D3.3.2 v1 Basic infrastructure available, provides initial learning unit collection from task 3.2.1

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Abstract.
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An initial learning management system is to be set up by the end of month 6 as a repository for the learning units collected as part of Task 3.2.1. This report outlines the reasons for our choice of system and reports on progress with the repository.

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The following partners have taken an active part in the work leading to the elaboration of this document, even if they might not have directly contributed writing parts of this document:
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Changes

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0.1	02-07-2004	Arthur Stutt	Draft
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Executive Summary

According to the KnowledgeWeb Technical Annex an initial learning management system is to be set up by the end of month 6 as a repository for the learning units collected as part of Task 3.2.1. This report outlines the reasons for our choice of system and reports on progress with the repository.

While the Annex mentions a 'learning management system' it does not specify what form this will take. While this could be interpreted as providing a pedagogically oriented learning system (such as WebCT) the mention of a repository for learning units and the wording of the deliverable indicate that what is actually required is an infrastructure for the learning units. This should be as neutral as possible with regard to pedagogy and should provide the basic means for storing, searching for and retrieving learning material to be used in a variety of contexts.

In addition, our work on possible scenarios which the Virtual Institute for Semantic Web Education (VISWE) could support indicates that, at least in the first instance, only a basic repository is needed.

We created and circulated four scenarios: Basic repository, MSc support, Professional Support, Support for Communities of Practice (see D3.1.1). Having asked network participants to provide details of any material they had available and asked them to suggest which scenario this could be used in, it was obvious that the most popular scenario was that which supports MSc students. It was also obvious that all of the scenarios required a basic repository. We also noted that there was significant support for the Communities of Practice scenario. This decision meant that in selecting a basic infrastructure, we had to:
-   provide a basic repository
-   be able to tailor resources for MSc students
-   be able at some point in the future to add features for supporting communities.

Discussions among the educational outreach work package participants, led us to the view that it was not essential to have a fully blown Learning Management Service since (a) this is not essential for any of our scenarios and (b) any possible candidate would mean that it would be less easy to experiment with providing MSc and community support.

In brief, having looked at the alternatives we selected the Educanext platform since this fulfilled out requirements. It provides a basic repository, which has an extensive metadata scheme which can be used for advanced MSc courses and, in addition, provides, albeit basic support for communities. As the companion report (D3.3.3) on the VISWE metadata model shows, all the criteria for metadata are satisfied by this platform:
1. The metadata cover all the basic properties of the learning material.
2. The metadata are detailed enough to meet future needs.
3. The metadata are compliant with recognized international standards in this area.
4. The metadata (and instances of objects described using the metadata) can be made available to humans or their agents in a widely used format, such as RDF.

The choice of Educanext is satisfactory for the initial deployment of the VISWE platform although it may be necessary to construct our own portal at some point in the future, e.g., for further personalization of course material, for the deployment of semantic technologies and for more complete support for communities.

In essence the repository is that needed for the initial collection of learning material which will form the basis for the teaching provided by the Virtual Institute for Semantic Web Education (VISWE) which will result from work package 3.1. *Note however that the three educational outreach packages are closely linked with many dependencies. Success for one depends on the successful outcome of the others.*

The repository will be used for the material selected in the first phase of the work on the delivery platform for VISWE. The second phase, the semantic delivery platform, will extend the functionality of the delivery platform from a basic repository to a semantically enabled platform.

Contents

1. Introduction

According to the KnowledgeWeb Technical Annex a report on the agreed metadata standard is required after the first six months of the Network's existence. This standard is defined quite narrowly as that required for the description of the learning units acquired by Task 3.2.1. It is therefore likely that, as the semantic platform is prototyped, and as more sophisticated access methods are deployed, this basic standard may need to be revised in the light of more advanced needs.

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The metadata scheme will be used for the material selected and stored in the first phase of the work on the delivery platform for VISWE. As we have said the second phase, the semantic delivery platform, may require changes to the metadata.

