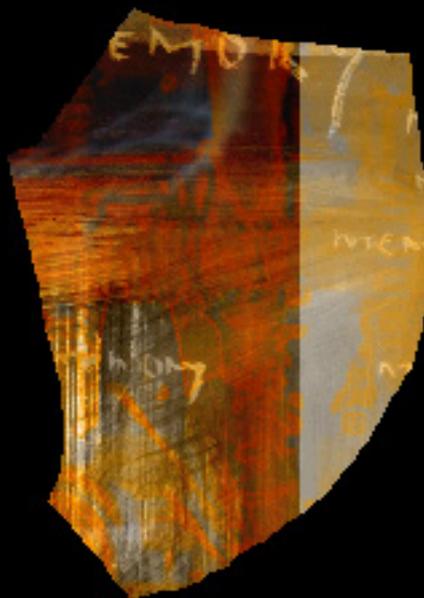


Collecting,
Curating, Preserving,
and Researching
Media Arts:
A good practice report

Melanie Swalwell, Helen Stuckey, Cynde Moya, Denise de Vries



all I
can
remember ...

Acknowledgments

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Melanie Swalwell, Helen Stuckey, Cynde Moya, Denise de Vries

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Project partners



Cover Images:

Stills from Norie Neumark, “Shock in the Ear” (1998),
Interactive CD-ROM. (images: Maria Miranda; music:Richard Vella).
Screenshots of work emulated in EaaSI running Sheepshaver.



Contents

5 Executive Summary

6 Chapter 1 Aims, Case Studies, and Methods

- 1.1 Aims
- 1.2 Case Studies
- 1.3 Methods
 - 1.3.1 Preservation
 - 1.3.2 Interviewing Artists

12 Chapter 2 Collecting

- 2.1 Disks are at risk
 - 2.1.1 *The Collections, by numbers*
 - 2.1.2 *Artists' Own Archives*
- 2.2 The Different Collections and Archives
 - 2.2.1 *Ostoja-Kotkowski archive*
 - 2.2.2 *ANAT, dLux, Experimenta*
 - 2.2.3 *Griffith University Art Museum*
- 2.3 Permissions
 - 2.3.1 *Deeds and Rights*
 - 2.3.2 *Permissions Proforma*
 - 2.3.3 *Proforma Use, Exceptions and Adaptations*

19 Chapter 3 Preserving

- 3.1 Imaging Disks
- 3.2 Emulation
- 3.3 Digital Asset Management
- 3.4 Configuring Environments and Rendering

26 Chapter 4 Curating and Exhibiting

- 4.1 The Role of Exhibition
- 4.2 Authenticity
- 4.3 Exhibition Outcomes
 - 4.3.1 *Restaging Artworks*
 - 4.3.2 *Art Gallery of New South Wales – Burning the Interface*
 - 4.3.3 *Griffith University Art Museum*
 - 4.3.4 *ACMI*
- 4.4 Online CD-ROM Exhibition
- 4.5 Showcasing Scenes
- 4.6 Reimagining
 - 4.6.1 *Matrix Re-Loaded*
 - 4.6.2 *Robin Fox / Stanislaus Ostoja-Kotkowski Archive*
 - 4.6.3 *Irene Proebsting and Barry Brown*
- 4.7 Virtual loans and Exhibition Infrastructure
- 4.8 Remote Research Access

38 Chapter 5 Researching Media Arts

- 5.1 Surveying Media Arts in Australian Collections
- 5.2 The "Media Arts in Australian Collections" Database
- 5.3 Observations on Database Entries
- 5.4 Processing the ANAT Archive
 - 5.4.1 *ANAT Disks*
 - 5.4.2 *Permissions*
- 5.5 EaaS's Benefits to Researchers

List of Figures

Figure 1 Michael Buckley and Melanie Swalwell, Interview, Digital Heritage Lab, Swinburne University, December 2022.

Figure 2 John Colette responding to the emulation of "30 Words for the City" (1995) in EaaS during zoom interview with Helen Stuckey and Melanie Swalwell, March 2022.

Figure 3 Don't Shoot the Messenger demonstrating their technique in the Black Magic Design Media Preservation Lab, ACMI. Courtesy ACMI.

Figure 4 Troy Innocent, "Soundform" (1998). Screenshot of work emulated in EaaS.

Figure 5 Screenshot of Linda Dement's "Cyberflesh Girlmonster" (1996) emulated in EaaS showing incorrect graphics and colours.

Figure 6 Screenshot of Linda Dement's "Cyberflesh Girlmonster" (1996) emulated in EaaS showing incorrect graphics and colours.

Figure 7 Screenshot of Linda Dement, "Cyberflesh Girlmonster" (1996) running on original hardware showing correct colour of the text (white).

Figure 8 One of Don't Shoot the Messenger's 'hacked' Amiga 400 computers installed at the Blackmagic Design Media Preservation Lab, Courtesy ACMI.

Figure 9 Martine Corompt, "Sorry" (1995) Amiga computer installation. Courtesy of the artist.

Figure 10 Martine Corompt, "Sorry" (1995) Sketch for Amiga computer installation. Courtesy of the artist.

Figure 11 Martine Corompt, "Cute Machine" (1997) CD-ROM. Screenshot.

Figure 12 Martine Corompt, "Cute Machine" (1997) Macintosh computer installation. Courtesy of the artist.

Figure 13 Martine Corompt, "Activity Station" (1995) Macintosh computer installation. Courtesy of the artist.

Figure 14 Linda Dement "Cyberflesh Girlmonster" (1996) in *Matrix Re-Loaded*, 2023. Courtesy of Xanthe Dobbie.

Figure 15 VNS Matrix "All New Gen" (1992-93) in *Matrix Re-Loaded*, 2023. Courtesy of Xanthe Dobbie.

Figure 16 Xanthe Dobbie, "The future is now, but for how long?", *Matrix Re-Loaded* (2023). Installation view. Courtesy of Xanthe Dobbie.

Figure 17 Xanthe Dobbie, "Cyberfeminism Readings Workshop", *Matrix Re-Loaded* (2023). Installation view. Courtesy of Xanthe Dobbie.

Figure 18 Six stills illustrating text and images reconstructed by Barry Brown & Irene Proebsting as *Industrial Vesper #11* (reconstructed), (2023), HD Video.

Figure 19 Setting up EaaS hosted Beam Software, "Mugsy's Revenge" (1985), *Radical Utopia*, RMIT Gallery, 2023. Courtesy of Helen Stuckey.

Figure 20 Relational modelling for the "Media Arts in Australian Collections" database.

List of Tables

Table 1 Media Carrier by Number and Type in each Case Study.

Table 2 Fields developed for the "Media Arts in Australian Collections" database.



When I studied conservation in the 1990s, then the frequent thing was “works on paper – they’re so fragile”.

Now we know that paper has got few problems when you think of it in comparison with digital media, which is so in need of care and people who know how to look after it.

As a person looking after an art collection at the Gallery, so many of the problems associated with the care of paintings, paper, sculptures... the majority of the issues have been solved... But digital media is a new frontier... Being a part of a project like this, to have the opportunity to work with amazing other collecting organisations and with all the different partners on this project, to really figure out how... we are going to do this has been great. The work we’re doing here to figure out how to look after things and how to store them and keep them available to access for future generations in the same way that we keep paintings and sculptures and works on paper in museums... this is so important... it’s a new frontier that we’re all part of.

This is just the beginning in many ways.

This project is a fantastic start but there’s lots more work to do to build on this, so we don’t lose the media heritage of the late twentieth century and the twenty-first century for future generations.

Carolyn Murphy
Head of Conservation,
Art Gallery of New South Wales



Executive Summary

This report details progress to date on the “Archiving Australian Media Arts: Towards a method and a national collection” ARC Linkage Project. The project sought to develop a good practice method for preserving and emulating historic digital media artworks from a diverse range of case studies drawn from exhibitions and the media art collections that have been developing across the Australian cultural institutions partnering this project. These include: dLux MediaArts, Experimenta Media Art, ANAT, ACMI, the Art Gallery of New South Wales, the State Library of South Australia, and Griffith University Art Museum.

This document reports on what the project team did and how we went about the work of: locating artworks (1.3.1, 2.2); recovering content from obsolete media carriers (3.1); emulating this content (3.2-3.4); and considering questions of curation and exhibition (4). The effort to develop a good practice method to preserve media artworks has been arrived at in conjunction with cultural institutional partners which bridge the diverse cultures, norms and protocols of galleries, libraries, moving image museums, university collections and researchers.

Key outcomes to date include: the acquisition of media art organisation archives into cultural institutions (1.2, 2.1, 5.4); stabilising a large number of disks and artworks from the collections and archives addressed; the emulation of all 32 of the artworks that required emulation; a research protocol that entails sharing access to emulated works with artists in the course of an interview (1.3.2), and seeking their permission for various preservation and research uses going forward (2.3); exhibition outcomes (4.3-4.6); and a database detailing media arts holdings across public collecting institutions nationally (5.3).

The preservation of significant digital heritage artefacts in this project demonstrates the considerable power of research-GLAM consortia in digital preservation. The successes have been made possible by a combination of funding and multi-directional knowledge transfer: from the academy to GLAM professionals; from GLAM partner expertise to university researchers; and the equally generous sharing of knowledge between discrete organisational teams.

The collaborative approach and buy-in from stakeholders has built a nascent community with the confidence to tackle the particular challenges that are entailed in collecting, stabilising and emulating complex digital artefacts. No one institution is undertaking this work in isolation; rather, they are part of a national digital preservation ecosystem, supported by a core research team with high level specialist skills.

Preamble

This report is an outcome of the 'Archiving Australian Media Arts: Towards a method and a national collection' (AAMA) research project.

This report is intended for an audience of researchers and staff in cultural organisations, whether large or small, that may or may not already have digital collections and may be considering emulation as a way to activate their collections. While the subject matter is digital media art, the techniques we detail are also relevant to dealing with other types of complex digital artefacts found in institutions that do not collect art, such as university archives and various industries.

The researchers on this project come from a range of disciplines, and have a mix of backgrounds, some technical and some non-technical. We have attempted to make the report as accessible as possible by explaining terms that might be unfamiliar and including a glossary.

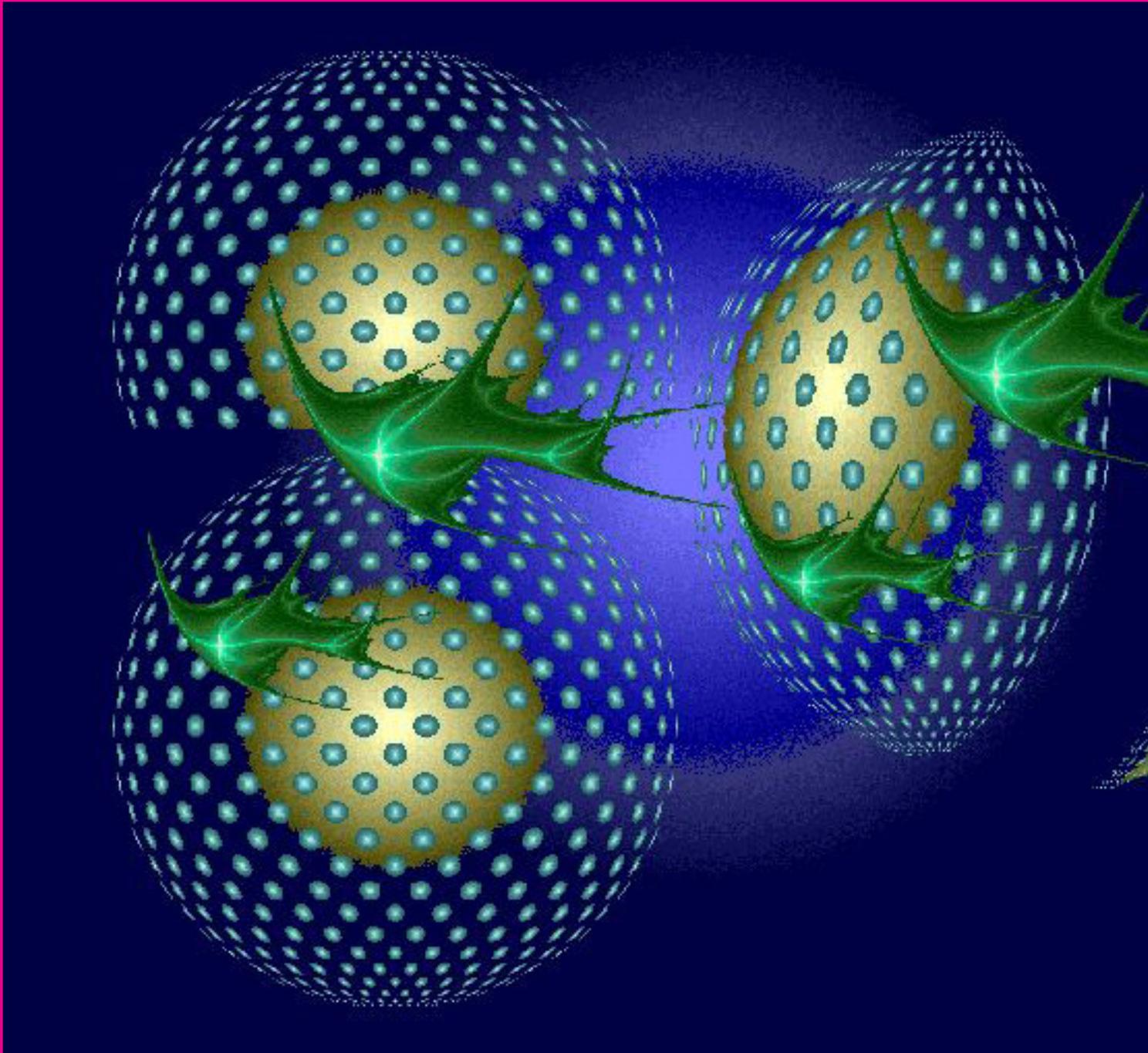
The professionals we collaborated with on this project come from across the GLAM sector, including a major state-run art gallery, a state-run moving image museum, a state library, and a university art gallery. Our collaborators from these diverse professional contexts hold titles of librarians, archivists, conservators, time-based media conservators, and digital preservation specialists. This cross-sectoral and cross-professional team is a strength, we believe, as our project has not been rooted in any one orthodoxy or use model (Swalwell et al. 2022).

