

Going Virtual for Enhanced Library Experience: a Case Study of the National Library of Singapore

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Abstract

Amidst changing lifestyles, Internet savvy users, and the availability of large amounts of information on the Web, libraries are faced with the main challenge to remain relevant and to continue develop innovative products and services to serve the needs of users. This paper proposes a number of roles that libraries can play in such a future: as info-concierges; as a network of inter-connected info-concierges; and as a network of true collaborations. Using a case study of the National Library Singapore (NLS), a number of initiatives currently undertaken by the library to move forward in such a direction are outlined. These include the introduction of a SMS reference service, enhanced accessibility of NLS's content through deliberate availability in users' search and social networking spaces, and the development and use of a platform that uses the principles of "wiki" to support the formation and use of a collaborative reference network to support reference enquiries.

Library, a Time for Re-Think

The library is traditionally associated with information storage, where content, stored in multiple formats, are collected, organised and displayed for use. As a result, it has been used as part of a social and learning network where users individually (or as a group) interact with the content for learning and leisure purposes. With the explosion of digital content over the world-wide-web, its availability and great ease of use, the library can become irrelevant if it does not keep in pace with changing user lifestyles and expectations.

In order for the library to keep up with the changes and continue to play a useful role in the world today, it has to break out from its traditional mould, re-invent itself and find ways to become part of people's lives in the way they live them, instead of trying to get people to come to its physical and digital spaces.

In this first part of the paper, we examine the opportunities brought forth by the Web and online content, and a number of new roles that a library can expect to play in future, namely, the library as an info-concierge, the library as a network of inter-connected info-concierges, and the library as a network of true collaborations. Subsequently in the second part of the paper, we present a case study of the National Library of Singapore (NLS) and highlight a number of recent initiatives that have been developed and implemented along these directions.

Library? What is the URL?

Just as it is not often that one remembers the URL of a website, it is not likely that one recalls the resources that may be available in a particular website. Today, many information seekers search for Web online information they require via their favourite search engines, Google, Yahoo or MSN (or GYM). According to Nielsen/NetRatings for March 2007, Google presently enjoys 55.8% of the market share of Internet searches (US), in comparison with Yahoo's 20.7% and MSN's 9.6% (Nielsen/NetRatings, 2007). The ability to ensure that the library's information and web pages are crawled and indexed by search engines are critical to ensure that these are made visible to all Internet users. Organisations are exploring and optimising their website for search engine optimisation in an attempt to provide information seekers with the most relevant and useful hits in their search outputs, and for their websites to be accessed by users.

For example, the National Library Singapore (NLS) has been prototyping and exploring ways to architect a website that for search engine optimisation. This requires making changes to the website structure, and the hierarchy of information on the resources. Such resources were previously 'embedded' within the website, sometimes a few layers below the first page. This made it difficult for users to find the information if they are only using internet search engines.

Initial tests were carried out on a small body of information produced by NLS reference librarians. Known as Infopedia articles and stored in the database, they comprise stories about personalities, places and historical events in Singapore. These articles are available in the National Library Board (NLB) website since its inception, and usage numbers were averaging between 200 to 400 article views per month. After making changes to the hierarchy of information presented in the articles, structure of the website and URL, the usage of Infopedia articles increased to an average of 63,000 article views per month (or 157-fold increase in use) in the last 10 months; with more than 40% of the traffic coming from Singapore. Further, there is an average of 330 inbound links to the Infopedia articles.

This experience is now translated into a strategy for website architecture and design, to enable ease of navigation and crawling by internet search engines. The information, services and resources are now more 'discoverable' by information seekers on the Internet, and when users find the information that they need, they are gently guided back to the NLB website to explore and to use the other resources that the library had painstakingly selected and organised for their use in the library's website.

The library as an info-concierge

One way to see the library's role is that of an info-concierge. This view of the library as an info-concierge can be extended to individual information object and service that the library produces. Each info-concierge is likened to a self-sustaining and self-contained 'cell' unit, which could comprise either content or a service. The content could be in any format, and could be a singular unit of a reference article, catalogue record, or research article.

With thoughtful planning of the web architecture and design for search engine optimisation, this enables the information object to be seamlessly accessible and to reside within the social networks or preferred spaces of information seekers. Hence, the information seeker need not always have to make his way out of his space to the confines of a library entity, physical or digital, to discover the information.

When the information object is discovered, an information object becomes an info-concierge, with the ability to connect the information seeker, to other content, both within and outside the library, or other information seekers. Each information object in the library thus serves as an info-concierge, connecting people to content, people to people, and content to another piece of content. Appendix A provides a further description of how an information object creates such connectivity between these entities.

