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Shibbolising Online Librarian:
how two university libraries enhanced their collaborative chat reference service by using a MAMS Mini grant to add authentication and develop an interoperable chat client

Jean McKay
Manager Liaison Services
Murdoch University
j.mckay@murdoch.edu.au

Annmaree Brown
Liaison Librarian
Macquarie University
annmaree.brown@library.mq.edu.au

Helen Bronleigh
Library Systems Coordinator
Murdoch University
h.bronleigh@murdoch.edu.au

Margaret Wright
Frontline Services Manager
Macquarie University
margaret.wright@library.mq.edu.au

Abstract
Chat reference, so what's new or innovative about that? It's a common enough service now offered by many libraries. In fact, Macquarie and Murdoch University Libraries have collaborated to provide a virtual reference service since March 2003 as described in a paper presented at VALA in 2004. Since then, Online Librarian has been transformed using open source standards and freeware products. The result is a robust and scalable product that allows multiple operators, smart assignment of calls, transfer of calls and automatic statistics collection.

Introduction

It is May 2006 and the Instant Messaging (IM) reference service that had been introduced with such confidence almost two years earlier is causing headaches for staff at Macquarie and Murdoch University libraries. MSN Messenger, the chat client for the collaborative reference service badged 'Online Librarian', has reached the maximum number of contacts on the 'allow list'. No new contacts can be added, so new patrons are unable to access the service. This adds urgency to another factor already under investigation – how to cope with the success of the service. A single MSN address is used to provide IM reference to students and staff at both universities, which means only one operator at any one time. Sometimes the Online Librarian is juggling up to three concurrent chat sessions. Scalability does not seem easily achievable while using the MSN client.

Macquarie University Library and Murdoch University Library have had a sustained interest in providing quality virtual reference. This developed through their collaborative Online Librarian (OLL) Voice over Internet Protocol (VoIP) service first described in a paper at VALA in 2004 (Fletcher, Hair & McKay 2004). Then in October 2004, following client feedback and declining use, the VoIP service switched to an IM service using the more popular MSN Messenger. Use quadrupled in the first months of switching to IM. However, initial enthusiasm subsided as problems with scalability emerged.

Then one of those synchronous events happened: Erik Vullings and Peter Schendzielorz from the Metadata Access Management System Project (MAMS) approached Macquarie and Murdoch libraries to see if there was interest in developing an authenticated and personalised chat service. OLL would become a demonstrator project for the MAMS Testbed Federation. MAMS is funded to aid collaboration between Australian academic institutions, providing middleware that utilises technology such as Shibboleth and open source identity management systems for single sign on and access control. The collaborative OLL service was suited to this initiative with staff experienced in providing chat help.

Fortunately, our vision for OLL matched the outcomes that working with MAMS would achieve - authentication of clients, automation of processes, flexibility in the distribution of conversations and, most importantly, scalability.

Metadata Access Management System Project

The Metadata Access Management System Project (MAMS) at Macquarie University's E-Learning Centre (MELCOE) is a three year $4.2 million project sponsored by Australia's Department of Education Science and Training (DEST) as part of the "Backing Australia's Ability" program. The project allows for the integration of multiple solutions to managing authentication, authorisation and identities, together with common services for digital rights, search services and metadata management. The project provides a 'middleware' component to increase the efficiency and effectiveness of Australia's Higher Education research infrastructure. (MAMS 2007). MAMS has supported a number of initiatives with a series of Mini-Grants (MAMS Mini-Grant Program 2006) for projects to build the federation

and to produce a series of demonstrator prototypes. Macquarie and Murdoch University Libraries were successful in the second round of Mini-Grants offered in June 2006. They obtained $40,000 funding for their proposal to develop an improved text chat service by building on the existing OLL service through adding authentication of patrons and automation of processes. The funding meant that a software developer could be employed to design better processes and the involvement with MAMS allowed the project team to draw on the Federation's experience and expertise with trust architecture.

Middleware is a layer of open source software services that sit above the network but below individual applications. Middleware helps connect disparate systems; it is the 'glue' that overcomes the limitations of isolated systems. One of the core components of middleware is identity and access management, particularly federated identity and access management. A trust framework (or federation) connects identity providers and service providers. Shibboleth is one of the technologies that support a trust federation (Dalziel 2007).