Report Structure

- » The report is structured into 5 chapters:
- » This preamble with an Executive Summary;
- » Chapter 1 introduces the AAMA project's aims, the case studies we have been working with, and gives a brief explanation of our methods.
- » A chapter on Collecting Historic Media Arts
- » A chapter on Preserving Historic Media Arts
- » A chapter on Curating and Exhibiting Historic Media Arts
- » Finally, a chapter on Researching Historic Media Arts
- » The Endmatter comprises a Glossary, a Reference List and Appendices.

Chapter 1

Aims, Case Studies, and Methods



Stanisław Ostojka-Kotkowski, "Lyapunov-d" (detail), 1992. Digital graphic produced in Acorn Archimedes application software. Courtesy of the State Library of South Australia. PRG 919/107/599/



1.1 Aims

The AAMA project has three aims:

1. To develop a best practice method for stabilising the artworks from selected case studies in the archives of the three Australian media arts organisations and related institutional collections that we partner with on this project;
2. To provide emulated access to the artworks to researchers in reading rooms, and evaluate their use;
3. To investigate the contemporary exhibition and re-display of historical media artworks, including but not limited to restaging the artwork.

1.2 Case Studies

The project adopted a case study approach to provide depth and focus to our research as we aim to develop a “good practice” method for stabilising artworks and providing emulated access for researchers in reading rooms. We have opted to use the phrase “good practice” despite one of our aims referring to “best practice” in recognition that best practices often evolve over time.

The main case studies are comprised of collections from across the four collecting institutions: dLux MediaArts (dLux), Experimenta Media Art (Experimenta), ANAT, Griffith University Art Museum (GUAM).

Several community-based, often artist-run organisations were pioneers of the media arts scene in Australia: dLux, Experimenta, the Australian Network for Art and Technology (ANAT), and Griffith Artworks. Sydney was home to the Sydney Super 8 Group, which became Sydney Intermedia Network, then dLux; Melbourne had Modern Image Makers Association, which became Experimenta; Adelaide-based ANAT ran nationwide programs. In Queensland, the Film and Drama Centre’s artist residency program supported the development of many innovative video art works that were subsequently acquired for the collection. The Centre evolved to be Griffith Artworks and is now the GUAM. Whilst these organisations have undergone changes of name, their archives present a remarkably coherent picture of the development of media arts in Australia. As archivist Louise Curham observed in her dLux “Significance Assessment”, taken together, the

archives of ANAT, Experimenta, and dLux constitute an invaluable and extremely rich record (Curham 2015). These organisational archives – containing various artists’ materials, ephemera, and artworks – offer insights into the practice of artists working with a range of technologies from the 1980s through to the present day.

A distributed national collection of media arts archives is crystallising with cultural institutions recently accepting stewardship of these archives, but the artworks have remained at risk.

The dLux archive was acquired by the Art Gallery of New South Wales (AGNSW) in 2023, Experimenta’s media collection was deposited with ACMI in 2020 (not yet formally acquired but being processed), and the ANAT archive was acquired by the State Library of South Australia (SLSA) in 2014.

In addition to the archives of these media art organisations, SLSA has long collected the papers of important South Australians and holds the archive of the significant Polish-Australian artist, Stanislaus Ostoja-Kotkowski. GUAM is custodian of Queensland’s second largest public art collection, which includes a collection of 1990s CD-ROM art.

We selected a case study from each of the collections, spanning the period 1991–97. We sought to target case studies with digital artefacts that were likely to need emulating, so single channel works from the exhibition case studies were excluded. Partner organisations already have established preservation workflows for these. In chronological order, the case studies are:

- » Ostoja-Kotkowski’s computer-generated images (CGI) from 1991–93 (SLSA). Ostoja-Kotkowski used an Acorn Archimedes computer to create a series of CGI works including his Mandelbrot images and a series of analogue photographic landscapes with CGI. This is a sizable collection, numbering 940 floppy disks.
- » Experimenta’s *Virtualities* (1995) exhibition, curated by Peter Morse and held at Scienceworks in Melbourne, featured 10 interactive works by 11 artists: John Colette, Moira Corby, Martine Corompt, Don’t Shoot the Messenger (Steve Middleton & Attilio Gangemi), Ian Haig, Peter Hennessey, Felix Hude, Patricia Piccinini, and Irene Proebsting & Barry Brown (Morse, 1995).

- » *Matinaze 97* (1997) was the first time that dLux's regular film and video screening program included an exhibition of interactive CD-ROMs: "This year, the 'grammar' of experimental film will be complemented by the 'language of interactivity'" (Sydney Intermedia Network 1997). Eleven works by 10 artists were exhibited in the AGNSW's Domain Theatre foyer: Peter Charuk, Bronwyn Coupe, Ross Franks, Megan Heyward, Janet Merewether, Norie Neumark and Maria Miranda, Sol Pandiella-McLeod, Sally Pryor, and Lloyd Sharp.
- » GUAM's CD-ROM collection comprises 18 artworks created from 1994-97 by 16 artists: Di Ball, Paul Brown, Michael Buckley, Peter Charuk, Martine Corompt, Linda Dement, Dorian Dowse, Nola Farman, Lucy Francis, Megan Heyward, Felix Hude, Merlin Integrated Media (Jeffrey Cook, Sam de Silva, Gary Zebington), and Brad Miller & Mckenzie Wark.

The SLSA Digital Preservation staff managed the disk imaging of and automated extraction from the Ostoja-Kotkowski floppy disks, meaning that the research project team mainly focused on the remaining three case studies.

The final number of artworks that we attempted to emulate was 32. Contact was attempted with all the artists in the three case studies and was successful apart from Patricia Piccinini and Peter Hennessey. Several artworks from the exhibition case studies were either: not able to be obtained (Lloyd Sharp's "invert"); Ian Haig's "AstroTurf" (1995) and Moira Corby's "My Memory Your Past" (1994)) were excluded because they were video works that did not require emulation; or were live mixed performance (Don't Shoot the Messenger's "Fractil and Middlebrot"). This meant we attempted to emulate a total of 10 artworks shown in *Matinaze 97*, 5 artworks exhibited in *Virtualities*, and 18 works from GUAM's collection. This gave a total of 30 artworks, because three artworks appeared in an exhibition case study and were also in the GUAM collection (Megan Heyward's, "I Am A Singer" (1997), Peter Charuk's "Men's Work" (1996), and Felix Hude's "Haiku Dada" (1993)). Two further artworks were added following interviews with the artists – Linda Dement's "In My Gash" (1999) was acquired by GUAM for their CD-ROM collection and Michael Buckley provided a copy of "The Swear Club" (1998) for the research project. This brings the final number of artworks addressed by this project to 32. Please refer to Appendix 1 for the full dataset of works studied.

The ANAT archive comprised a further case study. This collection was donated by ANAT to the SLSA in 2014. We discuss the work that has been undertaken to make this archive accessible to researchers in Chapter 5.

1.3 Methods

As the prior section makes clear, the AAMA project is comprehensive and comprises multiple 'strands' that typically cross disciplinary fields, and domains of expertise (and institutions). Each of these 'strands' is addressed by relevant methods.

In this chapter, we give a brief explanation of what we did in the *Preservation* and the *Interviewing of artists* parts of the project. Methodology is also discussed in greater detail in each of the subsequent chapters.

We employed two main approaches: a 'technical' approach to preservation and an interview-based humanities approach drawing on semi-structured interviews. Combined, these methods lay the groundwork for both the writing of history and preservation of complex digital artefacts, and often there are insights from one that inform the other.

1.3.1 Preservation

Preservation required a range of methods for the imaging of disk media, the emulation of artworks, and the comparison of artworks running in emulation and on original hardware. These are discussed in greater detail in Chapter 3, below.

We used a combination of approaches to image disks from the various case studies. Disk imaging either happened at the Digital Heritage Lab at Swinburne University, or on the premises of partner organisations, depending on equipment, internal resourcing, and the desire of staff to learn skills in disk imaging. We also had to adapt our approaches during the early period of the project when long lockdowns due to the Covid-19 pandemic affected the capacity of staff to travel to the Lab or meet face-to-face for training.

Denise de Vries ran a 'Disk Imaging Residency' in December 2019 for staff from all Partner Organisations to attend. Following attendance at this, staff at GUAM imaged the disks in their collection, with troubleshooting support available as needed.

The Ostoja-Kotkowski disks were handled by Digital Preservation staff at the SLSA. They developed an automated process for exporting .png files from the 940 floppy disks, which has been detailed in Taryn Ellis' iPres conference paper (Ellis 2023).

Locating some of the artworks from the *Virtualities* and *Matinaze 97* exhibition case studies was much more challenging. They were not always with the Experimenta and dLux archives, meaning that we needed to approach artists directly to ask if they had a copy of the artwork and whether they would lend it for the project. Locating artists was in some cases a lengthy process as not all were still practising as artists, were living overseas or travelling. Once contacted, our invitation to participate could precipitate a willing search through cupboards and attics to find original disks or copies.

Once disks were obtained, they were imaged, and metadata and technical notes were recorded. Once imaged, we offered artists a copy of the disk image/s for their own archive.

Legacy environments were built for the artworks from the *Virtualities* and *Matinaze 97* exhibitions and the Griffith collection in Emulation as a Service (EaaS) and/or Emulation as a Service Infrastructure (EaaSI).

As well as emulating the artworks in legacy environments, they were also run on original hardware. By running artworks on original hardware, insights were often gained about how an artwork was supposed to perform, or what might be causing it to not perform as expected. We are in the course of creating video documentation of each artwork running on original hardware and in EaaSI. This will provide a comparison for the works when emulated, and a guide to how works *should* function when the technology is working correctly.

1.3.2 Interviewing Artists

Ethics clearance was sought for a research protocol that centred around conducting interviews with artists. An artist interview schedule was developed, with input from the full team. Ethics approval was obtained from the Swinburne University Human Research Ethics Committee.

The artists who created the 32 distinct artworks addressed by the project were contacted with an explanatory statement and consent form. 34 artists replied and agreed to participate in the project. A total of 26 interviews were organised; some artworks were collaborations, so these were conducted jointly. At the time of writing, 21 interviews have been completed, including the conservation interview and demo with artistic duo, Don't Shoot the Messenger.