To further encourage discovery, the info-concierge or a group of these may be made available or 'released' to developers of various social and learning networks or services, through standard protocols such as web services, to be incorporated as a part of their service offerings.

By so doing, the info-concierge created by the library can now reside within the spaces of other service providers and are utilised by the end-user in the way the info-concierge is best suited to their needs. An example of this is *bookjetty.com* where the semblance of library and its info-concierge morph effortlessly to suit the information seekers' requirements, yet remains true to itself, through its work of interconnectivity of information objects.

Bookjetty.com is a typical mash-up site (a site containing a host of inter-related web services) that combines APIs from multiple websites, merging them to form a new innovative application that provides a user-friendly book cataloguing system to keep track of the books users have read, currently reading or wanting to read. Using this new mash-up web application, users can tag, rate and review their books, show their book list on their blog, share their catalogue and meet friends.

For *Bookjetty.com*, the key web services utilised for the mash-up are from Amazon and library catalogue services. Through this mash-up, it also allows users to check the availability of books in their local libraries seamlessly. It currently integrates with about 300 libraries worldwide. Users can choose to borrow from the libraries to save money, or buy from *Amazon.com*. Users no longer have to manually swap or 'toggle' between the websites of *Amazon.com* and the library catalogues. For this service, NLS provided the web services for Bookjetty's consumption with Z39.50 IR protocol being used for the integration with the other libraries.

The library, in enabling these connections, could therefore be viewed as a network of info-concierges. This is a typical example of embracing Web 2.0 design patterns to evolutionise the web of the future (O'Reilly, 2005).

The library as a network of inter-connected info-concierges

As we know, the process taken by any user in seeking information is non-linear. It is akin to a journey into a web of information and knowledge. When the information seeker discovers an information object, they discover one info-concierge first, and this info-concierge has the potential to lead him or her to a network or networks of inter-connected info-concierges. The role of the librarian is to provide and create the connectivity between info-concierges, using their key skills in meta-tagging content, creation of taxonomies and information content organisation, in order that information seekers navigate efficiently through the web of knowledge.

Going forward, the librarians' content organisation skill also allows them to establish taxonomies on behalf of the different segments of information seekers, which over time will define a universal view of a selected collection. For example, in NLS, this includes Singapore and SE Asia's collection in the information space. This view of the information space goes beyond the resources belonging or subscribed to by the NLS, and would encompass an increasingly wide range of resources from a wide network of information sources.

Utilising WWW harvesting tools that exist today, such as Bright Planet (<http://www.brightplanet.com/>), relevant resources from the Internet, including content from other libraries, can be harvested and value-added so that the resources provided by the library to the user can be effectively expanded. Whilst it is not conceivable that every node in the information space will be filled at the beginning, over time, with the help of the Internet crawler and the librarians' professional input, every node in the information space should have an 'occupant' or an information object.

The NLS information space (possibly defined by the information space relating to Singapore and SE Asia) would consist of NLS inter-connected information concierges, which in turn connects with other libraries and other Internet content. By specifying NLS-specific destinations for harvesting, this effectively changes the focus of library selection skills and policies. In the past, librarians employ their selection skills to select content of various formats to be collected in a library space, and then organise them within this space for information seekers. With the new paradigm in place and moving forward, librarians will now employ their skills to select and authenticate potentially useful content in the web, and created info-concierges that connect information seekers to a list of expanded resources.

A library will never have sufficient resources in its collection to serve its users, hence it will always rely on content from partner libraries and the Web to enrich its collection. Unlike information provision on the internet, the information space created in this manner should draw resources from trusted sources, harvested, filtered and organised on the basis of taxonomies provided by the librarians with an understanding of the needs of different segments of information seekers. In doing so, it provides a service as a trusted information concierge.

“What’s next?” to lure information seekers back to the library

When one or more info-concierges are discovered and are found useful, the information seekers “click” on it, and are connected to a piece of content or a service. When that happens, the information seeker is unconsciously transported to the “new-age library” – a world of inter-connected info-concierges, created, developed and maintained by the “new-age” librarians.

In it, the information seeker is presented with a whole new world of possible paths of discovery, beyond the first information object it had discovered. “What’s Next?” presents multiple ‘tracks’ of discovery or opportunities for information seekers to traverse the created information space. By providing relational links within one information object, the object acts an info-concierge that prompts further discovery. The path offered by “What’s Next?” may lead to another information object (ranging from textual to audiovisual formats) or a community. Gently, the information seeker is lured back into the library’s “social-cum-learning” network of interconnected info-concierges.

