January 2016

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Acknowledgements
The researchers acknowledge the work, advice and contributions of the following groups, organisations and individuals:

University of Melbourne Units and Centres
Australian Indigenous Studies Unit, Centre for Health Equity, Melbourne School of Population and Global Health
Grimwade Centre for Cultural Materials Conservation
Research Unit for Indigenous Language, School of Languages and Linguistics

Organisations
Australian Institute for Aboriginal and Torres Strait Islander Studies
Indigenous Remote Communications Association
Kanamkek-Yile Ngala Museum
Melbourne Networked Society Institute
National Film and Sound Archive
Thamarrurr Regional Authority Aboriginal Corporation
Thamarrurr Development Corporation

Individuals
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ISBN: 978 0 7340 5195 0

Images
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Cover Image
Mark and Jacinta Crocombe undertaking digitisation of the audiovisual collection at the Kanamkek Yile-Ngala Museum.

Suggested citation
Abstract

Audiovisual materials have been produced and stored by remote Indigenous media and cultural organisations in Australia for over thirty years, representing a distributed national collection of high cultural, linguistic and national significance. However, technical obsolescence of analogue materials, harsh environmental conditions and limited access to technological and financial resources in many remote communities present serious risk of information and knowledge being lost forever.

This report outlines a collaborative project undertaken by the Melbourne Networked Society Institute and researchers from the University of Melbourne’s Australian Indigenous Studies Unit, Research Unit for Indigenous Languages and the Grimwade Centre for Cultural Materials Conservation. In partnership with the Kanamkek-Yile Ngala Museum, Wadeye, NT, and the Australian Institute for Aboriginal and Torres Strait Islander Studies, the researchers investigated how culturally significant and endangered Indigenous audiovisual archives could be effectively preserved and transmitted to current and future generations using innovative digital technologies.
1 Introduction

This report details the design, conduct and outcomes of a research project on how culturally significant and endangered Indigenous audiovisual materials could be effectively preserved and transmitted for current and future generations using digital technologies.

In 2013, the Melbourne Networked Society Institute (MNSI) funded a project initiated by the Australian Indigenous Studies Unit (AISU) located at the University of Melbourne’s Centre of Health Equity, Melbourne School of Population and Global Health. This seed funding enabled a team of researchers from the Unit to collaborate with the Kanamkek-Yile Ngala Museum (Wadeye, NT) and project partners including investigators from the School of Languages and Linguistics, the Grimwade Centre for Cultural Material Conservation, MNSI information technology experts, and the Australian Institute for Aboriginal and Torres Strait Islander Studies (AIATSIS).

Research for the MNSI project was conducted in the remote Aboriginal community of Wadeye in the Northern Territory, developed in partnership with the Kanamkek-Yile Ngala Museum and the Thamarrurr Regional Authority Aboriginal Corporation (TRAAC).1 The project focused on the audiovisual collection of the Museum, a vast collection of analogue and digital materials of high cultural significance to the Wadeye community.

This MNSI project was developed in response to issues that were raised in a wider ARC Indigenous Discovery grant (IN130100007) - ‘Local Aboriginal community archives: The use of information technology and the National Broadband Network in disaster preparedness and recovery’. The researchers and partner investigators in this project have examined the social and technological practices of the Wadeye Aboriginal community members in protecting intangible cultural heritage and their prioritisation of preservation requirements.

Technological obsolescence of analogue materials, harsh environmental conditions, and limited access to technological and financial resources in many remote communities presents a serious risk of this information and knowledge being lost forever. This project promotes Indigenous media collections as items of significant national heritage, and advocates their conservation and access as a matter of urgency (Huebner and Cooper 2007; Kral 2010; Ormond-Parker & Sloggett 2013).