Whilst it was anticipated these interviews would occur earlier in the project, finalising interviews was impacted by limitations on interstate travel as well as considerations of health risks with face-to-face interviews during the Covid-19 pandemic and its associated lockdowns. Interviews began in March 2022 focusing on artists living overseas where Zoom would need to be used regardless of these limitations and involved setting up environments on EaaSI so that they could view their work in emulation through a browser. Interviews continued throughout 2022 and 2023 according to artists' availability and when travel was possible for face-to-face interviews.



Figure 1
Michael Buckley and Melanie Swalwell, Interview,
Digital Heritage Lab, Swinburne University, December 2022.

The scheduling of the interview depended upon the successful preservation and emulation of the media. In some cases, testing and problem-solving was time-intensive – and there remains at this stage one SyQuest work that has only recently been emulated.

Most interviews were conducted by Melanie Swalwell and Helen Stuckey, with three interviews undertaken by Angela Goddard, director of GUAM, with artists with works in GUAM's CD-ROM collection. Most interviews were conducted in person and were video-recorded, with a few recorded online due to the difficulty of arranging to meet in person. One artist was too ill to participate and preferred to supply written responses to the questions to supplement their collaborator's in person interview. In another case, an artist declined to be interviewed and supplied copies of written papers they'd given about the artwork instead.

While conservation interviews are an important method used by some of our partner organisations, our interviews were primarily focused on social and cultural history. As such, questions probed artists' personal biographies with technology, their intent, influences, and reflections on their artworks' historical significance as well as the making of artworks, tools used and reasons for their selection, and their responses to seeing their work emulated. The interview questions are available at <https://aama.net.au/wp-content/uploads/2023/11/AAMA-sample-interview-questions.pdf>

The exception here was the artistic duo Don't Shoot the Messenger, who brought their vintage equipment into ACMI and demonstrated their technique in real time. Partner Investigator Candice Cranmer recorded a conservation interview with the artists, discussing their preferences for particular technologies and their intent in creating the work.

We are aware that we are creating important primary source documents with these artist interviews. As such, we requested permission from informants to lodge the video and/or audio recordings of interviews and transcripts with our partner organisations for long term archiving after the project's conclusion. This will ensure these primary source documents are available to future researchers, curators, and conservators.

The research protocol included several other components that complemented the interview itself. After asking artists several questions about their backgrounds and how they came to make the work we were discussing, we would show them the work

running in emulation, and ask for their impressions. We also prepared a permissions proforma in which we asked artists (from the *Virtualities*, *Matinaze 97* and Griffith collections) to indicate their consent or non-consent to lodging a copy of the work (where it had not already been acquired) with the institution that had collected the relevant archive, to allow for format shifting and emulation of the work, and to consent or not to a number of potential future uses of the artwork. This was intended not only to give artists control over how their work is used, reused, viewed, etc but also to simplify the process for future researchers who might wish to include a screenshot of an artwork in a publication, for instance. See Section 2.3.2 in the Collecting chapter for a more in depth discussion of the permissions proforma.

Finally, inspired by Rieger *et al's* practice of inviting artists to author a statement about how emulation might change their artwork (2015), the research protocol included a similar invitation to the artists who were interviewed. Interestingly, rather than reflect on emulation, many artists used the opportunity to reflect on the work they'd made several decades ago from a contemporary standpoint.

All of the artists provided a statement with their permissions proforma (except for Linda Dement for two of her works at GUAM). Whilst the intention was to provide artists with the opportunity to speak to the emulation of their artwork, the majority of statements followed typical conventions: describing the work and speaking to the intentions of the artist/s at the time of creating it. Some artists also provided a biography and included technical specifications. Megan Heyward, for example, describes "I am a Singer" as "an interactive, non-linear narrative which sought to explore the potentials for narrative storytelling within the emerging digital interactive formats of the 1990s". Other statements did involve some reflection on the historical context for the works. Of "Hack", Ian Haig said: "There was a lot of buzz around the idea of interactivity in the early-mid 1990s in Australia. Hack was my attempt at exploring and critiquing the idea of interactivity in a sense". Norie Neumark's approach was to retrospectively review her intentions with "Shock in the Ear": "So, looking back at a time when CD-ROM art was at an early stage, one of the crucial questions was how to retrain the ear and the hand in the computer era in the way that cinema retrained the eye in early modernist era –to answer the need thrown up by computer culture to undo the already moribund habits of hand/eye/ear control".

Felix Hude also 'looked back': "It was chaos, it was beauty, and it was fun! I'd go back there in a flash". Sally Pryor used a more structured approach using a set of question to prompt her reflections. "Is "Postcard From Tunis" orientalist?" She responded by noting that "I'm proud of Postcard but this question haunts me. I was a lot more naive when I made the work, and when I began to talk about it".

The only instance where artists spoke specifically to emulation and its impact was in the case of "Industrial Vesper #11" (1995), a work from the *Virtualities* case study. The original work could not be emulated in its entirety. However, images used in the work were recovered from the imaged disks and the artists then reconstructed what they "thought would be lost forever, (but) was now resurrected" as "Industrial Vesper #11 (Reconstructed), (2023)".

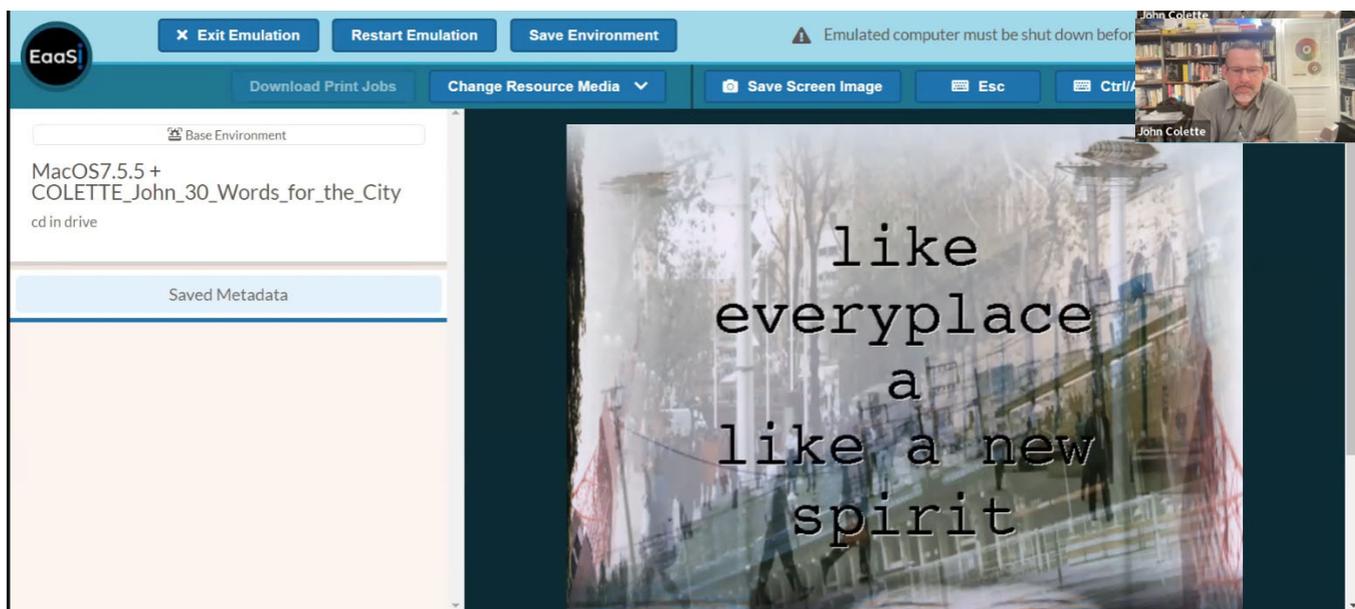


Figure 2 John Colette responding to the emulation of "30 Words for the City" (1995) in EaaS during zoom interview with Helen Stuckey and Melanie Swalwell, March 2022.

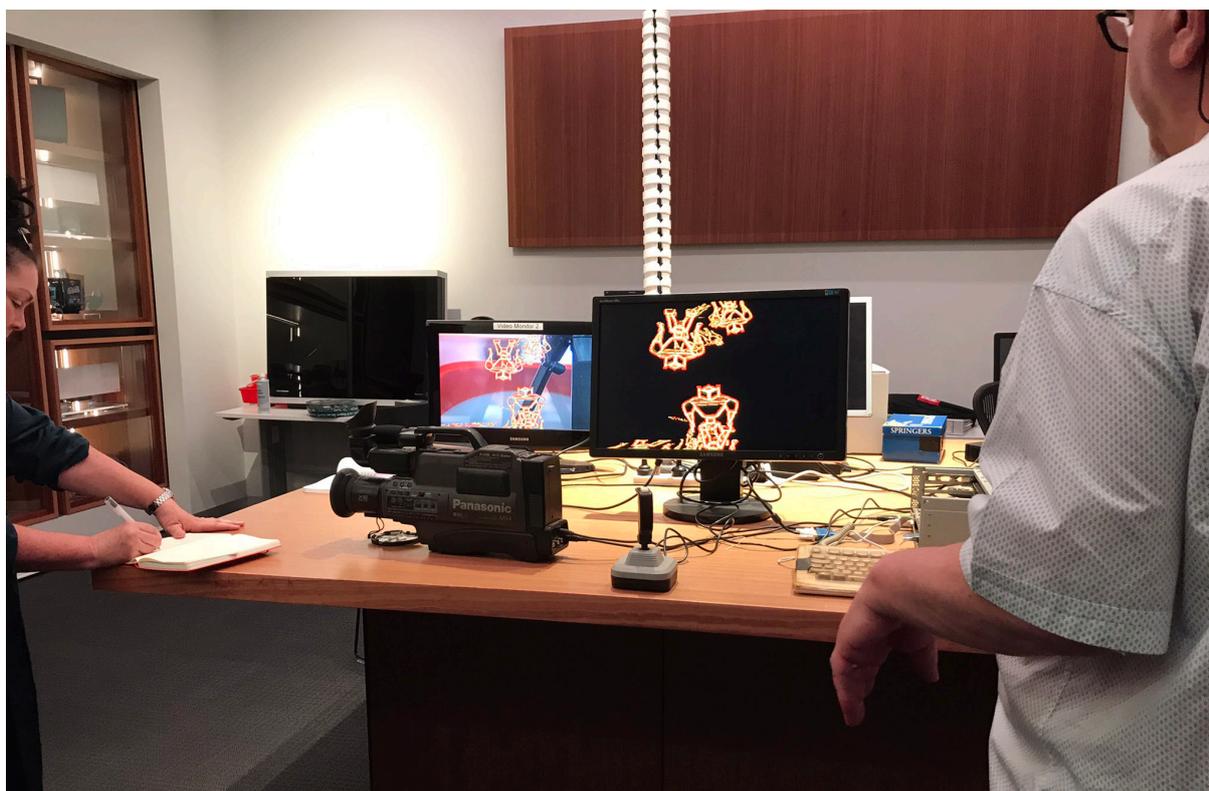
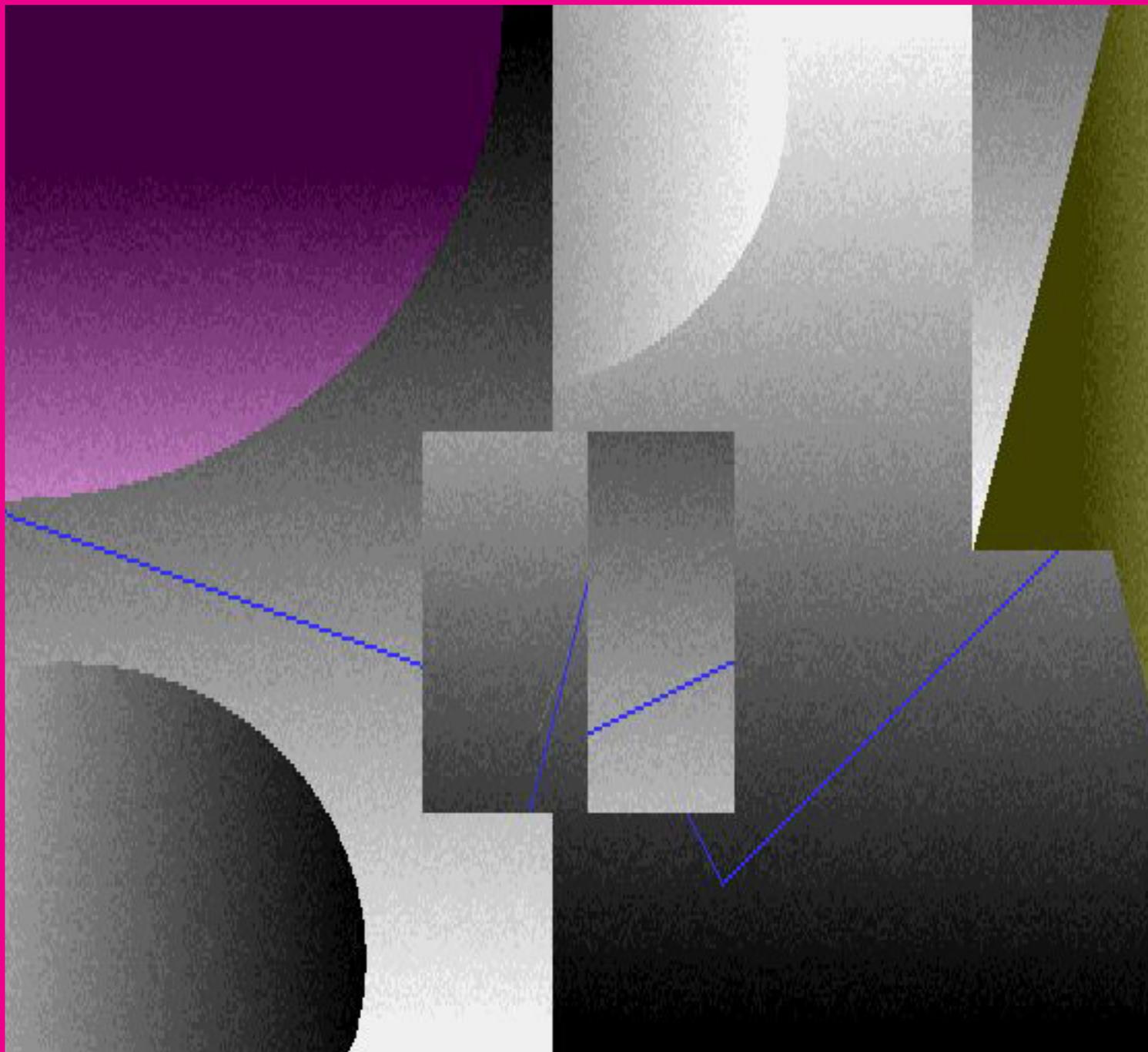