2. Scenarios

In brief the four scenarios were:

1. *Basic repository.* In this scenario all that is provided by VISWE is a repository of educational material relating to the Semantic Web. Such a repository would have the means for storing, searching for and retrieving materials as well as a basic mechanism for administering these facilities (e.g., the provision of a means for registering users and/or authors). Authors (or others) should be able to provide a description of a resource using a standards-complaint metadata model.

2. *MSc support.* A range of different scenarios were proposed for supporting Msc students. They have in common the need for a repository of material which can be regarded as canonical and can be readily accessed and inserted into a variety of teaching contexts.

3. *Professional Support.* As with support for MSc students, professionals required access to a range of material from case studies, through formal teaching material to best-practice documents. Again a pedagogy-neutral repository best provides this.

4. *Support for Communities of Practice.* While communities of practice can arise both in the case of MSc students and professionals, this much less structured scenario is best suited to the PhD student who requires access to a repository but also needs support for access to peers, supervisors and others who can provide guidance to and through the research literature. In addition, PhD students require help in accessing information about suitable conferences and journals for publishing their work.

For more details on the scenarios see Deliverable 3.1.1. In general it was felt that VISWE would need to be flexible enough to support more than one of these scenarios. Thus we have decided, at least for now, to make it a requirement that pedagogic matters should either be dealt with by learning material authors or by the deliverers of the material (whether in face-to-face classroom contexts or online).

3. Requirements for the VISWE repository

Based on our work on the four scenarios the requirements for VISWE's delivery platform are:

1. A means for storing, searching for and retrieving materials;
2. A means of administering repository users;
3. A means for annotating resources with metadata attributes;
4. It should be possible to deliver material which includes pedagogic aspects;
5. It should be possible make use of material in any pedagogic context;
6. It should be possible to make use of semantic technologies, for example in the delivery of stored material;
7. It should be possible to have some basic support for communities of practice centred on learning materials stored in the repository;
8.It should be possible to index material in a variety of ways. For example, using an index of Semantic Web sub-disciplines such as 'ontology tools' or 'formal languages' as well as by titles or authors. Type of material should also be available. For example, 'case study', or 'best-practice example'.

Since resources in the KnowledgeWeb Network are limited and since it is intended as a means of disseminating the results of previous European research activities we did not consider proprietary solutions such as WebCT. The latter considerations also meant that we did not look at possibilities such as the University of Alberta repository at http://careo.netera.ca/ or MIT's OpenCourseWare at http://ocw.mit.edu/index.html

4. Alternatives examined

Before deciding on Educanext, we looked at the Ontoweb Educational Resources Portal, and Ariadne Knowledge Pool both of which fulfil the requirements that the repository should be non-proprietary and the result of European research.

Ontoweb Educational Resources Portal

In previous work by work package participants (as part of the Ontoweb consortium's activities) an extensive collection of material relevant to the semantic web was made available via a web site.

