Talking Systems final report

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Dan Noyes

dan.noyes@newport.ac.uk

UNIVERSITY OF WALES COLLEGE, NEWPORT
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Introduction

Project information

Project Title:	Talking Systems
Project Director:	Janet Peters, Head of Library & Information Services, University of Wales College, Newport. Caerleon Campus, PO Box 179, Newport NP19 3YG e-mail: janet.peters@newport.ac.uk Tel: (01633) 432652
Project Manager:	Dan Noyes Centre for Learning Development, University of Wales College, Newport. Allt-yr-yn Campus, PO Box 180, Newport NP20 5XR e-mail: dan.noyes@newport.ac.uk Tel: (01633) 432490
Lead Institution:	University of Wales College, Newport
Project Partners	Percussion software Toby Bishop Percussion Software UK 2 Soho Square, London W1D 3PX e-mail: Toby_Bishop@percussion.com Tel: (020) 7334 5900 Fax: (020) 7437 5940 IBM Glen Taylor Lotus Software The Causeway, Staines e-mail: glentay1@uk.ibm.com Tel: (01784) 445252 Lancaster University

	Susan Armitage Information Systems Services Library & Information Services, Lancaster University, LA1 4YH e-mail: s.armitage@lancaster.ac.uk Tel: (01524) 593604 SIRSI Ltd Peter Gethin Unicorn House, Station Close, Potters Bar, Herts EN6 3JW e-mail: pete@sirsi.co.uk Tel: (01707) 858000 Fax: (01707) 858111
Project URL:	http://www.newport.ac.uk/talkingsystems

About this report

This report is intended as a summative review of the project to date. Although a printable version is being produced, the content is really designed to be accessed via a SCORM tutorial in a non-linear fashion. For more information on this please visit the project website (http://www.newport.ac.uk/talkingsystems).

Talking Systems: aims and objectives

The active funding period for Talking Systems was just 10 months, so objectives had to be focussed and modest. Our aim was to look at exposing e-learning content for search and retrieval within the University's library catalogue. More specifically:

To create SCORM learning objects, and transfer metadata from these objects to a Bath Profile compliant Z39.50 server.

Why do this? There are many reasons, including:

- Finding content when there are multiple VLEs or LCMSs
- Standardising search behaviour across disparate e-learning resource bases
- Opening access to learning content metadata beyond our institution

As a concrete example, consider the following scenario:

Imagine an institution where the SCORM has been implemented as a standard format for non-collaborative e-learning content, but where there are several different VLE platforms in use. A lecturer from, say, the School of Computer Science wants to offer some e-learning materials for her students who are struggling with a mathematical concept that she is unable to cover during her teaching, and yet is essential to their progress with an assignment she has set. She might do the following:

- Collate her existing resources on the topic
- Find a list of resources available from the library

- Use e-learning resources such as formative assessments that have been developed by her colleagues in, say, the School of Mathematics

The first two tasks are something that academics are very familiar with, and pose no problem to our lecturer. But how can she search for suitable e-learning content for her students? She doesn't have a username and password for the VLE in use in the School of Mathematics, and so cannot see what content is there.

Talking Systems aims to address this problem of searching for and retrieving e-learning content in a standard format called the SCORM from distributed and heterogeneous sources, without the need for centralized repositories. The same search that our imaginary lecturer performs in the library catalogue would return not just bibliographic references, but learning content too.

Processes

This section outlines what we did with our time during the project.

At it simplest, here is what we did:

1. Created a mini VLE using Lotus Domino
2. Populated this VLE with content – focussed on study skills
3. Exported some of this content and created SCORM tutorials from it
4. Established the Bath Profile on our library catalogue's Z39.50 server
5. Created MARC records for our SCORM tutorials and loaded these into the catalogue

The table below outlines in more detail what we planned to do against what we actually did:

Tasks or Activities	**Completion date** *Planned* Actual	**Notes**
1. Plan for and order hardware / software	*2002-10-29* 2002-10-28	The establishment of a development server(s) was required in orde to: ▪ provide an environment to mirror the library catalogue (SIRSI Unicorn running on Sun Solaris); ▪ house SCORM learning objects (platform = IBM Lotus Domino – preferably running on Windows NT). Our networks team does not currently support UNIX based system and given SIRSI's close involvement in the project it was decided that data could be housed in the live system under a separate 'virtual' catalogue. IBM offered to loan the project team servers on a month by month basis; it was decided to purchase our own for consistency through the project term. ACTIONS: purchased Dell PowerEdge 4600, NT4 Server license, Percussion Notrix
2. Collate and write documentation on SCORM – outline the Content Aggregation Model (CAM)	*2002-11-29* 2002-11-29	The SCORM had not previously been used at the University of Wales College, Newport, or Lancaster University (partner institution for the project), so we had to learn from scratch. We began with documentation published by ADL, although this was quite technically dense – you have to know the jargon before you can usefully approach it. Dr Ed's SCORM course

Tasks or Activities	Completion date *Planned*	Notes
		provided a good high-level overview of the specification for beginners (http://www.jcasolutions.com/SC12/index.html). Links to further documentation have been provided on the project website.
3. Install development server	*2002-11-29* 2002-11-29	http://domino8.newport.ac.uk Windows2000 server. Lotus Domino 5.0.11
4. Collate and write documentation on Z39.50 & Bath Profile	*2002-11-29* 2002-12-20	Paul Miller's introduction to Z39.50 published in issue21 of Ariadne is an excellent place to start: http://www.ariadne.ac.uk/issue21/z3950/intro.html Links to further documentation have been provided on the project website.
5. Install & configure Percussion Notrix	*2002-12-20* 2002-12-04	Percussion Notrix installed 4 December; found to be unusable with library as the platform for the latter was only 'Informix – flavoured' and did not support ODBC scripting.
6. Set up Z39.50 access for project team	*2002-12-20* 2002-12-04	Accounts created, SIRSI's workflows client installed.
7. Create SCORM object repository on development server using Lotus Domino (mini VLE)	*2002-12-20* 2002-12-16	Extended the functionality of a fledgling Lotus Domino database created to support Study Skills (http://www.newport.ac.uk/essentials). This database held very granular assets: over 500 - typically pieces of HTML formatted text at around 300 words. Scripts were added to: ▪ Export SCO metadata ▪ Export content in RTF format ▪ Create MARC records from SCO metadata
8. Transfer test materials from live VLE to the mini VLE	*2002-12-20* 2002-12-20	The Study Skills content from live server was pushed to the mini VLE and synchronised using Domino's replication process.
9. Create records in Unicorn with links to files in the mini VLE	*2003-01-31* 2003-02-03	Although slower than anticipated due to the problems 'pushing' data directly to the catalogue using Notrix, we proceeded by creating MARC records using the Dublin Core crosswalk provided by the Library of Congress at http://www.loc.gov/marc/dccross.html. We began testing our Z39.50 configuration against our first set of test records using the SIRSI Workflows zclient.
10. Establish Bath Profile compliance on library Z39.50 server	*2003-02-28* 2003-02-28	Slavko Manojlovich, from the Queen Elizabeth library at Memorial University, Newfoundland came to visit the project team in order to help set up Bath Profile compliance. His work involved: ▪ Upgrading the library catalogue software (Unicorn) to Bath Profile version ▪ Mapping the indexes to the Dublin Core elements