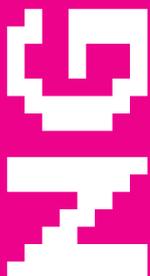
Figure 3 Don't Shoot the Messenger demonstrating their technique in the Black Magic Design Media Preservation Lab, ACMI. Courtesy ACMI.

Chapter 2

Collecting



Stanisław Ostoja-Kotkowski, "BAUHAUS2" (detail), 1992. Digital graphic produced in Acorn Archimedes application software. Courtesy of the State Library of South Australia. PRG 919/107/135/



Australian artists were significant contributors to the development of media arts internationally, yet only a relatively small portion of their work has to date made it into institutional collections.

Griffith University was one of the earliest collectors of video and multimedia works of art in Australia. While Griffith's early collecting is significant, at the time of starting this project the collection held 18 artworks on CD-ROM, so the numbers are still relatively small.

The lack of collections is not unique to Australia but is an international problem, as Christiane Paul has explained: few media artworks have been collected by Art Museums in part because the preservation of works that contain variable media elements is perceived to be outside the understanding of a traditional twentieth-century museum and as such too difficult (Paul 2015). This is a 'Catch 22', as artwork that is not collected is typically not preserved, nor exhibited: writing of video art, Buttrose noted in 2017 that, "little is seen...in the Australian art collection displays in our state and national galleries" (Buttrose 2017). While the collecting of digital artworks is increasing, there is work to do to ensure the development and implementation of appropriate preservation and display systems.

In 2018, with institutions working to collect several important media arts archives, we saw an opportunity to advance knowledge and practice in the preservation of media artworks. Over the past five to ten years, a distributed national collection had been developing, with the acquisition of the ANAT archive by SLSA (2014), the Experimenta media archive by ACMI (in process),¹ the dLux archive by AGNSW (2023), and the Griffith Artworks collection of GUAM. Whilst these organisations have undergone changes of name, their archives present a remarkably coherent picture of the development of media arts in Australia.

In particular, the ANAT, dLux and Experimenta archives are organisational archives containing various artists' materials, ephemera, and artworks. They offer insights into the practice of artists working with a range of technologies from the 1980s through to the present day, documenting the culture of the times and the making and exhibiting of media art during a 40 plus year period in Australia.

2.1 Disks are at risk

Preserving the legacy of these media arts organisations is urgent. These media are unstable, and the artists involved with them are getting older. Media arts collections are at risk with "consensus among audiovisual archives internationally that we

will not be able to support large-scale digitisation of magnetic media in the very near future. Tape that is not digitised by 2025 will in most cases be lost forever" (NFSA 2017). Born digital components bring special preservation and access challenges: videotape degrades, magnetic computer disks suffer bit rot, computer hardware quickly becomes obsolete, and software dependencies present special access challenges. The artworks are on obsolete media (floppy, Zip, optical, and SyQuest disks) and rely on obsolete operating systems and hardware. Our previous research has found imaging success rates for private collections varied dramatically from those stored in climate controlled conditions (61% vs 94%), highlighting the perils that legacy collections with non-optimal storage histories face (De Vries and Swalwell 2016). Even optical media are failing at an alarming rate: one Stanford study only had an 8% success rate with CD-ROMs (Wilsey et al. 2013).

2.1.1 The Collections, by numbers

Table 1 shows the number and type of each media carrier we worked with from the case studies. While we set out to image and emulate the 33 distinct artworks in the various case studies, we have in fact exceeded these goals. By the end of the project, all the disks in the ANAT archive and a substantial portion of the Experimenta and dLux archives should be imaged. Additionally, we have also cleared permissions for many of the materials in the ANAT artists' files, in conjunction with the SLSA.

These extra achievements were possible due to a combination of internships, extra funding being received (notably from the ARC LIEF project "The Australian Emulation Network", which funded the imaging and digitisation of a substantial portion of the remaining Experimenta disk and moving image archive; the LIEF project also provided an opportunity to image the exhibition archive "Burning the Interface", acquired by AGNSW in 2020), and the re-deployment of funds. Our initial plan to have a consultant archivist travel and audit the various collections was not able to be executed when the Covid-19 pandemic closed interstate borders. We used these funds to undertake the clearance of permissions for the ANAT archive.

2.1.2 Artists' Own Archives

Artists' needs are also great. Many artists have lost the ability to access their own artworks and few have the skills and equipment to comprehensively self-archive.

¹ ACMI is in the process of acquiring the Experimenta media collection; the State Library of Victoria has taken the Experimenta 'papers'.

Table 1 Media Carrier by Number and Type in each Case Study

Griffith University Art Museum	»	18 CD-ROMs
Matinaze 97 exhibition by dLux MediaArts (AGNSW)	»	9 CD-ROMs » 1 SyQuest data cartridge
Virtualities exhibition by Experimenta Media Art (ACMI)	»	3 CD-ROMs » 3 artworks of 3.5" floppy disks comprising respectively (1, 26 and 58 disks) » 1 zip disk
Stan Ostoja-Kotkowski (SLSA)	»	940 3.5" floppy disks

This project was focused on institutional archives, rather than individual artists' disks. However, we have been conducting small scale case studies with 2 artists/collectives, Troy Innocent and the cyberfeminist collective, VNS Matrix (Virginia Barratt, Francesca da Rimini, Julianne Pierce, and Josephine Starrs). We give some brief information about these case studies below; more detail on aspects of this work is intended to be published separately.

The members of VNS Matrix are archivally minded. In 2018, VNS Matrix launched a comprehensive website archive documenting 25 years of their practice, with support from the Australia Council - <https://vnsmatrix.net/> Pierce shared the outline of the Online Archive project, developed in 2017/18, when she delivered some of their disks for imaging. In this document, the group stated their rationale for creating an archive, which strongly resonates as a rationale for archiving the media arts field:

An archive is essential to preserve the work of VNS Matrix and to make it available to scholars, researchers, curators, gallerists and [the] public. Much of the work of VNS Matrix is ephemeral; comprised of performance documentation, audio, video, posters, notes, drafts, online and computer images and text. Their work was also created on computer software that is now outdated, subsequently it is difficult to screen and exhibit, and very little of their work is in gallery and museum collections. The work of VNS Matrix is studied and written about globally to this day. The archive will provide an important resource for the academic and cultural study of Australian cyberfeminist art practice (VNS Matrix, n.d.).

Troy Innocent

Troy Innocent provided us with three plastic tubs containing floppy disks and CD-ROMs. The imaging of Innocent's archive is still underway. To give an idea of the extent of his archive, it includes:

- » 11 CD-ROMs of completed and partial artworks, including "Idea-ON" and "Lore of the Land".
- » There are about 200 5.25 inch disks made on a Spaceward Supernova around 1987. The Supernova was a state-of-the-art, full broadcast (PAL) resolution, 24-bit colour video paint system used in broadcast TV and newsrooms for titling and animations. Innocent used these images on the floppy disks to create a video assemblage for his and Dale Nason's "Cyber Dada Manifesto". 50 of the 200 disks have been imaged thus far, with the remainder requiring imaging. We are working to find expertise to decode the proprietary Spaceward file format.
- » Almost 100 3.5 inch disks contain documents and other files for an Apple computer.
- » There are a few dozen more 5.25 inch Apple disks. Innocent recalls that these are games and small programs he wrote in his youth on an Apple II.

VNS Matrix

Julianne Pierce lent several disks of VNS Matrix artworks for imaging in 2017, which was undertaken by Denise de Vries.

The collection consists of one Zip Disk image, 3 CD-ROM images, and a folder containing files. The four disk images render well using a Mac OS 9.0.4 environment in EaaSI. The folder seems to be a

Windows resource, a set of high-resolution graphics, most of which render on a contemporary computer using Photoshop. The other disks have different versions of the interactive artworks "All New Gen" and "Bad Code", as well as other materials.

We are in the process of figuring out the best way of rendering these images.

During the course of the project, we were contacted by several artists concerned about their disks, indicating that there is awareness and concern about the fate of artworks in the face of media obsolescence. The need to stabilise artists' disks remains great.

2.2 The Different Collections and Archives

The selected case studies are very different, as are the collections and archives from which they are drawn.

2.2.1 Ostoja-Kotkowski archive

The Ostoja-Kotkowski Archive is a conventional donation to an archive from the estate of Ostoja-Kotkowski. Copyright has been assigned to SLSA, meaning that they are able to grant permissions to researchers for reproduction (see Swalwell and Garda 2019 for an example). Most of the archive has been

accessible to researchers in the library's reading room for some time. The challenge of this collection for SLSA was accessing the material contained on the large number of floppy disks, most of which were for the Acorn Archimedes computer.

SLSA preservation staff imaged the disks in three stages, dealing with some challenges unique to the format encountered. Taryn Ellis has detailed the methods followed, including troubleshooting some strange pastel colours and rendering of rectangular pixels (Ellis 2023). We have included some of these images throughout the report.