The URL for this is: **http://qmir.dcs.qmul.ac.uk/ontoweb/**
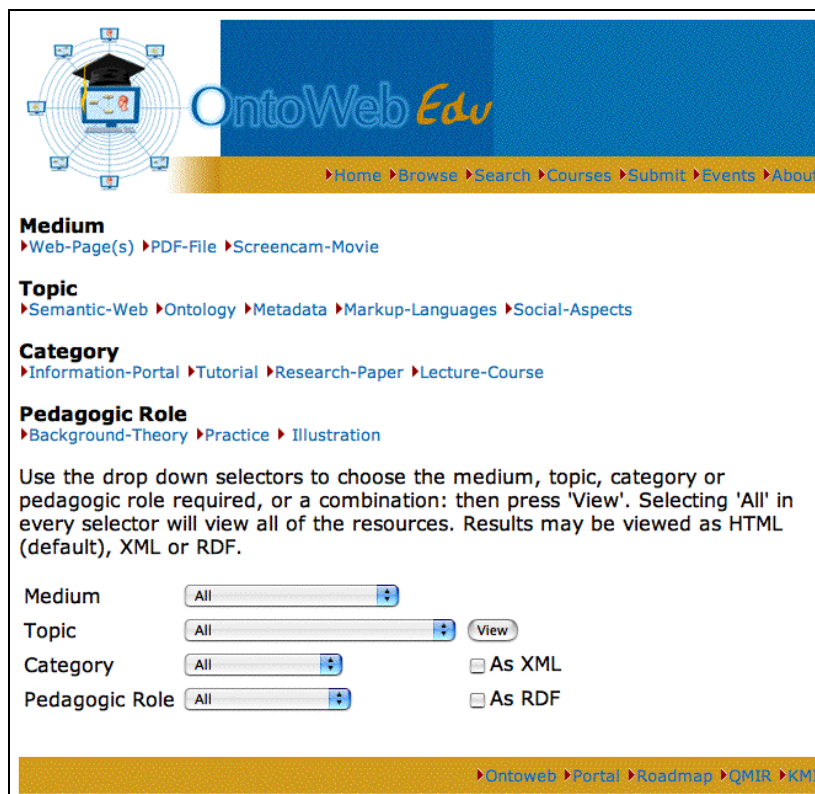
Figure 1: The browser/search interface

This site makes use of a simple ontology for the description of the learning material with categories for Background Theory, Illustrations, and Tools and Exercises as well as pointers to a variety of Portals. The site contains pointers to the actual material which is widely distributed throughout the World Wide Web. The site shares an ontology with main Ontoweb site (http://www.ontoweb.org) and can export its databases in RDF. It has extensive facilities for both keyword and index-based search, and an easy to use form interface for publishing descriptions of educational material.

Ariadne Knowledge Pool System

Ariadne is a project which can provide servers for educational resources. According to the Ariadne Strategy document[1], the project aims to develop and exploit the Knowledge Pool System to "enable a "share and reuse" approach for education and training". The project also provides the Web-Based Learning Environment (WebLE) for displaying learning objects and a set of authoring tools for creating learning objects.

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[1] Available from http://www.ariadne-eu.org/en/about/general/Ariadne%20Strategy%20Paper.html

Figure 2: Ariadne

URL: http://www.ariadne-eu.org

Papers:

Erik Duval, Eddy Forte, Kris Cardinaels, Bart Verhoeven, Rafael Van Durm, Koen Hendrikx, Maria Wentland Forte, Norbert Ebel, Maciej Macowicz, Ken Warkentyne, Florence Haenni. (2001) The ARIADNE knowledge pool system. Communications of the ACM,Volume 44, Number 5 (2001), Pages 72-78

Stefaan Ternier, Erik Duval. Web services for the ARIADNE Knowledge Pool System. 3rd Annual Ariadne Conference, 20 November 2003, Leuven, Belgium.

Stefaan Ternier, Filip Neven, Erik Duval, Maciej Macowicz & Norbert Ebel. Web services for Learning Object Repositories: the Case of the ARIADNE Knowledge Pool System. Poster at The Twelfth International World Wide Web Conference, May 2003, Budapest, Hungary.

5. Educanext

The Educanext portal is powered by the Universal Brokerage Platform, has easy to use web interfaces for browsing resources and entering metadata, and some, abeit primitive, support for communities. According to its brochure "EducaNext is an educational brokering service which relies on the Universal Brokerage Platform to mediate transactions between knowledge providers and knowledge consumers in a controlled and secure environment. At the beginning of 2003, while still in its prototype stage, the

EducaNext portal has already more then 600 registered users and holds about 300 references to learning resources in its catalogue."

