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Interpretation and Personalisation: Enriching Individual Experience by Annotating On-line Materials

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Abstract

Providing historical and cultural information that adapts to personal content and presentation preferences is increasingly important to museums. There is a need for personalization not only for accessibility but also to provide the user with relevant information-rich content. This paper describes how annotations can be used to support an interpretive process. Scenarios demonstrate how annotation technologies can enable different Museum user groups to add interpretive and academic content to *Quinkan Country* rock art records. Further, we extend the AccessForAll specification to allow Museum users to set display, control and content preferences for annotations.

Keywords: *Quinkan Culture, annotations, personalization, AccessForAll, interpretations, AnnoSource*

Introduction

Museums provide information that encourages learning, thought, experience and discovery to a number of user groups. This has led information technology designers in museums to take less techno-centric, more people-oriented approaches when creating information retrieval systems. Tailoring presentation and content has become a focus for many institutions and organizations. User-centric systems allow the individual to have control over access modalities and preferences for information retrieval. The IMS Accessibility for Learner Information Package (AccLIP) is a metadata specification to support user descriptions of content, control and display preferences in a standardized format known as a 'user profile'. As more people are using the Web as a primary means of information, it is becoming more important for museums to provide information-rich content in a form that is accessible to all users.

The Quinkan Matchbox is a repository for cataloguing Australian Aboriginal cultural heritage. It aims to increase understanding of cultural artifacts by not only cataloguing curatorial-type information about the resources but also encouraging experts to contribute information *in response to* information already contributed by others. In particular, it is hoped to elicit opinions and interpretations from members of the Quinkan Aboriginal community. Annotations are used to store this information in a manner that does not alter the original state of the resource and allows for contributors to extend information in personalized formats for different user groups. For example, imagine Harry, an Aboriginal student, browsing the Museum of Natural History Web site for research on Quinkan Prehistory. He comes across a rock-art painting called 'Giant Horse'. He remembers stories of its myths and origin told by the elders of his tribe. Harry creates an annotation containing this information. This annotated document acts as a supplementary resource designed to increase knowledge for a particular user group.

This paper demonstrates how museums can use annotations for interpretation and personalization to increase individual experience.

The first part describes technologies currently used in the creation of annotations. The World Wide Web Consortium (W3C) has developed many Web technologies, always being careful to support alternative interfaces for people with accessibility needs and preferences. Two of these are Amaya and Annotea which incorporate W3C standards and specifications to allow users to create, store, modify, and delete annotations. In this section, we present use cases showing how these technologies can be used to create personalized annotation for storing interpretations made by different expert user groups. Other annotation technologies such as AnnoSource will also be discussed. The second part of the paper will further develop earlier ideas (Nevile et al., 2004). We exploit the utility of the IMS AccessForAll profile and show how it can be used to interact with annotations. We present ideas suggesting how museums can modify the user profile to best suit the content needs of its diverse clientele. Finally, the paper presents conclusions and ideas for possible future research in this area.

Terminology Use In This Paper

- *Accessibility* is used to refer to the effective matching of resources to users' stated needs and preferences.
- *Interpreters* are users providing expert interpretations and views. For example,

interpreters may be Aboriginal Elders, anthropologists, archeologists, teachers or other experts within a particular knowledge domain.

- *Annotations* are described by the W3C as "comments, notes, explanations or other types of external remarks that can be attached to a document" (Koivunen, 2004) .

In this paper, we propose to use annotations that have the capability to be functional. They have the ability to present information to the user in separate forms or modalities by augmentation or transformation of the original content. For example, an annotation can contain content in Braille that would be useful for a blind Braille-user. The Matchbox Project uses annotations as a means of cataloguing interpretive knowledge in modalities that increase cultural experiences. One of the major benefits is that the original document remains unchanged; the annotations are stored on a separate server and are accessed only when a user accesses a resource through the annotation server. Annotations are expressed using the Resource Description Framework (RDF - <http://www.w3c.org/RDF/>), a language which uses XML syntax to present information on the World Wide Web. Thus, annotation information is described in a standard format which can be shared with other institutions such as universities, high schools, art galleries, W3C, etc. Museums may also share information using Annotation clients which have the capability to obtain annotation(s) from one or more annotation servers such as the Matchbox annotation server (<http://matchbox01.cs.latrobe.edu.au/quinkan/annotations/>) and the W3C annotation server (<http://annotest.w3.org/annotations>).

