

Drupal as a framework for publishing and meta-tagging of learning resources.

Objective of the presentation:

Show what utdanning.no's approach is and hopefully we will get some advice for what we should do next. In my oral presentation I will "show and tell" with examples from the actual software and graphical user interface.

Unfortunately our website and services are in Norwegian only. I will add some screen dumps with explanations in English to clarify some of the concepts.

About Utdanning.no

Utdanning.no is a website owned by the Norwegian Ministry of Education and Research. The website is a national common gateway that provides easy access to everything you need to know about education. Utdanning.no has no governing authority but is coordinating the Norwegian cooperation of websites in the educational sector (SANU). Utdanning.no is mainly based on open source software. The website is mainly a metadata portal, where the key services that we offer are:

- A national centralised repository with Course descriptions of almost all educations in Norway (course description metadata).
- A national centralised repository over learning object metadata.
- A framework for learning content publishing (new!).

From these key services we have two cases that could be interesting for others in this forum, and I have made a short summary of them in this paper.

1. Drupal.org as a framework for learning content publishing.
2. Fedora.info as a backend for a flexible service based repository.

Case 1.

1. Drupal as a framework for publishing and meta-tagging of learning resources.

Brief case description

Utdanning.no wants to offer a learning content publishing service for external editorial groups. This is realized by using a content management system called drupal.org.

URL: <http://fag.utoanning.no>

Technology: drupal.org as CMS

Background

First the project is offering the publishing framework to three editorial groups in three different subjects / professions at high school (Natural sciences, Norwegian language, Health and social studies). The editorial groups are owned by a cooperation of the local governments who has the economical responsibility to offer free learning content / equipment to all students at high schools in Norway. In Norway all public high schools are free of cost. The content is partly produced by the editorial groups themselves and partly bought from commercial companies.

The cooperative of local governments aims at enabling the content presented in this service to be sufficiently comprehensive to replace the traditional paper books. The digital content could thereby be used as a replacement of traditional books and not only as a supplement. This approach has generated a lot of debate in Norway about the competition and future of the traditional publishing industry.

The “Drupal framework” supports the publishing of multimedia content with support for text, pictures, video, sound and flash. The framework will be extended with a variety of Web 2.0 functionalities to make teachers and students participate more (Example: Commenting, personal pages, tags / tags-cloud (folksonomy), content participating with Wiki functionality, favourite, etc).

GREP – The curriculum project.

In Norway the national curriculum for high school and primary school is designed as a common, controlled vocabulary. It is constructed with the use of the semantic technology Topic Map (similar to RDF). (slides presenting [GREP](#) in English)

Drupal.org software advantages

- Open source software with a wide range of modules offering all sorts of functionality.
- It has an active and productive open source community.
- It has limited core functionality. Most of the functionality is offered as separate software modules (plug-ins). It is easy to construct the functionality you want by either choosing an already offered module or by programming one by your own.
- Drupal.org has a good semantic approach with the separation of taxonomy, tagging logics, semantic view/search and the actual content.
- Drupal has already a big variety of modules offering Web 2.0 functionality.
- Drupal has already a variety of import/export modules that make it less hard to extract content or metadata (ex. to store in an external repository).
- It has interoperability functionality for many popular services like YouTube, creative commons, facebook, Flickr, google API etc
- Very flexible tuning of content types and metadata fields.

Drupal.org software disadvantages

- Highly modulbased software that needs testing of the modules concerning how interoperable they are.
- Some key functionality that should be included as core functionality is made as modules (ex. Poor localizing / language support, access to unpublished content).
- Drupal.org is written in an object oriented language (PHP 5), but many of the modules are not necessarily written in an object oriented manner.

- Flexible construction method of content types gives less focus on performance (vertical constructed database).
- Drupal is a CMS and not a repository software with the sufficient stability and security for long term preservation, for our requirements. (But flexible export / import functionality makes it easy to preserve content in an external repository).

End-user functionality

- A taxonomy filtered search based on IMS LOM field.
- Filtering / search based on each of the curriculum objectives. The official curriculum is represented as a controlled taxonomy.
- Presentation of multimedia learning content with texts, pictures, Flash, Video (streaming) etc.
- All media contents are tagged separately and are searchable and reusable.
- The use of creative commons licensing (and GNU FDL) with icons to represent it.
- “Tip a friend” functionality.
- Printer friendly presentation with support for chapters and a complete book print (and PDF).
- Login / authentication with the use of a national educational identity provider (Feide) (Same username/password as they use at their local institution)

Editorial functionality

- Multimedia content publishing.
- Metadata tagging.
- Media objects reusability where the objects are metatagged separately.
- Content preservation, subversioned.
- Creative Commons licensing support

Utdanning.no internal editorial tasks

- No internal editorial tasks. The framework is offered as a service only, and the external editorial board has the full responsibility for the content.
- Utdanning.no offers technical support for the editorial tools.

ToDo

- We want to integrate Drupal.org as a front-end to fedora.info backend (to preserve both the content and the metadata in fedora repository).
- Extend functionality by the use of drupal.org already existing support for a wide range of web 2.0 support/services (tags and tagcloud, favourite and more)
- Extend functionality by develop our own modules (examples: synthetic speech as podcast, custom template/css, video streaming, multiple choice questions with QTI support and more)

Case 2

2. Flexible metadata repository based on fedora.info

Brief case description

We want to increase the usage of the repository and increase the number of resources. We also want to offer a wide range of services to other websites and software with the use of a Service-oriented Architecture. The overall goal is to make it easier for the end-user to find learning content suited for their pedagogical needs both at our website utdanning.no and through other services (ex. LMS / VLE).