The researchers collated the body of research literature that acknowledges the importance of archives in the lives of Aboriginal people (Anderson & Koch 2004; Christie 2005; Langton & Ma Rhea, 2005; Nakata & Langton, 2005; Huebner & Cooper 2007, Ormond-Parker & Sloggett 2012; Huebner 2013). Audiovisual collections have been produced and stored by

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1 Thamarrurr Regional Authority Aboriginal Corporation no longer operates in the community of Wadeye. Thamarrurr Development Corporation (TDC) has assumed responsibility for the activities undertaken by TRAAC.
Indigenous-owned organisations for over thirty years, with recordings depicting facets of Indigenous culture, language and community life and constituting defined acts of Indigenous self-determination and representation (Lockyer 2014, p. 4). These developments are reported in the Australian and international literature (see for instance: Gumbula et al. 2009; Nakata & Langton 2005; Ormond-Parker 2009; Thorner 2010).

This publication reports the development of an audiovisual delivery platform at the MNSI. This digital platform was trialled in the community, providing access to the archive for the people of Wadeye and inviting them to contribute their knowledge of the people, languages and events recorded. This information is of great research value, with particular benefit to projects investigating language acquisition in Murrinhpatha (the lingua franca of Wadeye and the surrounding Thamarrurr region) and in the safeguarding of local endangered languages. Much of the Indigenous knowledge held within this archive, such as preparation of bush foods, is retained by only a handful of living peoples, and is thereby invaluable. Furthermore, the MNSI project supports the growth of culturally meaningful jobs in the Wadeye community, advancing the capacity of the Museum to continue its work in digital preservation through the training and development of skilled Indigenous archive workers – priority areas identified by the Indigenous Remote Communications Association (IRCA) (2014, p.11).

The MNSI technology trial is one of multiple ongoing projects situated in the Wadeye community. The Aboriginal Benefits Account grant for the ‘Kanemkek-Yile Ngala Museum Audiovisual Archive Digitisation Project’ will enable the community and research team to work in partnership with AIATSIS to digitise the remainder of the audiovisual collection of the Museum, to develop protocols on use and access, add project metadata and translate recorded events. This continues the work of the Museum and the Wadeye Aboriginal Language Centre (WALC), and the ongoing support of Maree Kleisch at Batchelor Institute. Digitised material is being delivered at local community sites including: Our Lady of the Sacred Heart Public School, Wadeye Library and Knowledge Centre, Wadeye Health Clinic, and the Thamarrurr Aged Care Centre.

Another linked project is the establishment of a narrowcast digital TV station in Wadeye, scheduled for 2016. Wadeye TV aims to establish the training and employment of Wadeye youth to record and upload digital content for community relevant programmes and to manage the day-to-day running of the station. This service will allow local service providers to advertise community business affairs, to notify the general community about local events, and to deliver health messages. Digitised material from the Museum’s audiovisual collection will be used to generate material of cultural relevance for Wadeye TV broadcast programs.

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2 IRCA is the peak body representing the media and communications interests of remote Aboriginal and Torres Strait Islander communities in Australia. See [www.irca.net.au](http://www.irca.net.au)


2 Aims and Outcomes

Working in collaboration with local stakeholders in the Wadeye community, the MNSI technology trial was designed to explore the efficacy of digital technologies in establishing a secure archive of audiovisual materials using the collection of the Kanamkek-Yile Ngala museum. Three content delivery platforms were investigated: Internet Protocol Television (IPTV), Raspberry Pi and a Local Area Network (LAN).

The overall aims of the project were to:

- Develop a conservation and preservation methodology and framework for digitizing and archiving audiovisual materials.
- Trial how culturally significant and endangered audiovisual archival materials can be most effectively and appropriately preserved and made accessible for future generations.
- Provide safe storage and access to archival materials otherwise inaccessible without the use of innovative digital technology solutions.
- Deliver practical training to community members in the use of digital content delivery systems.