2.2.2 ANAT, dLux, Experimenta

The digital materials drawn from the national and state-based organisations ANAT, dLux and Experimenta include organisational archives, ad hoc materials on disks, slides, tapes and paper that have survived the decades. Complementing existing document archives from these organisations, the digital material provides rich contextual material for historians and curators on media arts practices of past eras. The disks include artist documentation of work such as photos and video artworks, specifications for installations, curriculum vitae, correspondence, articles and reviews, festival applications and material related to workshops,

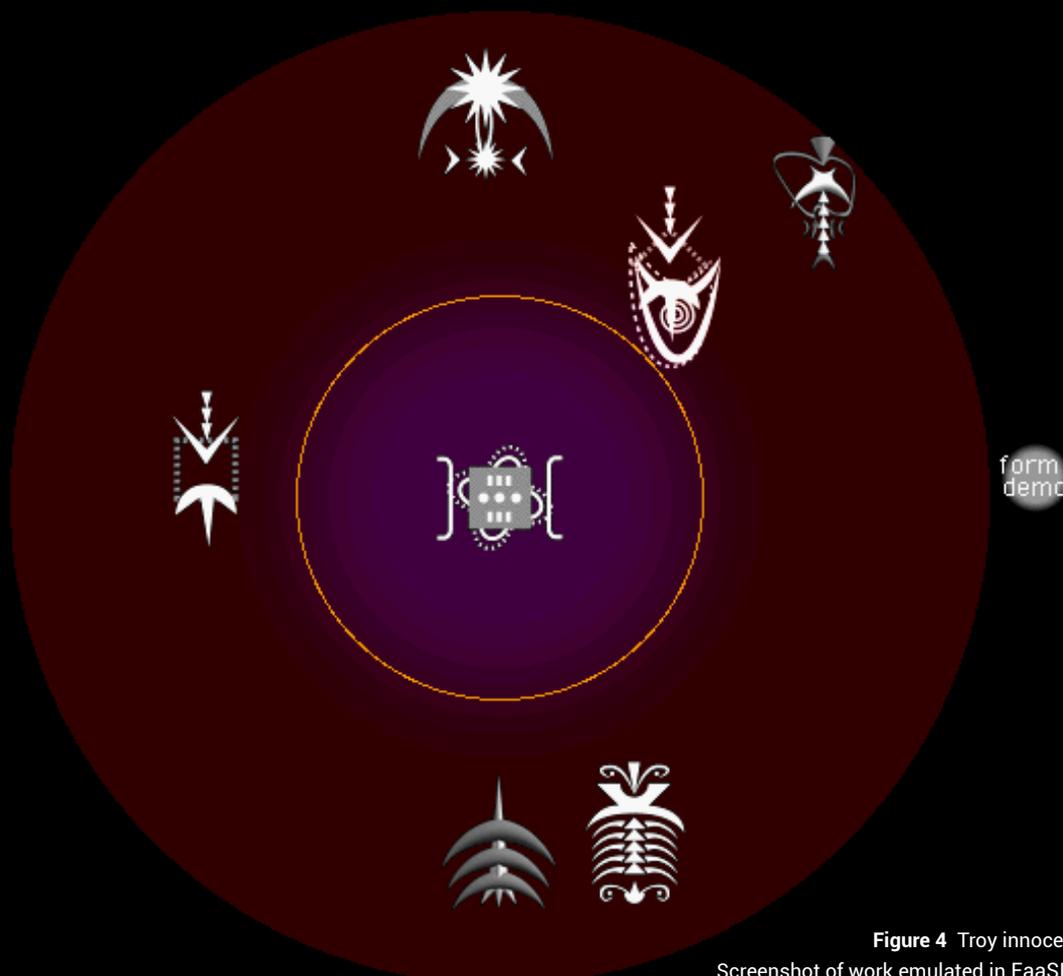


Figure 4 Troy innocent, "Soundform" (1998). Screenshot of work emulated in EaaS running Sheepshaver.

screenings, and other events. Included also are some artworks. The copyright status of much of this material is unconfirmed as it was typically sent in as supporting documentation for applications, and the work of researching what permissions may have been granted as part of application processes has not yet been undertaken. For this reason, we developed a permissions proforma for artists to complete at the time of interview, and spent considerable time also clearing permissions with artists for materials to which they own copyright within the ANAT archive.

The exhibition case studies *Virtualities* and *Matinaze 97* were selected by the project team. Some of the works from these exhibitions were in the collections, although they were not always catalogued. Others have had to be sourced directly from the artists. In acquiring copies of these works, it is not clear in every case that the version of the software collected is the one featured in the associated exhibition. Information such as this was not always recorded at the time, even by the artists. The focus has been on sourcing a copy of the artworks and where possible emulating the software rather than trying to reconstruct the installation display. There is little historical documentation of the installation of these works within the original exhibition contexts. Documentaion exists, for instance, about the more sculptural display formats such as Ian Haig's imposing display tower for "Hack," but its original hardware and touchscreen interface are no longer available and so have not been collected for this project.

In 1992, when Haig created "Hack," touchscreens were very unusual. Haig sourced a screen second-hand from the Melbourne Casino as gambling machines were one of the earliest technologies to feature touchscreen interfaces. Encountering a touchscreen at that time would have been a distinctive feature of the audience experience of this work. Haig's interest in using a touchscreen was prompted, he explains, by the Amiga Vision Manual including a section on how to implement a touchscreen interface. Haig's motivation offers an interesting example of the way that digital design tools shaped new work and artists' interests in working with novel technologies such as touchscreens. Haig, however, does not identify the touchscreen – which he describes as very primitive – as critical to the work. Indeed, today's audiences would neither need to be instructed how to use a touchscreen (as they originally were for "Hack") or even notice the touchscreen interface – as this technology is now so pervasive.

If a work like this had been collected at the time it would have been possible to collect all components of the installation including hardware, peripherals and the sculptural installation. In acquiring them thirty years later, decisions are dictated by artists' assessment of what constitutes the work and what of significance has lasted from the original install.

2.2.3 Griffith University Art Museum

Unique amongst the work being examined by this project is the Electronic Media Arts collection at the GUAM. This collection was developed in the mid-1990s funded through a Collections Development Grant from the Australia Council. Griffith made a public call out to Australian artists working in video and electronic based art to apply to have their work collected by the institution. The work was formally collected with deeds and artists were paid for the acquisition. Consideration was given in part for the archival challenges with the development of a Reproduction Agreement that enabled master copies of video works to be made an accession for archival purposes at the university's filmmaking facilities. That allowed for copies of the video to be held in Griffith's libraries for teaching and research purposes. A 1996 statement in *Artlink* magazine explains how the collection was established in association with the university's education agenda supporting Griffith's commitment at the time to developing its dedicated media studio and courses in media production and analysis. Indeed, the Griffith University Art Collection selection criteria included a very polemical statement addressing a desire for works embodying "the tension between abstraction and representation, the questioning of technique and technical perfection; the interplay between verbal and visual sign systems; the place of transitory and ephemeral art; the place of intermedia arts; the interface with new technologies in the arts." This is a collection statement from the 1990s that addresses both the challenges of performance-based ephemeral works and critical questions about the role of technology in art and culture.

In acquiring these works at the time, GUAM purchased not just the software but other associated exhibition materials such the oversized custom trackball created by Di Ball for use with "Pearls of Wisdom". Its inconvenience of use complements the wry humour of Ball's interactive work.

2.3 Permissions

2.3.1 Deeds and Rights

Seeking permissions was a key part of the research plan. The dLux, Experimenta, and ANAT archives are organisational archives formed in the course of the day to day business of each organisation. Each archive contained copies of artworks that had been lodged during the course of the business of the archive. In the absence of any documents confirming that copyright had been assigned to the archive, it was reasonable (and usual) to assume that copyright in these artworks was retained by each artist. In the Australian context, it is technically permissible under the Copyright Act (for instance, s113H and s113M) to make preservation copies of material that forms part of the collection.

However, the cultural institutions involved in the collaborative research project were at various stages in the process of acquiring or having acquired these archives. As a result, they had not all completed their internal processes to gain legal title to the archives and to seek a copyright license for each of the artworks contained in the archive. In this context, a proforma seeking various permissions from the artists was considered appropriate to ensure the same permissions were sought across all the different archives for the purposes of the project. (We detail the different process of seeking permissions for the ANAT archive in Chapter 5).

To help us develop an appropriate permissions proforma, at our first full team meeting, we reviewed the documents used at each institution when an artwork or archive is acquired to understand the permissions that were routinely requested and those that were not. Documents for the purposes of gaining legal title to a work or archive were variously entitled "Certificate of donation", "Deed of Gift", "Agreement for Purchase", "Donation of Records", "Deed – Gift of Records" and "Commissioning Agreement". Documents seeking copyright permissions were variously titled "Non-exclusive Collection Copyright Licence Agreement" and "Non-exclusive Collection Licence for Reproduction of Works of Art". These documents assisted us in understanding the types of considerations that were germane to software-based works and/or were not currently embedded in existing agreements.²

2.3.2 Permissions Proforma

Drawing on the insights gained from reviewing these documents, a working group developed a permissions template that addressed the permissions we were aware needed to be addressed. This was designed to be a 'bolt on' agreement, sitting alongside the existing institutional deeds and agreements used by our partner institutions.

Finally, because we are researchers publishing about digital heritage, we know it is necessary -- and can be time consuming -- to negotiate permissions to publish archival materials in books and articles. Therefore, we decided that since we would be dedicating resources to contacting artists, it made sense to also request some other use permissions at the same time. This would hopefully also help with the problem of media arts being remembered after an artist's death, where contacting the Executor of an Estate is not always easy.

The permissions proforma includes a pre-amble which emphasises several key points about our intentions in seeking an artist's permissions:

- » That the document is intended to present media artists with a series of choices so they can communicate their decisions on matters that are important for a receiving organisation to know;
- » That media arts are making their way into cultural institutions, in some cases after significant delay;
- » That the archives of media arts organisations contain rare archival material, documentation and artworks which are key to understanding the art history of the late twentieth and early twenty first centuries and thus hold considerable value;
- » That many digital and media artworks rely on obsolete technology and are at risk, so it is imperative that they receive proper care;
- » That if the content is not taken into collections, it will likely be lost to researchers, the public, and those wishing to re-exhibit these works;
- » That the organisations concerned seek to build a collaboration between institutions and artists in order to remember the legacy of media arts in Australia since the 1980s and ensure artworks are preserved.

² We also reviewed a permissions request prepared by Stanford University Libraries as a part of its Cabrinity-NIST project, which sought to obtain permissions from copyright holders of computer game software published between 1975 and 1995.

The proforma then provides an explanation of the particular institution's purpose, the archive that is being processed, introduces the exhibition case study which has brought the artwork into the purview of our study, defines what emulation is, and reiterates that all parties are committed to obtaining consent and permissions from artists and recognising artists' moral and other rights and their rights to control their work and the way that it is used. The proforma further notes that emulation may potentially change an artwork or its experience and invites artists to author a statement on this if they wish, to accompany the work.

We then ask for artists to indicate whether or not permission is granted: for a copy of the work to be donated (where a work is not already included in a collected archive); for staff to preserve the artwork and make it accessible by disk imaging, migration and/or emulation; for the artwork to be included in a research archive; for the artwork to be made accessible to the public by a range of means; for photographic images, audio excerpts and moving image clips of the artwork to be used, appropriately credited, for a range of purposes (personal research and study, publication from research, educational purposes, to promote the art and archive, on the internet, on social media); and for the artwork to be remixed. Finally, we ask the artist to provide the names of any other copyright holders. The document is available at https://aama.net.au/wp-content/uploads/2023/11/Permissions-Proforma_V1_Virtualities.pdf