Papers:
Educanext brochure http://www.estandard.no/docs/meetings/UBP_engl_INF_WUW.pdf

Gorazd Vrabic and Bernd Simon (n.d.) Learning Resource Catalogue Design of the UNIVERSAL Brokerage Platform

Infrastructure/Universal Brokerage Platform

The Universal Brokerage Platform has been developed by the Universal consortium . According to the brochure the UBP has the following advantages:
"First web-based application supporting exchange transactions for knowledge resources. The UBP supports the protection of Intellectual Property Rights (IPR) and provides means for catalogue management, resource evaluation and annotation.

Customsable Business Model. Knowledge resource providers can offer their learning resources under fully customisable conditions ranging from open-content license agreements to full-fledged contracts. The offers can be targeted to specific users, institutions or alliances of institutions.

Multilingual Platform. e UBP is currently available in English, French, German, and Slovenian language versions. More language versions will be available in 2003.

Conformity with standards. The UBP development team is working closely with the leading educational standards making bodies like IEEE, IMS, and Cen/Isss. The platform metadata model is based on a careful selection of Dublin Core and IEEE LOM attributes, which is mapped into XML/RDF.

Based on open source software. The UBP is a product with low maintenance costs, which can be implemented on open source components such as the Phoenix Firebird Database, the Apache Web Server and the TomCat Servlet Engine. Nevertheless, UBP can be also be built on commercial systems, for example the Oracle 8i DBMS.

Open interfaces. Based on web-services the UBP offers a variety of open interfaces for user registration, resource provision, booking and access control. This flexibility helps to keep integration and adaptation costs low. The type of delivery systems supported range from simple web servers and streaming media servers to video conferencing tools (Isabel) and sophisticated learning management systems such as IMC's Clix.

Highly scalable system architecture. The system architecture of the UBP is highly scalable because resources are stored and provided via separate delivery systems. The component-based architecture allows cost-efficient adaptations."

Metadata

For a complete discussion of the metadata model see Deliverable 3.3.1. In essence there are three top level categories: General Information, Technical Information and Educational Information. Included in the forst of these is a description of the discipline to which the resource belongs. In the default case, the Dutch Basic Classification System is used. However, it is possible to add other systems. Thus, we plan to create and deploy a classification system for Semantic Web sub-disciplines.