Significant outcomes of the project include:

- An audit of the Kanamkek-Yile Ngala Museum audiovisual collection.
- Formulation and implementation of a preservation strategy that encompassed identification, documentation, storage, repair, disaster preparation and duplication/digitisation.
- Digitisation of audiovisual materials to agreed archival standards.
- Providing access to historical and culturally significant audiovisual materials to Wadeye knowledge holders, community members and university researchers.
- Development of a transferable digital content delivery platform for Indigenous communities seeking to preserve audiovisual material.
3 Project Research Methods

This seed project has used a community-partnered, participatory action research (PAR) approach in combination with a collections management approach. Research framed by PAR aims to combine knowledge and action in response to local needs and desires. Kanamkek-Yile Ngala Museum Director Mark Crocombe and community leader William Parmbuk have articulated the high cultural significance of the collection and their desire for the Wadeye community to have access to this important historical footage. Work on this project commenced in 2013, with the study and research methods developed from discussions between the University of Melbourne researchers and the staff of partner Wadeye organisations in 2010.

Mark Crocombe, having developed and managed the collection over many years, has determined digitisation of the audiovisual collection to be a matter of urgency, with particular concern held to the fragile condition of the analogue tapes in a harsh environmental climate. The project research design was informed by the view that an effective conservation policy must not only achieve digitisation of this material but also community access and ownership over this cultural heritage (Ormond-Parker & Sloggett 2011).

With a focus on intergenerational knowledge transfer, action was taken to test and develop new digital technologies for participatory access to the Museum’s audiovisual collection, with expert advice from the audiovisual team from AIATSIS.

The majority of the research for this project was undertaken through fieldwork in Wadeye and Canberra. The University of Melbourne researchers Lyndon Ormond-Parker, Sharon Huebner and Caden Pearson conducted four fieldwork trips to Wadeye between 2013 and 2015, with each individual trip ranging in duration from two to six weeks. Additional fieldwork research was undertaken in Canberra at AIATSIS to deliver 405 digitised tapes (approximately 1,215 hours of footage) for safe offsite storage, and to clean, repair and digitise damaged tapes using the institution’s specialised equipment. The Wadeye community retain full ownership and intellectual property rights over both the analogue and digital content, in line with the AIATSIS Guidelines for Ethical Research in Australian Indigenous Studies (2012).
4 The Community of Wadeye

Wadeye (pronounced Wad-air), also known as Port Keats, is a remote Aboriginal community in Australia’s Northern Territory. Wadeye is situated inland between the Moyle and Fitzmaurice Rivers approximately 420 kilometres southwest of Darwin within the region of Thamarrurr. Thamarrurr, a Murrinhpatha term, roughly translates to ‘coming together as one people’ (Ivory 2005, p. 1). Wadeye is one of the largest Aboriginal communities in the Northern Territory, with a population of approximately 3200 people comprising seven language groups and 20 clans (Thamarrurr Development Corporation n.d). Over 90 per cent of Wadeye’s population is Indigenous with almost half being under the age of 20 years (Taylor & Ivory 2013).

The language groups of the people in Wadeye are Murrinhpatha, Murrinh-Kura, Marri Ngarr, Marri Ammu, Magati Ke and Marri Tjevin. Each of these groups maintains its distinct cultural practices and ceremonies, with the ‘social relations between these groups, and their ongoing interaction in ceremony [having] produced an intense flowering of composition and performance of public song and dance’ (Barwick et al. 2007, p. 385). These ceremonies reflect an extensive history of cultural exchange and trade within and beyond the Kimberley region (Treloyn 2014, p. 205). In 1994, the need to collect and preserve this cultural heritage inspired the creation of the Kanamkek-Yile Ngala Museum. Many items housed within the Museum are considered highly significant at local and national levels (Waters-Lynch et al. 2015).

Figure 1. The geographic location of Wadeye (Port Keats), Northern Territory. (Image Source: http://sydney.edu.au/paradisec/mpsong2/location.html)
5  Project Partner: Kanamkek-Yile Ngala Museum

The Kanamkek-Yile Ngala Museum is a keeping place for the cultural material of the Wadeye community. Established in 1994 by Br. Phil Costigan and Wadeye Elders, the Museum holds artworks, cultural objects, family and community photographs, documents and audiovisual recordings of cultural events, ceremonies, song, dance and language.

