

Trust Online for Information Sharing

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Abstract: The use of the Internet for information sharing between government departments and between government and community organisations is growing. However the issue of trust needs further study as this communication could benefit from Web 2.0 technologies. This project was initiated by a network of Indigenous people in government and community who wished to make more efficient use of information sharing online, without people external to the culture and aspirations being able to influence the content, or comment on the work being shared. The culture has a strong protocol for sharing information or knowledge, and this is rarely valued outside this community. Furthermore, the experience as a minority culture within a colonised society has increased the caution in public display of people's interests or concerns.

1 INTRODUCTION

Trust is not just about willingness to share but also about the value of what we share. For Aboriginal people in NSW the decision about what is important information is different to those in the mainstream culture. While Federal Government has been concerned with privacy issues around sharing of information under Web 2.0, there needs to be more consideration of the type of information different cultures share, and to support that. This includes the need to inhibit the sharing of information that is not acceptable to minority cultures, such as respecting periods of mourning.

The project for the development of suitable web services for Aboriginal information and knowledge sharing in NSW was developed around the following community needs:

1. Community projects often receive Government funding and wish to share the success, and the reason for their success, with others who run similar projects. Also Indigenous government workers need to be able to analyse these projects to improve the support they give. This requires the development of repositories for knowledge access and extraction.
2. Organisational learning involves the retention and linking of tacit knowledge. The use of audio recordings to retain and share knowledge is preferred by many indigenous groups and provides a more accessible form of recording tacit knowledge.

3. University involvement in the project originated with a community request to support knowledge sharing protocols with software and to research how these traditional communication methods may provide new perspectives on Internet sharing.

4. Government and community workers wish to share information on upcoming events, jobs, projects and funding options. This required a communication interface and analysis of information presentation for online sharing

We describe briefly the first three projects to provide the context to the research, but the main focus is the fourth project dealing with information sharing.

2 COMMUNITY PROJECTS

In previous work we developed a conceptualisation of search engines and artefact annotation in an online community used for Indigenous knowledge sharing (Kutay, 2011). We extended the work of Pirolli and Card (1997) focusing on enhancing the information retrieved, rather than seeing the search result as the final 'feed' of the scavenger. We based the design on a traditional form of knowledge interchange in community learning, the corroboree, or story telling through dance, performance and music.

The corroboree format is hard to envisage online, as in real life the process requires many hours of

preparation by the elders gathered to organise the ceremony. We considered how community meetings prior to the ceremony organise the ‘performance’ that provides the knowledge sharing. During the preparation they discuss their desires: the context of the corroboree, what is significant in the present situation for the people, which is related to user’s desires within the environment. They evaluate the community’s goals and beliefs: this involves considering the themes that need to be covered for learning about the present context, which links to the audience’s goals. They interpret and interact with this environment: this develops the cohesion of the narrative, what will be presented for the social and creative linkage of information. Thus they decide what will be performed.

Once this corroboree has started individuals contribute stories or songs relating to how their own knowledge fits into the previous narrative and so select the stories that are shared.

2.1 Taking the Concept Online

In the online environment there are no ‘elders’ or over-arching knowledge holders to link the results of an online search into coherent knowledge. In present search engines the system provides isolated packets from which the user has to draw sense. The project for coherency of isolated knowledge packets online used tools for providing (cf. Rogers and Scaife 2007):

- Knowledge representations within the real world, providing a real performance;
- Re-representation of information in various format such as images, or use of audio and text annotation;
- Thematic support for searching through domain, temporal and spatial sorting; and
- Graphical context for the user’s search activity.

The design concepts that we developed from these approaches were divided into the three main activities on the portal. Firstly the user searches for relevant material. Then within the results of that search they want to explore the search results, including any accessible annotations attached to these artefacts. Finally they may want to add their own annotations and notes for future searchers.

