

# ***BETWEEN A ROCK AND A DATA BASE: A CULTURAL SITE MANAGEMENT SYSTEM FOR THE ROCK PAINTINGS OF ULURU, CENTRAL AUSTRALIA***

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## **ABSTRACT:**

The monolith known as Uluru, also called Ayer's Rock, is one of the most recognised icons of the Australian landscape. It is located almost at the dead centre of the Australian continent, within the Uluru Kata Tjuta National Park, and within the country of the Anangu people. The land around Uluru and Kata Tjuta (the Olgas) was ceded to the Anangu people in 1985, and leased back to the Australian Government to be managed jointly as a National Park using the principles of *tjukurpa* (traditional law and morals) as the basis of the management decisions. The Plan of Management for the Park recognises this approach to joint management, and also requires that the rock painting and pecking sites located around the rock be documented and conserved as they contribute greatly to the social and cultural landscape.

Following a photogrammetric survey of over 80 rock art sites it was decided to develop a site management system to hold all of the documentation of the sites (in a digital form). This system was developed through extensive consultation with the senior men and women in the Mutitjulu community, and it was during this consultation that the project was extended to contain other material important to the custodians.

The Cultural Site Management System is capable of dealing with digitised site plans, photographs, report forms, works forms, and digital audio and video. It is a protected system, developed so that only people authorised to view certain images are given access, with the facility to restrict images depending on circumstances. It has also been developed to be used by the community, with extensive use of graphical user interfaces in order to simplify operation.

This paper will report on the development of the system, and progress and acceptance of the system to date.

## **1. INTRODUCTION**

### **1.1 Background**

Uluru is perhaps one of the most readily recognised features of the Australian landscape, along with the Sydney Harbour Bridge and perhaps Ned Kelly's Helmet it is also one of the important icons of Australia. The World's largest monolith, Uluru rises some 340m from the surrounding plains creating a dominant presence in the landscape. The importance of the 'Rock' to humankind is reflected in the declaration of the Park as a World Heritage Site (1987, Natural/Cultural) and as a Biosphere Reserve under the UNESCO Man and Biosphere programme. The Rock is home to a very wide biodiversity of plants and animals, and is visited by over half a million people each year.



Figure 1: Uluru at Sunset, photograph Cliff Ogleby

The Uluru Kata Tjuta National Park was established originally under the Northern Territory Government as a Park in 1958. A more significant event however was the granting of inalienable freehold title to the lands of the Park to the Anangu people in 1985 (The Anangu are the traditional owners of the country around Uluru and Kata Tjuta, the languages they speak are Pitjantjatjara and Yankunytjatjara and the name of the township is Mutitjulu). The lands were then leased back to the Australian Government as a *jointly managed* National Park. Joint Management means that the Anangu are represented on the Board of Management of the Park, and that all management decisions are governed by *tjukurpa*.

### **1.2 Tjukurpa**

*Tjukurpa* is perhaps best described as the Anangu legal, moral and religious code that governs the relationships between people, animals, plants and the landscape (or perhaps *the 'proper' way of doing things*). The Plan of Management for the Park expresses the basis of *tjukurpa* as the guiding principles for its operation, and all decisions are taken with the cooperation of the Anangu people and respect for the Anangu way. (All work undertaken as part of the research presented in this paper, and all the researchers working on the project, are governed by *tjukurpa*).

An understanding of the fundamentals of *tjukurpa* is beneficial in understanding the development of the information system discussed in this paper. The definition presented here is superficial, but will suffice in this instance.

### 1.3 Petroglyphs and Pictographs

Around the base of the rock are approximately 80 sites containing rock paintings or peckings. Some of these sites have been developed for visitor access while others are restricted to authorised men or women, and others are registered as Sacred Sites and governed by Acts of Parliament. The Plan of Management recommended that these sites be documented and conserved as many are threatened by visitors, wasp nests, water damage, dust and animal presence. A project was undertaken in 1999 to document these sites, and a report was prepared that included data in a format suitable for incorporation into the Park Management's Geographic Information System (GIS). The report also included some multimedia material to give an indication of the potential for contemporary information technology' to store and manage data like images, drawings, maps and tables. This small addition to the report was the seed for the development of a unique cultural heritage information system.