Shibboleth

Shibboleth is a project of the National Science Foundation Internet2 Middleware Initiative (Internet2 2007). The project's aim is to "develop an open, standards based solution to the needs of organisations to exchange information about their users in a secure and privacy preserving manner" (Afifi 2004). The Shibboleth software provides a federated Single SignOn to web based services across or within organisational boundaries. Shibboleth is an open source implementation of the SAML (Security Assertion Markup Language) specification, developed by the OASIS Security Services Technical Committee, and focuses on trust federations for education and research.

Shibboleth is freely available, and is released under the Apache License, which allows use of the source code for the development of free and open source software as well as proprietary and closed source software. Apache is developed and maintained by an open community of developers under the auspices of the Apache Software Foundation, which provides organisational, legal, and financial support for a broad range of open source software projects. (Apache Software Foundation 2007)

By using Shibboleth, libraries and academic institutions can provide protected and validated access to online resources they produce, license or share (for example our IM reference service). The Shibboleth system provides a standards based link between existing campus authentication systems and resource providers of all kinds (including chat services). Access control is based on attributes determined by the identity provider. Shibboleth is designed so that the user's home institution verifies their existence in the institution's database and then provides the necessary attributes about them to the resource owner/service provider, who then may or may not provide access. Because only attributes are exchanged, the Shibboleth system allows institutions with different technology architectures and security systems (such as Macquarie and Murdoch Universities) to easily collaborate.

The diagram in Figure 1 explains how Shibboleth authentication operates for the Online Librarian service. A detailed explanation is provided below.
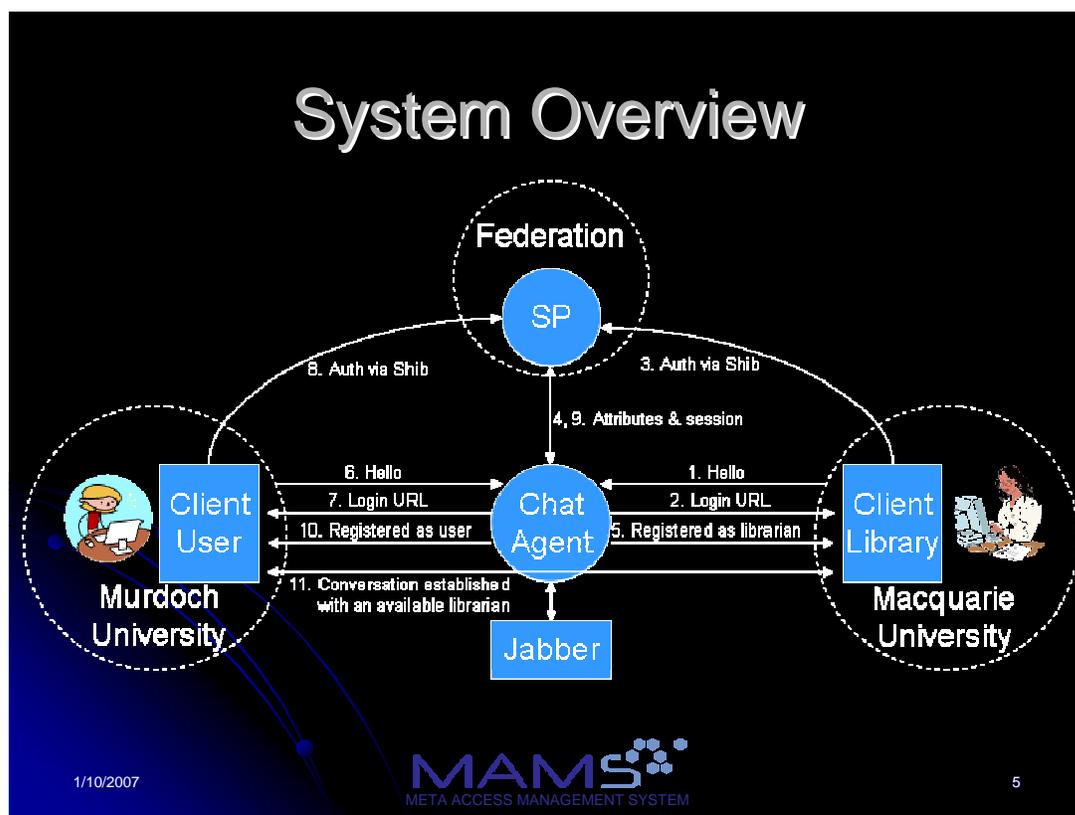
Figure 1: System Overview diagram courtesy of Peter Schendzielorz (MAMS) from a presentation 'Online Librarian Providing Online Support to Library Customers' at Murdoch University in July 2006