“What’s Next?” may be considered a service, leveraging on the librarians’ knowledge and skill of information organisation on the basis of taxonomies, and information

discovery process, to provide information seekers multiple paths to continue a quest for information and knowledge. As a service, it brings to information seekers a direct, relevant, and trusted recommendation of routes to explore for further discovery. The “new age library” does not differentiate itself by the number of resources it owns, but by the connections it makes and the possibilities of ‘knowledge routes’ it offers to information seekers in a better-organised manner. Through the connections that the library makes between one information object and others, and allowing the information seeker a freedom to explore “What’s Next?” in a convoluted web of information sources, the “new-age” librarian adds value to the process of information and knowledge quest, and not necessarily through a large collection of resources.

The library as a network of true collaborations

The library as a network of inter-connected info-concierges is only part of the evolving picture of the future. While libraries attempt to create a comprehensive ‘collection’ (within and outside the organisation) that is able to cover all the nodes of the information space, we need to be mindful of the need for common standards for accessing and sharing information between institutions seamlessly. True collaborations therefore is realised when there is breaking down of silos of contents residing within individual institutional ‘fortresses’ to enable sharing based on the taxonomy that is relevant to the information seeker, regardless of where the information resides. It presents the information as a collection pertaining to a taxonomy relevant to the particular information seeker.

Additionally, true collaboration is also about connecting to people and communities, since knowledge exists in people and these networks of communities. This is the other part of the picture in future. Information-concierges created by libraries not only point to information resources or links, but would both connect to and comprise communities of users and experts.

The advent and rapid adoption of Web2.0 applications, such as wikis and blogs, are important enablers for dialogue and sharing. So far, where the info-concierge connects to the community, it will most likely take the form of the librarians. However, increasingly, the information seeker will also be connected to other information seekers and experts with similar interests, which in turn will allow the library to connect people for knowledge sharing or co-publishing.

As institutions move towards building that are easily crawled, and open up more content for discovery, it would be possible to integrate content from such institutions to complement the existing content to form an information web comprising “library-owned” and “others-owned” content. Obviously, there are issues of copyright, intellectual property, access, downloading, and use that needs to be identified, addressed and resolved.

When other institutions move towards a similar principle for web architecture and design, making it easier to share, the library would truly be a network of collaboration; with information seekers connected to content, as well as, other information seekers for joint discovery and collaboration.

The National Library Singapore: A case study

Like in all libraries including the NLS, customers want convenient access and prompt service, with validated and authoritative recommended sources for them to get information to answer their questions. The information provided should be sufficient enough for whatever purpose they need the information for. Customers also expect librarians to be able to refer them to resources and experts who are available beyond the library's boundaries.

In the 2005 survey on perceptions of libraries and information resources, OCLC found that 84% of users go to an Internet search engine first when they begin a search, and only 1% of them use library websites to start a search (OCLC, 2005). Nowadays, it is very common to see librarians and teachers lament on the fact that students use and search Google as their library. They grow up using Google, and when they think library, they think Google. Nonetheless, in her description of the British Library's business information service, Marfleet (2006) noted that "despite concerns within the information profession that the role of the information professionals will gradually be eroded by Google and other search engines, we are increasingly finding that people are looking for help in navigating the myriad of different information resources and in locating very specific information".

For the past year, NLS has been working on a number of projects to re-position its reference and information services to meet the changing expectations and consumer lifestyles of its customers. Through leveraging on technology innovations, NLS attempted to increase access to her content and services, and put in a platform that allows librarians and experts to share knowledge for the benefit of her users.

Three service objectives are articulated in the design and delivery of NLS's services:

- Service within reach – providing Reference and Information Service (RIS) wherever, however and whenever customers need it, with any device they have at hand.
- Service as a lifestyle – making RIS available within the social space that customers are comfortable in, e.g. Google, Yahoo!, MSN (GYM), without them having to leave their space in order to find the library's content.
- Service as a team – providing RIS by leveraging on the collective wisdom and knowledge of the library community. Through an online collaboration platform, librarians from anywhere can come together digitally to collaborate in real time,

discuss and simultaneously work on one enquiry using their respective email systems.