Recently, we have started to use annotations to introduce Semantic Web information by linking annotations to other systems that contain information that also can be extended.

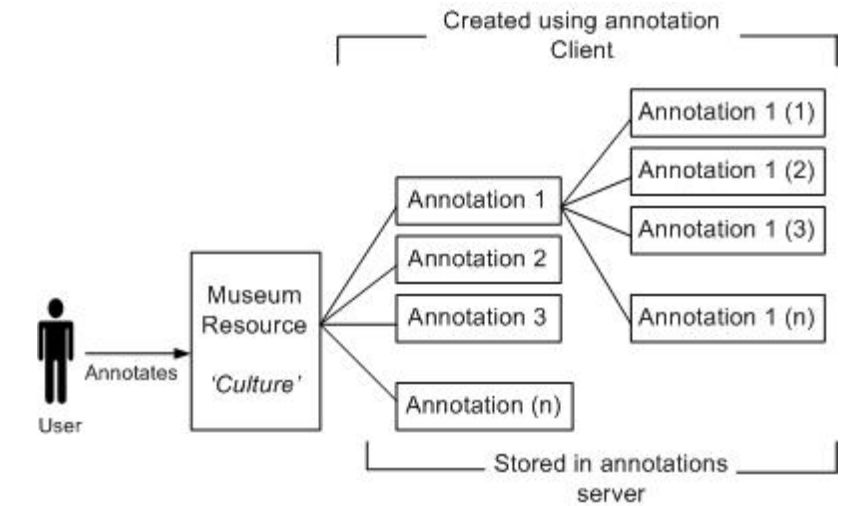


Fig. 1: Flexibility of annotation servers, creating multiple annotations

Annotating Museum Content

The way people seek information on the Web is changing. Simply put, people endlessly want more. They seek information through forums, mailing lists, conference transcripts etc. Museums have a very wide spread of user types, ranging from learners to experts from different cultural and knowledge backgrounds, and increasingly they seek better personalization technologies to improve the visiting experience by creating a *human element* (Bowen, 2004) . Annotations can help improve user experiences by providing additional sources of rich accessible information. The following describes current technologies used to create annotations. Museums can adopt annotation technology without having to sacrifice their current information technology infrastructure. Most annotation servers and clients described are available, free and they often come with support.

Fig. 1 shows how a typical server works. A user chooses to annotate a single paragraph within a resource, so the server stores both the coordinates of the position where the user has decided to add an annotation and the content of the annotation. The flexibility of annotation servers such as Annotea (<http://www.w3.org/2001/Annotea/>) and Zope (<http://www.zope.org/>) allows a user to make any number of annotations to a single document. In addition, a user can make annotations to existing annotations. This facility is expected to be of great use in museums as information about the same thing can be contributed from different discipline perspectives.

