SHARING EXPERIENCES USING WEB 2.0 AND KNOWLEDGE PORTALS FOR ADVANCING WEB COMMUNITIES

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ABSTRACT

The paper discusses the development of a web based knowledge sharing portal using intra and inter tagging functionality. This functionality enables multiple users to tag multiple documents in multiple ways at a macro and micro level. Users can upload documents and tag the whole document as well as parts there-in as they deem appropriate, other users can then tag the whole document or specific parts there-in as they deem appropriate. The flexibility offered by the technology allows for specific instances as well as specific types of information to be found across a given repository of knowledge. The technology also allows users to navigate across multiple, possibly disjointed, documents that are connected only in so far as they have been tagged using the same word or phrase by the user community.

KEYWORDS

Distributed Community of Practice, Folksonomy, Collaborative Tagging.

1. INTRODUCTION

The paper discusses experiences learnt with the development of various web based knowledge sharing portals. These were the main deliverables from the Arts Council funded Ambition project and the JISC funded Users and Innovation programme in which authors have been involved with. These portals used an inter and intra tagging system developed at the University of Bedfordshire during 2007-2008 [1]. A synopsis of the user communities will be given followed by an overview of the methodological approach taken to develop the technology. Requirements capture and user needs identification will also be described. This will be followed by descriptions of service functionality and implementation, essentially how the technology works and the way that user communities could use it. Finally there will be an overview of the testing and evaluation procedures that were followed and a discussion of the results derived there from.

2. CASE SCENARIO

Two communities were the recipients of the technology that was developed. The first were arts organisations taking part in the Ambition project. An aim of the Ambition project was to foster best practice in the use of ICT by arts and cultural organisations. A group of 15 organisations based in the North West and in the East of England participated. The second community comprised of participants of the JISC funded Users and Innovation (U&I) programme. The community was made up of 22 projects based within various higher educational institutions throughout England. The aim of this project was to investigate and implement the use of innovative practices and technologies within higher education establishments.

Although the domains that these communities exist within do differ there were certain elements that both had in common. For example both communities were comprised of distinct independent groups of practitioners, both communities by the nature of the projects they were involved in were going through a learning experience and both communities were made up of groups that through their involvement and practice had produced experiential knowledge of their processes and outputs. Due to the nature of their dispersed characteristics both communities recognised the need for a web based knowledge sharing tool for

much the same reasons as Hildrech, P. et al. observed "… improve organisational performance by maintaining implicit knowledge, helping the spread of new ideas and solutions, acting as a focus for innovation and driving organisational strategy." [4]. With this in mind, the contributions of the paper are to: i) present our methodological approach; ii) discuss our service development; iii) including web portal implementation; and iv) offer relevant evaluation results.

2.1 Our Methodological Approach

Initial investigation was with the arts/cultural organisations community as chronologically this group had a requirement first. The U&I community decided upon their need for a knowledge sharing portal later on.

A User Needs and Innovation Development Framework (UNIDF) approach was employed. The approach synthesized Participatory Design and Rapid Application Development activities into various development stages. The approach taken appreciates that the user community as a Community of Practice (CoP) required the following levels of support:

- The user community as a CoP made aware of the existence of the UNIDF approach and its process and benefits for them.
- The user community as a CoP involved with using the UNIDF approach in practice. The approach used for assisting and enabling users to participate, network and develop cross-sector coherent implementations.
- This level assumed a level of expertise amongst users so that they can use the UNIDF approach for criticism and for sustaining the user community by sharing experiences and innovations with a wider CoP. This also served as the vehicle to sustain user community and gather evidence for critical analysis and evaluation about our methodological approach. Figure 1 details the iterative process of the activities.