Three projects illustrate how these are achieved in NLS:

1. The SMS Reference Service
2. Accessing NLS content through the GYM space
3. Collaborative Reference Network

The SMS Reference Service

Cellular phone usage (including SMS usage) is very high in Singapore. Singapore's cellular phone penetration rate for May 2007 stood at 109.1%. (The Infocomm Development Authority of Singapore, n.d.). Trends such as these suggest that SMS is an ideal way to reach out to a greater pool of potential users of our reference enquiry service. Adding the advantages of portability of the cellular phone and ease in using SMS, it becomes clear that SMS provides an alternative and potentially ideal mode of posting reference enquiries for users on the move, or who may not have the luxury of visiting the library due to their schedules. Against this backdrop, NLS launched the SMS Reference Service on 11 April 06 as an additional convenient channel for users to pose questions.

Due to the limitation of the 160 characters for text messages, many libraries in the world adopted SMS to provide for simpler directional, circulation or program enquiries, preferring to direct more complex enquiries to their email or chat reference services. An example is the SMS service provided by Sims Memorial Library in Southeastern Louisiana University (Sims Memorial Library, 2006).

NLS has innovatively overcome the text limitation of 160 characters by delivering answers to complex enquiries through a URL link sent to the user's cellular phone. Upon opening up the URL link either through the cellular phone directly, or through a computer or PDA, the user would be able to view the full reply easily. This includes links to e-resources that are recommended to users asking the questions (Figure 1).

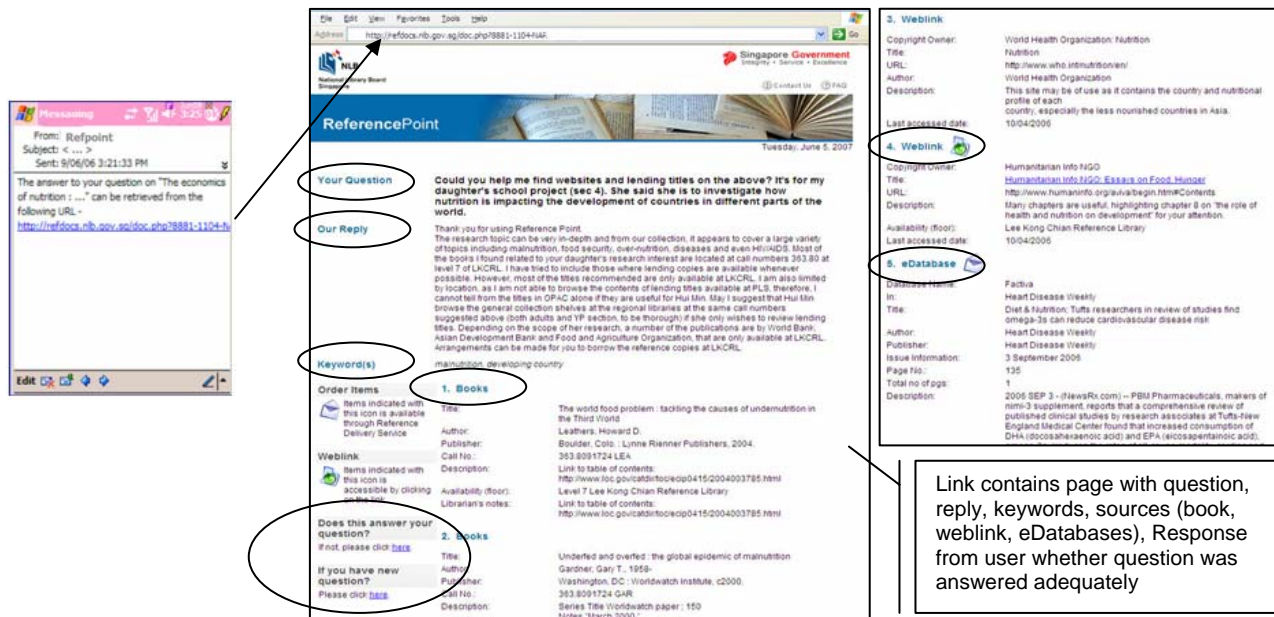


Figure 1: SMS Reference Service: URL from SMS reply links to full page of reference response

The following are examples of questions that have been answered through the SMS service:

- How is Singapore's GST compared to other countries like Hong Kong, Japan and Korea?
- When was earrings first introduced? Was it for slavery? How did it evolve to become a fashion?
- What was the original scope and objectives of the US Apollo program?
- How many people are there in the world? What are the proportions of the different races (Caucasian, Asian, etc)?
- Which organization currently stands as the most prominent one in advocating environmentally friendly practices, particularly in favour of decelerating the pace of global warming?