In the diagram, the Online Librarian ('Client Library' on the right hand side) is based at Macquarie University and the patron ('Client User' in the left hand side) is from Murdoch.

1. "Hello" Librarian contacts Psi to register as an operator
2. Login URL via Shibboleth's WAYF (Where Are You From) web page
3. Authorisation via Shibboleth – to Federation Service Provider (SP).
4. Attributes released
5. Registered as Online Librarian
6. Murdoch patron says 'hello' (using Java window or own chat client)
7. Login URL via Shibboleth's WAYF web page
8. Authorisation via Shibboleth – to Federation Service Provider SP. Patron enters their Murdoch University ID and University password
9. Attributes released
10. Registered as a patron ('Client User)
11. Conversation established with an available Librarian

The Project

Features of the Online Librarian service in June 2006

A description of the features of the Online Librarian service at the time that MAMS became involved in the project provides a baseline against which to evaluate and assess the developments from the project.

- OLL was a collaboration between Macquarie University Library and Murdoch University Library and commenced in 2003, initially using Microsoft NetMeeting, and then since October 2004 using MSN Messenger with the handle onlinelib@hotmail.com

- The hotmail handle meant that it was an anonymous service and the service was public, with no priority for Macquarie or Murdoch patrons. For each caller, the reference interview commenced with a request for details from the caller – Macquarie/Murdoch/other?

- Only one operator could work at a time and this was problematic when a number of concurrent chats were received. There was no capacity for additional operators to register on the same handle. The handover between operators was a cumbersome manual process and there was a risk of a chat session being dropped as one operator logged off and another logged on.

- The service operated for a limited time span, of only 34 hours per week. Both libraries wanted to increase the spread of hours but this was not feasible.

- In 2004 a total of 214 calls were received. In 2005 there were 823 calls, and to June 2006 a total of 502 calls.

- No further contacts could be added to the MSN 'allow list' which meant the service could only be offered to patrons already in the contact list. This situation was becoming unworkable.

What MAMS offered the Online Librarian Service

We met with MAMS staff and talked about the key features of the service that would be developed with the implementation of Shibboleth authentication. Once the service was set up, it would support multiple operators and multiple networks with the interoperable Jabber being the likely chat client. The Shibboleth authentication would enable information to be supplied about the client, based on the attributes they displayed, thus facilitating the reference interview. There would also be smart assignment of calls, based on the client and operator attributes. Operators would be able to transfer conversations and there would be system-generated statistics. Finally, Macquarie and Murdoch patrons would be able to use their login to access other MAMS services for which they were eligible.

In June 2006, IT staff members from each institution attended a MAMS workshop for all second round Mini-Grant winners to learn about Shibboleth. They could then provide essential support in completing the second task - to set Murdoch up as a

MAMS second level identity provider (IdP). Macquarie was already an IdP as well as a Service Provider (SP).

A project plan was developed using a method recommended by MAMS - 'Quick Kill Project Management: how to do smart software development even when facing impossible schedules' (Stellman 2006).

Project goals
- To develop and improve design of a text chat information service between library patrons and librarians, building on the existing OLL service by adding authentication of users, automation of processes, and scalability and flexibility in how conversations are distributed.
- To evaluate the potential of the service to meet the needs of other service providers within each university, for example student services, IT support.
- To produce a product that was flexible enough to be used by other institutions and helpdesk type services. Such an approach leverages the modularity of Shibboleth authentication.