The Museum works in partnership with the Wadeye Aboriginal Languages Centre (WALC). The WALC was established in the early 1990s as an initiative of Aloysius Kungal and Damien Tunmuck, senior men from the Magati Ke tribe. At the time they were employed at the Literacy Production Centre at Our Lady of the Sacred Heart School, where they worked to produce books and classroom teaching materials in Murrinhpatha for use in bilingual classes. Their primary concern was to save the languages of the Wadeye/Daly/Fitzmaurice region from becoming extinct (Crocombe 2009, p. 123).

Language is the primary medium by which cultural transmission occurs, and these recordings are important not only because of the linguistic information they contain, but also for their cultural knowledge. As stated in the Our Land Our Languages (2012, p. 7) report by the House of Representatives Standing Committee on Aboriginal and Torres Strait Islander Affairs:
Cultural heritage and knowledge is passed on throughout each generation by language. Language is integral in affirming and maintaining wellbeing, self esteem and a strong sense of identity. Languages contain complex understandings of a person’s culture and their connection with their land. There is a wealth of evidence that supports the positive associations of health, education and employment outcomes as well as general wellbeing, with language and culture.

At the time of colonial settlement there were approximately 250 known Indigenous Australian languages, many of which remained in active use into the 18th century. Government policies that were in place well into the twentieth century actively discouraged or forbade Aboriginal and Torres Strait Islander peoples from speaking their languages, resulting in the extinguishment of language for many Australian Aboriginal cultural groups (Walsh 1993).

Of the 18 different languages originally spoken across the broader Daly region, all but Murrinhpatha are now highly endangered and not being acquired by children (Nordlinger in Press).

Aware at first hand of the impacts of language loss, community members undertook initiatives such as those implemented by the WALC to address the loss of language intrinsic to cultural identity, by recording and preserving local languages. As others have noted (Hobson et al. 2010; Walsh 2010; Walsh & Zuckermann 2011), these recordings present a paradigm shift away from language ‘loss’ or ‘extinction’ towards that of language being ‘dormant’ or ‘sleeping’, and having the potential to be revitalised. The United Nations Declaration on the Rights of Indigenous Peoples supports this notion, with Article 13 stating:

> Indigenous people have the right to revitalise, use, develop and transmit to future generations their histories, languages, oral traditions, philosophies, writing systems and literatures (UN General Assembly 2007, Article 13).

Following relocation of the WALC to the Museum, the institutions have worked to produce audiovisual materials with a community focus (Crocombe 2009, p. 123). Supported by Batchelor Institute and the Victoria Daly Shire Council, their main priority has been ‘…to record the cultural sites and associated stories in the region…in eight languages’ (Crocombe 2009, p. 123). The input of Wadeye Elders to the recordings has resulted in the capture of intimate knowledge concerning sacred and significant sites, with this knowledge subsequently developed into educational publications for school-aged children.

Through the digitisation and preservation of these culturally precious materials, the Kanamkek-Yile Ngala Museum and the MNSI project have played an important role in the safeguarding of Indigenous languages of the Daly region.
A significant portion of the materials at the centre of this project involve languages such as Marri Ngarrí, Magati Ke, Marri Ammu and Marri Tjevin, for which there are now only very small numbers of speakers remaining. Further, there has been very little description of these languages in the linguistic literature. This means that the information on the Museum recordings is crucial to broader understanding of these languages, and in many cases these are the only existing recordings of the languages being spoken.

It is a matter of extreme urgency that these materials be transcribed and translated while there are still remaining speakers who can understand them, and enabling this has been one of the goals of this project. The cataloguing process has identified recordings that involve Indigenous languages (rather than English). Using these materials, linguists working with community members are then able to work with speakers of the languages, identifying the relevant languages, and undertaking the critical task of translation and analysis. The linguistic and cultural work enabled by this project will have substantial benefits for speakers of these languages in the Wadeye community and Thamarrurr region. Preserving these materials for the community is an outcome of the project identified as high priority by Kanamkek-Yile Ngala Museum director Mark Crocombe:

This has got to be the biggest collection of history and culture in remote Australia… and my concern is to get [the footage of people and events] seen by the public. At the moment we just don’t have the storage suitable for the photos, the audio collection and the video collection. It’s a big job. But it’s got to be digitised… The building isn’t cyclone proof… and fire worries me…if we have a spark, well, its gone… We’ve got to get this tape collection digitised as soon as possible and get the [master analogue] copies off site. The master tapes can be housed in a better environment, so that they can get the maximum quality [of archival digitisation]. Mark Crocombe (Museum Director) July 2010
William Parmbuk, a well-known community member who has worked for organisations including the Thamarrurr Development Corporation, has described his desire for the community to access this material, and how the use of digital technologies will appeal to Wadeye youth:

Kids are smart. Yes people do have mobile phones and TV and that helps. But we want to get someone who – get funding and put it in a place – the museum in Canberra, Sydney or Melbourne – we can connect it to – call up someone and find out we’ve got stuff here, stuff there, so make sure we don’t lose it. Anyone could come and access – and the material is blown up on the TV. William Parmbuk, August 2013

Other benefits relating to preservation of, and access to, the materials and their contents have also been manifest during the period of this research project. These are described briefly in the following section.
6 Preservation and Access

Project researchers conducted an audit of the Museum’s audiovisual collection in December 2013 and January 2014. The collection comprises 800 VHS tapes, 600 MiniDV tapes and around 100 SVH compact tapes, totalling over 2,000 hours of footage. The collection also includes a substantial portion of materials ‘born digital’, distributed over a number of external hard drives. In hot and humid conditions the shelf life of analogue tapes can be as low as 10 years (IRCA 2014, p.11), with the shelf life of external hard drives also compromised. As such, digitisation of the collection was considered a matter of urgency. A digitisation workflow was initiated in November 2013, including training for local community member Jacinta Crocombe.

Figure 5. Project researcher Sharon Huebner undertaking the audit of the Museum audiovisual collection (Photograph: Lyndon Ormond-Parker).

Digitisation is undertaken onsite at the museum to an agreed archival standard, resulting in a large corpus of digitised material with basic metadata, including tape number, media format, title/label, category, author, year of recording, content description and notes on digitisation.

The Indigenous Studies Unit research team is continuing work in collaboration with local community members to identify individual events within this corpus and to create advanced metadata relating to language, ceremony and local knowledge. Identification of this information is of great importance to the local community and holds potential for scholarly
use in field linguistics, language pedagogy, and language technology; and for purposes of teaching, research and research development (Bird & Simons 2003, p. 558).

AIATSIS has become the custodian of the original analogue materials. Following archival digitisation, they are transferred to the AIATSIS archival storage space dedicated to audiovisual media. Researchers developing digital preservation strategies have come to understand that future technologies may enable enhanced retrieval of information from the analogue carrier, and that the original materials are valuable artefacts in their own right and warranting of preservation (AIATSIS n.d).

Figure 6. Project researcher Caden Pearson undertaking conservation treatment of damaged tapes at AIATSIS (Photograph: Lyndon Ormond-Parker).

The project conservation methodology followed a holistic approach towards care of the Kanamkek-Yile Ngala Museum audiovisual collection, including collections management, audit and relocation; disaster preparation; and conservation treatment of damaged items.

The Museum is exposed to seasonal weather impacts, including dry and dusty, or hot and humid conditions, and, from time to time, dangerous cyclonic and very wet, windy conditions, as a result of the alternating wet/dry monsoonal cycles that occur across tropical north Australia. The museum’s audiovisual collection is therefore exposed to significant environmental risks. An audit of the collection provided an opportunity to clean storage areas and re-house items, providing protection from the elements and minimising the risk of
catastrophic loss in the event of cyclone, flooding or fire. In the event of a cyclone, stored items can now be easily relocated to a secure and protected storage area.

The audit of the audiovisual collection found the majority of tapes to be in good condition, but a number were found to display dust/dirt soiling, mould and/or deterioration of tape binders (‘sticky-shed syndrome’). Many of these tapes were known to hold significant cultural content.