The issues that arose in the design of Indigenous sites were the need to promote (Kutay, 2011):

- Trust – knowledge can be misused or misinterpreted if used out of context,
- Access – ability to receive feeds particularly suitable for mobile access is vital for many users,

- Language – the language used on sites must be simple written English or audio,
- Immersion – a ‘modern’ look to the site with links to social networks, ease of navigation and practical presentation of the themes
- Relevance – the interface, choice of content matter, and the way information could be handled on the site had to be relevant to the culture of the users.

3 ORGANISATIONS

In Australian and North American Aboriginal groups the oral tradition is a skill learnt and passed on as a discipline, involving repetition, praise and critique (Rosenzweig and Thielen, 1998) to train the young in this method of knowledge retention and information sharing. Yet the importance of Aboriginal oral memories in terms of retaining a true history of Aboriginal collective identity and knowledge is generally denigrated in the non-Aboriginal view, as oral records are perceived as coloured by personal experience (Mellor, 2001), and in constant flux.

The online sharing and comparing of stories to provide both a commonly agreed, stable and accessible record of knowledge is an important aspect of Indigenous culture online. The difference between Aboriginal and Torres Strait Islander and non-Aboriginal knowledge is summarised in Byrne et al. (2008) and Christie (1994) and these differences provide a model for general audio sharing online as described in (Kutay & Ho, 2009).

The socialisation of learning to include Web 2.0 resources enables users to maintain update information online. The learning is therefore focused around collaboration in learning, as well as learning knowledge developed collaboratively. In the previous work we used a learning model for dynamic creation of organisational knowledge and compare this to the SECI model (Nonaka, 1994), in particular looking at transforming tacit to explicit knowledge. The design also provides a mapping between technology and learning processes.

We extended the concepts developed in the Indigenous mode of knowledge sharing to a model that supports mainstream organisational learning. For instance our approach is mirrored in research into organisational learning where annotation tools are enhanced using a user-centric approach that includes the knowledge status of the annotator (Ballim et al., 2004).

4 PROTOCOLS

Aboriginal Australian story telling is a communal form of oral history designed for the inheritance structure of a society with minimal hierarchical. The narrative that Aboriginal people maintained uses group story telling process to select the stories that are valuable and worth repeating, those that have meaning for them. This is comparable to the social constructivist learning process described by Berger and Luckmann (1996).

The research into the usability of existing web services and redesigning these for Indigenous communities has been hampered by the irrelevance of much online material, computer illiteracy and lack of trust in the medium (Dyson and Leggett 2006); (Kutay, 2010). People are wary that their knowledge will be used inappropriately, out of context or separated from the community narrative (Nakata and Langton, 2005); (Kutay, 2011). This is compounded by what is seen as insufficient government protection and lack of community control (Janke, 1999). For indigenous people to utilise the internet, issues of relevancy and usability must be considered while developing trust in terms of security of access and ensuring the material remains in the context selected for it, and retaining the scope and flexibility of cloud computing where possible.

Research at The University of New South Wales is developing web services to provide:

- Access control system that links to ownership of artefacts and mourning protocols
- XrML description to manage access control of files based on kinship
- Collaborative annotation tool that incorporates access protocol and reuse for learning

The data access control is to enforce protocol through reference to a distributed database on genealogy and kinship responsibilities. This requires secure tools to write new or changed protocol structures for mainstream multimedia sharing sites.

In general the use of protocols or policies to enhance the flexibility of online learning is worth investigation, as is the specific features that apply to Aboriginal knowledge sharing (Kutay, 2009). The provision of the web services focuses on options to embed access protocols in distributed web services (Wang et al., 2009) and autonomous information sharing (Skogsrud et al., 2009). Also there is a need to extend trust to cloud service provision with distributed authorization control (Varandharanjan, 2005) to securely display culturally restricted

material on public sharing web sites.