2.3.3 Proforma Use, Exceptions and Adaptations

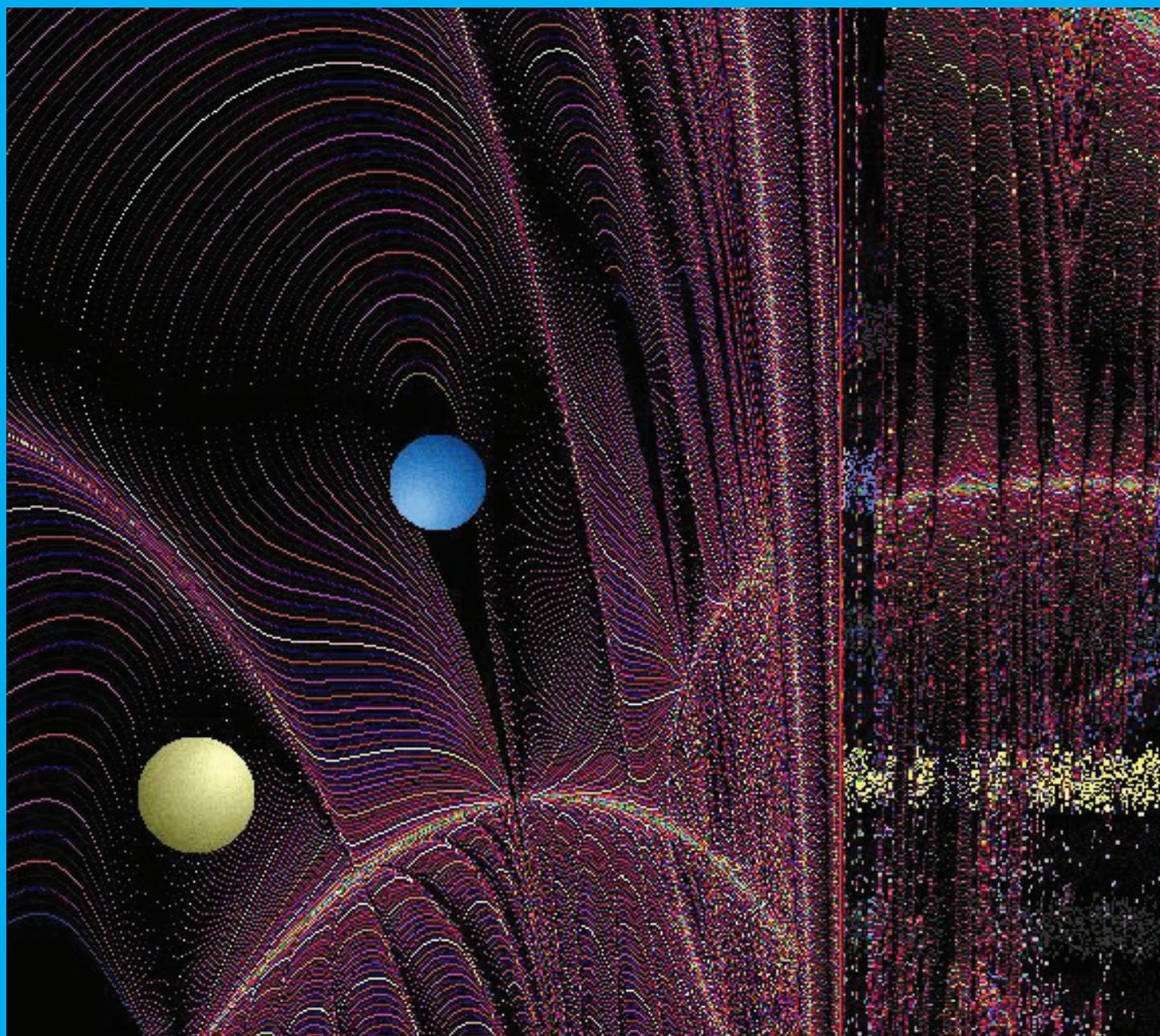
The proforma was used to request permissions from those artists in dLux's *Matinaze 97* (AGNSW) and Experimenta's *Virtualities* case studies (ACMI). The SLSA amended the proforma for permissions for the ANAT archive. Copyright for SLSA's Ostoja-Kotkowski collection had already been assigned to the Libraries Board of South Australia, which means researchers

make requests to the Library directly. Similarly, as has been already mentioned, the CD-ROM artworks in the GUAM's collection were purchased, with signed deeds and a Non-Exclusive Copyright Licence. However, in the case of Griffith's collection, the proforma was used in an adapted form to pose the questions about publishing screenshots, and whether artists consented to their work being used on social media to promote the art and the archive, or remixed. While the document we reviewed at our meeting included reference to "the Artist grant[ing] the University a...licence to reproduce, publish, transmit, broadcast or otherwise communicate the Work to the public (or excerpts of the Work, if applicable) on the internet, web-sites, social media platforms and mobile device apps for those Non-commercial purposes set out...", this was clearly an updated version of the Licence; at the time of acquisition, the copyright licence did not include references to web or social media because these did not exist at the time.

Permission proformas were emailed to artists after interviews had been conducted and they'd been shown their work running in emulation.

Gaining permission to hold, preserve and emulate artworks was seen as being of central importance for partner organisations. While there was some initial discussion as to what the minimum level of permissions were that would be acceptable for public benefit, we found that the vast majority of artists were happy to complete the permission proforma, giving their consent to the various proposed uses. At the time of writing 14 have been returned, out of 21 artist interviews. All the artists who have completed the proforma have consented to their work being included in the partner organisation collections and to its preservation and emulation. Most agreed to all the questions. All but one artist agreed to the remixing request, with all but one of those consenting stipulating that "consultation is required".

Preserving



Emulation is a key digital preservation strategy for accessing the digital file/s that may comprise all or part of a complex digital artwork. It works by simulating the function of obsolete systems on contemporary computers. Other preservation strategies include migrating the files from old to new formats, or accessing the original media using vintage computers.

In the process of emulation, a disk image of the obsolete carrier is made, then the disk image is accessed using a computer emulator to open and execute the file. In practice, there are many steps and decisions to make along the way.

3.1 Imaging Disks

The digital artworks in this project were stored on obsolete media and depended on obsolete computer hardware and operating systems. Born digital components bring special preservation and access challenges: magnetic computer disks suffer physical deterioration and bit rot, computer hardware quickly becomes obsolete, and software dependencies present special access challenges.

The first part of our preservation workflow is creating disk images. Creating a disk image frees data from reliance on its storage media so that it can be preserved without altering the original files. Our case studies contained examples of the physical storage media used at the time -- 3.5 inch floppy disks, 5.25 inch floppy disks, CD-ROMs, Zip disks, and SyQuest disk cartridges. These carriers are all critically endangered, per the Digital Preservation Coalition Global 'Bit List' of Endangered Digital Species, and require immediate attention if they are not to be lost (Digital Preservation Coalition 2023).

The Digital Heritage Lab in the Centre for Transformative Media Technologies at Swinburne University of Technology has a working collection of equipment to image these types of media. Each carrier type has at least one construction of specialized equipment with which to make the images.

Floppy disks

5.25 inch and 3.5 inch floppy disks are imaged using two different floppy disk controllers – the Kryoflux forensic floppy controller, and Applesauce floppy disk controller. Kryoflux is a professional product, in use in many libraries and archives around the world. Applesauce is a hobbyist tool, of limited availability, which has several additional desirable affordances – such as detecting the disk type automatically,

and making the file directory and files immediately available for analysis.

These floppy disk controllers require specific kinds of vintage floppy disk drives. The lab has sourced a number of these drives from eBay and hobbyists, and use them for testing, repair, and production. We needed at least 4 different kinds of floppy disk drives to image the disks in this collection; 2 types of Apple drives and 2 types of IBM PC drives. To add to the complexity, the two physical sizes of floppy disks (5.25 and 3.5 inch) look the same, but can have very different capacity, formatting, and computer system, requiring further forensic analysis for all but the most common formats.

Software tools like CiderPress and FTK Imager will often, but not always, display the directory and files of Apple and PC disk images. ADF View shell extension is another program that shows the file directory of Amiga disk images that have the .adf file extension. Analysing the disk directory for its named contents is the first step for archival appraisal, and deciding whether the best solution is to view the disk image in an emulator, or try some other way to extract, migrate, and view the files. The problem is that the files usually won't open in a contemporary computer environment, which is why these other methods are required.

Optical media

We imaged CD-ROMs using a professional software tool called Alcohol 120%, along with a contemporary, commodity external USB CD/DVD drive attached to a contemporary Windows 10 laptop. There are other free software tools that work almost as well for imaging CD-ROMs, such as ImgBurn and PowerISO; we prefer Alcohol 120% for its presets for special formats. These presets are useful when making images of CD-ROMs that have non-standard configurations or have more than one session. We prefer having CD-ROM images that have the .iso extension, because Emulation-as-a-Service Infrastructure (EaaSI) works best with that format. (We are developing procedures to follow when a disk cannot be imaged as an .iso.) Once imaged, the file directory is available for study using programs such as Windows Explorer, WinImage, and FTK Imager.

Zip disks

In the 1990s, personal CD-ROM burners were expensive, unlike today where they are common and inexpensive commodities. Zip disks and drives were a solution brought forward by iOmega. These 100MB disks could hold the information of nearly 70 1.44 MB

floppy disks, and were a solution adopted by many users, including media artists working with large files.

Like floppy disks, Zip disks require a special vintage iOmega Zip disk drive. The disks are about the size of a regular 3.5 inch floppy disk, but thicker. These drives, of which millions were manufactured, come in three connector options – SCSI, Parallel, and USB. There are also two disk capacity sizes – the older 100MB disk size, and the later 250MB, which requires a newer type of Zip drive. These drives were agnostic, working on both PC and Mac computers.

To image these disks, we used the `dd` command ("disk duplicator") with the USB Zip drive attached to a Linux computer. This command copies raw data from one source to another – i.e., makes a disk image of the Zip disk. The `.img` files thus created can be rendered in an emulator, and the directory is available for examination using Linux or FTK Imager.

SyQuest disk cartridges

The competing 1990s storage solution came from SyQuest Technology, which targeted personal computer users working in data-intensive fields like desktop publishing and multimedia. SyQuest has a long legacy of removable media; the ones most relevant to our project are the 5.25 inch 44 MB and 88 MB disk cartridges, and the later 3.5 inch disks which came in sizes 135 MB, 230 MB, and 270 MB. Each of these hefty disk cartridges requires a corresponding type of drive. The lab has amassed a selection of working SyQuest drives from eBay. These drives connect using SCSI cables, which unlike USB are not common on contemporary computers, so require a working vintage computer with the proper connector. The lab has a Macintosh G3 running Mac OS 9.2.2 with an external SCSI connector that we have been using in conjunction with the various SCSI SyQuest drives. In this way we can copy the contents of the SyQuest drive to the hard drive of the Macintosh G3, and from there not only examine the directory, but also run any multimedia programs.

Once imaged, to get the file off the vintage computer and into a usable state for emulation, we have either used the vintage computer to write the disk image to a Zip disk then image the Zip disk as above; or copied the files to a CD-ROM and then imaged that as above.

3.2 Emulation

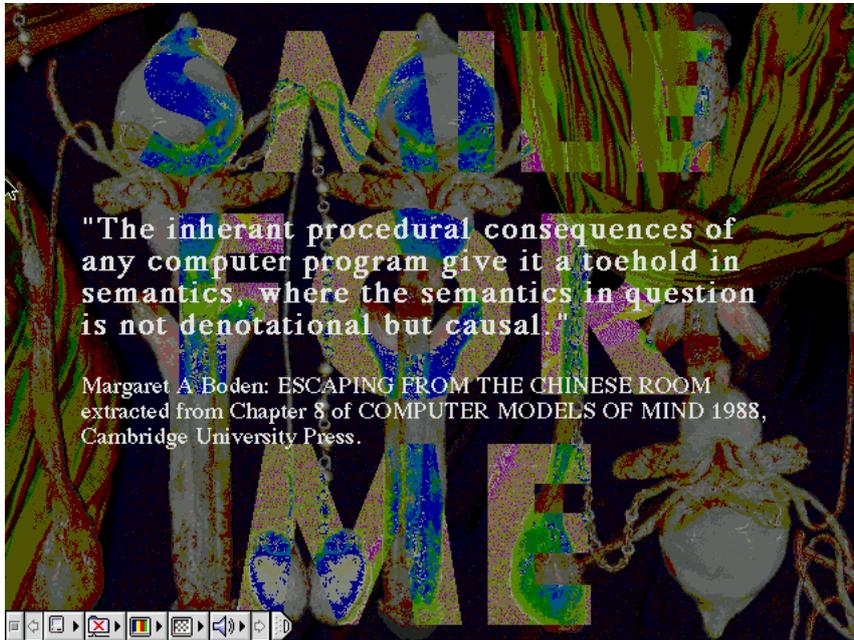
These artworks in the AAMA study are multimedia works, complex digital artefacts, which react and respond to the clicks and mouse movements of the user. Most are Macromedia Director Projector files, which are no longer amenable to migration.

There is a vibrant economy and long history of professional, open source, and hobbyist emulators. Some of this descended from mainframe computers, where a roomful of equipment was gradually replaced with emulators that ran on small, contemporary computer equipment, in order to retain an investment in complex enterprise-sized software packages. Another branch of emulator development comes via video game enthusiasts, who create emulators for game consoles (and disk imaging apparatus for game cartridges). A third branch are the innumerable emulators for individual computers and operating systems, for example the BBC Micro, Acorn Archimedes, Commodore 64, Xerox Alto, Amiga, IBM PC, and Macintosh.

These free-standing computer emulators are a solution for institutions looking to reanimate complex digital objects. Most are free, open-source projects led by enthusiastic volunteer teams. All the user needs to do is 'simply' download the tool and follow instructions for its installation and use. Except, it is not that simple: each emulator is different and requires a learning curve to understand and use. Installation requires that the user or archivist have administrator access to their computer to download and install the emulator, which is not common in the large collecting institutions that we work with.