As these tapes were unable to be digitised in situ, they were transferred to AIATSIS in Canberra to undergo restoration. Under the supervision of senior technical manager Tom Eccles, project researcher Caden Pearson restored the tapes to a playable condition, from which they were subsequently digitised. Conservation treatment encompassed dry-cleaning, re-spooling, and baking of tapes to kill mould and reverse the symptoms of magnetic binder deterioration. The long-term storage of digitised materials will be managed by AIATSIS and backed-up on Linear Tape-Open (LTO), a non-proprietary magnetic tape data storage solution, as the primary method for long-term preservation.

Figure 7. Tom Eccles at AIATSIS (Photograph: Lyndon Ormond-Parker)
7 Digital Platform Development

Digitisation of the Museum’s audiovisual collection reflects only one aspect of the conservation strategy adopted by this project. The MNSI trial project also worked to trial community access to this heritage database, with respect to the cultural significance value of these materials and their capacity to advance community health and wellbeing. Indigenous adoption of digital technologies presents a unique opportunity in this respect (Ormond-Parker & Sloggett 2011). Lauren Ganley (2014, p.16) has noted that Indigenous Australians primarily use digital technologies for ‘entertainment and social connection’, suggesting this is a point of departure comparatively to the wider Australian population. Further, she states that:

The multimedia capability of many devices is also being widely used - both in a production and a consumption sense … the next steps rest around showing the practical side of the internet … Indigenous specific applications such as a place to keep cultural records.

It is imperative that such a digital repository be developed with long-term access and sustainability in mind. Numerous scholars (Council on Library and Information Resources 2001; National Library of Australia n.d) have referred to the perils of a ‘digital dark age’, and a need to recognise the inherent fragility of digital media formats and the ongoing risk of digital object obsolescence. A 2007 report commissioned by the UNESCO Memory of the World program and prepared with the support of the Australian Partnership for Sustainable Repositories (APSR) concluded that ‘a functioning preservation system must consider all aspects of digital repositories; Ingest, Access, Administration, Data Management, Preservation, Planning and Archival Storage, including storage media and management software’ (Bradley et al. 2007, p. 3). The report acknowledges that there is ‘no ultimate, permanent storage media, nor will there be in the foreseeable future’ (p. 3), and that ‘…the aim and emphasis in digital preservation is to build sustainable systems rather than permanent carriers’ (p.3). Barwick et al. (2009, p.391) also state:

To remain accessible, digital data requires sustainability planning, the input of consistent content and rights-management metadata at the time of digitisation and an ongoing program of maintenance including off-site mirroring, regular backup, checking of the integrity of the resources and migration to new formats when required.

In Indigenous documentation projects, this is of paramount importance. Previous projects of this nature typically have been linked to software versions, file formats and system configurations with an average lifespan of only three to five years (Bird & Simons 2003, p. 557). As such, the MNSI project built on the prior work of Linda Barwick et al. (2007) in establishing a sustainable digital repository of Murrinhpatha songs at Wadeye:
It is crucial for today’s knowledgeable elders to participate in the development of metadata in order to allow the discovery and access of these digital files according to culturally appropriate categories for community access and employing the international archival and documentation standards essential for long-term management (p.391).

The MNSI project dealt primarily with two forms of media: analogue VHS and Super-VHS magnetic tapes; and digital MiniDV tapes. The analogue material was first digitised *in situ* using a Canopus digitisation device, a store-bought, easily accessible piece of technology. Once digitised the native file saved to the local server, a proxy file for community access was created, and the video content metadata was added to the database. The most at-risk MiniDV tapes were packaged and shipped to AIATSIS to be captured.

![Digitisation Station at the Kanamkek-Yile Ngala Museum, Wadeye (Photograph: Caden Pearson).](image-url)
7.1 Internet Protocol Television (IPTV)