5 EXEMPLAR

The new technology of our age is the sharing of information electronically across the globe. It is important that Aboriginal people involved in this development. Also we should note that recent learning theories stress that learning does not necessarily translate solely into knowledge gains: rather it can be measured in terms of increased participation and interaction of individual with their group or community in knowledge development. It is the support and analysis of online interaction and sharing of information that we use here as an example of Indigenous knowledge sharing.

When government workers and community organisations met to discuss the options for information sharing online, the School of Computer Science and Engineering (UNSW) offered support. We worked together to find web services with suitable social support that will provide an environment in which the Aboriginal people can, with confidence and ease, share their resources.

A combined meeting set up the requirements for the web site, however the network is divided into a growing number of separate regions around Sydney, each servicing the Aboriginal community in their region, and each with different information to share. The site that was developed has been running for over 4 years and we felt it was time to report on what was, and was not, a success in this work.

5.1 Requirements Gathering

The Information site was set up as a content management system framework and a wrapper to various services. While other systems have been developed focusing on annotation and sharing (Saraiva and da Silva, 2009); (Chakravarthy et al., 2006); (Schroeter et al., 2003) this work extends to the management of information in many forms (email, calendar events, pamphlets and photos) and linking into more social media. (cf. Lavoué, 2011). While previous work has suggested audio-visual support useful, the people using the system did not have access to audio or video equipment such as web-cam and often did not have speakers on their work computers.

While providing common services to all sub-regions, there was a need to provide customisation and extend components according to local needs. The generic components of the system requested by

the different network meetings included separate website access for each network region in Sydney to:

- Regional maps showing services in area
- Directory of services and service types in area to locate on map
- Online email service to reduce download and repeated forwarding of emails
- Moderated email system that allow emails to be moved across various topics and regions
- Daily digest mail available to subscribed emails
- Website email form as well as standard email access to mail service
- Document storage to link as attachment to emails
- Calendar of events linked to email notification to regional coordinators
- Support for coordinators and representatives in the use of the site.

5.2 Architecture

The architecture is designed around the original Sydney regional website with a configuration file that was altered for each region. All features were set up on the main regional website and then each region could access their local component. This was so that organisations that spanned many regions can have access from one interface, while local users could filter out other regions.

Trust

For Aboriginal users the issue of trust online has revolved around (Kutay, 2011):

- Misuse of information generated by Aboriginal people, by non-Aboriginal people
- Being identified as Aboriginal and hence being abused
- Information that should be private at certain times (eg mourning) being shared publically
- Aboriginal people want their services controlled by Aboriginal people to ensure such protocols will be followed
- Information that 'belongs' to one person being shared by another as an authority

It is perhaps the last point that has little analogy in mainstream information sharing, however we will briefly explain the others first.

The information on the site cannot be easily linked through other services, so users feel this remains in the context they intended for it, for example the calendar events (see Access below). We have used moderation to reduce the abuse of the site, but still require users to add contact details, such as

email, for further information. This also provides the users with acknowledgement of the ownership of information.

The site has remained relatively free of spam and abuse. Probably due to the small network actually interested in the service and the open nature of the site, there has been no attempt to hack or access the site. This has increased the trust in the site, and the interest in using the web for more services. Also having control of the site content, and being able to enforce protocols such as respect for ownership of information, has empowered those coordinators who have been involved and they are proud of the service they provide.

The ownership of knowledge also provides a way of determining the authority of the material. As in the case of language, people will know who submitted the information and will value it in that light. While the coordinators have prio respect in the community, they have become an authority through their position in the online community. However, while coordinators regularly change when a new person moves into a more central node role in the network, those no longer in that role would not consider interfering or taking control as it is not their responsibility anymore.

Access

The site provides some feeds but the calendar is not compatible with other technologies to achieve this. Cloud services such as Google calendar now exist, but do not offer the privacy and the ability to tailor the interface and the functionality to the network's requirements. Our research looks at new formats of access control to cloud services and this is a case in point.

The region selected by a user limits the events shown, while events can be added to all regions, hence the user as well as the original contributors filter information.