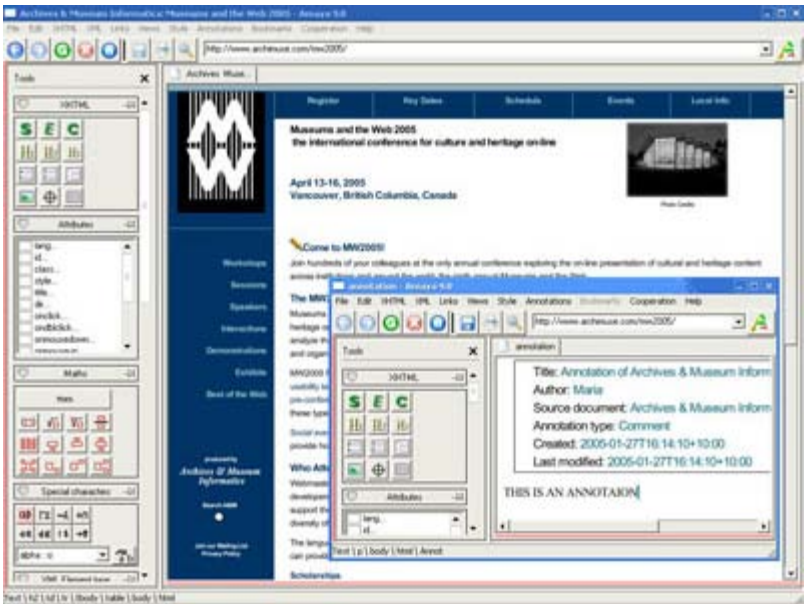


Fig. 2: Screenshot of Amaya annotating Museums and the Web 2005 Web page. (<http://www.archimuse.com/mw2005/>)

The W3C annotation client Amaya (<http://www.w3.org/Amaya/>) offers the user a functional interface for posting, modifying and deleting annotations on the annotation servers (Fig. 2). Kateli and Nevile (Kateli & Nevile, 2004) have developed use cases for creating accessible annotations in an educational environment for students with special needs. Museum interpreters can extend these to enrich content by including images, sound and other features using methods described in those use cases. AnnoSource (<http://matchbox01.cs.latrobe.edu.au/annosource/>) created by Kateli (2004) for the Matchbox project is an experimental annotation client that extends author information. Currently AnnoSource uses the 'Friend of a Friend' (FOAF) specification (Brickley & Miller, 2004) to tailor 'author' for greater descriptive use in a cultural environment. For example, Mr. Tommy George is an Aboriginal Elder from the Quinkan tribe; he is an expert in Aboriginal cultural heritage. Using AnnoSource, any additional information he contributes can be associated with his authorship, described in a standardized format, giving a later user greater access to information about the author of the annotation.

Museums who integrate annotation servers and clients offer a valuable service to their users. Now not only can people use Museum systems to retrieve information, but they can also use them to publish their own materials and share them with the world. Academics can add reports of their expeditions. Aboriginal community members can catalogue stories, myths and locations of ancient cultural artifacts (Fig. 3).

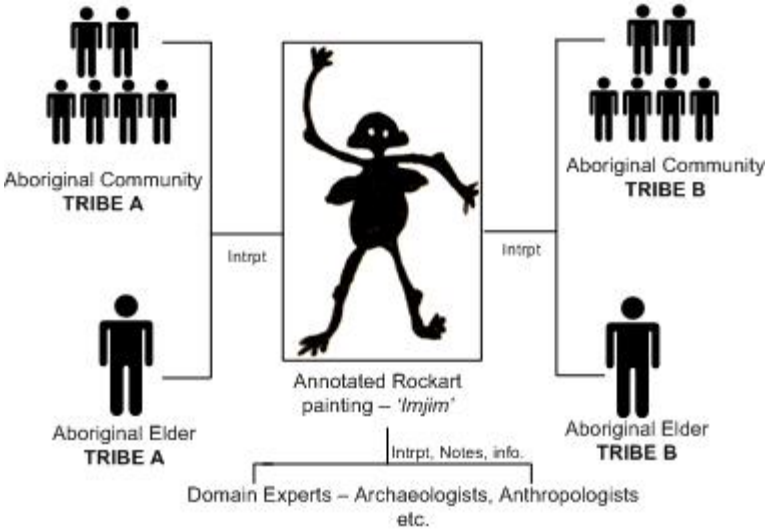


Fig. 3: Range of users annotating cultural artifacts

Annotations – Interpreting Aboriginal art in 'Quinkan Country'