Identifying appropriate broadcast technology for this immensely valuable heritage collection at Wadeye was a key goal of the MSNI project. Thus, the research team designed broadcast systems utilising the National Broadband Network (NBN) and cutting edge digital broadcasting technologies as potential platforms for the sustainable storage and access of Indigenous audiovisual collections. Internet Protocol Television (IPTV) was identified as one such potential platform. IPTV is a system that utilises a broadband data network to deliver live and pre-recorded channels as well as video-on-demand (VoD) to consumers (Clarke et al. 2013). Successful examples of this form of broadcast in an Australian context include FoxtelGo and Netflix. Initial research focused on an existing in-lab proof of concept, ‘Bee-Smart IPTV’, a platform that allows content to be streamed to a television, personal computer or smartphone. Bee-Smart replicates and updates ‘remote’ video servers, situated in Wadeye, from a centralised and secure archive server based at the MNSI. Newly digitised material is thereby made automatically available. Further, the platform can utilise metadata to facilitate easy end user searching of the video archive in a culturally appropriate manner.

Early testing of the Internet speed in Wadeye, undertaken during the MNSI trial, has shown that this IPTV platform is not presently supported by the ADSL service presently available to the community. While Telstra provides 4G mobile broadband to Wadeye, it is currently very expensive. Mobile broadband services in remote Aboriginal communities exclude the majority of residents who cannot afford the high cost of access to this service for the purposes of streaming video. Accordingly, the MNSI shifted the design focus towards a locally placed, self-contained media storage and exhibition platform as an interim measure. This is discussed in section 7.2, the Raspberry Pi.

The MSNI project partnered with Philip Dutchak of the Cape York Digital Network (CYDN), to design a scalable wireless local area network (WLAN) proof-of-concept. CYDN has delivered communications and information technology solutions to remote Aboriginal communities in the Northern Territory and Cape York Peninsula for over 30 years. This WLAN has the capacity to broadcast media at predetermined locations, and within a boundary; to provide granular, controlled, culturally appropriate access to material by separate cultural groups, such as those determined by the Wadeye traditional owners.

The end user would then be able to access the audiovisual collection via television (using the Raspberry Pi), personal computers and smartphones.
7.2 Raspberry Pi

A Raspberry Pi is an open source computer developed by the Raspberry Pi Foundation in the United Kingdom for the purpose of teaching computer science and programming in schools. Given its low-cost, portability, ease of adaptability and functionality akin to a desktop computer, the Raspberry Pi has been adapted for use in a range of contexts. High numbers of units sold have generated wide community support for the device, facilitating its use in a number of high-profile applications, such as robotics and engineering (Shah 2015, p.1).

The open source nature of the system allows for flexibility of customisation to suit the needs of the user. The Raspberry Pi has been used as a computer, home media centre, and video game console. The device is entirely self-contained, running off Linux (an open source computer operating system), with media delivered via an attached SD card; and is powered by universal mini-USB cables. The device can be connected to a television or computer monitor via a HDMI cable. There is great benefit to the open source model used by the hardware and operating system. It gives the potential for full customisation to the specific needs of the Wadeye community; while avoiding issues of hardware and software obsolescence associated with commercial products. As outlined above, this is an important component in developing a sustainable repository and preservation system (Bradley et al. 2007).

‘Raspbmc’ was selected as the preferred operating system for the delivery of audio-visual material in this context. This system runs off ‘XBMC’, an open source application developed for use in entertainment, with capacity for 1080p (full high definition) video playback, and support for all popular video codecs. This platform also allows customisation of the XMBC interface to provide tailored skins, button functions and capacity for searching a video database. Ease of access was considered essential by the research team, as these

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3 The current iteration of this software is titled ‘OSMC’ (Open Source Media Centre)
technological solutions could then be adopted by community institutions with limited technological capacity. However, the initial setup requires a high level of IT expertise.

It is in this capacity that the Raspberry Pi holds an advantage as it can be operated using existing community infrastructure. The platform can be operated via a television remote control. If required, the Raspberry Pi also features external USB ports, allowing for operation via a keyboard and mouse.

In-field testing of the Raspberry Pi system was undertaken at the Wadeye Health Centre and at the Thamarrurr Aged Care Centre in November 2013. For the purposes of the trial, an SD card was prepared with a custom playlist containing local health promotion content and recently digitised material from the Kanamkek-Yile Ngala archive.