Responses to the service so far have been very positive on the whole. Some positive comments (in verbatim) from users include: "It is very efficient. The explanations are concise.", "Very good, please keep it up.", "Had the idea that a short/simplified answer will be sent via SMS instead of giving the links. However, the links are certainly useful.", "I will rate the SMS service good.", and "The figures are what I need". The less favourable responses from users include: "The reply took too long. I enquired this morning between 9 to 10am.", "Hi, The info provided is useful, but they were also sites that I had found through my own Internet search. I was hoping that you provide resources that are in your library collection - books, articles etc. Please let me know if you have relevant resources in the library's collection.", and "The reply is very slow."

An average of between 10 to 15 enquiries is received via SMS daily. Enquiries receive an auto-acknowledgement message within 10 minutes that include a message to inform the user of the operating hours of the service (Monday to Friday, 9am-9pm; Saturday, 9am - 5pm; Sunday, 1-5pm, Closed on public holidays). As far as possible, librarians will respond to enquiries within the day itself. For more difficult and complex enquiries, the enquirer is notified of the need for a longer time for research. Almost all enquiries are closed within 3 working days

Overall, the introduction of SMS Reference Service has broadened the reach of NLS services. Users can now reach the librarians wherever they are and whenever the need of an enquiry arises.

Accessing NLS content through the GYM and other online spaces

The majority of today's young Internet-savvy enquirers spend a significant amount of their time in the GYM (search engine) and online social network spaces. To engage this group of users, NLS began to provide service and content in these users' preferred lifestyle spaces in the GYM space about a year ago.

Through this space, the enquirer is able to discover the library's electronic content, including the library's past reference enquiries and encyclopedic articles on Singapore (Singapore Infopedia). An interactive Infopedia map (<http://infopedia.nlb.gov.sg>) was also created to provide users an alternative way to navigate through NLS's collection on Architecture and Landscape comprising about 400 articles using a visual map. The location of the Infopedia map can also be searched from Google Map (<http://www.google.com/maps>) or Google Earth, thus providing another means for the public to discover our collections (Figure 2). With better exposure of the library's content, usage has increased exponentially, thus increasing the value of the content. Usage numbers for Infopedia were averaging 200 to 400 article views per month, before the micro-site for Infopedia articles was set up in early 2007. Since the micro-site was set up, usage has risen to an average of 63,000 article views per month.



Figure 2: Infopedia map showing categories of information, location of “story” on map and related article with metadata

In addition to Infopedia, other NLS resources have been organised into microsities for better exposure:

1. *Singapore National Bibliography* (<http://snb.nl.sg/catIndex/index.html>) has very recently been put into a microsite. At the time of writing, Google is still crawling the site and may not have it fully indexed to enable search and retrieval.
2. *New arrivals* microsite has also been exposed to Google for it to crawl (<http://newarrivals.nlb.gov.sg/new arrive 20070326.htm>). When a search is done on a specific title or topic (e.g. macrobiotic diets using a search query “macrobiotic NLB” on a search engine), the search results listing present this as one of the books under New Arrivals.

Collaborative reference network

In the past, there was no effective and efficient means to collaborate and consolidate contributions simultaneously the information for answers to enquiries, and to share knowledge. Librarians used to work individually on reference enquiries received from users, as it was inconvenient and time consuming to find the right subject experts to help on an enquiry.

Where help is required from others, librarians typically engage their counterparts or contacts through a mix of email, document sharing and offline discussions. This meant that the onus is on one librarian to know who to ask and track the discussions. The staff also has to consolidate all the information from different parties. Discussions also tend

to be operating on 'one to many' and 'many to one' dialogue, rather than 'many to many' open discussion and simultaneous collaboration. Further, the knowledge gleaned through the process is not effectively shared or re-used.

To overcome this, NLS put in place a collaborative platform where a community of librarians can help each other to answer each enquiry more effectively by tapping on their collective wisdom as well as the knowledge of their contacts. This enable a multiplier effect in the sharing of knowledge, as each person in the community would be able to share their intrinsic knowledge as well as connections to other communities or experts. As a result, a more comprehensive, higher quality and more authoritative reply can be given to the user.

The platform which is called the Network of Specialists (NOS) also allows the threaded discussions as well as questions and answers to be captured and re-used by librarians (Figures 3 and 4). This immediately increases the value of the answer to the enquiry, as others can use it to answer similar questions. The questions and answers will also be made available to the library users. Through this DIY service, the library users can access to the answers immediately if similar questions are found in the database.