Tasks or Activities	Completion date *Planned*	Notes
		transferred from VLE to the MARC records.
11. Establish new 'library' in the library catalogue to hold only references to learning objects	*2003-02-28* 2003-03-14	Database 'ELECTRONIC' established as zTarget for e-learning content.
12. Create new forms for loading lo metadata to library catalogue	*2003-02-28* 2003-03-14	Unicorn forms created to match the Bath Profile mapping established by Slavko Manojlovich.
13. Create record loader script which loaded MARC records generated by VLE and makes appropriate changes.	*2003-02-28* 2003-03-14	Having tidied up the format of our MARC records we could now automate their import with a new script.
14. Create new web-based Z39.50 gateway to the learning object data within catalogue	*2003-03-31* 2003-03-28	Enabling users to perform a Z39.50 query via a form on a website rather than requiring a zClient. See project site for dynamic link.
15. Create SCORM tutorials focusing on two areas: the project itself (these tutorials to be delivered as part of the web event), and referencing using Harvard.	*2003-04-30* ongoing	Our e-learning resource developer had to reduce her workload due to ill health. The project manager took up this work, although this will cause a delay in the delivery of the full objects into summer 2003. The project manager undertook training in Macromedia Authorware and is currently developing a standard format for the tutorials.
16. Install IBM Lotus Sametime on development server to practice for live web event.	*2003-04-30* 2003-04-30	IBM hosted practice sessions, and have given us full access to a Sametime demo server. There is therefore no need for us to administer the software ourselves.
17. Practice for the webcast.	April	Members of the project team attended several events to establish a suitable format. IBM have given us accounts on a Lotus Virtual Classroom server. Attended several events, including a project launch with IBM's International Technical Support Organization that seemed to offer a suitable mix of screensharing using a browser &

Tasks or Activities	Completion date *Planned*	Notes
		simultaneous telephone conferencing.
18. Create new keyword / browse policies tied to Z39.50 Dublin Core Use Attributes.	*2003-04-30* 2003-04-30	These could not be tested until at least a hundred records were loaded into our 'electronic' library. We created some dummy records for this purpose.

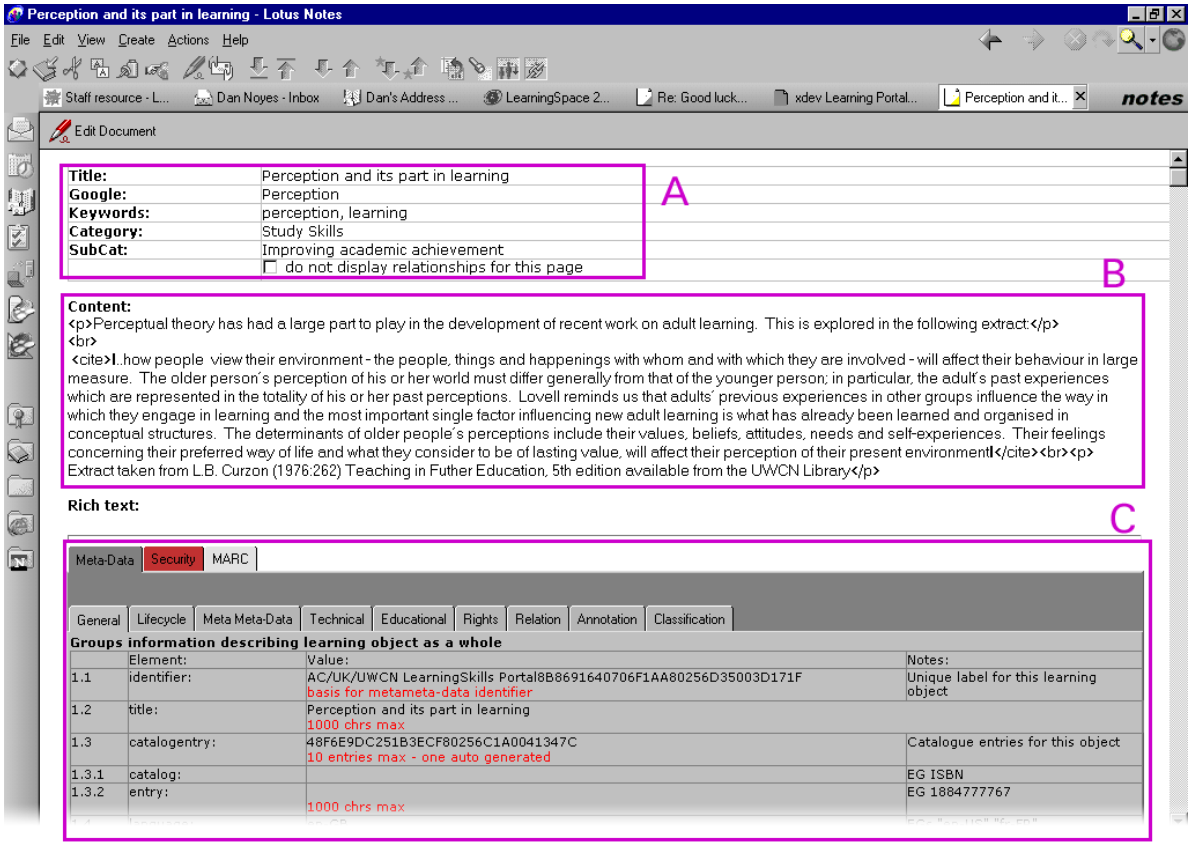
Talking Systems: a test drive

This section aims to provide a high level overview of the systems in place at the University of Wales College, Newport – and how they were used to achieve our aims.

Using IBM Lotus Domino to create a content store

The content base for both SCO assets and SCORM objects was built on the IBM Lotus Domino[1] platform. Domino is an unstructured database engine commonly used as an e-mail and collaboration platform. Although Domino has its own client (Lotus Notes), it also runs an HTTP task that will convert data into HTML pages (and XML) on the fly for web browsers. The software can be freely obtained by HE institutions for research purposes under the IBM Scholars[2] programme.