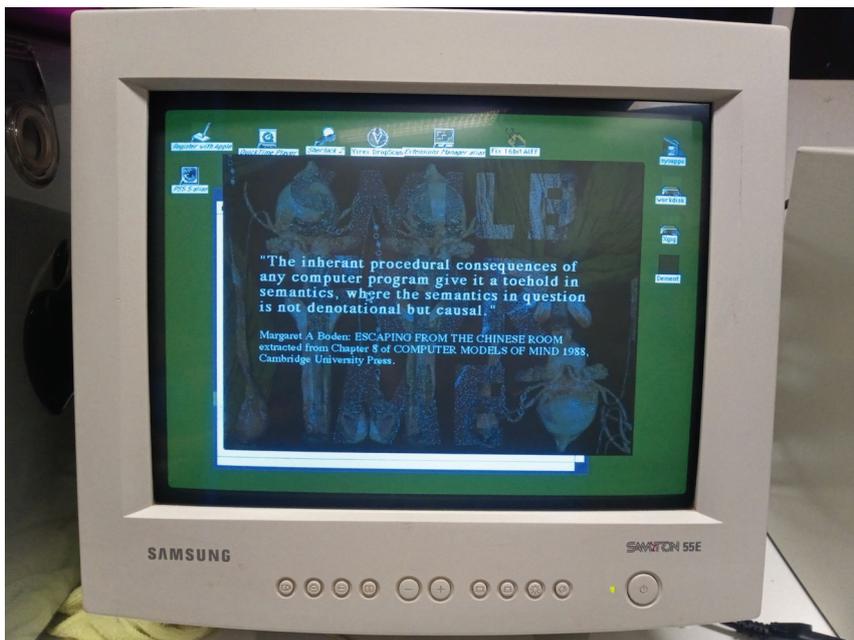
Professional virtualization tools like Oracle's VMware are another solution. At least one Australian institution we have been working with has used VMware to build and configure environments with which to render their complex digital objects. This kind of emulation is a stable, professional way to build emulation environments and use them internally. (What this solution lacks is the crucial function of sharing configured environments across a network of subscribers, which is provided for in Emulation-as-a-Service Infrastructure.) Archive.org provides a different compelling technique of emulation, with certain content in their online catalogue spinning up an emulator such as DOS Box or MAME in the browser, which renders the complex digital objects. This solution, although elegant, is live to the web, therefore not suitable for institutions that need to manage access to the works they hold.

Developed by computer scientists at Freiburg University, the Emulation-as-a-Service (EaaS) platform provides access to obsolete computer environments (hardware, operating systems (OSes)) enabling legacy software and other complex digital artefacts to be emulated and accessed by users in a web browser. The most developed emulation solution, EaaS is being used or evaluated at a



"The inherent procedural consequences of any computer program give it a toehold in semantics, where the semantics in question is not denotational but causal."

Margaret A. Boden: ESCAPING FROM THE CHINESE ROOM extracted from Chapter 8 of COMPUTER MODELS OF MIND 1988, Cambridge University Press.



From top: **Figure 5** Screenshot of Linda Dement's "Cyberflesh Girlmonster" (1996) emulated in EaaSI showing incorrect graphics and colours, **Figure 6** Screenshot of Linda Dement's "Cyberflesh Girlmonster" (1996) emulated in EaaSI showing incorrect graphics and colours. **Figure 7** Screenshot of Linda Dement, "Cyberflesh Girlmonster" (1996) running on original hardware showing correct colour of the text (white).

number of institutions, including Rhizome, the Tate, the Canadian Centre for Architecture (CCA), and the Dutch Digital Heritage Network (Rhizome 2016; de Vletter 2019; Klaus Rechert, Falcao, and Ensom 2016; O'Donohoe 2020). We have been using it in Australia in this project and also our sister Linkage Project, "Play It Again: Preserving Australian videogame history of the 1990s". Standalone versions of EaaS require installation on a Linux computer.

Funding from the Alfred P. Sloan and Andrew W. Mellon Foundations to Yale University has enabled a group of US university libraries to develop a networked version, called EaaSI (EaaS Infrastructure). EaaSI delivers a scalable emulation service, linking US libraries with born digital collections into a decentralised network where they can not only emulate content in house, but also share images of utility software and preconfigured legacy environments with other library nodes (Anderson et al. 2018). For instance, if a file in one archive requires an environment of Harvard Graphics 4.0 running in Windows 95, an administrator can search for and download the environment someone else has configured, saving time and resources.

EaaSI involves minimal IT setup in an organisation. The technical expertise is provided by an EaaSI service provider. AARNet, our partner on the Play It Again project, set up an EaaSI instance in Google Australia cloud. This online facility was thus available to us for use in both Play It Again and AAMA projects, and is being scaled up in our new project "The Australian Emulation Network: Accessing Born Digital Cultural Collections." Through this project we are training over a dozen institutions in the process of imaging disks and configuring environments for their use.

EaaSI is platform agnostic: environments are configured by users in the backend via a web browser. Users don't need to download and install emulator software; instead they access it via a browser such as Chrome.

The backend administrator console for EaaSI has two primary functions. One function is configuring the operating system and software environments. The other function is as a catalogue that manages emulators with configured environments. A configured environment is a stack of an emulator, an operating system, and software – for example the emulator Sheepshaver, the operating system Macintosh OS 9.0.4, and software Macromedia FreeHand 4.0. These different configured environments are available for all members of the

node, who can upload files that depend on this software configuration to be rendered. Members can share their content environments, or keep their content environments private, so they are not available to any other users of the node.

3.3 Digital Asset Management

Being a research project, the Digital Heritage Lab does not have a formal catalogue or collection management systems (CMS). The GLAM institutions we work with are professional archival organisations with significant tooling. Even so, the lab needs to preserve these disk images in an orderly manner. Using a combination of Excel files and Dropbox folders we named the files according to their accession number and sequence number and stored them in Dropbox for active use and sharing with partner organisations. Dropbox files are regularly backed up and also copied into NextCloud, a storage solution that is managed by Swinburne University of Technology IT. Technical notes tracked each of the actions taken to image the files and extract their directories.

3.4 Configuring Environments and Rendering

The next step was to use EaaSI to configure environments for the media artworks. We attempted to configure emulation environments for all the media artworks in the project. Most of the artworks were CD-ROMs, which once imaged would render in a Macintosh OS 9.0.4 or Windows 98 SE environment. Other formats, like SyQuest disk cartridges, zip disks, and floppy disks had favourable but not universally successful emulation outcomes.

GUAM imaged their own 18 CD-ROM artworks and shared them with us to make environments. 14 of the CD-ROMs were for Mac OS 7 or Mac OS 9. Two required Microsoft Windows 98, and two CD-ROMs worked in both operating systems. Each was made in version 4 or 5 of Macromedia Director. Only two of the works had rendering problems. One, "Soundform" by Troy Innocent, had a special requirement that it would only work with QuickTime 2.5, which is included on the CD-ROM. The emulators all had later versions of QuickTime, so we needed to follow the instructions in the readme file to disable the later version of QuickTime in the emulated environment in order for the work to run. Lucy Francis' work "Virgin with Hard Drive" was challenging because it crashed repeatedly during installation. After some testing on an original Macintosh G3 computer running Mac OS 9.2.2 we worked with the EaaSI developers who suggested adding the switch 'jit false' to the

environment settings, which then enabled the artwork to install and play.

We were not able to source one of the artworks from *Matinaze*, "invert" by Lloyd Sharp. Though Sharp had kept disks, they were the original working project disks before being compiled and fully constructed.

The software used was, he told us,

not common, was serial locked with a purchase code system and the version I was using at that time was a beta v2 during the period they were sold to Quark, moved city in USA and all the original development stopped and the whole development platform was shelved and not developed any further.

Emulation can enable recovery of many works, but not when faced with such a narrative of multiple losses.

The remainder of the CD-ROM artworks emulated quite well. We acquired the CD-ROMs from the artists directly and imaged most of them in our lab. We initially had an issue getting a usable file of Sol Pandiella's work "[anon]", as she first provided us with a copy of the files from the CD-ROM, rather than a disk image (.iso). CD-ROM artworks often have hidden files and structures that are not retained when the visible files are just copied from the CD-ROM. Pandiella eventually loaned us the CD-ROM so we could image it in the lab, and with that .iso image we were able to make a working environment.

This collection also included one 135MB SyQuest disk cartridge, which we were able to image in the lab. We made Mac OS 9.0.4 environments of each of these works, which are all Macromedia Director Projector files. We also, as an experiment, built a single Mac OS 9.0.4 environment that has all of the works installed. This is part of a strategy that we are testing to eventually offer multiple emulated artworks on a dedicated computer in the AGNSW reading room.

Of the 10 *Virtualities* artworks, three artworks on CD-ROM (Martine Corompt's "Cutometer," John Colette's "30 Words for the City," and Felix Hude's "Haiku Dada"), the floppy disk and the Zip disk image of the *Virtualities* catalogue worked well in an emulated Mac OS 9.0.4 environment. These were all compiled Macromedia Director projector files.

Two works are for the Amiga 1200, which we emulated to an analysable degree in the free-standing emulators Amiga Forever and FS-UAE, since these emulators are not yet part of EaaS. The final work, "Fractil and Middlebrot" (1995) by Don't

Shoot the Messenger (Steve Middleton and Attilio Gangemi), was documented through interviews with the artists, as it originally existed as a complicated live performance mediated with two Amiga 4000 computers, GenLock, and other equipment. We were not able to re-render it in emulation at this time.

Though many of these works are performing in emulation, we have noticed some rendering issues in the artworks made in Director. For example, we noticed an issue with the sound in several artworks. When the works are emulated, there is a slight interruption where the sound seems to "drop out" momentarily. We have observed it with Norie Neumark's "Shock in the Ear", Megan Heyward's "I Am a Singer", and some other artworks running in Mac OS 9. The issue is consistent across both freestanding EaaS and the networked EaaS. We are still inquiring into what is causing the issue.

We have also noticed an issue with the graphics and colours not rendering correctly in Linda Dement's "Cyberflesh Girlmonster", (1996). It does not always happen, but sometimes the graphics seem to revert to an 8 bit palette and the text is shown in colours that the artist has said are incorrect. We have made screenshots of the incorrect graphics and colours in EaaS and these are shown in Figures 5 and 6. The text should be white, as shown in Figure 7 running on original hardware. We have noticed this behaviour whether the artwork is emulated in OS 7 or OS 9. We continue to inquire into the cause of this issue and will be conducting a comparison with a freestanding version of the Sheepshaver emulator. We intend to publish our findings on these rendering issues separately.

We also noted quite pronounced differences when rendering Martine Corompt's "The Cute Machine" on PC, in Windows 98. The work is supposed to play on both Apple OS9 and Windows PC. When we showed Corompt the artwork emulated, the Apple version performed well, but the Windows emulation displayed differences in both colour and timing.

Two of the other *Virtualities* works are 3.5 inch floppy disks for the Amiga 1200. EaaS does not have an Amiga emulator yet, so we imaged the disks and tested them in two different free-standing emulators – the freeware FS-UAE, and the professional Amiga Forever from Cloanto.

Ian Haig's "Hack," one of these Amiga artworks, was partially reconstructed, and it seems all of the images are present, but the Amiga Vision script that stitches the work together is incomplete. We created environments with graphics programs like

DPaint IV, Dyna View, and Photolab in order to view the individual files. There are several Amiga Vision scripts that enable a play through of most of the work, but none of them navigated to the final screen, of a blinking brain (although we do have that .anim file as part of the collection).

We also created FS-UAE Amiga 1200 environments using the disk images from Irene Proebsting and Barry Brown's "Industrial Vesper #11". The images in this collection were stitched together with a presentation program called Scala. The company Scala still exists, and we asked them whether they had copies of their earlier products from the 1990s, but they did not respond. After purchasing and installing several instances of this software from eBay, we found a sample CD on archive.org that had Scala software that worked with this collection. This Scala software had a built-in function that knew how to scan files on the computer, including our emulated computer, and rebuilt the links in the script. This was very helpful, because rebuilding each of these hundreds of links was prohibitive in terms of time. The Scala script mostly worked and we were able to recover the images and the black screens which had been where inter-titles had been located, but we were

not able to recover the inter-title slides themselves. We provided the images to the artists, who went through and remade the intertitles using the same text, reconstructing the work from the extracted images.