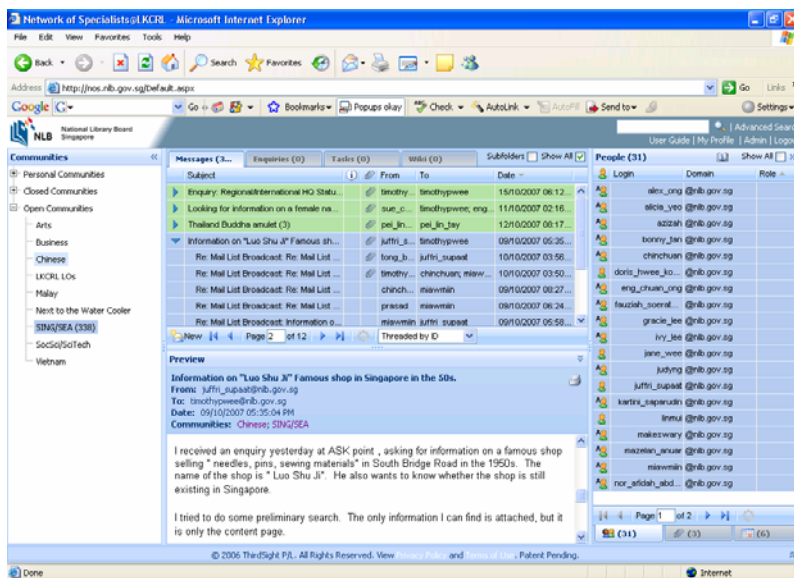


Figure 3: Network of Specialist (NOS) showing threaded discussions, communities and participants

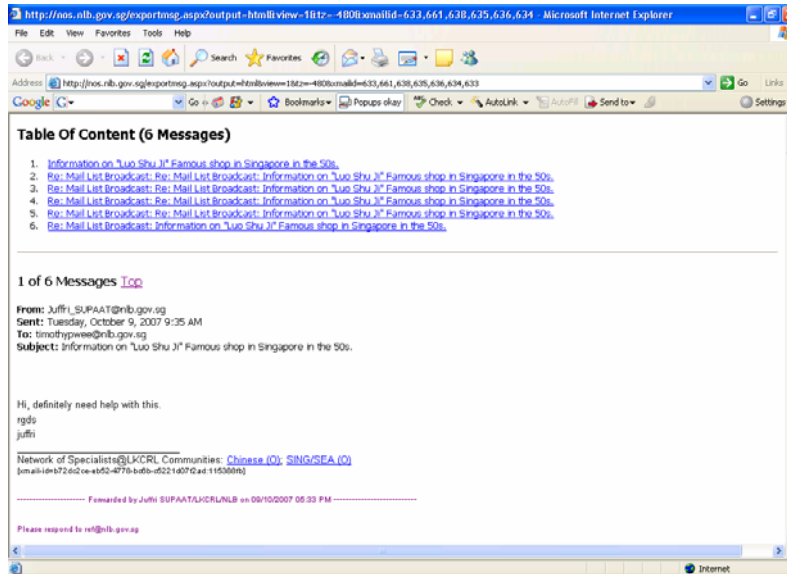


Figure 4: Hyperlink format used to organise threaded discussions for chronological reading.

The requirement of tapping on the collective wisdom and knowledge of a community posed the challenge of building a collaborative platform that allows collaboration in real-time, concurrent editing, discussion, and instantaneous consolidation of information, both for librarians within the NLS and partners outside of the organisation using their respective email systems.

The collaborative reference network that is developed combines a 'wiki-like' platform for collaboration, threaded email environment, and blog for discussion and learning. Appendix B provides a more detailed description of the platform. Launched in 2007, the platform serves as a convenient means for simultaneous collaboration, and an effective knowledgebase and network, facilitating the 'discovery' of subject or knowledge experts, and learning among librarians. All collaboration is done simultaneously, in real time, and various contributors from the community can provide contributions for the answer to enquiry concurrently. The workflow in using NOS is shown in Figure 5.