### 1.4 The Cultural Site Management System

As a result of the initial documentation project, it was decided to develop a computer based cultural site management system (CSMS) capable of providing information for the day-to-day management of the rock painting sites, and providing a safe keeping place for the 'intangible' heritage of the Anangu people (the use of 'intangible' will be discussed later in this paper, the term here is used only for convenience). The system can store video, maps, forms, drawings, images, and audio in an indexed, web-browser based information system.

The first release of the system was installed at Uluru in late 2002, and is currently being populated with data.

## 2. PHOTOGRAMMETRIC RECORDING PROJECT

The rock painting and pecking sites in the overhangs and on the rocks around the base of Uluru were documented in 1999 using a combination of photogrammetry, photography, and hand drawing (Ogleby, 1999). All sites have UTM coordinates as a result of a combined GPS/GLONASS survey performed at the same time.

The photogrammetric recording undertaken on site used both a film-based camera for the record photography and a digital camera for the provision of survey control. This innovative approach ensured that the maximum number of sites could be documented in the limited time available, there being no need to use conventional surveying equipment to coordinate the small targets used to control the photogrammetry.

The primary record was obtained using a modified Hasselblad 500ELM camera with 50mm lens, and 100ASA colour transparency film. The 100ASA film has small grain size, which allows for a high level of detail to be contained in the photographs. The film has been processed by a custom laboratory, ensuring consistency of quality and good archival qualities. The men's, women's and public sites were processed separately, and the restrictions on gender access was maintained by the processing laboratory. The resolution of the 100ASA film also allows high resolution digital scans to be acquired from the images if required.

Small plastic targets were affixed temporarily to the rock surface away from areas of pigment and/or sensitivity so that a network of coordinated control points could be obtained. The

targets were removed after the photography. They were unnumbered, but are annotated on reference photographs.

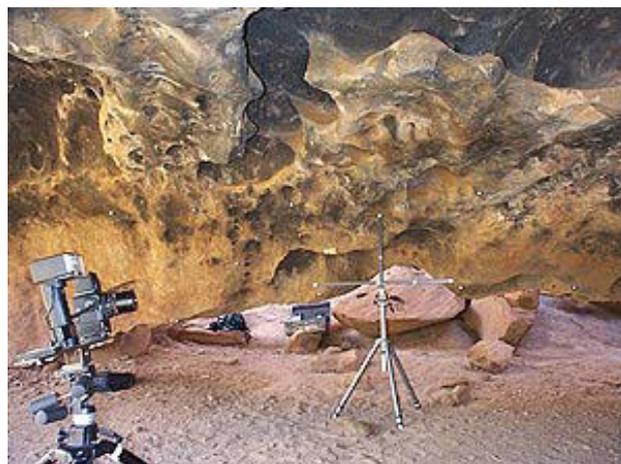


Figure 2: Typical recording session showing T-bar, Hasselblad, flash and targets on the rock surface

The method used to transfer arbitrary coordinates to the targets uses a calibrated T-bar and multiple, convergent digital images of the target array. These images were acquired with a Kodak DC210 with a metric calibration, and are solely for the provision of survey control (they have been exposed and framed for this purpose, they do not form part of the primary record). Coordinates are transferred from the T-bar to the targets using a bundle adjustment photogrammetric solution via the Australis software system developed by the Department of Geomatics (Fraser and Edmundson, 2000).

The photographs, control images and coordinates are kept in a fire-proof safe at the Park headquarters.

## 3. THE 'INTANGIBLE' CULTURAL HERITAGE OF 'COUNTRY'

There have been formal developments recently regarding the documentation of 'intangible' cultural heritage, in particular the preparation of the 2003 'Preliminary Draft Convention for the Safeguarding of Intangible Cultural Heritage' by UNESCO (UNESCO 2003a). This Draft recognises the importance of intangible heritage, and recommends methods be developed to preserve this component of the culture of humankind.

The Intangible Heritage Unit of UNESCO's Cultural Heritage Division defines intangible heritage as being "... oral traditions, customs, languages, music, dance, rituals, festivities, traditional medicine and pharmacopoeia, the culinary arts and all kinds of special skills connected with the material aspects of culture, such as tools and the habitat" (UNESCO 2003b). The role of the division is perhaps best summed up by the phrase ... a link between the safeguarding of the tangible and preservation of the intangible heritage (ibid), which is also an apt description of the aims of the project discussed in this paper.