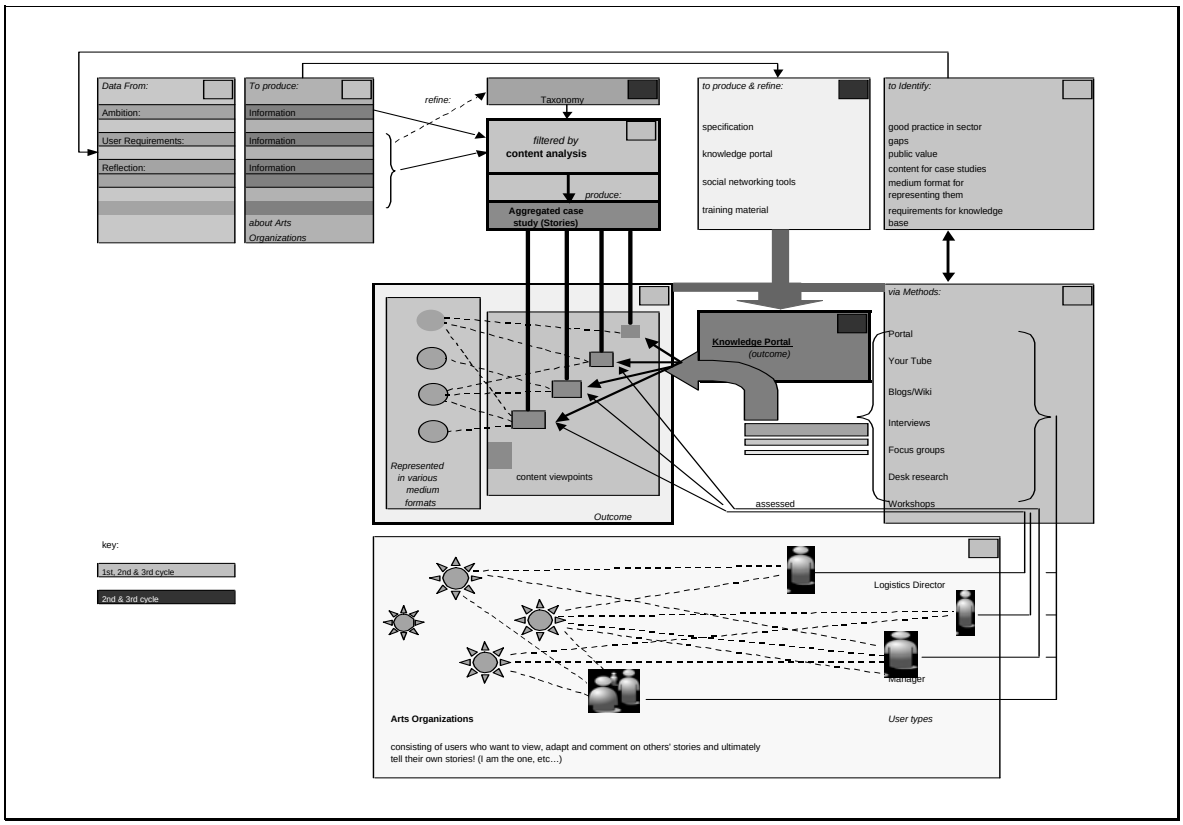

Figure 1. The Iterative Process of our User Needs and Innovation Development Framework Approach (UINDF)

3. SERVICES DEVELOPMENT

A Rapid Application Development approach was taken to the development of the knowledge sharing portal. Essentially the approach was an iterative process of building and testing with lessons learned or observations made from the testing phase being implemented in the next building phase. The research team conducted initial system testing in-house. The system was then previewed by members of the user community with further changes and enhancements being made to the system before it was trailed/critiqued by the wider community for further development.

3.1 Service Modelling

Focus groups were employed involving arts organisation stakeholders. The aim of these focus groups was to create a baseline understanding of how the participants perceived themselves and their peers and their organisations in terms of experiential and learning change as well as the influence and use of ICT. Various elicitation techniques were employed in a manner inviting participants to consider experiences in the past, present and future. The elicitation was done with regard to the work experiences of participants. Participants were also provided with the opportunity to discuss these matters in an informal peer group setting.

During the focus groups, participants were exposed to a case study describing the use of ICT by an arts organisation. Information was collected regarding its perceived usefulness in terms of what aspects of the case study participants found of interest to themselves as well as what they felt may have been lacking. This was useful in feed back to NMP, a consultancy whose task was to produce an initial batch of six case studies, which were to form the basis for us to observe the manner in which it would be beneficial for arts organisations and trigger them to prepare and publish their own stories and case studies using next generation technologies. A Grounded Theory [2] approach was adopted to content analysis of the output from participants.