Project objectives
- To develop and improve design of a personalised chat information service that can be tailored (over time) towards the user. To achieve this it is essential to authenticate for the service via Shibboleth, so that customer attributes including staff/student status, university/campus, faculty/school, study level, study mode (where information is available) can be used.
- To develop automatic scripts for answering questions.
- To build a service that is scalable to accommodate current and future usage of the chat service
- To build a service that uses existing hardware and software, thus keeping costs down and reducing the need for librarians to be retrained.
- To allow the use of 3rd party clients, such as MSN Messenger, Gaim or Trillian.
- To allow for automatic routing of calls, i.e. smart allocation of new conversations.
- To allow forwarding of calls from one librarian to another.
- To promote the growth of the MAMS Federation testbed.

The project plan was broken into Stage 1 and Stage 2, and the aim was to have Stage 1 completed by the end of August. Once the basic version of Online Librarian was operating, work would begin on the enhancements in Stage 2, which was to be completed when the Mini-Grant project ended in December 2006. In actuality, Stage 1 was not completed until towards the end of September.

Stage 1 implementation

Selection of Jabber client & setting up Psi
The Libraries were guided by MAMS' recommendation to user Jabber Psi as the client for the new service. Its interoperability with other chat clients, the capacity to support a Java chat window and its stability were all reasons for selecting Jabber. Though 'Library Success: A Best Practices Wiki' (Library 2007) does not include Jabber amongst the preferred IM clients, our experience with Jabber is that while not being the most attractive chat product it has proved stable and performs well.

MAMS staff pre-populated Psi with individual Jabber IDs for reference staff at both libraries, and at Macquarie, generic accounts were set up for reference desk computers. The Psi client was installed on all reference staff and reference desk computers across both libraries. Jabber accounts were also set up for other messaging clients (MSN, ICQ). Patrons could choose to contact Online Librarian through the Java chat box or by using their own IM client.

Setting up the Shibboleth authentication for Online Librarian
These steps provide a guide to what is required to implement a chat service with Shibboleth authentication.

Step 1: Set up Identity Providers (IdPs) for both Murdoch and Macquarie

Step 2: Set up interfaces consistent with the Murdoch and Macquarie authentication systems.

Step 3: Customise the MAMS WAYF (Where Are You From) page to show only the Macquarie and Murdoch IdPs. The standard MAMS WAYF page lists all Identity Providers and Murdoch and Macquarie were not readily identifiable. The dropdown list was replaced with the Murdoch and Macquarie logos. This page links through to the Murdoch and Macquarie authentication pages. See Figure 2 below.

Step 4: Redesign library web pages for the new OLL service. Callers can now connect directly to the chat client from the webpage, whereas previously they were required to install and connect from MSN Messenger. See Figure 3 below.

Step 5: Install web based client JWChat and ensure that Java/JavaScript is turned on for web browsers in both libraries

Step 6: Establish rules code for smart assignment of calls so that Macquarie calls are routed directly to a Macquarie librarian if available and Murdoch calls to a Murdoch librarian if available. A librarian handles up to three concurrent chat sessions. If all librarians at one institution have three calls each then the next call will be routed to the other institution. Where all librarians are at the maximum level or unavailable, patrons will be routed to their institution's email help.

Step 7: Establish basic commands
- Transfer command to transfer from one librarian to another (!transfer)
- Information command to find out further attributes of user (!info)

- Develop scripts for basic functions including a welcome message

Step 8: Automate the production of basic operating statistics – number of calls from each university's patrons; number of calls answered by operators from each university; the time of day of calls; and the number of message transactions in each call.
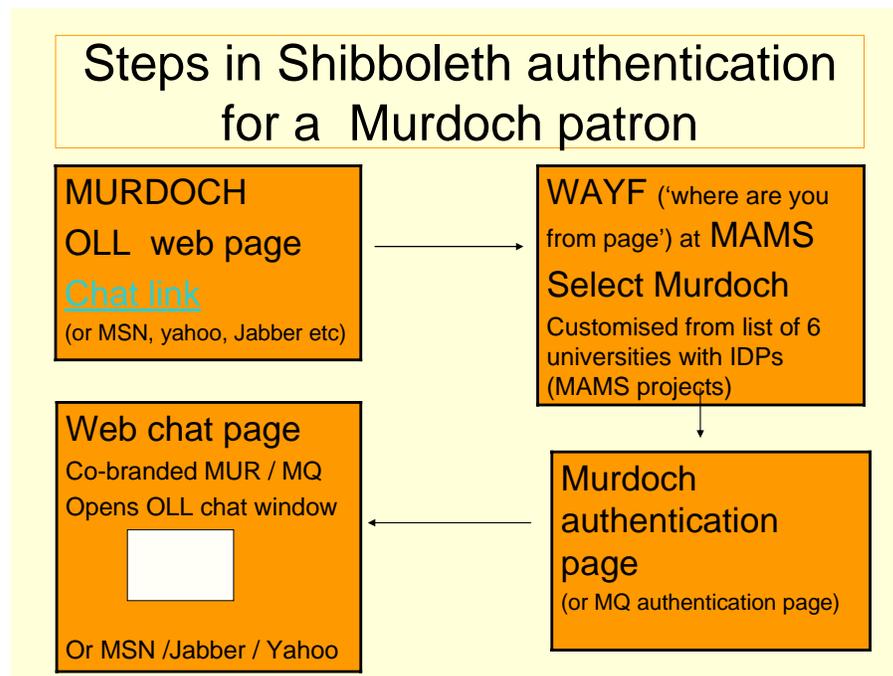

