Innovation and experimentation to increase access to the ACMI art collection

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Abstract

ACMI works at the cutting edge of emerging technology and digital innovation to present and preserve moving image and interactive art to its audiences now and safeguarding these collections into the future. This is done by applying a unique audience-centered approach combining experience design, digital preservation, and access practices across two key teams at the museum. The cross disciplinary approach leads to better results and means the experimentation is more expansive and impactful. It means ACMI can keep pace with the artists it works with and support them in this rapidly changing environment. Through a series of case studies from emulation, AI enriched search and on premises 'reading room' access this paper will consider how these strategies could be employed more broadly across the gallery, library, archive and museum sector and hopes to inspire collaboration and discussion.

Keywords

Digital preservation, access, experience design, collections, product development, software development, museums, interactive art, moving image, user & audience research

Introduction

The Australian Centre for the Moving Image (ACMI) is Australia's national museum of film, TV, videogames, digital culture and art. Distinct in the Australian museum landscape, ACMI celebrates the moving image and its profound impact over the last 120 years as it transports, challenges and entertains people of all ages and backgrounds, right across the globe. ACMI holds a collection that encompasses art, film, television, videogames, ephemera, digital culture and social memory[1].

ACMI is recognised as a global leader in digital preservation, access and experience design practice, collaborating with multiple partners to do this important work over the past ten years. In recent decades museums have changed from primarily being storehouses for objects, to catering for increasingly diverse non-specialist audiences[2]; the opening up of collections is an important part of attracting and engaging visitors. With the pace of technological change and corresponding shifts in audience behaviours, it is critical that museums keep pace with these changes if they are to remain relevant to audiences and deliver impact in this access space.

ACMI has been able to keep up with the needs of artists in the interactive art and moving image sphere - successfully exhibiting, acquiring, preserving and reshowing their work - because of our unique approach which brings together user experience design and product development methodologies. The Experience, Digital & Insights and Collections teams at ACMI work closely to examine opportunities for advancement in discoverability and access to the collection, alongside constant consideration of what is digitally possible. Compared to other cultural collecting organisations, ACMI has a unique focus and approach. This digital thinking and doing combines business needs, technology strategy and the audience needs to prioritise what is designed and how it is designed. This is ACMI's point of difference making us leaders in this space as recognised by sector awards including MAGDA and MAPDA, and industry awards including Good Design, Idea Awards and Premier's Design Awards.

ACMI believes that for the sector to thrive more collaboration, shared infrastructure are critical. For this to be achieved, we believe the sector needs to develop a culture of experimentation, which in turn involves a cultural mindset shift.

Using a series of case studies, this paper sets out to describe ACMI's unique focus and approach to this work. In doing so, we aim to consider how this thinking and doing could be applied more broadly across the gallery, library, archive and museum sector.

ACMI Collection and Strategy

ACMI's collection is over 70 years old, developed over distinct eras since its original incarnation as the State Film Centre in 1946. Initiated as a film lending library for metropolitan and regional Melbourne, the State Film Centre

[1] https://www.acmi.net.au/about/reports-policies/collection-development-strategy/

[2] https://www.thisdaylive.com/index.php/2023/11/19/from-objects-to-audiences

collected documentary, education and State Government funded titles. Socio-political shifts and emerging technologies saw the State Film Centre merge with Film Victoria in 1996, and in this period, collecting was directed toward popular film titles in the form of magnetic media and optical disks. As early as 1986, plans for a moving image centre to expand this collection evolved and by 2001, ACMI was built as a public institution for screen culture.

ACMI's collection now contains artworks, videogames, film, TV, and moving image related artefacts and has an active commissioning program to both support and the development of and acquire Australian artworks. This has seen an increase in complex, born digital works enter the collection, and a transformation of our preservation practices. The collection and registration teams transformed from lending library practices to installing and accessioning these complicated born digital and bespoke sculptural installations. The acquisition of these works over the last twenty years has seen ACMI develop a significant time-based media collection.

With a focus on supporting innovative artistic practice and the targeted acquisition of commissioned, Australian artworks, ACMI's collection will invariably grow with ever increasingly involved works. As artists push both conceptual and technological boundaries in their work, the complexity and speed in which obsolescence occurs will also increase. These examples of artistic and technical experimentation require dedicated preservation strategies and will remain vulnerable without dedicated preservation efforts. Delamination, bit-rot, segment corruption, hardware and software obsolescence are only a handful of challenges that plague the optical disks, floppy discs and the videogame cartridges, contained on physical formats. Born digital works are perhaps even more vulnerable however, and require immediate attention, dedicated preservation skills for their management and re-display to comprehensively understand unwanted change.

Digital preservation

Taking the Digital Preservation Coalition's definition of digital preservation as a "series of managed activities necessary to ensure continued access to digital materials for as long as necessary…beyond the limits of media failure or technological and organisational change", ACMI's strategies have evolved in tandem with its collection iterations[3].