An important aspect of the results collated from the focus group content analysis was that participants wanted online case studies to contain navigation to other relevant case studies. Further, participants expressed views on specific aspects of the organisation, the nature of their job, what they thought and felt, and the work environment (social and physical). To achieve this content analysis of nine textual case studies was undertaken; three of these were developed by independent sources with the remainder being provided by NMP. The overarching aim was to identify key categories and produce a taxonomy of types of information that would inform the design of the knowledge sharing portal. The taxonomy served two related purposes; it allowed for the tracking and analysis of how users tag and search information within case studies, and; it helped to provide guidelines for users on how to tag and search information. An inductive grounded theory approach [2] was taken for this analysis. Each case study was analysed in terms of structure and content (types of statements) being made as well as supporting categorisations. Content analysis was also used with the data collected in the focus groups described earlier. The participants perceptions of organisational change and learning were identified, as well as, their experiences of using ICT.

Seven organisations as a sample, from the arts/cultural community, were invited to participate in blogging about their experiences in the project to date. Participants were encouraged through emails to write about specific themes. They were also given the option to write about any other relevant topic, related to, or stemming from participation in the project. The blogs were set up to be confidential, only the participants and the project team had access to the content contained in them. It was hopped that through this means participants would express their views about what was happening in their organisations, reflectively. It was also an opportunity to capture and analyse the users reactions to the prototype of the knowledge sharing portal when it became available to them. These blogs could also help the organisations create their own case studies which they could upload to the knowledge sharing portal at a later stage.

3.2 Service Functionality

The knowledge sharing portal was developed with a view to sit within a Joomla content management system as this adequately and securely dealt with issues such as user registration and logins as well as offering other tools for collaboration and community building such as fora and messaging. The knowledge sharing portal enables the annotation from differing perspectives to be applied to material on the same subject matter.

Essentially the knowledge sharing portal allows multiple users to inter/intra tag instances of a given subject matter, see Figure 2.

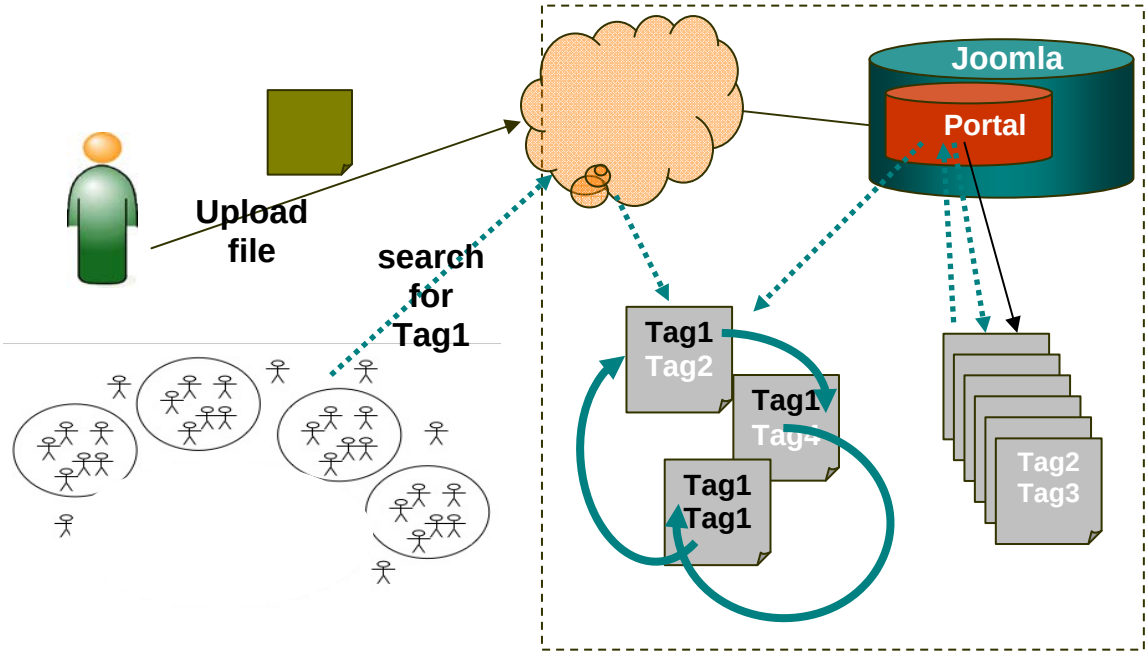

Figure 2. Illustrative overview of the knowledge sharing portal.