Data is stored within Domino in 'documents' that are created and displayed using forms containing fields. We created a single form for SCO and asset input that could automate the creation of most of the metadata we required:

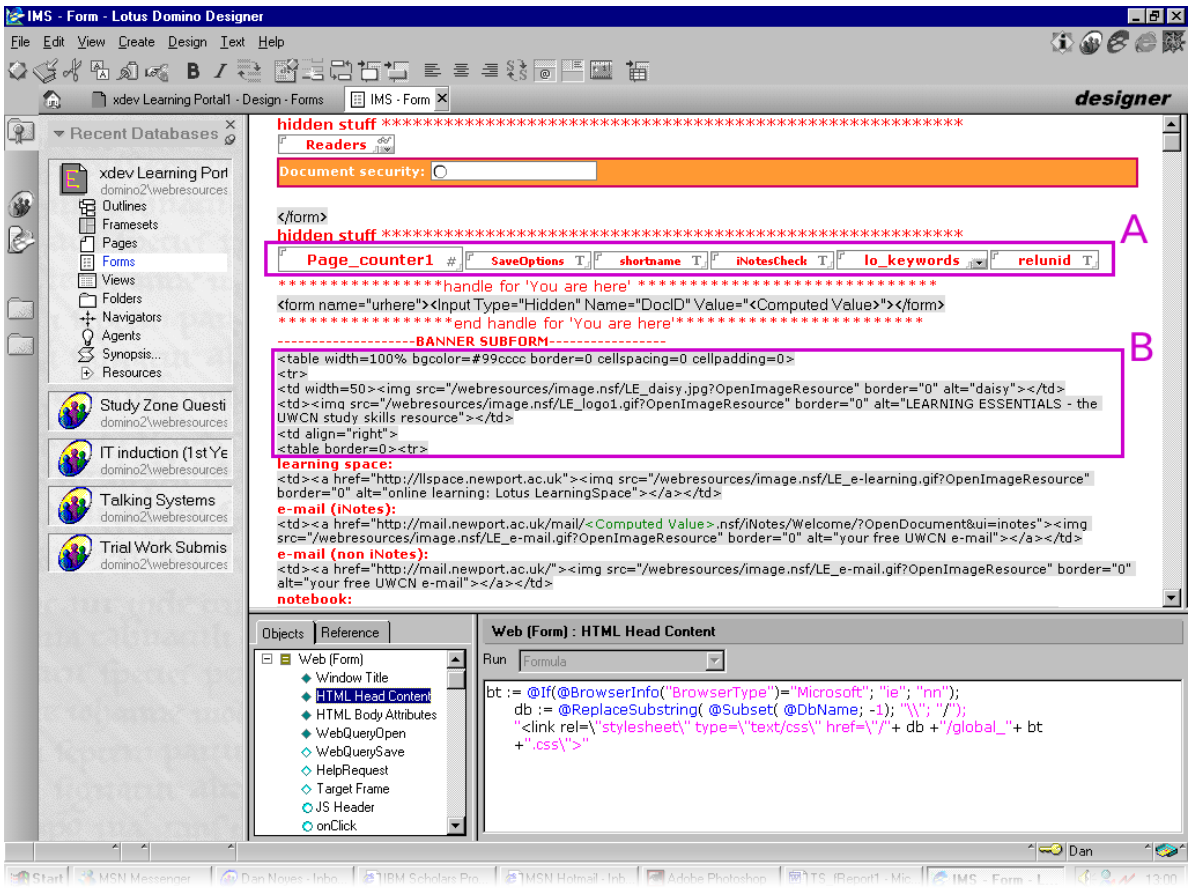


The SCO / asset input form as seen through the Lotus Notes client. There are three main elements to the form: basic asset metadata provided by the content author (A); SCO / asset content itself (B) – this example shows marked-up text; auto-generated metadata (C) - IMS and MARC sharing Dublin Core elements

[1] http://www.lotus.com/products

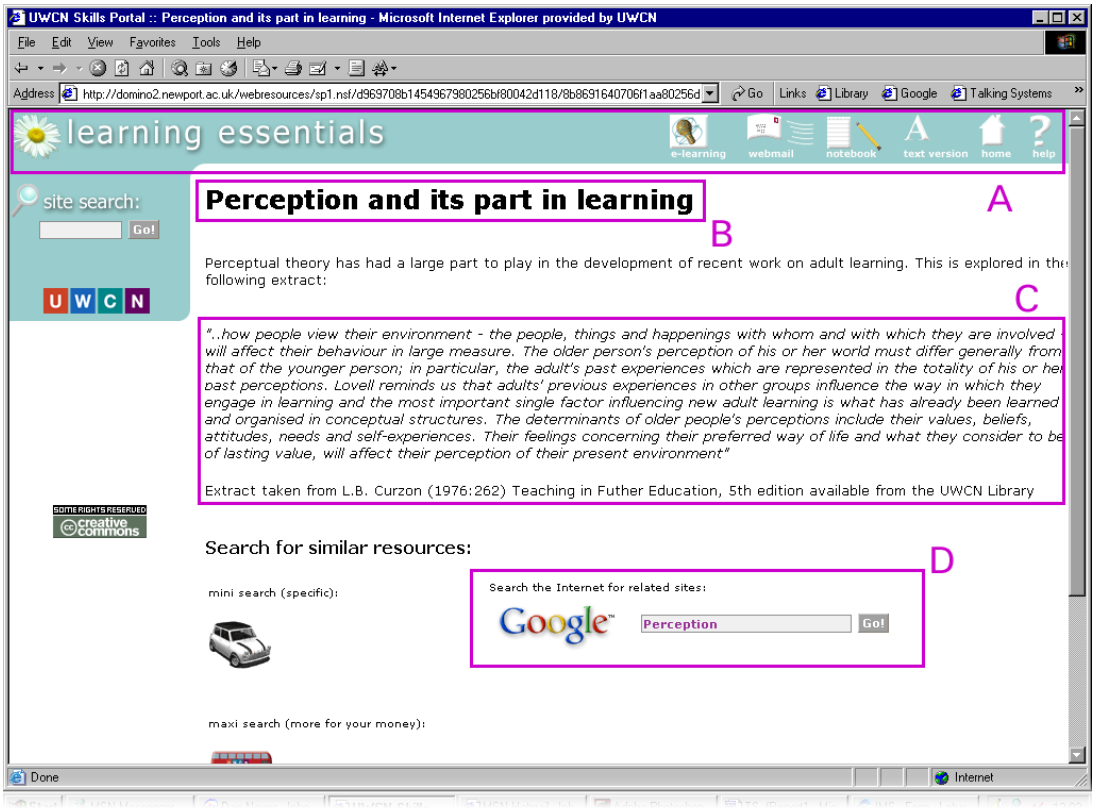
[2] http://www.ibm.com/university - the programme offers a huge array of software for free use, along with (we found) excellent free support.

Once documents had been created using this form we could begin to manipulate the data, including the way it is displayed to our users via the web:



The SCO / asset form as seen through the Domino Designer client. Documents can include data elements that are hidden from the end user (A); along with pass-thru HTML to manipulate the display of the visible data elements (B).

The HTML page that is delivered to the end user is a mixture of metadata, content, and design elements.



The SCO as viewed by the end user. This contains: design elements such as graphics and buttons (A); metadata such as the Title element which are displayed to the end user (B); content (C); and metadata which is either partially or completely hidden from view (D), but which allows for client-side HTTP request generation – such as the Google search box shown, and ISBN search queries on the UWCN catalogue when the asset concerned is a reference to a text [not shown].