Language

The language of the site is in Aboriginal English. Contributions by those from various sections of Australian culture are very different in form. It has been suggested by some coordinators that the language (as much as the author) provides a filter for how much credence or relevance to accredit an information piece. According to some it is not that the language of such contributions is less familiar; it is just that the language is used to discuss less relevant material.

Immersion

The site has failed to keep up its interface to date, due to lack of development funding. We are now

seeking resources and support to upgrade to a new look and feel that has a more ‘modern’ appeal. The initial site was very basic template due to costs, but this can be made to look more ‘smooth and elegant’ with minimal work. Also the lack of the Aboriginal colours (red, black and yellow) on the site, a decision of the original coordinators, is now considered to have adversely affected access.

Otherwise the gradual construction of the site through addition of new features every year or so has kept the interface simple, and the basic CMS construction has simplified navigation.

Relevance

The coordinators were very wary at first of adding too much to the web site, as it would lose its focus and its usefulness. They wanted the users to become more familiar with the service before they expanded it, and the have a feeling of control and ownership as it grew.

The material is also moderated for relevance to the site. It does not deal with political events or specific immediate family events and issues, only information that is relevant to the community.

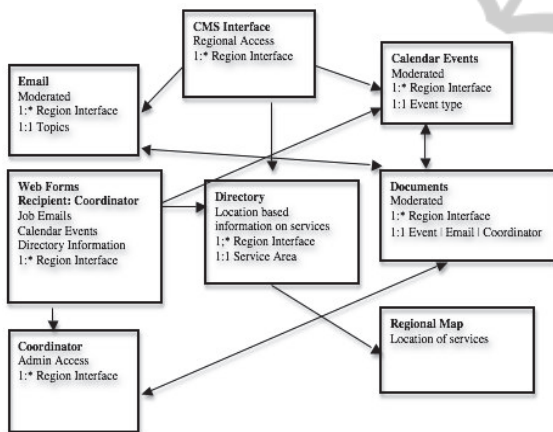


Figure 1: Interface components.

5.3 Organisation

At present the site forms a fairly diverse collection of information, as the network is very broad in focus. There is little work we can do to tie the various strands together in a more coherent form of information sharing. However we can allow viewing one piece of information through different interfaces or formats.

Interoperability

Various services have multiple interfaces, or are accessed by many services, so the interoperability of the components for the site was always an issue.

Also the site was reliant on the contributions of the novice public while completely moderated. Also the separate sites are moderated by separate coordinators, so overarching policy has to be developed as issues arise.

- Documents: The document repository needs to support the storage of email attachments, details on events and material shared by the network members. At present the attachments have to be manually stripped from emails and saved, but we are researching how this step can be automated.
- Events: The events are placed on a region’s calendar, and can be also included in the regional calendar. A publically added event will trigger an email to the coordinator. Documents can be uploaded to provide more information on events.
- Emails: The emails are stored in a private mailbox online. Coordinators can select to move them to a public mailbox or delete them. Also a daily digest is generated and emailed out on a mailman list.
- Forms: The site provides forms to guide users to supply all the required information in an email to the jobs vacant list. The lack of subjects on all emails sent to the coordinators remains an issue.

Functionality

The users are generally novice, but also they consider they are doing this information sharing as a part of their work, while the government or community sector that employs them does not usually recognise this. Hence their time available to upload or moderate material is limited. The usability of the site had to be well developed as each new service was added to reduce the load the extra information source could cause.

For instance if an event is added, any pamphlet relating to that event has to be linkable to the calendar event. Also the service information in the directory includes location data (which can be entered through a Google map pin) to link to the front map.

5.4 Protocols

The main protocols are developed in the face-to-face meetings of the network, then enacted online through the coordinators’ moderation and the users choice of topics for submission. The coordinators provide the elders, those most experience with web communication or the most central in the local network structure, and hence those most aware of the local issues and interests. They set up the topics relevant to their region.