Input interface

Figure 3: Educanext Input form

Output interface

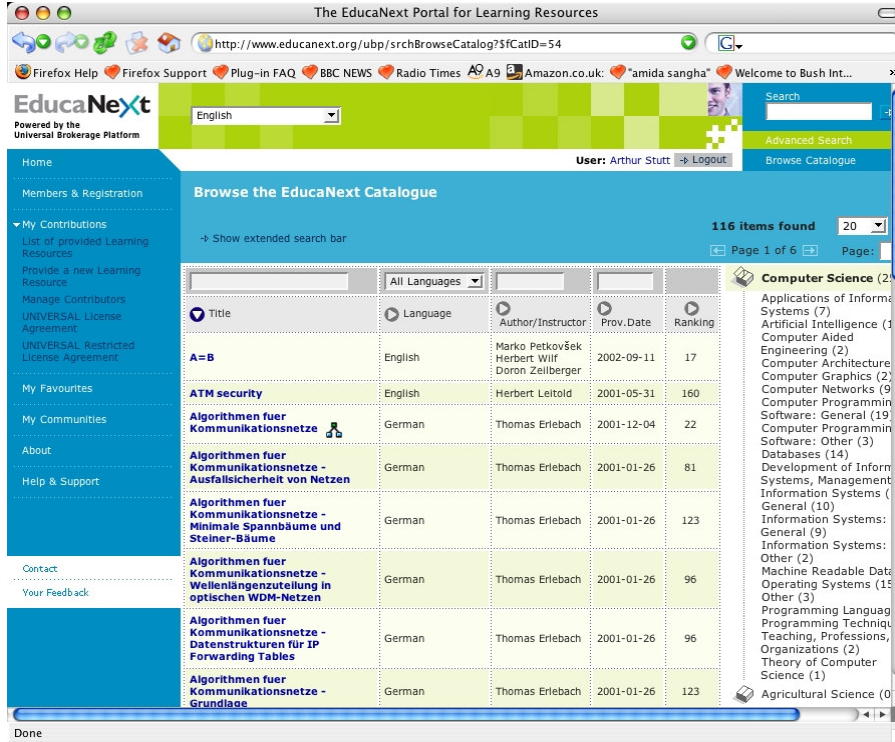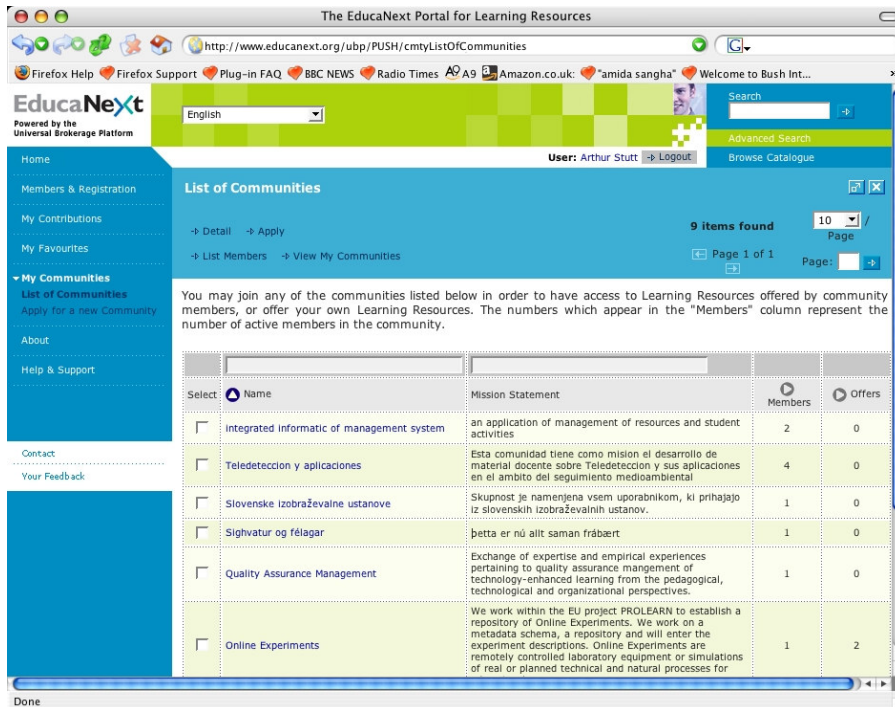

Figure 4: Educanext output

Community Tools

Figure 5: Educanext community tools

6. Reasons for rejecting alternatives and selecting Educanext

Alternative	Reasons for rejection
Ontoweb Edu	Not standard metadata model One-off solution Not easily extendible
Ariadne Knowledge Pool	Bespoke server solution Authoring environment not needed Learning environment not needed
Educanext	Standard metadata model No need to set up own servers Easy web-based interfaces for annotating resources with metadata attributes Free European Already contains a great deal of material Can use alternative classification systems for (sub)-Disciplines UBP provides a means of administering repository users UBP can deliver material which includes pedagogic aspects for use in any pedagogic context UBP provides basic support for communities of practice centred on learning materials stored in the repository UBP allows the use of multiple classification schemes

While, there is nothing in the Educanext platform which is specifically geared towards the use of semantic technologies, it should be possible to add the Magpie Semantic Browser to the resources which it contains.

7. Work in next period

In the next reporting period we will:

1. Extend learning unit collection
2. Add these to Educanext
3. Explore Educanext communication tools (for various scenarios)
4. Investigate whether we need to rebuild the repository as part of a new portal or as part of the main KnowledgeWeb Semantic portal.