Creating SCORM content

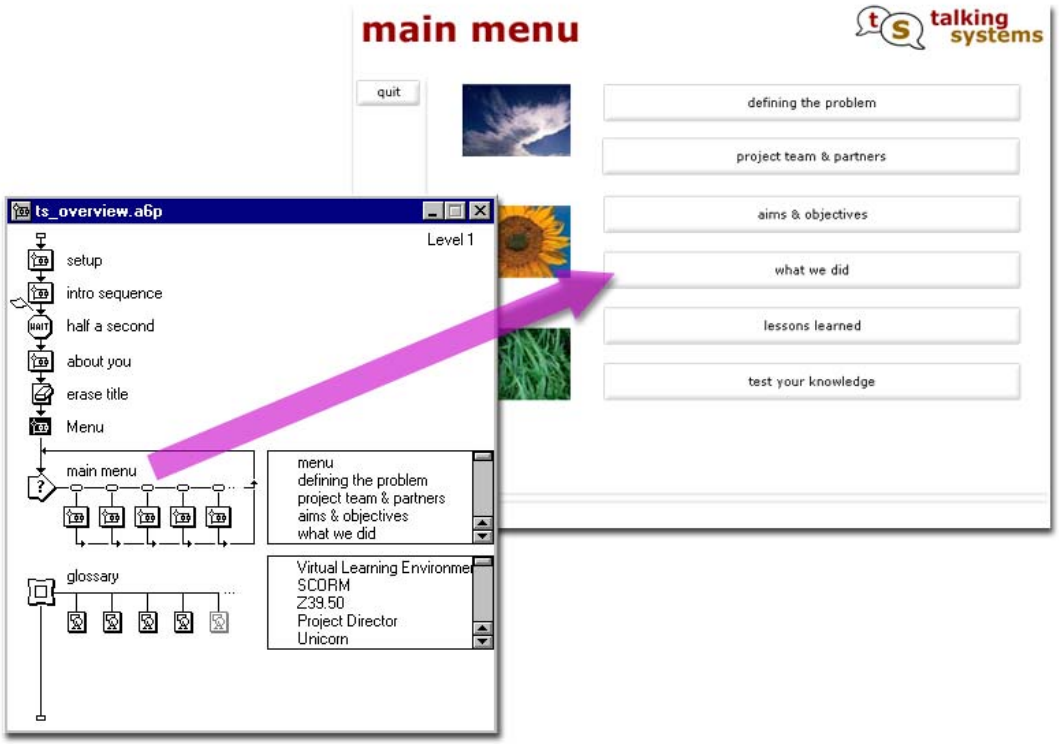
Once we had Domino documents in place we needed to string the content together in order to create SCOs and Content Structures – the tutorials that our end-users would use. For this aggregation and sequencing we used Macromedia Authorware[3]. The process involved in creating the content was as follows:

1. Identifying the required resources using full-text searching across the content base.
2. Exporting the content to RTF files: LotusScript[4] agents iterate through the selected documents creating text files and removing any mark-up present in the content.
3. A basic Authorware template created.

[3] http://www.macromedia.com/software/authorware/

[4] Domino's native object-orientated scripting language

4. The RTF files imported into Authoware 'frameworks' that allow users to navigate resources.
5. Authorware's SCO metadata editor creates manifest files.
6. Authorware compiles the objects into various formats (XML, executable files, HTML).



Sequencing content using Macromedia Authorware. Although a fairly 'heavy' application for the novice (or the average academic) to grasp, Authorware allows for the rapid development and re-use of navigation tools. Once content has been imported into an Authorware file, one-click publishing allows the user to export the content into a variety of formats, including SCORM packages and executable files that can be delivered via the web or CD-ROM.

Implementing the Bath Profile

Although Z39.50 is a well-established standard for searching databases, its adoption by vendors, and local implementations vary tremendously: options in the standard have been interpreted in different ways. Profiles such as the Bath Profile are intended to explicitly define and restrict implementation of Z39.50 in order to ensure consistency in search and retrieval.

Support of the Bath Profile and quality of product-specific documentation varies greatly between library management system vendors. Although SIRSI's support of Z39.50 is fully documented (http://www.sirsi.com/Aboutsirsi/z3950) we were lucky to have benefited from the

help of Slavko Manojlovich from Memorial University Newfoundland to establish the profile for us. His work with the project team primarily involved:

- Upgrading our SIRSI Unicorn Z39.50 server to the Bath Profile version
- Changing the indexing and browse policies of the catalogue
- Creating a separate catalogue to hold our SCORM resources
- Creating customised MARC record loader scripts
- Creating custom MARC display forms suited to displaying SCORM (Dublin Core) metadata

Refer to Appendix B for further information on how to search the UWCN Unicorn Bath Profile compliant server with a Z39.50 client.

Outputs

This section outlines the outputs produced during the project.

Documentation

Talking Systems did not aim to break any new ground; the project was a practical exploration of the implementation of existing standards and systems. As such, no new documentation of the standards explored has been produced. However, the project website contains links to essential resources for both the Bath Profile and the SCORM – from resources for complete beginners to the maintenance agencies for both standards.

SCORM objects

The development of the finished SCORM objects was delayed due to the reduced input of the project's e-learning content developer through ill health. The delivery of these objects is now imminent, and details on how to download and use them will appear on the project website in August.

Two main tutorials have been produced: one on the project itself (based loosely on the content of this report), and one on referencing using Harvard.

Webcast

One of the main planned dissemination activities was the webcast explaining the work of the project that took place on 26 June with 12 participants. This included:

- Phone conference
- Web lecture
- Screen sharing & search demonstration
- Audience polling
- Plenary session

A recording of the audio made from the telephone conference is being edited and added to an automated PowerPoint show. This will be available mid September from the project website.

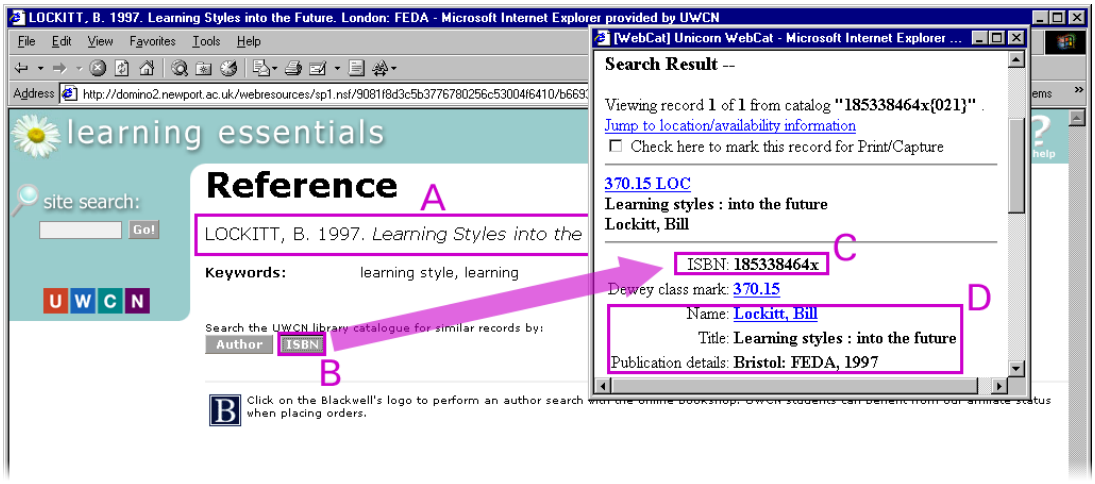
Looking to the future

This section outlines where the project goes from here.