The Raspberry Pi system remains in use at the Wadeye Health Centre at the time of writing. The success of the trial demonstrates the adaptable nature of the system, allowing for the delivery of audio-visual material using existing infrastructure. In this instance the platform was displayed on a flat screen television recently installed at the centre.

The successful trial of the Raspberry Pi system confirms the potential for digital platforms to deliver audio-visual materials to the Wadeye community. New technologies are constantly arriving in the marketplace, and there need not be a limitation placed on a best practice model for access to digital media. However, the Raspberry Pi is an inexpensive, adaptable and robust device for delivering a remote Indigenous archive. Planning and collaboration with local stakeholders would maximise local use of the archive and ensure that digitised material is reusable and will transcend generations.
7.3 Local Area Network (LAN) and Network Attached Storage (NAS)

MNSI project funding enabled the establishment of a dedicated LAN and Synology® 8 Bay Scalable NAS unit as a dedicated server for the Museum’s audiovisual collection. The NAS is a networked storage and back-up unit that can flexibly stream content to multiple screened devices. Automated and remote backups from a central server provide a secure content storage solution for both the digitised and born-digital collections, otherwise at significant risk of loss if stored solely on external hard-drives. The device has the capacity to stream video content to a smartphone via a dedicated app, and is thereby considered more likely to be adopted by Wadeye youth (Featherstone 2013). Establishment of a second LAN at the Wadeye Library and Knowledge Centre, scheduled for early 2016, will also utilise this NAS model, providing an additional community access point to the collection.

![Image](image_url)

Figure 11. Mark Crocombe demonstrates the Raspberry Pi during a trial at the Thamarurr Aged Care Centre (Photograph: Caden Pearson).

Development of a delivery platform is an ongoing process. The current tasks of the research team include generation of an automated metadata-generating tool; developing integrated features to allow community access via portable devices (such as personal computers or smartphones); and customisation of the Raspberry Pi XBMC software to deliver the system interface in local languages (Peng 2013).
8 Conclusion

The MNSI pilot project has demonstrated the efficacy of new digital technologies to deliver significant and at-risk audiovisual materials to remote Aboriginal communities. The cultural significance of the audiovisual collection of the Kanamkek-Yile Ngala Museum has been identified by community members and reinforced by the audit undertaken as a part of this project. The full audit of the collection found the collection to contain over 800 VHS tapes, 600 MiniDV tapes and around 100 SVH compact tapes, in total comprising over 2,000 hours of footage.

The cultural, social, historical and linguistic information of this collection is extremely important, with footage of cultural sites, stories, language and traditions of Thamarrurr clan groups from the region recorded over a period of decades. As magnetic tapes have a limited life span, the community members fear that if the material is not digitised and transferred to other formats, it is in danger of being lost forever. The MNSI project is working to ensure the continued use and longevity of this important cultural collection.

Delivery of audiovisual material through digital technologies presents a means for the Wadeye community to access, revitalise and maintain local languages, customary law, customs and cultural heritage. An IPTV system, delivered through the broadband network, is of particular value due to its capacity to deliver content in local languages. Searching of the video archive using associated metadata will allow for granular, controlled access to culturally sensitive material by separate cultural groups. Further, this information is of broad value to researchers, with particular regard to linguistic research. It also has the potential to establish a transferable model for the digitisation and delivery of Indigenous audio-visual materials throughout Australia and internationally.

At present, the Wadeye ADSL broadband service is unable to support an IPTV platform, given the need for reliable video streaming over local Wi-Fi networks. As an interim measure, the MNSI has developed an off-line technology platform to provide access to digitised audiovisual content. Successful trials of this Raspberry-Pi device at the Thamarrurr Aged Care Clinic and the Wadeye Health Clinic have demonstrated the capacity for this platform to deliver important historical footage alongside local health promotion content. A positive outcome of the project will be the establishment of a Local Area Network at the Wadeye Library, which will allow community members to access the collection through dedicated NAS infrastructure.
9 Useful Resources

9.1 Preservation

• Caring for audiovisual materials / National Film and Sound Archive: http://www.nfsa.gov.au/preservation/care/


9.2 Digitisation


10 References


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