However this separation of tangible and intangible cultural heritage is not appropriate at Uluru (and many other places for that matter), heritage is a connected whole where the visible signs of 'culture' (say the rock paintings) are merely one manifestation of the life and beliefs of the people, and an integral part of *tjukurpa*. There are songs, dances, stories and behaviours that form part of the Uluru story. The separation of song and dance from the rock paintings and the fauna is

however an eurocentric concept, they cannot be separated as they are all part of the bigger picture.

Intangible heritage will be used here to cover the songs, dance, stories and relationships of the Anangu for the sake of convenience only, as this is what the information system has been developed to incorporate with the more mundane images, tables and Park management forms. However a Cultural Site Management System at Uluru that did not incorporate this additional information would be incomplete.

#### 4. THE CULTURAL SITE MANAGEMENT SYSTEM

The CSMS has been developed with two aims in mind: to provide an operational tool for the management of the rock art sites and to provide a secure 'keeping place' for cultural heritage data deemed to be important by the traditional owners. The interface is to be kept simple, the information is to be protected from those who would not be authorised to have access, the men's and women's information to be kept separate, and the maintenance of the system including data entry to be able to be performed at the Park and community by people with a basic level of IT competence.

##### 4.1 System Design

The CSMS has been a collaborative project, deriving input from Parks staff, an Australian Heritage Commission consultant (Nicholas Hall), Anangu Rangers from the Park and senior Anangu people from the Mutitjulu community (wadi tjilpi and minma pampa – senior men and senior women). Two of the most important design parameters were the need to ensure that the secret/sacred material was protected from those not authorised to view the material, and that the men's and women's information be kept separate. It was also necessary to ensure that the images used as part of the site design were in the public domain, and that navigation through the package would be simplified so that it would be relatively easy to use. These requirements were naturally part of the need (and desire) to respect *tjukurpa*.

Initial interface designs were presented as large colour prints which were refined over time. A prototype system was also presented to the 'stakeholders' in order to demonstrate the mechanisms in place to protect the data. These were presented during several meetings at the Park headquarters, and the input was taken into consideration in the re-design of components.

The system uses Microsoft Internet Explorer as the interface, as this is familiar to many of the intended users. The software has been developed by Glen MacLaren of Environmental System Solutions, a consultant who has been involved in the project from its inception. The system uses the ASPMap web mapping component along with the packages listed below, all other software has been written specifically for this project.

- Internet IIS 4.0+
- Intranet IIS 4.0+ or Personal Web Server
- Microsoft Data Access Component (MDAC 2.5+)
- Microsoft File System Object Component

The user interface graphics have been designed by Fiona Ellis. In addition, the map GIS data used to render map images is in ESRI's ArcView format so as to be compatible with the GIS used by the Park Management, allowing layers of information (such as vegetation for example) to be incorporated into the CSMS if this is deemed necessary by the users.

#### 4.2 System Operation

The system is initialised by clicking on the appropriate icon on the desktop. Once loaded the splash screen shown below appears. Clicking anywhere on this screen advances to the login page. (It may be difficult to see detail in these images). At this stage the primary interface is the purely visual, it is intended that if the need arises audio prompts in language will be added to the corresponding icons.



Figure 3: Main Splash Screen, CSMS

There are 3 levels of data access, comprising the men's sites (that is restricted to authorised men), the women's sites and public sites (open to all). In order to protect the access to this information a user needs to log into the system, and once successful their photograph is displayed on the main navigation screen. This is so that users and observers are reassured that the person in front of the computer is the same as the person authorised to access the information.

The following options are presented on the main navigation screen: home; places; areas; reports; search and help. Places relate to specific locations (coordinates from GPS or place name), 'areas' refer to larger locations than may not or may not be within the Park boundary (the boundary has little relationship to the extremities of the Anangu lands)



Figure 4: Places Option Screen, CSMS

The 'places' option is the usual entry point to the system. This option loads the map data (in ESRI's ArcView format) where the appropriate site can be selected. The images included in this

paper show the information from the test system, which is for the main shelter at the Mutitjulu Water Hole (which is in the public domain, although additional information relating to this site may be restricted)

The following screen gives an overview of the different data types that the system can accommodate. In this instance there is a copy of a photograph taken in 1938, there is a video segment of a senior man talking about the rock shelter (in language), there are scanned detailed drawings of the art, contemporary photographs and a maintenance report.