As ACMI's collection changes, so do its preservation needs. Preservation practices have had to evolve from handling physical film formats for onsite access to managing born digital files and documenting the complexities of time-based media works for long-term access and re-display. ACMI's digital preservation workflows have also evolved for the digitisation of the collection and ACMI's desire to make as much material available online as possible to our audiences.

These shifting practices require a range of new preservation skill sets and expertise. Accordingly,
ACMI has been embedding time-based media conservation practices since it began acquiring single, multi-channel and software-based artworks and officially created a dedicated, time-based media conservator role in 2019 as well as a dedicated digital preservation technician.

This work is incredibly time consuming, resource intensive and requires a broad range of knowledge and skills to understand the interconnectedness of numerous software and hardware platforms, operating together to make a work come to life. Cross-department and interdisciplinary collaboration is also essential for the long-term care of these works.

For museums to do this they must also be able to look after the technology these works are built in and on and ensure they are preserved for the future. ACMI approaches this challenge by engaging in research and collaboration via three Australian research council (ARC) grants and sharing ideas and practices through a community of practice approach. Best practice and policies are still being developed by institutions for this preservation work and a collaborative approach is beneficial.

Emulation

One preservation method ACMI has been experimenting with as part of ARC projects is emulation via the Emulation-as-a-Service (EaaSi) infrastructure, the browser-based software management tool that allows access to, and storage of, legacy computing environments[4]. Using EaaSi, ACMI has been able to open, assess and give access to a range of interactive Australian artworks and videogames from the 1980's to 2000's. This work forms part of the collaborative, Australian Research Council (ARC) projects that we have been partner to for over a decade.

The Play it Again I and Play It Again II ARCs undertaken with Flinders University, University of Melbourne, RMIT, Swinburne University, The New Zealand Film Archive, Berlin Computerspiele Museum, and the Research Trust of Victoria University of Wellington saw us create a playable history of Australasian videogames. While in the Archiving

[3] https://www.dpconline.org/digipres/what-is-digipres#:~:text=(digital%20preservation)%20refers%20to%20all,or%20technological%20and%20organisational%20change.

[4] https://labs.acmi.net.au/making-legacy-videogames-and-artworks-playable-with-eaasi-via-acmis-website-43c686dfe947; https://www.softwarepreservationnetwork.org/emulation-as-a-service-infrastructure/

Australian Media Arts ARC together with Swinburne and RMIT Universities, and AARNET, we took in Experimenta's archive of interactive work (of over 34 years) and have made CD-ROM interactives accessible. This work is also being expanded in the Australian Emulation ARC Linkage Infrastructure, Equipment and Facilities project for which ACMI is a major partner with Swinburne and RMIT Universities, AARNET, Open SLX and Yale University.

In May 2022 we made over forty Australian videogames and interactive art from the 1980s and 1990s playable via EaaSI which we embedded in ACMI's collection record, webpages. Emulation opens a variety of options for visitor engagement. So far, we have had emulation platforms running in our centerpiece exhibition, The Story of the Moving Image, at an exhibition at our partner RMIT, and on our website for visitors to the museum to access on their own devices.

Creating a separate emulation environment for each artwork or videogame is very time intensive, so we're currently working on a way to automate the process. To do this, we are developing a single base environment that can run the majority of artworks, and then dynamically load and start the artwork image in that base environment.

There are some challenges to solve around authentication with remote image repositories and adding custom scripts to run images. 25 different operating system emulators have been tested and installed.

The decade of experimenting in this space has taught the ACMI teams that we can be on the front foot with this and develop infrastructure for artists to present their work. By 'infrastructure' we mean software and policies and processes.

Gallery 5

Gallery 5 is ACMI's fifth gallery space and is online as part of our website. It explores art that reflects, celebrates and interrogates the internet and digital culture through a series of free virtual exhibitions and performances.

Being online the scale is flexible as we are not limited by physical space and the reach can be broad - regional, national, international - making it an accessible presentation mode.

The majority of Gallery 5 works are self-contained single-page web sites, so the technical requirements to run and preserve them are minimal. Works that need servers are all using open-source frameworks with the complete code to build, update, and run them included in our preservation archives. Preservation work for Gallery 5 is just as intensive as for in-building works so we need to prioritise the value and where resource goes.

AI tools

Since 2017 ACMI has been using artificial intelligence, namely machine learning tools, to increase the discoverability and access of the online video collection. Early experiments were making an experimental interface for navigating video content by tags generated by computer vision tools and using Google Video Intelligence for automated content detection of the historic videos. We also experimented with Videogrep, a tool that looks at video subtitles and selects all of the mentions of a word from them and then stitches the video back together. At this early stage, we could see the potential of these applications, but none were at a point where they could be released publicly at scale.

Lately the capabilities of Chat-GPT 3, for example, released in late 2022, have been surpassed by that of Chat-GPT 4, released less than six months later and the opportunities for access and adoption of these tools is like nothing we have experienced before. The last year has seen a huge advancement in what we have been able to imagine.

The following products are examples of where the digital preservation and experience design work integrates to deliver something delightful for audiences.