This is our place. Our country. The country of our ancestors. The spirits of our ancestors live here. In the rocks, those sand stone escarpments. Our ancestors made that art you see on the rocks. The Quinkans do their work at night. The good ones and those bad ones. The pictures and paintings of the past are our link with the present. This is our country. The place of our ancestors. You have to know that way

to understand Aboriginal way. The land gives us what we need. Food, shelter, tradition, law, dance. They were put there in the dreaming. That way we live. All things work together: the land, the law, the culture, the heritage. That way things work. *Tommy George & George Musgrave* (George & Musgrave, 1995)

Cape York, located in far North Queensland, Australian, is home to 'Quinkan Country' covering approximately 1000 square miles, located on the Cape York Peninsula in the far north of Australia. A diverse environment of barren Australian outback and lush tropical savannah, it contains one of the largest collections of rock art paintings in the world, dating back almost 36,000 years (Lissonnet & Neville, 2003) . The invasion of the land caused by the gold rush of 1873 led to great conflict between the 'newcomers' and the Aboriginal people who were defending their land. As a result, tribes were brutally massacred, and many surviving people lost contact with their families. "It is one the darkest moments in the history of this country" (George & Musgrave, 1995) . The locations of ancient rock art sites were forgotten for many decades.

Some rock art galleries were re-discovered among giant sandstones in 1960 by road building workers in the main community of Laura (Trezise, 1969) . Percy Trezise, a bush pilot, soon found more galleries while on low-level flights over the Quinkan region. He began cataloguing sites, paintings and interpretations passed on through generations by tribal elders. Archeologists first started excavations at Mushroom Rock near Laura in mid-1963. This led to further work by researchers in zoology, botany, geology and geomorphology (Morwood & Hobbs, 1995) . Annotations from experts in such disciplines will not only enrich the resources but will also allow for focused interrogation of the complete range of information.

Scenarios

The following scenarios show how different user groups can include interpretations and research information in annotations for a rock art image. (The images and text are taken from a book written by Mr. Tommy George and Mr. George Musgrave, two Aboriginal elders. They are used here to illustrate the potential of the new technology.) The scenario's hypothetical user groups will consist of:

1. Community members and elders from two separate tribes: Julia is field researcher who works for the World Museum. She is gathering information on 'Imjim' a rock art painting (Figure 4) located at Lakefield National Park near Laura. As Aboriginal elders often speak a number of different languages but may not be able to read or write English now, Julia decides to also record their spoken interpretations.



Figure 4: Rock Art 'Imjim' located at Split Rock (George & Tresize, 1995)

2. An archeologist: Jim, an archeologist specializing in Quinkan prehistory, has seen several versions of Imjim at different locations. He decides to add annotations to the image to catalogue his findings.
3. A teacher: Maria, a high school student in Italy, has found annotations made by Julia very interesting, but is worried that her students won't be able to read them unless the text is in Italian.

Example 1

Julia asks Mr. Tommy George, a Kuku-Thypan elder who lives at Laura, to give his interpretation on Imjim. Mr. George tells his story:

Imjim is a bad bugger. That Imjim came from up Battle Camp way to look for a wife. He found that wife at Split Rock and that's where he stayed. You can see him and his wife with that red dingo (George & Musgrave, 1995) .

Julia catalogues the above interpretation by creating an annotation using Amaya (Figure 5). She later visits another tribe and some very old people tell her about Imjim:

They are called Anurra, spirit figures who bounced about like kangaroos at night on their long knobbed penis; they can bounce half a mile in one hop and live like frogs. The female Anurra use their breasts to bounce around in the same way (George & Musgrave, 1995) .

Julia takes the information and includes an audio/visual link which directs a user to comments made later by children (Figure 6).