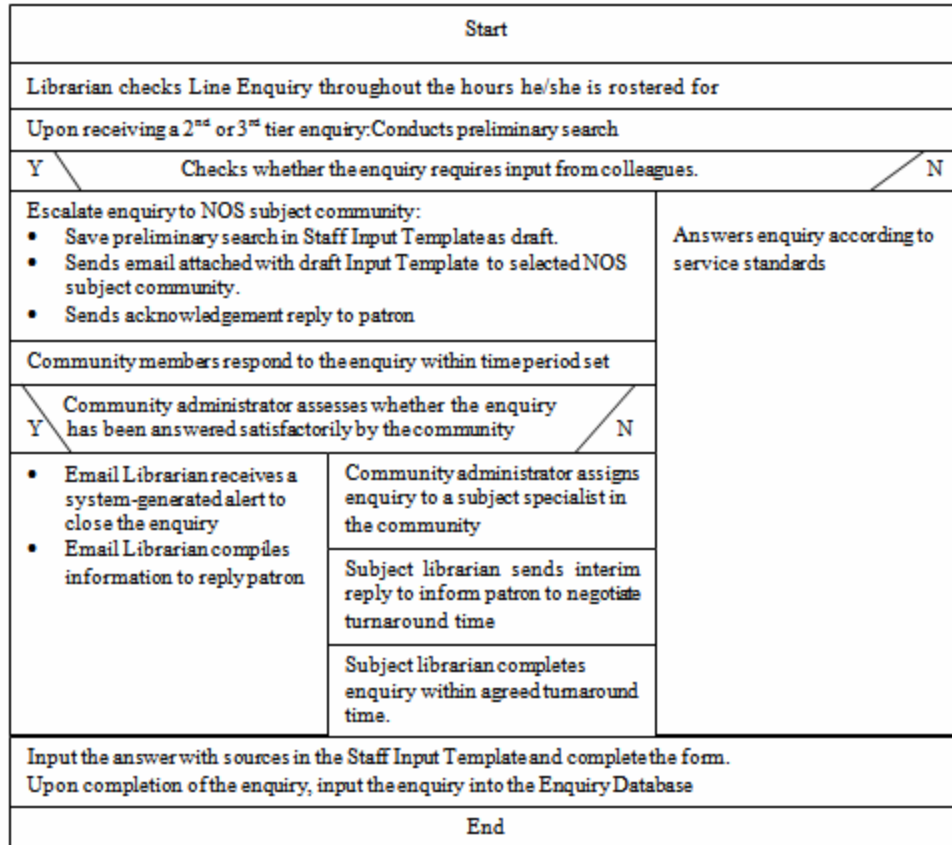


Figure 5: NOS for Enquiries

Currently, the participants are the National Library's own reference librarians. NLS will be opening this platform to government department librarians outside NLS, and public librarians. When the platform is ready, this platform will be opened to other librarians in Singapore and beyond.

In order to ascertain the acceptance level of such a platform amongst reference librarians, a survey was conducted to gather usage feedback. The concept of collaborative sharing and self-learning via such a platform was well-accepted by librarians. In using the platform, librarians were able to discover knowledge experts that they did not previously know and they appreciated the benefits of knowledge gained. Through sharing and collaborating, it brings about a better level of service for users. Respondents also gave suggestions for improvement of the workflow and for the interface to be made more user-friendly. Although librarians are generally very open to sharing and are not afraid to ask for contributions via the platform, there are some librarians who are still not used to sharing using an open discussion platform. These librarians are usually those who do not blog, participate in online forums, Yahoo/Google groups or Wikipedia. Such behaviour is typically carried into the collaborative platform. However, there is an emerging trend of such librarians beginning to post enquiries and share on the collaborative platform slowly, and getting used to the new working style. A main challenge in introducing and implementing such technology-based initiatives is therefore changing old working styles and mindsets.

NLS Next steps

NLS aims to continue exploring and developing these initiatives in future. In particular, there are plans to extend the collaboration platform to the library community within Singapore, ASEAN, the Asia-Pacific region and the world to tap on the unique knowledge and resources all around the world as soon as collaboration agreements are in place. The NOS collaborative platform can be extended to librarians from libraries anywhere, as groups can be dynamically created, according to the subject matter of the particular enquiry at hand. This means that the collective wisdom or knowledge of librarians and other subject experts within NLS as well as those from external institutions can be tapped on to bring the best resources within reach of the information seeker or reference service user.

Conclusion

This paper has articulated a number of emerging roles of libraries to meet the evolutionary users' needs in the society of today and beyond. Using NLS as a case study, a number of initiatives are outlined and discussed. It is clear that many challenges remain to make these ideas realisable and entrenched in everyday use by users, but at the same time, it promises to be an exciting time ahead for librarians and managers of libraries.

While we attempt to realise the ideal scenarios of the provision of global trusted resources and true collaboration among all to provide the best reference services, these ideas requires much support and experimenting with librarians and users to see how novel products and services can be best created, implemented and sustained for the benefit of users to help them discover a lot more than what typically one library can offer in terms of her resources and expertise.