Figure 5: Mutitjulu Shelter Screen, CSMS

Figure 6 shows a copy of an early photograph taken of the main art panel at the Mutitjulu Shelter. This image provides an important baseline from which to measure the deterioration of the pigments, which has been considerable in the intervening years (washed off the surface by visitors and tour guides splashing water on the art to make it easier to photograph).

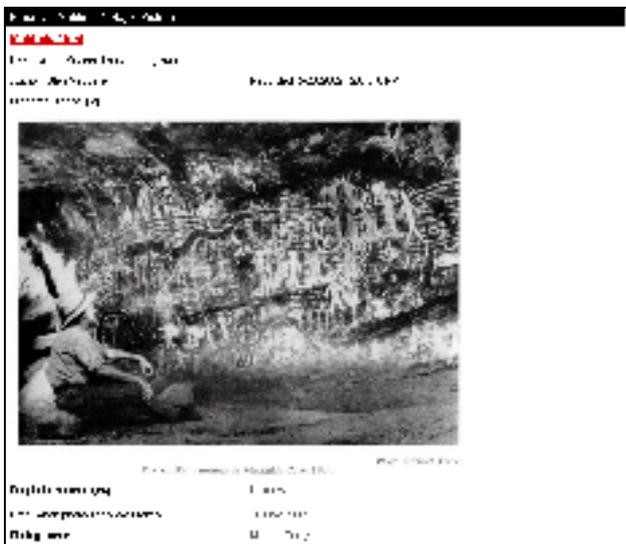


Figure 6: An historical photograph

A considerable amount of metadata is incorporated when data is added to the system. For example, in the case of photographs and video, all the names of all people in the images are included so that data can be searched on these names. Whilst this may appear to be a handy facility, under the obligations of *tjukurpa* images of deceased people are not to be seen for a particular period of mourning, so photographs and video containing these

people can be 'moved' to the 'sorry box' until it is decided that they can be released.

### 4.3 The Designer Option

The system also incorporates a 'designer' menu accessible to the system administrator, where new forms and categories can be developed as the need arises. Currently there are 5 main hard copy forms that are completed when work is undertaken on the rock paintings, this number may however increase as new threats are discovered to the preservation of the rock art, or as new reporting is required by the Park management. These forms are replicated in the CSMS, so the system needs to be able to accommodate new forms as necessary (or new data types and so on).

A library of standard query boxes and data input modules are provided under this option so that the system manager in the Park can add enhancements as required. The intention of the CSMS is that the bulk of the management can be undertaken by the staff on site without the need to continually bring the consultants back to Uluru.

## 5. CONCLUSION

The first phase CSMS is currently in use in the Cultural Heritage Unit at the Uluru Kata Tjuta National Park, and training has been undertaken to give the users the skills needed to use the system effectively. It is however an evolving project, with additions and improvements being added as their need becomes apparent during the use of the system.

The success of the CSMS is a tribute to the input and efforts of many people, including the senior men and women of the Mutitjulu community for whom the system was developed. It is an example of the potential of Joint Management, where both *piranpa* (non-indigenous white people) and *Anangu* can work together under *tjukurpa* to contribute to the better management of a region of such cultural importance.

## REFERENCES

- Fraser, C.S. & Edmundson, K.L., 2000. Design and Implementation of a Computational Processing System for Off-Line Digital Close-Range Photogrammetry. *ISPRS Int. Journal of Photogrammetry & Remote Sensing*, 55(2): 94-104.
- Ogleby C.L. 1999. Report to the Uluru Kata Tjuta National Park and the Mutitjulu Community: *The Rock Art Sites of Uluru*. Unpublished.
- UNESCO 2003 (a) [http://portal.unesco.org/en/ev.php?URL\\_ID=12998&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php?URL_ID=12998&URL_DO=DO_TOPIC&URL_SECTION=201.html) Visited July, 2003
- UNESCO 2003 (b) [http://www.unesco.org/culture/heritage/intangible/html\\_eng/index\\_en.shtml](http://www.unesco.org/culture/heritage/intangible/html_eng/index_en.shtml) Visited July, 2003

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