We have not developed a blog or forum on these sites. This level of interchanges is not considered relevant as the site is purely for information sharing, not for discussion and debate. This enables the site to cater to a broader range of people, without alienating any view.

All information is already public before it goes on the site. It is not a site to provide private information to the public arena. It is information that is commonly held in one part of the community, and gives them an opportunity to share it with others in the community. This reduces the need to attribute and protect material, and allows the users to become more familiar with the tools in what is a familiar communication format.

5.5 Issues

The main concern with the site was initially developing trust of the service. The users were not familiar with the Internet, and not aware of the advances in web services over the last ten years in the form of Web 2.0 that provided them an informal but secure means of contributing to online information. Learning this required being involved with these Internet services.

The second issue was the interface. While the community and government workers expressed concern with the 'usability' of the site, the main factor seemed to be the look of the site, if it was modern in format. At the same time the issue of usability related to general computer literacy in the community, which is low, as well as the restrictions on computer access at work in many government organisations. For instance, we had to get permission to access an online email service, and most workers could not use Facebook or other social media that would have improved interaction on the site.

As the site progressed the concern was mainly with the interoperability of the site. Especially the documents section played many roles, as repository for email attachments, brochures for calendar events, and photo sharing for Joint Network events.

This problem will only increase as we now move to provide access for the users through social media. In eLearning, it is acknowledged that social interaction is a motivational form of knowledge sharing (Kay et al., 2007). In sharing community information and encouraging engagement in this sharing there is a need to link to social media, as this is the area which Aboriginal people can practise more familiar and informal forms of information sharing (Smith et al., 2000). The need to integrate social networks with serious information sharing

systems requires ontological and web services support (see Deparis et al., 2011), and to provide an area the users trust within these.

5.6 Feedback

The main response to the web site is the great reduction in emails. Given that the community is close knit, there is a tendency for people to forward emails to their lists, often including the sender. The coordinators are usually a central node in the local networks and so repeatedly received their emails.

The other area that is highly popular is the publically editable calendar for social events such as the annual Aboriginal week of celebrations. However it would be good to have this linked into other calendar services, such as computer based services. The existence of different calendar services is clearly an issue, but their compatibility is increasing and the next upgrade will be to focus on providing easier options to upload and download events.

Also importantly the site provides one of the main services outside Facebook that is regularly used by Indigenous people in Sydney. It provides an in depth and versatile form of information sharing.

6 CONCLUSIONS

The network service is not a particularly innovative system, but the collaborative effort involved in its design and the ongoing link with the community through its development provides an interesting view into information sharing in the Aboriginal community. The joint network meeting regularly provide feedback on the site and continually suggests upgrades. We are indebted to these coordinators for their ongoing commitment to making the site an area they feel comfortable sharing information with their peers. We also acknowledge that their feedback has provided the source material for our analysis of how and why the site has developed in the format it did.