Folksonomic tagging as a concept and a technology is fairly well used and understood (see http://del.icio.us) [3][5]. However the knowledge sharing portal differs from these systems by enabling multiple users to tag specific documents as well as specific components there-in. The functionality of the knowledge sharing portal thereby allows the searching of specific components within a given document and also across other documents that contain that specific tag. The use of user-generated tagging of documents allows for the most specific and relevant content to be identified and consumed by practitioners as opposed to software (search engines) or documents on a macro level (del.icio.us).

At this stage any digital file type recognised by the PHP core of Joomla can be used on the knowledge sharing portal. All of these digital file types can be uploaded to the knowledge sharing portal and viewed via a browser in the normal way. The uploaded files can be categorised and sub-categorised.

The knowledge sharing portal uses two levels of classification, categories and sub-categories. Categories work at a macro level and are used to cluster similar material. Category headings used for example were: Understanding the User, Technical Development or Audience Development.

Sub-categories however work at the micro level within each of the aforementioned categories and can be helpful in disambiguating potentially large clusters of uploaded material in a given category. Sub-categories titles were: General Methods and Approaches, Specific Tools/Techniques and Outcomes/Benefits/Results.

Categories and sub-categories were pre-defined and not user changeable. However, regardless of which category/sub-category a file was uploaded under, the user was able to specify the title and a brief description of the file during the process of uploading that file. The title and description were both searchable via the search field and were both examples of inter-tagging, that is, tags that describe the whole document.

The knowledge sharing portal also uses intra-tagging, also known as micro-tagging. To date this facility is only available for text documents with the .txt extension and for image files such as jpeg, gif and png formats. Intra-tagging is essentially the user being able to select an area of interest within a document and labelling it from their own (subjective) perspective. This means that multiple users could tag the same elements within a given document using a variety of tag labels and thus making the content discoverable from multiple perspectives.

4. SERVICE IMPLEMENTATION

Two versions of the knowledge sharing portal have been developed, one for each user community, Figure 3 illustrates the interface for the knowledge sharing portal developed for the arts/cultural organisations. However, the U&I community required slightly more functionality and it is the knowledge sharing portal developed for them that will be the focus of this section.

Once logged into the system a user has several options available to them concurrently, see Figure 4. Essentially the screen is broken up into two areas of navigation, the top navigation bar and the categories. The top navigation bar is comprised of: My Files, Upload, Preferences, Categories, Micro Cloud, Last Upload, Search and Search History.

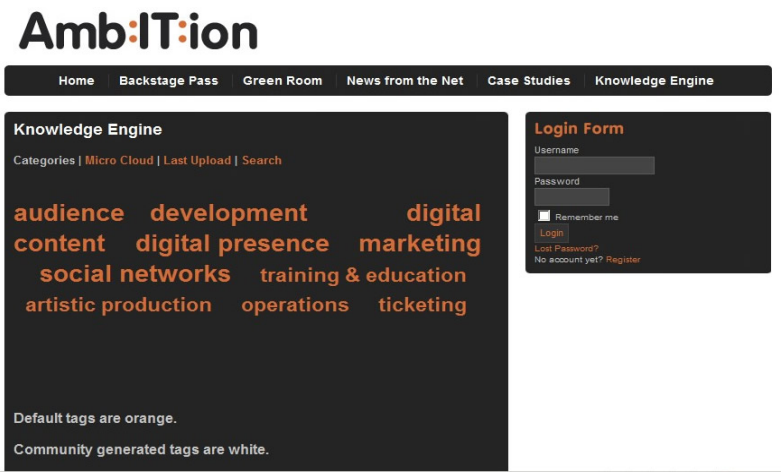

Figure 3. A screenshot of the knowledge sharing portal interface.