Learning Essentials goes live

The study skills resource that was used as a test VLE during the project – Learning Essentials – goes live to UWCN students at the beginning of the next academic year (2003/2004). This will see the integration between our e-learning infrastructure and our e-library put to its first real use. It is hoped that by providing this integration, our students will become more aware of the wider resource base available to them.

Students browsing the catalogue will come across records for content in Learning Essentials, and conversely we will begin to 'push' students towards the library catalogue from book references held in the VLE:



'Pushing' students towards the library catalogue from Learning Essentials A reference for a text (A) and associated metadata – in this case a hidden field containing the ISBN – causes a button (B) to be generated for the user. On clicking this button a search is initiated in the library for the ISBN (C), returning the record for the text (D). It is hoped that students will then place holds directly from this environment.

Collaborations

A number of possible further collaborations were identified during the final steering group meeting. This includes a project to produce a European-funded distributed e-learning content repository for Wales. The minutes of all steering group meetings are available from the project website.

VLE at UWCN

The VLE currently in use at UWCN is LearningSpace Forum 3.5. This has been the sole e-learning platform for around 3 years, and a phased upgrade is now being planned during which there are likely to be two platforms in use. Referencing content from both platforms centrally via the library will be an essential aid to managing a multi-platform environment.

Dissemination

A number of different upcoming dissemination activities have been identified:

- **Webcast recording** The 26th June webcast was recorded, and a PowerPoint with audio will be produced for distribution via the project website in September. Notification via JISCMAIL lists.
- **ALT-C** September Sheffield. No paper submitted.
- **DC-2003** Paper submitted for Dublin Core conference September / October in Seattle
- **Unicorn user group** Janice Sim to present paper in Septmber
- **UCISA Teaching and Learning Information Group (TLIG)** to contact, with regards upcoming meetings and workshops in April

The project manager has already presented a paper based on the project entitled *E-learning content discovery using library search tools* at the EUNIS 2003 conference in Amsterdam in July (http://www2.ic.uva.nl/eunis2003/).

Learning from implementation

In this section we comment upon the issues that we had to work with that were unexpected at the outset of the project.

Altruism

Altruism is required in:

- creating good metadata (which is costly to create, and only realises its value when exposed to other systems and is used by others);
- and in allowing others to access learning objects in the first place.

Creating good metadata

This problem can worked around by making metadata easier (less costly) to create in the first place; and automating the process entirely where possible. (Automation, however, will nevertheless come at the expense of quality – which is why most libraries have cataloguers!) The SCOs used during the Talking Systems project therefore used as much automated metadata as was practical – requiring the content creator only to provide Title and Keywords elements.

Opening your resources to others

Those who invest a lot in creating learning resources tend to be reluctant to offer free access to them for lots of reasons, including:

- 'Why should my competitors benefit from my hard work?'
- Concerns about breaking copyright in the re-use of other people's resources
- Wanting to provide unique added value for 'their' learners

There is currently no easy answer to rights management for content delivered on the Internet. However, the following strategies were used during the Talking Systems project:

- Creative Commons licensing for content (http://www.creativecommons.org)
- Opening access locally
- Publishing metadata for restricted – access content (interested parties can at least then approach the rights holders)

Granularity

Maintaing meaning without context

One of the 'golden rules' of SCORM learning objects (and the 'assets' – text, images, media – of which they are made) is that they must not include references to other learning objects: they must be entirely stand-alone. Instead references are made by the packaging that references them.

To understand why this is problematic on a pedagogical level, take the analogy of a traditional text book and imagine that we want to create a SCORM tutorial based on a

particular chapter. Without breaking the golden rule, consider how to accommodate the following:

- introductions / contextualisation such as 'In the previous chapter we examined the concept of…now we will look at…which will lead us to…'
- inline references to key texts and other authors
- the glossary, which sits at the back of the book and not within the chapter

Although these things can be referenced by packaging, the content itself must be entirely neutral – which is difficult when creating new content, and makes re-using older content very difficult. It also means that the packaging itself is prone to redundancy once the underlying content is re-used.

To surmount these difficulties, we have developed two different strategies:

- creating very large discreet learning objects – each chapter would include a copy of the book's glossary, to use the above analogy;
- creating small learning objects that are contextualised by their proximity to other learning objects at the point of delivery / by their packaging.

The first solution offers problems of scalability; imagine for example, that over time the number of 'chapters' grew - the glossary (and all other 'external' resources which were incorporated into the learning object as assets) would grow exponentially even though a given learning object would remain fixed in its scope. The second solution leads to the creation of content that loses meaning as it is transferred between learning management content systems- how can you manage a large resource base of content that is very flexible, but granular enough that it is easy to search?

The solution that we have settled upon is a heavy compromise that sees us forfeiting our goal of transferable, durable, interoperable (etc.) content: creating learning objects that represent a snapshot of a dynamic content base - our SCORM objects have a 'best before' date and are essentially only used to sequence content.

What does the user want?

Talking Systems is all about enabling users to actively search for learning content. But what *is* 'learning content'? An entire course? A solution to a specific problem? A short tutorial? Measures of the granularity of content (<aggregationlevel>) are reasonably subjective, especially when taken in conjunction with their semantic density (<semanticdensity>).

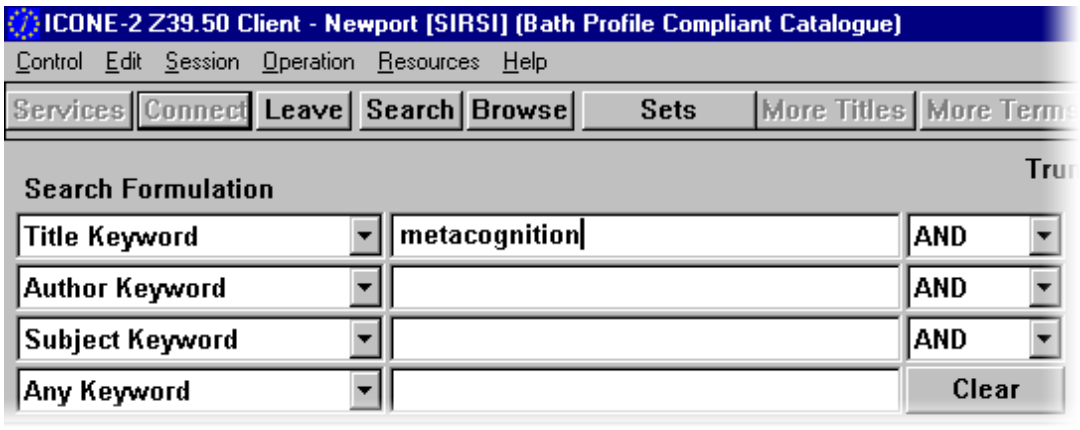
During the project, therefore, it was decided to offer the user a variety of options for searching for content, that would usually be performed by the user in the following order:

- Z39.50 search for SCO (assets) and SCORM objects (tutorials)
    - Search directly within a granular asset base
    - Proximity searches initiated from within an SCO

The returns on each type of search were really quite different.