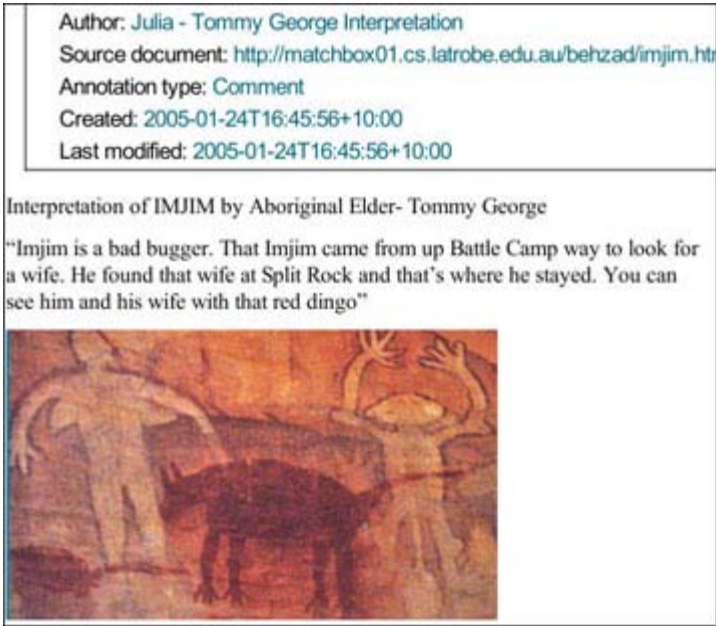


Figure 5: Interpretation of 'Imjim' by tribe elder

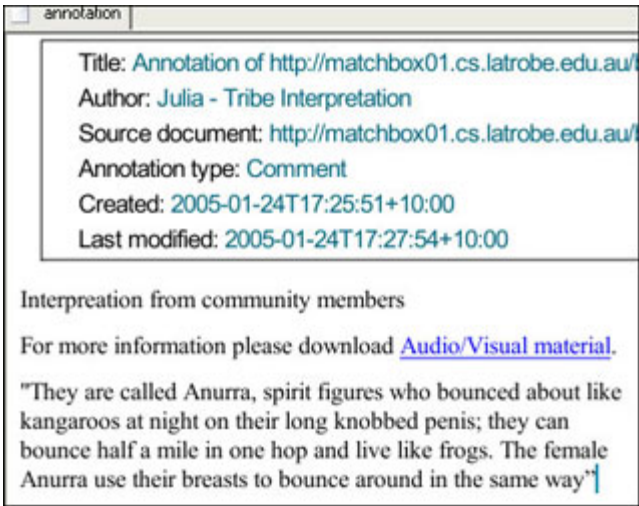


Figure 6: Interpretation by the community

Example 2

Jim is browsing the World Museum catalogue and views the annotations made by Julia. He remembers that he had collected data on a similar image while excavating at Red Bluff near Laura (Morwood & Hobbs, 1995) . He uses annotations as a means of publishing some of his findings, including excavation notes, painting layers, colors and carbon-dating. He does this without changing the original document or original annotations made by Julia (Figure 7).

annotation

Created: 2005-01-24T17:47:43+10:00

Last modified: 2005-01-24T17:47:43+10:00

The Excavation:

Located in Red Buff in a trench 1X4m was open on the northern side of the wall.

The excavation was held well downslope to help protect the art from dust

Stratigraphy:

Comprised of 3 layers. Layer 1 colour 7.5YR 3/4. Organic Content 4.3%

Layer 2 color 5YR 3/4 Organic Content 6.3%. Layer 3 2.5YR 5/4. Organic content 1.2%

Dating:

2320+-b.p.

Figure 7: Annotation – Archeologist painting at Red Buff

Example 3

Maria finds annotations extremely useful for locating additional information about resources. She wants her students to include information inserted by Julia and Jim for their assignment. Using Babel Fish (<http://world.altavista.com/>) she decides to make annotations that translate Julia's information into Italian (Figure 8).

annotation

Title: Annotation of <http://matchbox01.cs.latrobe.edu.au/behzad/imjim.htm>

Author: Maria

Source document: <http://matchbox01.cs.latrobe.edu.au/behzad/imjim.htm>

Annotation type: Comment

Created: 2005-01-24T18:14:21+10:00

Last modified: 2005-01-24T18:14:21+10:00

Interpretation dai membri di Comunità

Per le più informazioni trasferisca prego il materiale dal sistema centrale verso i satelliti di [Audio/Visual](#).