The My Files section comprises a record of existing files that have been uploaded by a user and a number of options are available, arranged horizontally, with each file dependant upon its type. All files can have supplementary files added to them here. The file type is displayed here by its extension, for example .txt or .jpg. The title and first 30 characters of description are displayed; these are both hyperlinked to the actual file. Each file also has the capacity to have its category and sub-category to be re-defined. Each file also has the capacity here to be viewed or listened to and also to be downloaded. The download of text files with the extension of .txt are converted automatically to the Adobe PDF file format. There is a caveat on files that need a specific browser plug-in, for example, files that might use the free Quicktime plug-in to be rendered by a browser are usually not downloadable, this can only be done if a user is in possession of the paid for Quicktime PRO plug-in.

The next option available on all file types is the capacity for it to be removed from the knowledge sharing portal. If this option is selected then a confirmation dialogue box is displayed which allows the user to accept or reject the file removal operation. The next option is available only to those file types that can be micro-tagged or intra-tagged. This option basically allows the user to edit or remove any existing intra-document tags that have been created or add new ones if necessary. The final option on this page enables a user to toggle between allowing others to add tags to their documents or not.

The next option on the top navigation bar is for a user to upload files with. The initial option uses a Microsoft Windows style browse interface, the user is presented with the option to browse around their computer/network for a given file that they wish to upload. Once a file has been uploaded the user is required to give the file a title and description as well as allocate a category and relevant sub-category. The user can elect at this point to enable other users to tag the file before saving their choices. The next screen that is presented is typically the document ready to be intra-tagged, if the file type is appropriate. The user can for example select an area of an image by creating a marquee over the appropriate area and then ascribing a tag to that marquee area by using the Add Tag button. With text, the process is similar, text needs to be highlighted/selected and then a tag can be ascribed using the Add Tag button towards the bottom of the screen. Irrespective of whether the file is text or an image, the user can define as many tags as they wish.

Further, selected areas to be tagged can overlap. The user is also given the option to select tags for deletion as well as adding more files to be linked to the document. This latter option takes the user back to the upload process already described.

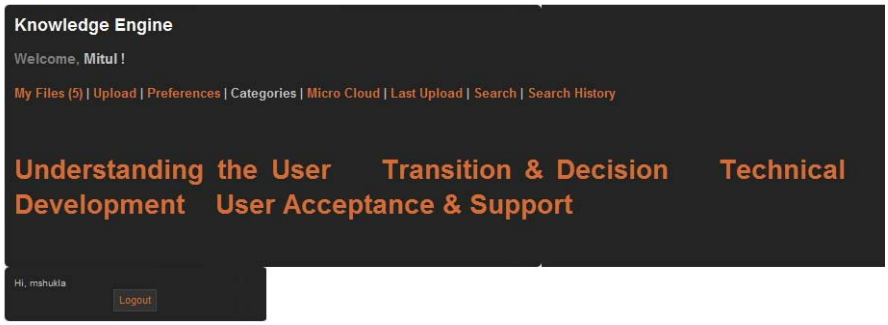

Figure 4. The user menu available to the U&I community.

The preferences function is the name of the next option available to the user on the top navigation bar. Once selected the user is given choices as to how they would like text and tags to be rendered by the browser. The choice of preference includes text size, foreground and background colour of tags in a document as well as foreground and background colour of text in a document.

The Categories and Micro Cloud are the next two options available and have already been described.

The Last Upload section supplies a list of the latest uploaded files by the entire community. The latest uploaded files are presented in descending chronological order with the latest file displayed at the top. Other details shown here for each file include: the type of file, the username of the uploader, the date the file was uploaded, the number of tags attached to the file, an indication of whether or not the file can be intra-tagged as well as the ability to do so and finally a way to navigate to the file.

The Search and Search History options enable a given user of the knowledge sharing portal to search for content based on a given keyword or phrase. The search is by default enabled to search tags through out all fields. However, if required, a search can be narrowed by filtering which fields to conduct the search on. The available fields were searches can be filtered through, are by the uploader, by title, by description, by category, by sub-category and by micro tag. The search history option enables a user to view a list of their most recent searches within the knowledge sharing portal. This functionality enables a more streamlined workflow, the concept being that a user can view and activate their most recent searches rather than have to conduct the search again.