URL: <http://utdanning.no/laering> (End user GUI)

Technology: [Fedora.info](http://fedora.info) as backend and [FEZ](http://fez.org) GUI in front-end (We have comprehensive customized FEZ).

Background

The software is only used as a metadata repository and we do not store the actual content. We are planning to extend this by offering storage of the actual content in fedora.info as well.

Fedora.info backend functionality

Fedora.info does not offer any GUI, but a Web service API. The GUI has to be chosen separately or you could develop one yourself (There are 2-3 open source GUI available). Fedora.info does not support any end-user functionality but offers a flexible method for content preservation and retrieval. Fedora.info has a built-in Dublin core support but can be extended with any other XML information. To have search filtering on custom XML fields other than Dublin core, you have to make an external search index. Due to its flexible xml construct mechanism the database is not normalized. It has a vertical partitioned database with a high degree of manageability and less focus on performance.

Our End-user functionality (GUI) (Customized FEZ)

- Filtered search based on IMS LOM fields such as age range (Context), subject (Classification), Learning resource type etc.
- All searches could also be represented as RSS.
- Ten most popular resources.
- End user registration / “tip” for learning resources that should be included in the collection.

Internal editing tasks

- a) Metadata quality insuring of resources registered by end user.
- b) Write articles that recommend learning objects from the collection.

Third part services

- Harvesting of other minor collections based on [NORLOM](#) (Norwegian IMS LOM profile).
- A wide range of RSS filtered searches witch users or websites could use.
- Some JavaScript search boxes that other websites could include. (http://utdanning.no/wiki/DLR:eksternt_sok_js)
- Harvest possibilities of our collection through the use of [OAI-PMH](#) protocol.
- Search API through the use of google [GData](#) API, with the result in RSS / ATOM / LOM (a lot of IMS LOM fields could be used for filtering and the same result can be represented as HTML, LOM, Dublin core, RSS/atom)
- A search/harvest API with the combination of OAI-PMH and Gdata. (OAI-PMH harvesting but with the support for filtering on specific LOM fields like subject, producers etc.)
- Both of the two LMS software with the larges amount of users / consumers will integrate a search using our search API in their software by the end of this year. (The Fronter and It's learning software have around 80% of the Norwegian market).

The screenshot shows the Utdanning.no website interface. At the top, there is a search bar with the text "Søk i over 5200 digitale læremidler:". Below the search bar, there are three main filter categories: "Education level", "IMS Classification - Subject", and "Learning Resource Type". Each category has a list of sub-filters with corresponding counts. For example, under "Education level", there are filters for "Barneskole (4)", "Trinn 1-2 (2228)", "Trinn 3-10 (2215)", "Videregående opplæring (3286)", "Bachelor (600)", "Mester / PhD (471)", and "Dokt.- og vitenskapelig (50)".

Education level	IMS Classification - Subject	Learning Resource Type
Barneskole (4)	Matematikk (975)	Personell, studieplaner og arbeidsoppgaver (174)
Trinn 1-2 (2228)	Religionskunnskap (1888)	Informasjonsressurser (1968)
Trinn 3-10 (2215)	Religionskunnskap og etikk (227)	Oppdateringer og oppdateringsverktøyer (124)
Videregående opplæring (3286)	Seriefilosofi (991)	Skole, skole og skole (298)
Bachelor (600)	Service og service (126)	Teater og teater (363)
Mester / PhD (471)		Videregående opplæring og videregående opplæring (772)
Dokt.- og vitenskapelig (50)		Verktøy (57)
		Språk og språk (21)

Below the filters, there are three editorial articles: "Kari Sandberg anbefaler:", "Avis-nett", and "Livet som flyktning og asylsøker". In the bottom right corner, there is a "10 mest populære" section with a list of popular resources.

End user interface with IMS LOM field filtering on: education level, subject and learning resource type. Below the filters (links) we present editorial articles recommending resources from the collection and in the bottom right we have a top ten list (popularity).

Lesson learned

- Technologically we can offer search based on many IMS LOM fields, but usability testing show that we must restrict how many filters we actually offer to the end-user to avoid the user interface to be too complicated.
- To get external minor collection to deliver metadata as IMS LOM takes time.
- We have tried to make our own subject classification suitable for all age groups. This has not been a good approach.
- One of the most time consuming and complicated tasks have been classifications / vocabulary discussions.
- A good approach is to separate the taxonomy, the metadata editor, view/search logic and the result format. In that way it is easy to maintain the taxonomy, restructure the view/search logic and add a result format. (HTML, RSS, LOM, METS, Dublin core).
- The combination of OAI-PMH and Google GData is a very flexible solution for both search and harvesting.

Todo

- We want to integrate Drupal.org as a front end to fedora.info backend (that is, to store both the content and the metadata in the fedora.info repository).
- Support for the actual Curriculum objectives (goals) as classification taxonomy.
- Connect our repository to international federated search projects (ex. EUN DLR/Fire, Ariadne).
- Marketing of the third party services of metadata exposure (LMS / websites).
- SRW / SRU search API
- More [documentation](http://bak.utdanning.no) of our work in English. <http://bak.utdanning.no>