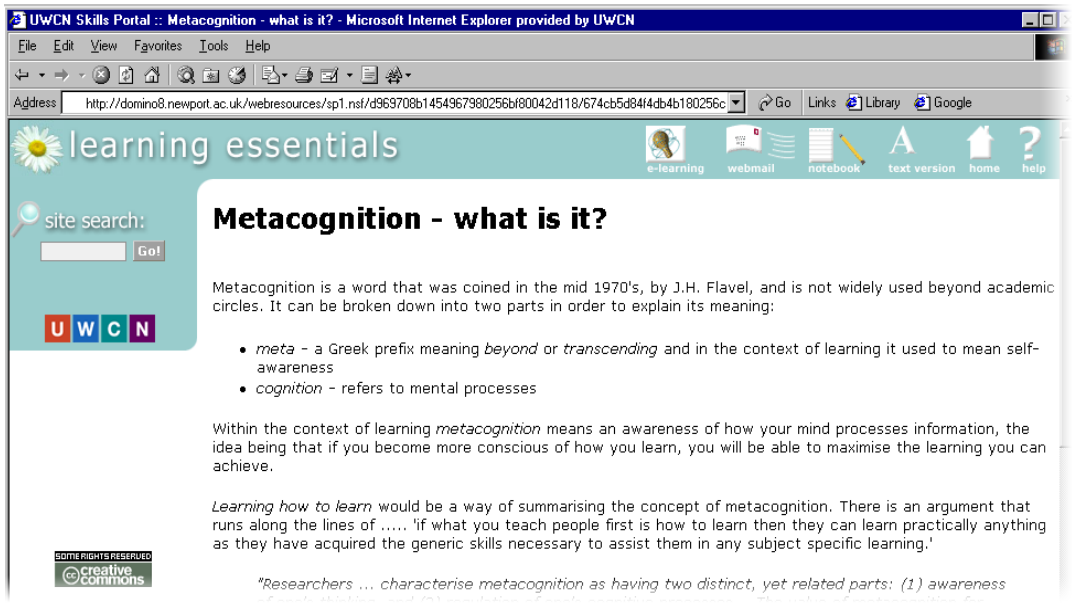
Z39.50 SCO search

A search can be initiated within the library catalogue Z39.50 gateway, or using a Z39.50 client, returning both low level assets and tutorials:



Z search: A title search for the term 'metacognition' is initiated from the ICONE-2 Z39.50 client

Each search result for SCOs or SCORM returns a MARC record containing a URL pointing at a resource in the VLE – either an Authorware file or a Domino document:



Learning Essentials: A Domino document in the test VLE as displayed to the user. This example shows a text SCO asset.

Authorware files have been treated as discreet: they are complete tutorials with a scope that has been defined by the content developer, and with set learning outcomes that are outlined at the beginning of tutorials. SCO assets (as shown above), however, carry no assumptions about the kind of learning outcomes they might address – they are entirely neutral.

User – initiated searches within the Study Skills resource

Once the user accesses an SCO asset they can initiate further searches within the study skills database itself by using a ubiquitous search box. This is noteworthy because it exposes users to another search interface (with direct access to the Domino search tables) that behaves very differently from the Z39.50 search that got them 'there' in the first place); and, mostly importantly: for a given Keyword search, the results themselves differ between Z39.50 and Domino.

The search syntax itself within Domino may vary from the zClient the user used to access the SCO asset (are Boolean operators supported, for example, what syntax is required to express a string? and so on).

Searches initiated within Domino use weighted full text indexing that accounts for:

- The position of the keyword in the document (keyword matches score higher when they appear at the beginning (i.e. in the metadata) and the end (usually the conclusion of the SCO asset text) of a document)
- Keyword matches within the SCO asset text itself
- The number of times a keyword appears in a document
- Fuzzy or explicit matches (variations such 'play', 'played', 'playing' etc.)

Because the Domino searches are *weighted*, the results can also be *ranked*.

Proximity searches within SCOs

The fact that Domino ranks search results makes it suited to creating what we called automated 'proximity searches' that find other SCO assets that are similar to the one being accessed, based on Keywords and Description fields:

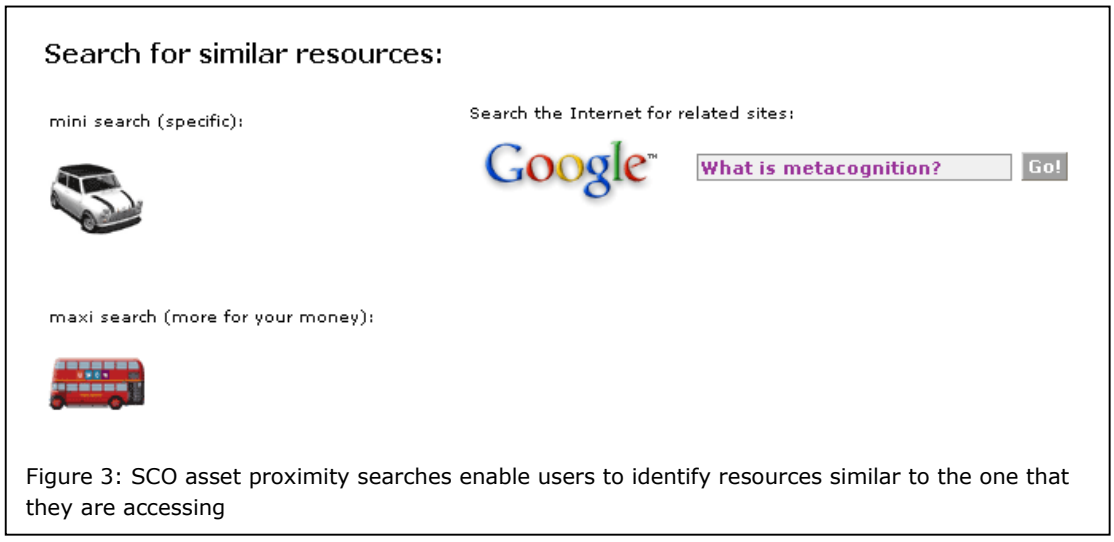


Figure 3: SCO asset proximity searches enable users to identify resources similar to the one that they are accessing

Users have three basic choices:

1. Mini search (search for objects that contain Keyword1 AND Keyword2 AND Keyword3, and so on)
2. Maxi search (search for objects that contain Keyword1 OR Keyword2 OR Keyword3, and so on)

3. Internet (Google) search using the SCO asset Description field.

The search terms for the Mini and Maxi searches are hidden from the users – we wanted to create a 'lucky dip' effect – whereas the Google search terms were viewable and open to adjustment by users.

Push or pull?

Virtual Learning Environments and Digital Libraries are fundamentally different in the way that they offer access to their resources: VLEs tend to 'push' resources towards profiled users, whilst users of Digital Libraries tend to have to 'pull' the information that they want. This distinction is changing, of course, and programmes such as DiVLE are instrumental in bringing about these changes.

