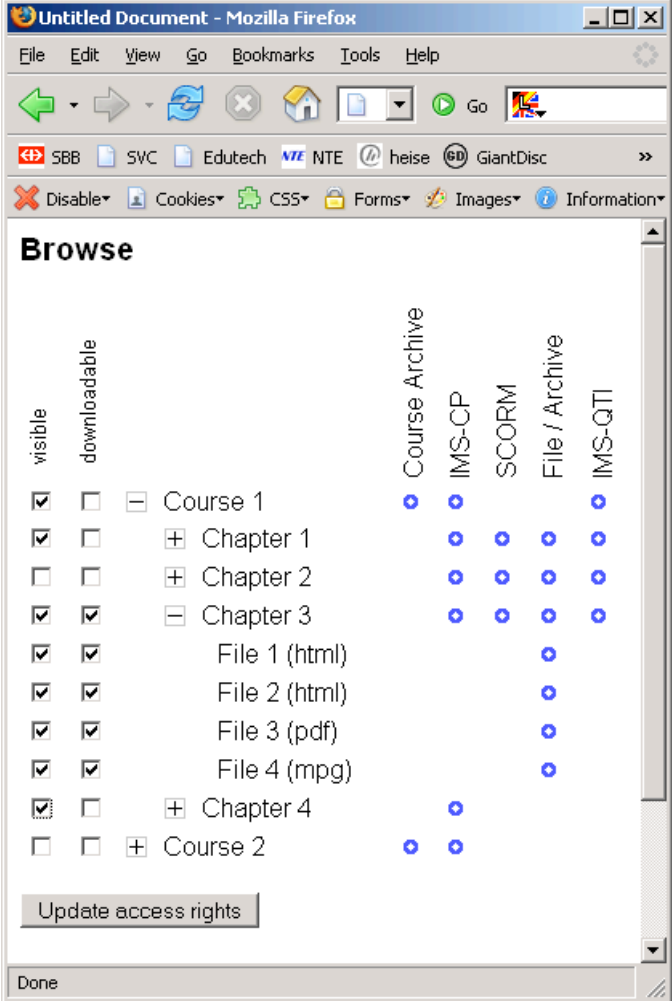
The classical approach with an LOR adds the possibility to upload content to the repository to make it publicly available, and to download it for reuse. Metadata are manually added in a web-interface. The

experience has shown that simple http up-/download of files and manual addition of metadata can be cumbersome, and may lead to general lack of acceptance or rejection by the users.

These problems can be avoided by a direct integration of the LOR with the LMS. A course author who is still primarily working in the LMS can directly make a course and its components available in the LOR by *publishing* it. The publish action, invoked by a single mouse click, transfers the content and automatically adds the most important metadata (title, author/owner, category, course context). The author can modify and complete the generated metadata later.

Action	Description
publish	<p>Transfer entire course from LMS to Repository. This includes:</p> <ul style="list-style-type: none"> • Course archive • Modules (IMS-CP, SCORM, zip) • Files • Quizzes <p>The course transferred to the LOR with a simple command, that requires no or minimalistic user interaction. The transfer at least includes an entire course (i.e. backup archive) and the individual files. If the LMS supports the notions of activities, modules, lessons or quizzes, they are automatically packaged as IMS, SCORM or zip archives and transferred to the LOR too.</p>
download from lms	Transfer specific item to local computer
deploy / import	<p>Transfer a specific item to a course in a LMS</p> <ul style="list-style-type: none"> • entire course: create an entire course (incompatible LMS? transform or re-package on-the-fly?) • module (make SCORM/IMS-CP module automatically available as lesson in a LMS) • file (copy file to LMS file store to make it manually available courses) <p>The direct import feature is a tricky one, and may not be easy to realize in this feasibility study.</p>
Search	<p>Search engine:</p> <ol style="list-style-type: none"> 1. search by metadata (subset of ims-metadata) <ul style="list-style-type: none"> • title, language • author, owner • textual description of content • catalog, domain • self-defined / pre-defined keywords • version • status (draft, final, revised) • rights: cost, copyright • ... 2. search by content <ul style="list-style-type: none"> • full text search • filenames
Browse	<p>Browsing is supported at different levels:</p> <ul style="list-style-type: none"> • browse for courses within the entire LOR or a single institution • browse for learning objects within a course <p>Browsing for objects in a course directly displays all objects, that were automatically generated during the publish action. Different LMS may implement the publication of different sets of learning objects, depending on what granularity levels are supported by the LMS.</p>

	
<p>Manage access rights for</p> <ul style="list-style-type: none"> • self-defined group • world 	<ul style="list-style-type: none"> • User roles are: author, owner, group (self-defined list of users, i.e. department members), world (anybody without authentication) • Access rights can be defined individually for each learning object at any granularity level. • The roles 'world' and 'group' can have different sets of access rights • Access rights are set by the authors or owners of a course. • Authors can invite new authors and give them writing access. • User authentication is based on AAI.

	
<p>Upload to LOR Download from LOR</p>	<p>The system should support more than just http upload and http download. Access should be as simple as possible and allow integration with desktop file managers.</p> <p>Protocol be considered: WebDAV.</p>

Integration LMS – LOR

LOR's to be considered (list currently being reviewed by edutech):

- Dspace <http://www.dspace.org/>
- DOOR <http://door.sourceforge.net/>
- COL-LOR <http://www.col.org/lor>

Integration LMS – file versioning system / online file store

online file storage systems to be considered:

- subversion
- WebDAV