"sono denominati Anurra, figure di spirito che hanno rimbalzato circa come i canguri alla notte sul loro lungo knobbed il penis; possono rimbalzare la metà un di miglio in un luppolo e vivere come le rane. L'u so femminile di Anurra i loro seni rimbalzare intorno nello stesso senso "

Figure 8: Annotation - Italian translation

Richer Experiences: Personalisation using AccessForAll

The AccessForAll Metadata specification (<http://www.imsglobal.org/accessibility/>) was designed for use by institutions that have diverse users. To test its effectiveness and set a new standard in accessibility, the Advanced Technology Research Center (ATRC) at the University of Toronto developed The Inclusive Learning Exchange (TILE) that uses the AccessForAll specifications to allow students to create user profiles to specify control, display and content accessibility preferences. Neville and others (Neville et al., 2004) offer a use case showing Maria, a dyslexic student, using the AccessForAll profile to have her learning environment adjusted to her unique needs. The system presents her with a rich individualized experience and enhances her learning environment by allowing her to choose her own control preferences, device needs such as screen readers and content modalities. WebForAll (<http://www.web4all.ca>) uses the AccessForAll profiles so a given user can load a personal profile using Smart-Card technology and have the computer automatically configured to suit their needs, and then have the computer returned to the original state ready for the next user. Museums could create 'default' AccessForAll profiles not only for their on-line users but also for visiting tour groups:

- Primary/high school and tertiary students: Museums can create AccessForAll default profiles to suit groups visiting on field trips. For example, there could be a simple display for young high school students and a more academic display for university students and academics. Each person could then tailor these profiles further based on their individual needs.
- Tourists: A group of young German tourists wants to visit World Museum to view their famous cultural artifacts. Bill, the information technology manager, creates an AccessForAll default profile to customize language settings. This will allow any tourists seeking information to retrieve information that is catalogued in German.
- Mature/senior visitors: Larger text, and contrasting foreground and background color combinations can help mature people viewing resource material.

The Matchbox system extends the utility of the *Content* element of the AccessForAll profile for interaction with annotations. For example, Lucas is visiting the 'World Museum'. He uses the AccessForAll service offered by the Museum to load his personal profile. He then modifies the content preferences so that he sees resources with annotations made by Aboriginal Elders. His colleague is more interested in geology and so wants to see the annotations made by the geologists. He also uses a modified AccessForAll service.

Future Work

Our aim is to offer AnnoSource as a flexible annotation management tool for educational institutions such as schools, libraries and museums. Integration of FOAF will allow for rich descriptions of interpreters, cultural social networks and knowledge domains. This information can then be shared with other FOAF networks to create a rich semantic environment. AnnoSource will also support the accessibility needs and requirements of individual users by offering services to personalize control, display and content of annotations. In addition, we are investigating how we can create annotation Web servers that automatically create annotations by exploiting metadata information about resources. For example, Lucas can state in his AccessForAll profile that all information entered within the period 1990-2000 is to be displayed and the rest is to be offered only through annotations. Lucas can further streamline his preferences to state that only annotations made by Aboriginal elders containing interpretation of rock-art images are to be displayed. This will give museums the ability to extend current information retrieval methods by offering more relevant resource materials to their range of users without having to change their existing content or metadata.

Conclusion

As users demand more information from the Web, annotation technology can be used by Museums to enrich individual experience. The Matchbox system adopts these technologies to catalogue interpretive information on Quinkan cultural heritage. Various scenarios demonstrate how different user groups such as Quinkan tribal elders, archaeologists, and teachers can create annotations about a rock art image to contribute knowledge through stories and academic information. The AccessForAll profile encourages Museums to create a more 'user centric' environment by allowing users to personalize display, control and content preferences. As new annotation technologies such as AnnoSource emerge, Museums can offer their users more relevant and accessible information.

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