5. EVALUATION RESULTS AND DISCUSSION

Testing of the knowledge sharing portal was an essential process and was undertaken by specific discrete groups. Three groups assessing specific areas carried out the testing, arts professionals, software testers and non-regular users. Arts professionals assessed the general functionality of the knowledge sharing portal by logging in to the system and carrying out specific tasks, such as: testing the upload feature, testing the tagging features, testing the tag cloud and search features, assessing whether the knowledge sharing portal facilitates an impact value towards their work. Software testers tested specific functionality of the knowledge sharing portal for errors, again by logging into the system and carrying out pre-determined tasks in a similar fashion as the arts professionals. Finally, non-regular users looked specifically at content and usability and testing as the previous two groups.

User testing required a number of user roles to be looked at such as expert or non-expert users, additionally a user guide was created to be used with worksheets for conducting the testing and was carried out on the 30th of May 2008. Functional testing had been carried out as an ongoing process in-house during the course of development, however, user testing was an eminently sensible process to undertake to investigate the usability and functionality of the knowledge sharing portal development to date. A major factor here was to get feedback and opinions from people who had not been involved in the development of the project and were viewing the site for the first time, see table 1 for the types of issues identified.

Testers represented three domains: expert specialists from the arts professionals domain, technical experts from the computing domain and non-regular users. Testers volunteered from the Ambition project team, PhD researchers from the Institute of Applicable Computing as well as administrative staff and Post Graduates from the Visual Arts/Media field at the University of Bedfordshire. Testing was carried out at the University of Bedfordshire, except that done by the Ambition project team which was conducted off-site. All testers were given essentially the same tasks to conduct with the aim of: Logging in to the system, testing the knowledge sharing portal upload, testing the knowledge sharing portal tagging, testing the knowledge sharing portal tag cloud and search, and assessing whether the knowledge sharing portal facilitates or helps the user with their work.

Testing was carried out on the PC and Macintosh platforms with both Internet Explorer and Firefox browsers tested on the PC and Firefox on the Macintosh. Both Mac OSX and Windows XP were used during the course of this testing.

Table 1. Primary issues identified for correction.

No.	Error Description	Occurrences (out of 10)
1	Confusion with Homepage navigation	3
2	Confusion with knowledge sharing portal navigation	3
3	Confusion with site terminology	5
4	Failure to save tags/Site failure	4
5	Issue/boredom with repetition of tagging	2
6	Difficulty in Macro Tagging	1
7	Difficulty in Micro Tagging	4
8	Uncertainty about capitalisation of tags	2
9	Confusion with Search facility	2
10	Difficulty with tag browsing	5

On the 27th of November 2008 the knowledge sharing portal was presented to fifteen U&I community members during an online conference using the Elluminate online collaboration tool. The audience were given a presentation as to how the knowledge sharing portal operated and the types of functionality it had. This was followed by a brief exercise in using the knowledge sharing portal that the audience participated in. After the exercise, participants reflected on their experience during the exercise and sought some further clarification on either functionality or scope of the knowledge sharing portal.

Members of the audience expressed that there was an amount of similarity with regards to the intra-tagging principle being offered by the knowledge sharing portal and by the online service offered by Diigo (www.diigo.com). One essential point came up during this discussion and that was the issue of rights access and who should have it. Basically there were two schools of thought on the issue, one was that only selected members from the U&I support team should have rights to upload and tag material, while the other line of thinking was that everyone in the U&I community should be able to upload and tag material. The case for only selected members being able to upload and tag was essentially that a certain level of quality of service could thereby be maintained. The selected team would be instructed as to aesthetic content parameters and could ensure that these were adhered to when the wider community fed material to them. The alternative viewpoint was that the whole community should have rights to upload and tag material as they saw fit. A uniform quality of service could not be as tightly managed but peer support/encouragement could help ensure that an appropriate quality of service was produced by the community as a whole.