However, the pull / push difference poses a useful question in the context of Talking Systems: how does e-learning content that is designed for a VLE need to be adapted for delivery via the Digital Library? The answer is one of *contextualisation*.

In a VLE it is very easy to get a picture of who your learners are, what they have studied to date, what exams they have passed and so on: content developers (usually academics), can offer content to a user base that is well profiled. This kind of profiling was not available to us at all from the library catalogue, and we therefore had to rely on creating good metadata so that our users could pull the resources they wanted. Once accessing tutorials or assets the users are then exposed to 'proximity' links as described in *What does the user want?* above. Essentially, the *content* is profiled, and not the users. This brings interesting questions to VLE content, such as:

- Why would a user want / need to access such and such a granular resource?
- In the context of which *activities* would this resource be handy?

Whereas for our own content management purposes we started out with a metadata framework (the categories and sub-categories of topics we thought we would need to provide for), in reality our low level resources needed to transcend this framework in order to be effectively re-used.

Duplicating data

Why did we choose to import data into the library catalogue rather than query it directly in the VLE? The batch import of metadata into the library catalogue using MARC creates potential problems, such as:

- we have to manage a wide content base: we are effectively duplicating data, which needs to be managed and maintained both within the library catalogue, and separately in the VLE
- we risk not being able to carry certain elements of the IMS metadata into the library system
- we lose certain SCORM run-time capabilities available within a conformant VLE / LMS

Importing data was chosen as a solution to exposing VLE metadata in SCORM format to Z39.50 search and retrieval for many reasons, including:

- Users can access metadata even if VLE security would normally prohibit this;

- the management of VLE metadata can benefit from the processes and controls already employed in the library;
- this is a scaleable solution: we can do this no matter how many or what kind of VLEs are in use;
- we can benefit from the Bath Profile conformance of our library's Z39.50 server; this is a solution that can potentially be employed between and not just within institutions;
- there is no existing Z39.50 profile for e-learning content discovery: using the Bath Profile would be a good basis for further exploration.

Concluding remarks

Has Talking Systems been a success? Yes and no: it has been hard work to achieve our aims, which at the outset appeared modest and focussed. The simple goal of referencing e-learning content from the library catalogue is deceptively complicated, and moreover can be achieved in any number of ways. The good news is that the standards that we used in our practical exploration (Dublin Core, SCORM, IMS, MARC, Z39.50…) are all relatively easy to implement – and are certainly very well documented.

So, in a nutshell, what did we learn? This was a short project, and a bit of time for further reflection will no doubt tease out more wisdom. But for now here are a few points:

- **The SCORM isn't for everyone.** The SCORM is difficult on many levels: the technical standards are opaque to most real life content creators (academics!); authoring tools are complex to use; implicit pedagogical models clunky, and so on. Having said that, it is being increasingly supported by VLE vendors and third party content developers. Good SCORM objects can also deliver a rich learning experience to individual learners. Although SCORM will no doubt *not* be adopted as a standard across VLE activity at UWCN, it will fulfil useful roles during student inductions and study skills support.
- **Keep it simple.** If it works, use it and don't change it. We were looking initially for an automated 'flow' of metadata from our VLE to the library catalogue, because we assumed this would be easier to manage. Technical restrictions made us turn to a simple solution – creating MARC records. It's simple, and in doing so we benefit from the wealth of experience that library staff have already built up in managing metadata in this format.
- **Most people develop content in Microsoft Office.** We were very conscious that a lot work goes into reformatting content- even text. From RTF to HTML to Authorware and back out to XML/graphics/HTML. Throughout this process we kept the 'master' copies of content in Microsoft Office documents. Although not ideal in terms of flexibility and content management, this was based on a realistic assumption that our academics would be managing *their* content this way.

It will be interesting to analyse how our students use the Learning Essentials resource, and especially those parts that we worked very hard to put in place - such as SCO proximity searches, library catalogue queries initiated from book references, and so on. Based on how these features work and are used in practice, we will have to update and rethink our VLE-digital library integration on an ongoing basis: our work in integrating our digital library and our VLE is by no means done.

APPENDIX A: Jargon Glossary

ASSETS

Assets are the building blocks for online learning experiences. They represent the lowest level of content, and are too small to be tracked by a SCORM-compliant VLE.

> *Assets are learning content in its most basic form. Assets are electronic representations of media, text, images, sound, web pages, chat session, assessment objects or other pieces of data that can be delivered to a web client.*
>
> From 'Sharable Content Object Reference Model (SCORM) version 1.2
>
> http://www.adlnet.org

BATH PROFILE

One of a number of Z39.50 profiles (http://lcweb.loc.gov/z3950/agency/profiles/profiles.html) which aim to standardise the syntax for search on a Z39.50 server. If Z39.50 is a standard, why do we need a profile?

> *Within any standard there are implementation options; and the meaning of some specifications may be open to interpretation. Software developers have selected different options to implement or interpreted the standard differently in their systems. This results in the user receiving many false hits or, conversely, not retrieving a record even if it is in the database. Profiles provide the mechanism for vendors and users with an interest in common functionality to specify a standard way to interpret and implement options within the standard. Using a profile that is tailored to your specific search requirements should provide more consistent search results. Specifying conformance to a profile in an RFP or RFI will ensure that libraries acquire the functionality that they require.*
>
> From Carol Lunau's *The Bath Profile: what is it and why should I care?* [WWW] available online:
>
> http://www.nlc-bnc.ca/bath/obj/bathfaq.pdf

LEARNING CONTENT MANAGEMENT SYSTEM (LCMS)

LCMSs are used to store e-learning content independently of the VLE(s) that delivery it. Not all VLEs use a separate LCMS, however

LMS

Learning Management System also: **Library Management System**

For Learning Management System see **VLE**.

The Library Management System at its most basic is an electronic catalogue. However, newer LMS products can include services such as:

- User profiling
- Portal services
- Internet resource discovery gateways
- Digital rights management services

LEARNING OBJECTS

The term 'Learning Objects' describes physical or digital resources that enable learners to work towards a learning outcome. Under this broad definition could be included:

- A textbook
- A chemistry set
- A web page

The term is commonly used to describe discreet web-delivered tutorials.

LOM

Learning Object Metadata

This is a standard for describing Learning Objects that is developed and maintained by the IEEE Learning and Teaching Standards Committee (IEEE LTSC: http://ltsc.ieee.org/)

MANAGED LEARNING ENVIRONMENT (MLE)

Although **VLE**s can be stand-alone systems, they are often integrated with others such as:

- Student records
- Financial systems
- Messaging
- Learning Content Management Systems (LCMS)

When these systems share data or services they are sometimes collectively called Managed Learning Environments (MLEs).

SHAREABLE CONTENT OBJECT (SCO)

> *SCOs represent a collection of one or more Assets and / or Shareable Resources that include a specific launchable asset that utilizes the SCORM Run-time Environment to communicate with LMSs. A SCO represents the lowest level of granularity of content that is able to be tracked by an LMS using the SCORM Run-time Environment.*
>
> From 'Sharable Content Object Reference Model (SCORM) version 1.2
>
> http://www.adlnet.org

SCORM

Shareable Content Object Reference Model

Funded by the US Department of Defence via the Advanced Distributed Learning programme (ADL: http://www.adlnet.org/), the SCORM is an emerging specification that combines a number of existing standards. It aims to provide a standard way to describe sequenced content that is non-collaborative (to be used by a single learner). ADL's vision is one of a 'learning economy' in which a learner can identify a specific learning requirement, and have a bespoke tutorial created from distributed content that answers this requirement.