Collections explorer

The website collection explorer is for visitors who don't know what they're looking for. It uses OpenAI Embeddings to convert the words in the metadata of a collection record into numbers (also known as a vector). This allows the computers to return some similar vector numbers based on the ones we give it, which we then convert back into collection records, to show to our visitors. It's search without needing to input words.

This example is one that we could see would be possible and it was a matter of waiting for the time when the technology was advanced enough. It's important to surface these experiments early and make them public so teams internally and partners externally can see the potential and how we might collaborate to extend the work or create new applications.

One example is putting a new interface over the Embeddings database and putting it in the museum on a larger screen for visitors to browse the collection. Because we have developed this on our own infrastructure the ability to extend and repurpose it is straightforward. This is one example where digital thinking and doing moves us on from traditional exhibition project planning where everything is custom and then you start from scratch the next time.

Audio and frame search

For visitors who know exactly what they'd like to search for, we've enhanced our text-based metadata search to also include information inside the videos in our film collection.

For videos in our collection with spoken words we use OpenAI's Whisper to create automated transcriptions. These transcriptions are linked to the timecode they appear in the video, which allows visitors to search for a keywords they'd like to find, and then click through every time that word is spoken in the video.

To be able to index silent films we use BLIP-2 to automatically write a caption describing what it sees in a single frame every 100 frames of our videos. We then pass those captions and the timecode to our search index as we do for audio transcriptions so that visitors can search for a keyword and playback the video every time that keyword occurs.

These two techniques provide a comprehensive way to search inside videos in our collection.

Researcher access

Our collections team service requests from researchers to view films in our collection that have been digitised but that we don't have a license to provide publicly on our website. Until the new solution was implemented this was hugely time consuming, involving multiple systems, manual steps and back and forth with researchers over email or phone.

Rather than manually uploading those digitised videos to our Vimeo or YouTube accounts with an individual password for access, we've created an automated one-click process which allows our collections team to provide time-limited access via our website using a Researcher Lens. By using this on premises 'reading room' model we mitigate copyright risk of uploading media to third party platforms that concerns many collecting organisations.

Similar to our ACMI Lens which visitors use to collect works in our galleries to take home with them, the Research Lens holds works requested for remote access. Once our collections team approves the request this gives automated access to digitised versions of our film holdings online. After the limited time expires the work metadata remains on the Researcher's Lens for reference, but access to the video is removed automatically.

This has improved workflows and made efficiencies meaning staff can do more meaningful work and the ease and visibility it has brought to the collection has meant an increase in engagement with the collection.

Conclusion

In summary the collaboration between the Experience, Digital & Insights and Collections teams has brought huge value to the organisation and had an impact on the sector more broadly and supported artists working in a volitile and fact-paced environment.

We have made the video and interactive art collection more discoverable and accessible and demonstrated what is possible with combining efforts and collaborating with external partners. We have shown what can be done in a relatively short time when you have your own infrastructure and can experiment and iterate with constantly changing, emerging technologies. With an audience-centered approach to what is done and how, we are prioritising high impact work and making it public so it gets immediate use, feedback and validation.

The next stage is collaboration and partnerships between institutions to further leverage this work and solve more problems and imagine new opportunities, together.

One possible avenue that we have been exploring with a state library is processing their video collections using our computer vision tools for a fee. It saves them developing the same tools with public money and creates a revenue stream for ACMI. Another example is the partnership ACMI has with the Deutsches Film Institute and Museum in Frankfurt where we have built them a version of our infrastructure customised for their data and storytelling needs to co-design an online and in-gallery experience built on it.

Our intention in sharing these outcomes is to invite collaboration and discussion. Our hope is that participants of the ISEA conference will think this work is innovative and critical and be inspired to consider how this approach might be introduced in their process and practice.

Author(s) Biography(ies)

The title "Author(s) Biography(ies)" should be 12 point, bold style**,** centered**.** Using 9 point, regular type, biographies should be no longer than 150-word count.

Lucie Paterson

Lucie is at the forefront of change and innovation in the museum field. With fourteen years of experience at leading cultural organisations, including Te Papa in New Zealand, Southbank Centre in London and now as Head of Experience, Digital & Insights at ACMI in Melbourne, Lucie's work shapes the exhibitions and experiences that will lead our sector into the future. Her work has won Australian (AMAGA) and international awards (GLAMi), and digital products made under Lucie's guidance have been adopted around the world in the UK, South America and New Zealand. Lucie is on the National Digital Forum NZ board and presents at conferences in Australia and overseas and writes regularly about museum process changes and practices online.

Candice Cranmer

Candice is ACMI's first Time-based and has many years of experience in collections care and digital preservation. She has a keen interest in the preservation of contemporary art and is the co-convener of Electron, the Time-based and Variable Media special interest group of the Australian Institute for the Conservation of Cultural Materials (AICCM). She has also presented and published conservation based articles on both national and international platforms.

Simon Loffler

Simon Loffler is a creative technologist at ACMI. He was a founding member of MOD. and Hackerspace in Adelaide