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REFERENCES

- Ballim, A., Fatemi, N., Ghorbel, H. and Pallotta, V., 2004. A knowledge-based approach to semi-automatic annotation of multimedia documents via user adaptation. In *Computing and Computers*.
- Berger, P. L. and Luckmann, T., 1966. *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*, Garden City, NY: Anchor Books.
- Byrne, A., Gibson, J., Gardiner, G., McKeough, J., Nakata, M. and Nakata, V., 2008. *Australian Indigenous Digital Collections: First generation issues*. <http://hdl.handle.net/2100/631>.
- Chakravarthy, A., Ciravegna, F. and Lanfranchi, V., 2006. AKTiveMedia: Cross-media Document Annotation and Enrichment. In *Proceedings Fifteenth International Semantic Web Conference (ISWC2006)*
- Christie, M., 1994. Grounded and Ex-centric Knowledges: Exploring Aboriginal Alternatives to Western Thinking in John Edwards (Ed) *Thinking: International Interdisciplinary Perspectives*, Victoria: Hawker Brownlow Education.
- Dyson, L. and Leggett, M., 2006. Towards a Metadesign Approach for Building Indigenous Multimedia Cultural Archives. Proceedings of the 12th ANZSYS conference – Sustaining our social and natural capital. Katoomba, NSW Australia, 3–6 December
- Janke, T., 1999. *Our Culture: Our Future*. Report on Australian Indigenous Cultural and Intellectual Property Rights commissioned by AIATSIS and ATSIAC.
- Kay, J., Reimann P., and Yicef K., 2007. Mirroring of Group Activity to Support Learning as Participation. In R. Luckin et al. (Eds.) *Artificial Intelligence in Education* IOS Press.
- Kutay, C., 2011. HCI study for Culturally useful Knowledge Sharing, In *1st International Symposium on Knowledge Management & E-Learning (KMEL)*.
- Kutay, C., 2010. Issues for Australian Indigenous Culture Online. In E. Blanchard, D Allard (Eds.) *Handbook of Research on Culturally-Aware Information Technology: Perspectives and Models*. IGI Global.
- Kutay, C. and Ho, P., 2009. Australian Aboriginal Protocol for Modelling Knowledge Sharing. In *Proceedings of IADIS International Conference on Applied Computing Rome, Italy*.
- Lavoué E., 2011. A Knowledge Management System and Social Networking Service to Connect Communities of Practice. In Fred A., Dietz J. L. G., Liu K., Filipe J. (Eds.) *Knowledge Discovery, Knowledge Engineering and Knowledge Management*, pp. 310-322
- Nakata, M. and Langton, L., Eds 2007. *Libraries and Indigenous Knowledge: A National Forum for Libraries, Archives and Information Services*. <http://hdl.handle.net/2100/57>
- Nonaka, I., 1994. A Dynamic Theory of Organisational Knowledge Creation, *Organisation Science*, 5,1, pp.14-37.
- Mellor, D., 2001. Artefacts of Memory: Oral histories in archival institutions. In *Humanities Research*, III,1.
- Pirolli, P. & Card, S., 1997. The evolutionary ecology of information foraging. *Technical Report*, UIR-R97-01. Palo Alto, CA: Xerox PARCo.
- Rogers, Y. and Scaife, M., 1998. How can interactive multimedia facilitate learning? In J. Lee, (Ed.) *Intelligence and multi modality in multimedia interfaces: Research and applications*, pp. 68-89.
- Rosenzweig, R. and Thelen, D., 1998. *The Presence of the Past, Popular Uses of History in America*, New York, Columbia University Press.
- Saraiva, J. and da Silva, A., 2009. WebC-Docs: A CMS-based Document Management System". In *Proceedings of the International Conference on Knowledge Management and Information Sharing (KMIS)*, INSTICC.
- Schroeter, R., Hunter, J. and Kosovic, D., 2003. Vannotea: A collaborative video indexing, annotation and discussion system for broadband networks. In S. Handschuh, M. Koivunen, R. Dieng and S. Staab, *Proceedings of the Second International Conference on Knowledge Capture: K-Cap 2003*. pp. 23-26.
- Skogsrud, H., Motahari-Nezhad, H. R., Benatalla, B. and Casati, F., 2009. Modeling Trust Negotiation for Web Services, *Computer*, 42, 2: pp. 54-61.
- Smith, C., Burke, H. and Ward, G., 2000. Globalisation and Indigenous People: Threat or Empowerment? In C. Smith and G. Ward (Eds.) *Indigenous Cultures in an Interconnected World*
- Varadharajan, V., 2005. Authorization and Trust Enhanced Security for Distributed Applications. In *Information Systems Security. Lecture Notes in Computer Science*, pp.1-20
- Wang, K-J. Lin, D. S. Wong and V. Varadharajan, 2009. Trust Management Towards Service-Oriented Applications. In *Service Oriented Computing and Applications Journal (SOCA)*, Springer, 3, 2.