The SCORM has been criticised by some as being unsuited to learning in HE – it's focus is on *training*.

VIRTUAL LEARNING ENVIRONMENT (VLE)

The VLE (often called a Learning Management System (LMS) outside the UK) is the system (software, hardware, client, server etc) that *delivers* e-learning content and services to learners. Typically this will include:

- Resource delivery (SCORM objects, MS Office documents, images, multimedia…)
- Collaboration tools (discussion board, live (or 'synchronous') text chat, screen sharing…)
- Assessment tools

Examples of VLEs include:

- Blackboard
- WebCT
- IBM Lotus LMS
- Nathan Boddington

Z39.50

The Z39.50 standard (ANSI/NISO Z39-50-1995, Information Retrieval, or ISO 239.50:1998) provides for communication between two computer systems for searching and retrieving information from databases. The standard is maintained by the Library of Congress (http://lcweb.loc.gov/z3950/agency/)

APPENDIX B: Talking Systems Z39.50 target

This appendix outlines the correct configuration details for the ICONE-2 Z39.50 client for connecting to the Talking Systems Z server. The ICONE-2 client from CrossNet systems is available here: http://www.crxnet.com/icone.php

```
The following records must exist for each host:
 H = Host name record;
 D = database name record (start of dbase info)
 S = Search parameter records;
 B = Browse parameter records;
 P = Presentation parameter record;

The H record format is:
H, "host name", "internet address, "port", T or F;
The I record format is:
D, "Database Name";

The T in "host" makes it possible to enter username and
password;

The S search parameter records are:
S, "Attribute Name", UseNo, 2, 3, 4, 5, 6;

The B browse parameter records are:
B, "Attribute Name", UseNo, 2, 3, 4, 5, 6;

The BP record contains the scan start position and stepsize

The SKW record contains the sort keywords for the database

H, "Newport [SIRSI]", "193.63.82.144", "2200", F;
BP, 0, 0;
D, "", "Bath Profile Compliant Catalogue";
S, "Title Keyword", 4, 3, 3, 2, 100, 1;
S, "Author Keyword", 1003, 3, 3, 2, 100, 1;
S, "Subject Keyword", 21, 3, 3, 2, 100, 1;
S, "Any Keyword", 1016, 3, 3, 2, 100, 1;
```

```
S, "ISBN", 7, 0, 0, 6, 0, 0;
S, "Author Phrase", 1003, 0, 0, 1, 0, 0;
S, "Title Phrase", 4, 0, 0, 1, 0, 0;
S, "Subject Phrase", 21, 0, 0, 1, 0, 0;
S, "ISSN", 8, 0, 0, 6, 0, 0;
S, "Author Ex Lv 1", 1003, 3, 1, 1, 100, 3;
S, "Title Ex Lv 1", 4, 3, 1, 1, 100, 3;
S, "Subject Ex Lv 1", 21, 3, 1, 1, 100, 3;
S, "Any Kw Lv 0", 1016, 3, 3, 2, 100, 1;
S, "Author Pr Lv 0", 1003, 3, 3, 101, 100, 1;
S, "Title Kw Lv 0", 4, 3, 3, 2, 100, 1;
S, "Subject Kw Lv 0", 21, 3, 3, 2, 100, 1;
S, "Any Kw Lv 0", 1016, 3, 3, 2, 100, 1;
S, "Author Pr Tr Lv 1", 1003, 3, 3, 101, 1, 1;
S, "Author Kw Lv 1", 1003, 3, 3, 2, 100, 1;
S, "Author Kw Tr Lv 1", 1003, 3, 3, 2, 1, 1;
S, "Author Ex Lv 1", 1003, 3, 1, 1, 100, 3;
S, "Title Kw Tr Lv 1", 4, 3, 3, 2, 1, 1;
S, "Title Ex Lv 1", 4, 3, 1, 1, 100, 3;
S, "Title 1st Wds Lv 1", 4, 3, 1, 1, 100, 1;
S, "Title 1st Ch Lv 1", 4, 3, 1, 1, 1, 1;
S, "Subject Kw Tr Lv 1", 21, 3, 3, 2, 1, 1;
S, "Subject Ex Lv 1", 21, 3, 1, 1, 100, 3;
S, "Subject 1st Wds Lv 1", 21, 3, 1, 1, 100, 1;
S, "Subject 1st Ch Lv 1", 21, 3, 1, 1, 1, 1;
S, "Any Kw Tr Lv 1", 1016, 3, 3, 2, 1, 1;
S, "Standard Id Lv 1", 1007, 3, 1, 1, 100, 1;
S, "Date Level 1 < ", 31, 1, 1, 4, 100, 1;
S, "Date Level 1 <=", 31, 2, 1, 4, 100, 1;
S, "Date Level 1 =", 31, 3, 1, 4, 100, 1;
S, "Date Level 1 >=", 31, 4, 1, 4, 100, 1;
S, "Date LEvel 1 >", 31, 5, 1, 4, 100, 1;
S, "Date LEvel 1 not equal", 31, 6, 1, 4, 100, 1;
B, "Author Exact", 1003, 0, 1, 1, 0, 0;
B, "Title Exact", 4, 0, 1, 1, 0, 0;
B, "Subject Exact", 21, 0, 1, 1, 0, 0;
B, "Title Keyword", 4, 0, 3, 2, 0, 0;
B, "Subject Keyword", 21, 0, 3, 2, 0, 0;
B, "Any Keyword", 1016, 0, 3, 2, 0, 0;
```

```
S, "Title Phrase Cross-Domain", 4, 3, 3, 1, 100, 1;
S, "Subject Phrase Cross-Domain", 21, 3, 3, 1, 100, 1;
S, "Any Phrase Cross-Domain", 1016, 3, 3, 1, 100, 1;
P, "USMARC", "XML";
E;
```

APPENDIX C: The 5 "must access" links to learn more

SCORM

Dr Ed's SCORM Course (http://www.jcasolutions.com/SC12/index.html)

A course, itself in SCORM format, all about the SCORM explaining what it is and where to learn more.

CETIS SCORM pages (http://www.cetis.ac.uk/list.html?SpecificationContext=adl)

From CETIS - the voice and demystifiers of learning technology standards for UK HE – includes articles and fora.

Z39.50

Paul Miller's *Z39.50 for All* (Ariadne issue 21: http://www.ariadne.ac.uk/issue21/z3950/intro.html)

Excellent overview of what Z39.50 is and what it can do.

Z39.50 Maintenance Agency (Library of Congress: http://lcweb.loc.gov/z3950/agency/)

Full documentation, including profiles and current activity

MARC

MARC tutorial (http://www.loc.gov/marc/umb/)

From the library of congress

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