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Appendix A

An information object is an info-concierge that connects people to content, people to people and content to content

An information object, as an info-concierge, connects through various means. These include:

- (1) simple hyperlinks within an article [an information object]
- (2) putting own content on different platforms [information objects that presents information in a different context] for discovery
- (3) 'push' information to suggestion for exploration of other related categories of resources

The 'push' information (3) is still currently being tested at NLS. This relates to suggestion of areas of information that are relevant to the initial search query. This would be done via recommendations of other related sites, articles, online communities, images, audio-visual materials, etc. that are categorised by the subject, format, and any other relevant taxonomies. Such information is typically organised and presented in a separate area on the web page as information that are related to initial search query to facilitate discovery.

An example of (1) and (2) can be seen in Infopedia, where articles have been organised into a microsite for easy access of the Infopedia article via various search engines (e.g. GYM). At presently, when an article is found, there would be:

- hyperlinks related to other articles within Infopedia microsite [content to content]
- a hyperlink to Google map to view location on a map (of Singapore) if the subject is related to a place/landmark [content to content]
- a hyperlink into InfopediaTalk, which is a blog that allows information seekers to share other information that they may have on the subject (the information shared could be links to pictures they may have on the subject, citations, websites, comment on the usefulness of the article etc). Through this link, the initial information object connects the information seeker to other information seekers, and possible sources of information. [content to people; people to people; people to content]

The connections are not one-way, and information seekers can discover any given information object through other information objects, such as Google map. If the information seeker had searched for the location of a Singapore landmark on Google map, he/she may also view a related article by Infopedia through the map.

The same can happen via InfopediaTalk if the blog is found. InfopediaTalk is the wiki version of Infopedia where articles about Singapore and references are posted out to a wiki-platform for users to participate in Infopedia entries. With this, information seekers can comment on a subject presented in Infopedia or simply read the Infopedia article

through a link within InfopediaTalk. These connections bring about new discoveries for the information seekers, and possibly provide a new or different perspective of the subject in some instances, so by placing the information objects in platforms that present information in a different context, the information object enriches and provides connections of interest.

Appendix B

Wiki-like collaboration platform for reference work and knowledge sharing

In order to facilitate the sharing of knowledge and learning from one another, and to improve the quality of reference service, a wiki-like collaboration platform was explored for NOS. Through this online platform, librarians and other people from different places could come together digitally to collaborate in real time, discuss and simultaneously work on one enquiry using their usual workplace email systems in order to enhance the quality of the answer.

Librarians handling an enquiry could rely on the communities of subject specialists formed, including those whom they may not personally know, to seek inputs pertaining to in-depth reference enquires. In the process, learning takes place as the initiating librarian continues to take ownership of the reply to the enquiry whilst getting and using inputs contributed by others in the community to enrich their replies. This improves incrementally and continuously the librarian's capability in dealing with the more challenging reference enquiries.

In this set-up, the collaborative communities can be formed dynamically as and when needed, according to the subject matter requested for by the enquirer. Participating librarians and subject specialists can contribute resources directly into the answer in real time. Joint study reports, research papers can also be collaboratively prepared in real time concurrently. While the collaborations take place, interactions between staff and subject specialists are captured and archived to form part of the library's knowledge management data.

Threaded emails and blogs as learning tools

Through the platform, librarians and experts can help each other to respond to the enquiry anytime, anywhere. Once alerted by SMS and then via the Internet, the librarians and experts have access to the threaded emails that capture the contributions on a particular enquiry via a blog.

Contributors can view the entire discussion on the enquiry at any one point in time, in one click and on a single screen. At the same time they can also view the draft version of the reply while the librarian works on it. At any point, any contributor can add her expert opinion to the discussion that is captured in both the threaded email format and as a blog.

Database of past enquiries

The enquiries answered are subsequently packaged into a self-service enquiry database for librarians and users to access and to re-use thereafter. By making this database searchable, it reduces the time taken by librarians to identify and select the

resources for any enquiry that they receive. This is expected to increase the use of the library's resources. Librarians and experts will also have access to past reference enquiries via GYM spaces or the NLS website.

In designing the workflow, one consideration is to facilitate the learning of reference work between librarians and expert contributors. This will take place when anyone interested to learn from another can choose to view each other's contributions for a list of enquiries via a blog containing all the contributions made by any specified contributor so far. They can also initiate a dialogue with the expert via the same blog to share and exchange knowledge. For those who may not have participated in the particular discussions, they can learn by simply viewing the contributions and ideas by others via the threaded emails or the blog.