Subsequently (January12-23 2009), the U&I community were offered a questionnaire that was actioned by Glenaffric, an independent consultancy brought in as evaluators on the U&I project. Five questions from the survey were directly concerned with the knowledge sharing portal and its usage. The following is a summary of the relevant survey findings.

From the twenty responses, 35-55% of them would be likely to contribute to the knowledge sharing portal, the most likely file type to be uploaded would be textual (42%), that uploading and tagging files was seen as the most important functionality for this kind of repository, that 35-45% of respondents would refer to it during the course of their current projects and finally that the majority of respondents (60%) would be most likely to use the knowledge sharing portal as a resource in future projects. Therefore, we can conclude that U&I community perceived the knowledge sharing portal as beneficial not just during this project lifecycle but quiet likely in future projects as well.

6. CONCLUSION AND FURTHER WORK

The basic premise to future proofing the knowledge sharing portal is through the addition of an XML conversion module. By converting files to XML before or during the upload step intra tagging of more file-types becomes possible, see Figure 5.

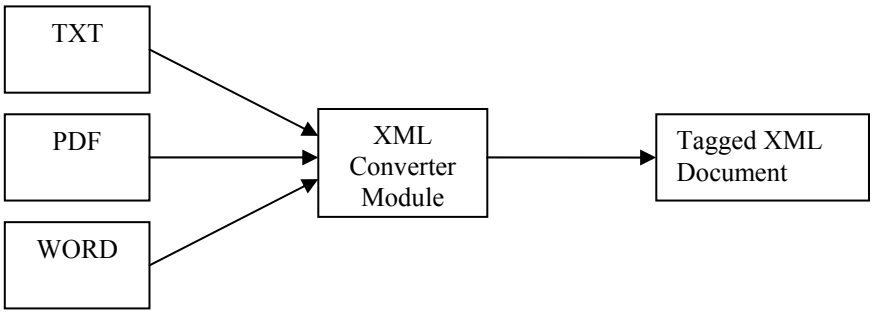

Figure 5. Improved knowledge sharing portal concept.

By using XML based files on the knowledge sharing portal the system can accept numerous file-types for various and multiple purposes. Additionally the use of XML can facilitate the use of embedded URLs from within a given tagged document. For example, by pulling in XML data for the knowledge sharing portal, the system should be able to produce facilitation for a number of applications serving differing needs. Facilitation for applications could range across a datasite, a mashup, or a data integrator to name but a few.

The development of the knowledge sharing portal has been described, the portal acts as a means to allow two dispersed user communities to publish and search for relevant information, including audiovisual material, through a Joomla mediated web interface. During this development, a rapid application development approach has been used throughout. The approach was an iterative process of building and testing with lessons learned or observations made from the testing phase being implemented in the next building phase. The system was previewed by members of the user communities with further changes and enhancements being made to the system before it was trailed/critiqued by the wider user communities for further development. Subsequently, the U&I community were offered a questionnaire that was actioned by Glenaffric, an independent consultancy brought in to evaluate the entire U&I project. Results from this survey suggests that the user community perceive the knowledge sharing portal as beneficial not just during this project lifecycle but quiet likely in future projects as well.

REFERENCES

Bessis, N., Gaitan, A., Shukla, M. and Stephens, J. (2008). Using Next Generation Service Oriented

Technologies to Assess Cultural Handling of Information Communication Technology, International Conference on

Computer Science and Information Systems, Web Based Communities 2008, IADIS, 24th-26th July, Amsterdam.

Glaser, B.G. & Strauss, A. L. (1967). *The Discovery of Grounded Theory. Strategies for qualitative research.* Chicago: Aldine.

Hassan, Yusef and Monteroa Víctor Herrero-Solana (2006), Improving Tag-Clouds as Visual Information Retrieval

Interfaces, International Conference on Multidisciplinary Information Sciences and Technologies, InSciT2006. Mérida, Spain.

Hildrech, P., Kimble, C., Wright, P. (2000), "Communities of practice in the distributed international environment", Journal of Knowledge Management, Vol. 4 No.1

Mathes, A. Folksonomies – Cooperative Classification and Communication Through Shared Metadata. *Computer Mediated Communication - LIS590CMC*, December, 2004.