Figure 2: The MAMS WAYF (Where Are You From) page

Figure 3: Murdoch University Library's Online Librarian webpage

During this period, librarians worked closely with our developer and MAMS staff to try to resolve outstanding problems. We tested conversation assignment with groups of librarians and 'patrons' from Macquarie and Murdoch, and conversations were assigned as expected. Transfer functionality was tested and this worked satisfactorily between Murdoch to Murdoch operators, Macquarie to Macquarie operators as well as Murdoch to Macquarie and Macquarie to Murdoch operators.
There were some problems preserving the uniqueness of conversations; however these were resolved. The other major problem was the slowness of the web chat screen to load and this was fixed by the installation of a lightweight client.

On 27 September 2006, the Online Librarian service became live with operators at Murdoch and Macquarie registering on Psi (Jabber).
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Steps in Shibboleth authentication for a Murdoch patron

MURDOCH
OLL web page
Chat link
(or MSN, yahoo, Jabber etc)

WAYF ('where are you from page') at MAMS
Select Murdoch
Customised from list of 6 universities with IDPs (MAMS projects)

Web chat page
Co-branded MUR / MQ
Opens OLL chat window

Or MSN /Jabber / Yahoo

Murdoch authentication page
(or MQ authentication page)

Figure 4: Steps in Shibboleth authentication for a Murdoch patron

Step 1: Murdoch Online Librarian web page
The Murdoch patron has come via the Murdoch Library's web page and selected to open a chat link to Online Librarian.

Step 2: WAYF (Where Are You From Page)
The MAMS WAYF page has been customised to show only Macquarie and Murdoch and not all Australian IdPs. The patron selects the Murdoch icon.

Step 3: Murdoch authentication page
The patron enters their familiar Murdoch ID and password and is verified in Murdoch's directory.

Step 4: The web chat screen opens
The patron can start chatting with the Librarian.

The service was operational and there was immediate positive feedback from patrons, although Librarians were reporting a high number of lost calls. These calls appeared to have been successfully assigned to operators but then there was no further interaction with up to a third of these patrons. A solution was proposed to redesign the Online Librarian system to eliminate a component, "jhatbot", thereby giving greater flexibility to the system. This involved an extensive design phase, implementation of phase coding, then testing, documenting and installing.

It was proposed to have the redesign completed by December 2006. However, there were also some outstanding tasks from Stage 2 so it was agreed by MAMS to carry the project over until the end of February 2007. A further extension has resulted in the project continuing until July 2007.

Stage 2 implementation

Version 2 was implemented in July 2007. Online Librarian now has its own server and is a more robust product. Enhanced functionality from Stage 2 implementation includes:
- **Transaction log on exiting** with optional ability to email transcripts
- **Feedback** - link to a feedback form when exiting the service
- **Frontline and secondline operators**

It is now possible to assign staff as frontline or secondline operators. Calls can be transferred from a frontline to a specialist second line operator. After briefly assigning staff as frontline or secondline operators, we have decided to revert to all being frontline. The reason for this was insufficient frontline operators being registered at any one time, which meant that many calls were being routed to the other institution. We plan to investigate this functionality more fully. It could be useful to have functional areas as 'secondline', for example Document Delivery. Alternatively 'frontline' could handle general enquiries and then transfer specialist questions to reference librarians.

Hours of operation

One of the key motivators in joining the MAMS project was the opportunity to provide the Online Librarian service over a greater spread of hours. Like most virtual reference services, we want to be available for our patrons wherever they are and whenever they require research and reference support. Online Librarian is available 87 hours per week (compared to 34 hours per week with the previous service using MSN and a single operator). The collaborative nature of the service means that it is available for more hours than reference services are offered at each library.

There is no roster to provide the service; rather librarians are asked to register as operators whenever they are at their desks and respond to IM inquiries as required, in much the same way they respond to phone calls or emails. IM is just another way

for our clients to engage with us. During evenings and weekends, Reference Desk staff are required to register as Online Librarian.

The Shibboleth authentication and routing of calls based on attributes means that most callers are routed to their own library except in the early morning or evening when they may be routed to the other institution.

Day	Macquarie University Library EST		Murdoch University Library WST	
	OLL	Ref Desk	OLL	Ref Desk
Mon - Thurs	9 am – 11 pm	9 am – 10 pm	7 am – 9 pm	9 am – 9 pm
Fri	9 am - 8 pm	9 am – 6 pm	7 am – 6 pm	9 am – 6 pm
Sat	9 am – 7 pm	9 am – 5 pm	7 am – 5 pm	1 pm – 5 pm
Sun	9 am – 7 pm	9 am – 5 pm	7 am – 5 pm	1 pm – 5 pm
Total hours	87 per week	77 per week	87 per week	65 per week

Figure 5: Online Librarian hours & Reference desk hours at Macquarie University Library & Murdoch University Library

Support and training for staff

Reference librarians across both libraries have been involved in the project. Being a new and developing project, training resources were being developed simultaneously with testing functionality. The project team members in the libraries at both universities prepared training guides to Psi (settings and functionality), and also procedure documents for the new OLL functionality.

Communication channels

Macquarie and Murdoch Libraries have some well-established communication channels. Their IRUA (Innovative Research Universities Australia) membership means senior staff meet several times each year. The OLL project has been in operation since 2003, and staff involved in the project communicate well via face to face meetings, phone and email. An email list and a blog were also provided. Communication with MAMS staff, the developer and Library project members has been mostly by regular teleconferences. Throughout the project, MAMS was generous with their commitment and support.

Now that the project is moving into the mainstream, both libraries have suggested and agreed to strategies to facilitate communication – to resurrect the email list; nominate at least two contacts in each library and to forward to one another a list of semester dates, public holidays, IT maintenance days and other days where there could be staffing issues.

Evaluation

To date no thorough evaluation of the service has been conducted. However, there are plans to do this and there should be further information to report at VALA in 2008. So far, there are statistics indicating usage information and client feedback from the optional feedback form that is presented to patrons when they exit Online Librarian.

Statistics

Statistics are generated by the system and provide details about patron affiliations, operator institutions, the start time and end time of each call, the number of transactions in each chat interaction, the transfer history, and notes including whether the call ended by operator action or timeout.

There is a SQL feed of statistics from the server, and this is extremely useful in managing the service. For example, we can monitor if there haven't been many calls for a period of time, if there have only been calls from patrons from one institution, or if all the calls from one institution are being responded to by the other institution.

MQ Operators All Calls	MQ Operators 0 - 2 messages	MQ Operators Actual Calls	MU Operators All Calls	MU Operators 0 - 2 messages	MQ Operators Actual Calls
671	263	408	977	439	538

Figure 6 Online Librarian use 21 Sept 2006 – 16 June 2007

A total of 1648 calls were received during this period. However, those with 0 – 2 messages (675) were not included in the final tally, because the conversations had dropped or been lost. Thus a total of 946 calls were responded to successfully between 21 September 2006 and 16 June 2007.

Feedback from patrons

Clients from both universities have been very enthusiastic about the improved service.

Feedback form

The optional feedback form that appears at the end of each call has helped us collect the following recent comments.

What do you like about the Online Librarian?
- ✓ *Just wanted to let you know how much I value the Online Librarian service. I love the fact that someone is there to help me out while I'm working online. The fact that I can ask a question, get a reply, and keep working the whole time is a wonderful time saver for me. It also keeps my blood pressure down. The Online Librarians are a friendly mob, and invariably pass on useful information*

✓ *So quick to respond and convenient, I have sick children so not poss to get into Uni and understood my question (it regarded how to locate ECMS!!) It saved me time getting into Uni.*

✓ *It is so easy and quick to get answers to simple questions. I was even able to get my book renewed through this, which is great because it was due back and I didn't want to be penalised.*

✓ *how quick and easy it was (I am a remote student)*

Did you experience any problems? :
✓ *No, none, none whatsoever, absolutely not, it was just problem-free, y'know, like not even one little teeny weeny problem arose the whole time, so it was all smooth running!*

Other comments or suggestions? :
✓ *No, just please keep this service going if feasible, because it is great not to have to get out of my chair and get to the phone/library.*

✓ *Brilliant service, many thanks to whoever came up with this idea. Cheers.*

Technical support for Online Librarian

Ongoing support is required to ensure that we can provide a robust and reliable service for clients.

MAMS has agreed to host the server used by Online Librarian until the end of 2008. During 2008, decisions will be made about future hosting for the service. A special email list has been created for the developer to communicate about technical issues, especially issues connected to the server. It is important that support issues are resolved to ensure long term viability for OLL.

Functionality not developed

Outstanding tasks connected to patron attributes

Two tasks in the project dependent on the provision of patron attributes were not able to be developed at this stage, due to limitations on attributes provided through the universities' systems. These were automatic direction of callers to a particular operator based on the attributes of the caller, and provision of reference interview information.

This functionality is dependent upon each university agreeing or being able to provide these attributes at institutional level. Attributes such as affiliation, faculty, course and level of study would enable us to tailor the service to patrons' specific needs.

Identified future enhancements

Single sign on
It was agreed that single sign on would be desirable, though in this version of OLL it will not be achievable. Both Universities are implementing Student Portals, and the ability to connect to Online Librarian from within the Portals without re-authenticating could potentially increase the visibility and use of the service. However, this is dependent on further development of the Portal software's single signon capabilities.

Widget
We intend to investigate the development of a 'widget', so that patrons can to link to OLL from their preferred interface or browser, for example Facebook or iGoogle.

Implementation of the service and best practice recommendations
The implementation of this joint service has been successful and relatively smooth. Regular communication between MAMS staff, the developer and library staff ensured that issues could be dealt with quickly and library staff kept informed of changes as each version was rolled out. One of the key factors in a successful implementation of the service was staff acceptance and training, and this requires ongoing attention to ensure that staff use the service to its best advantage.

Recommendations for best practice in implementing this service include:
- Established and clear communication channels (mailing lists, contact persons etc) between the two institutions
- A change management program for the introduction of the service, both for technical implementation and for staff (training, expectations, procedures, communication)
- The use of scripts to automate part of the service
- Automated feedback forms for ongoing evaluation of the service, with regular formal evaluation to ensure the service continues to meet the needs of clients.

Demonstrator for MAMS Testbed Federation?
At the outset OLL was to be developed to promote MAMS Testbed Federation, by providing a demonstrator of an authenticated chat service for use by other enquiry services in libraries, student services or IT help services. The service has not yet been promoted widely. Even within each university, marketing of the new OLL service has been low key. The product is now sufficiently stable for serious promotion of the OLL service. Very recently, a large OLL smiley was added in a prominent place on the Murdoch students' help page. Other methods to market OLL could involve redesigning the web page, and links to the service from a number of library and university pages, for example the student portal or the university's learning management system. Promotion to other chat services will be undertaken through forums such as this presentation at VALA and also by MAMS.

Future for Online Librarian

OLL is a successful service and both libraries are committed to its continuation. It fits with strategic directions at both libraries to provide services to clients beyond library walls and in the spaces that they frequent. Chat reference provides support when required and is not dependent on where the student is located.

The Shibboleth authentication has meant that client groups can be identified and calls routed to the appropriate university to best answer the call, with a fall back of routing the calls to the other institution. The substantial development work has produced an interoperable chat client with smart assignment of conversations, clever scripts and commands, automatic statistics collection, optional transcripts and an optional feedback form. Online Librarian is a smart and effective product.

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