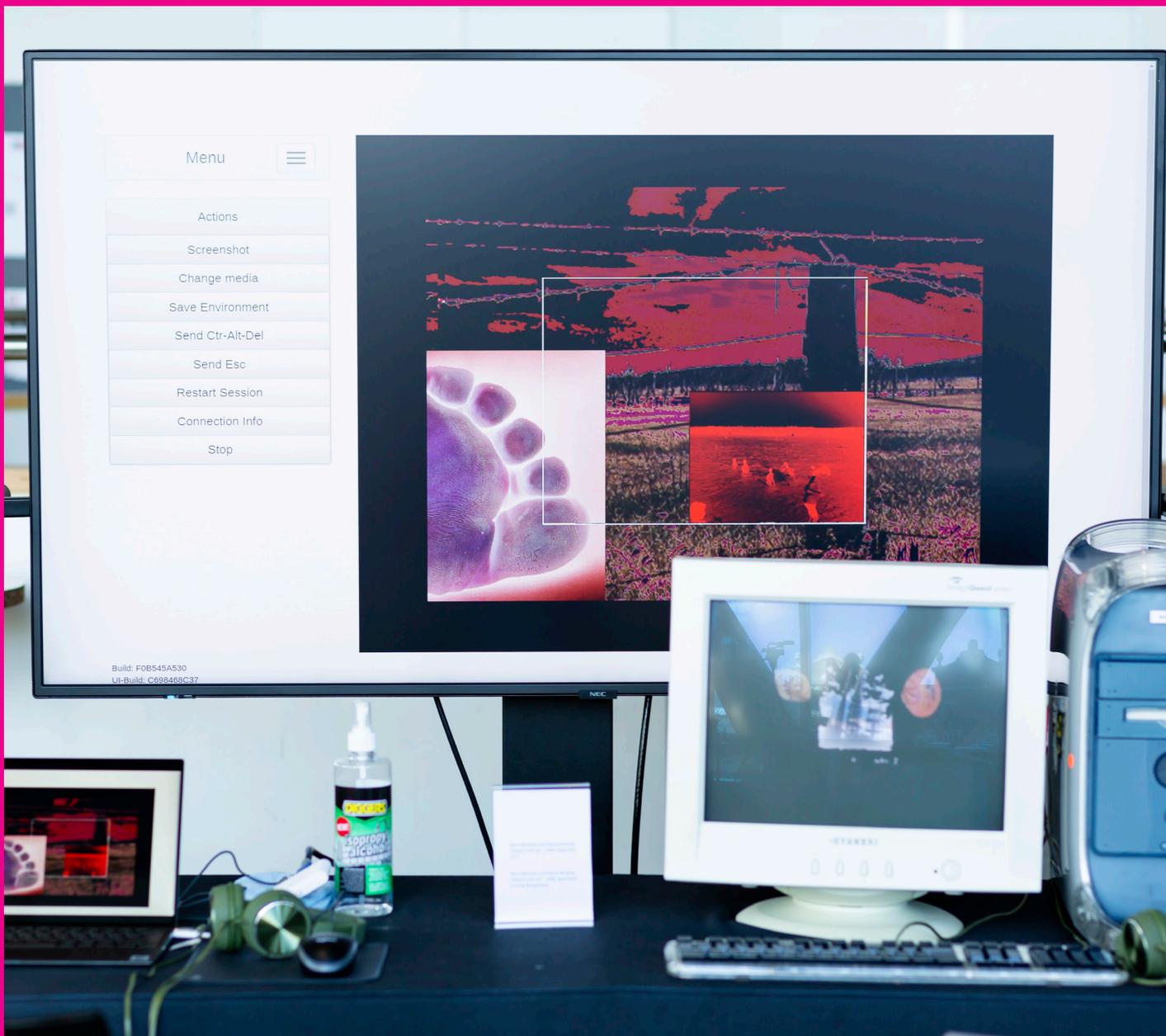
An interesting case study from the *Virtualities* exhibition was the performative "Fractil and Middlebrot" (1995) by Don't Shoot the Messenger (Steve Middleton and Attilio Gangemi). The preference of the artists is to re-exhibit their work as a live performance on the hardware with which it was created and performed in the 1990s. To demonstrate this for us, the artists generously reinstalled their original hardware (which they had maintained throughout the years) in ACMI's Blackmagic Design Media Preservation Lab. This consisted of two Amiga 4000s, a camera, input/output equipment and peripherals to present a real time feedback loop with their original HAM-8 animations. Recording the reinstallation of the work afforded us the opportunity to discuss the artists' preferences for particular technologies and their intent in creating the work. The artists also shared some of their original documentation and other recorded performances which intersect with the Cyberthon archive also at ACMI.



Figure 8 Don't Shoot the Messenger demonstrating their technique in the Black Magic Design Media Preservation Lab, ACMI. Courtesy ACMI.

Chapter 4

Curating and Exhibiting



Norie Neumark and Maria Miranda "Shock in the Ear"
(1998) Side-by-Side display Swinburne 2023.



What does it mean to exhibit historic media art? This question has guided our curatorial and exhibition activities. Exhibiting historic media art entails facing not only the challenges of legacy hardware and software but reflecting on changed contexts for curation, seeing past the technology to consider audience experience, and going beyond re-presenting the original set up to potentially re-imagine the presentation of artworks for contemporary contexts and exhibition opportunities.

4.1 The Role of Exhibition

The exhibition of artwork is understood as critical to its continuing cultural relevance. In his 2013 paper "Writing Media Art into (and out of) History", Darren Tofts – a leading voice in Australian media art theory – argues that lacking ongoing institutional support, the lively discourse of the 1990s and early 2000s receded leaving a decline in interest and knowledge of local media arts practice. He explains how media arts' inability to gain a secure foothold in collections or on curatorial agendas has contributed to a withdrawal of support for the area of arts practice marginalising it in arts discourse (Tofts 2013).

There was a rapid evolution of computer technology at the turn of the century which contributed to the perception of a short 'shelf life' for computer-based art. Earlier work could be quickly overshadowed by the next generation of computing which supported better graphics and functionality. There was also a loss of literacy for audiences in navigating older hardware and software, due to changed interfaces and protocols for interaction. Platforms themselves became commercially redundant, unavailable, and unsupported (e.g. LaserDisc in the 1990s).

Media arts funding and organisations were often complicit with the dominant teleological narrative of progress, focusing on the potential of emerging technology, innovation, and new ideas. As an example, AAMA project partner, Experimenta, had planned to commission a new work that reflected on the artwork/s in *Virtualities*. Disappointingly this did not proceed due to the disruption caused by the COVID-19 pandemic. However, it highlights two points about the exhibition of media arts. First, that it is predominantly an art of festivals and temporality (Cook 2014; Dietz 2005). Second, that new work dominates the landscape of dedicated media arts organisations (Graham and Cook 2010; Quaranta 2012). For instance, Experimenta's vision statement and funding precluded the exhibition of historic artwork.

It is well-documented that the challenges of collecting and conserving media art have contributed

to galleries' reluctance to collect such works. Curators and scholars such as Graham and Cook, Paul, Ippolito and Rinehart, Noordegraaf et al have explored how the variability of media art – the fact that it does not manifest as a stable and discrete 'object' – puts it in conflict with traditional collecting and conserving practices (Graham and Cook 2010; Paul 2007; Ippolito and Rinehart 2014; Noordegraaf et al. 2013). These challenges stem from the complexity of media art, including its software and hardware dependencies, as well as the rapid obsolescence of the underlying technologies. Moreover, artworks frequently demand expertise that institutions may lack the necessary resources to provide.

Cook and Graham have further argued that the incompatibility of media art with existing collection taxonomies has contributed to its ongoing exclusion: that the lack of representation of media art in collections has had a cumulative effect, discouraging collecting organisations from investing in technology-based works that do not align with the existing focus and nature of their collections (Cook 2014; Graham 2014).

The absence of institutional collecting has resulted in a lack of resources for contemporary curators and historians to discuss and contextualize historic media art within broader art conversations. This, in turn, means that audiences and contemporary artists have limited opportunities to engage with the vibrant history of technology-based art. Increased access to, and exhibition of, such work is necessary to change this. Once artworks are able to be exhibited and accessed, people think differently about them and they re-enter art historical dialogues.

Access has been the key focus of the curatorial work as notwithstanding some important surveys (Zurbrugg 1994; Tofts 2005; Harley et al. n.d.), much of this art has been absent from the historic record. In making this art visible the potential of the EaaSI platform to provide a shared emulation solution has been central to curatorial investigations. The importance of emulation as a means to reconnect with the exhibition of historic artworks was adeptly explored in the 2004 Guggenheim exhibition *Seeing Double: Emulation in Theory and Practice* ('Seeing Double: Emulation in Theory and Practice' 2004). In *Seeing Double*, artwork was presented on original hardware running side-by-side with the work either emulated or displayed as a migrated version. The exhibition addressed the technical challenges of exhibiting historic works focusing on the all-important question 'what is the work?' Identifying the significant properties of an artwork is a complex issue. It can involve idiosyncrasies related to its

original hardware and software and in restaging it what needs to be maintained (conserved or recreated) to preserve this. For example, for *Seeing Double's* restaging of Grahame Weinbren and Roberta Friedman's "The Erl King" (1982-83), new code was written that recreated the appearance of the text overlay as performed by the RGB overlay system of the original SMC-70 computer, as this feature was identified as significant to the work (Ippolito and Rinehart 2014).

4.2 Authenticity

Authenticity of a work is an issue often raised by collecting organisations and has implications for exhibition and display. The traditional association of preservation with the conservation of original material creates particular challenges for media art, where hardware becomes obsolete and will eventually fail. To address the hegemony of authenticity associated with material preservation in the museum the Tate's expert in time-based media conservation, Pip Laurenson, suggests adopting the concept of allographic objects—where authenticity is related to the experiences of the work – in contrast to autographic objects – where authenticity is associated with original material. Laurenson's approach identifying that an artwork manifests in two stages, first, a moment of conceptualisation, and second, a moment (or moments) of execution, allows for the variability of a work and understands that it may change in various iterations and develop over time (Stricot 2013; Laurenson 2006).

³ One of the researchers on this project, Swalwell, has argued – in a chapter that moves between discussion of media arts and digital games preservation – of the necessity for game historians and critical theorists to move beyond the game lover's fetishising of the 'original experience' as if this were singular, recognising the variable instantiations that a particular title may have had upon its release (Swalwell 2017). In the exhibition of historical software works questions of associating work with historical hardware become a curatorial one. In the curating of videogames historical hardware is often featured in display for its significance in speaking to a historical period and highlighting the technology constraints that the gamemakers worked with. In the touring exhibition *Game On* (2003 – 2016) playable heritage games running in emulation were often displayed with the appearance of running on original hardware. The contemporary hardware running the emulated game was hidden, and the heritage hardware showcased. In contrast to this curatorial choice, for the MOMA exhibition *Applied Design* (March 2, 2013–January 20, 2014) curator Paulo Antonelli explicitly hid all hardware systems to avoid the nostalgia and fetishism associated with games hardware and allow audiences to focus on the nuance of the design of the interactive experiences (Antonelli 2013).



Figure 9
Martine Corompt, "Sorry" (1995) Amiga computer installation. Courtesy of the artist.

Contemporary art curators used to site specific and performance-based work can readily grasp this concept.³

It is worth reflecting on how variable the display of a single work might have been and the multiplicity of incarnations. VNS Matrix's "All New Gen" (1992-1993) was an evolving installation that VNS Matrix staged differently at different venues between 1992 and 1995 across Australia and internationally; it featured lightboxes, audio, and video material and later a CD-ROM. Martine Corompt's "Cute Machine" CD-ROM (1997) contains two of Corompt's works that she originally created on an Amiga computer and then presented on the Amiga or an early Apple Mac (Apple Macintosh LC 500 or Macintosh Performa 5200), "Sorry" (1995) and "Cutometer" (1995) (Figure 11). For the CD-ROM she assembled them in Macromedia Director using original assets from the Amiga. The exhibition of the work "Sorry" on the Amiga included a confronting user interface where audiences had to stomp hard on the cute character faces (on physical custom-made floor buttons) to engage with the work, making them complicit in the violence (Figures 9 and 10). The second work "Cutometer" was exhibited as an installation called "Activity Station" that featured a cute, rounded pink and cream vinyl dressing table ensemble sewn by the artist that covered the Amiga and the CRT Monitor. For "Activity Station" Corompt hacked the mouse so that it was controlled by users straddling a rolling stool. The mouse button was a noisy popper sourced from the board game, *Trouble* (Figure 13).



Figure 10
Martine Corompt, "Sorry" (1995) Sketch for Amiga computer installation. Courtesy of the artist.

The installations of both these works were elaborate and performative, providing an experience quite different from the subtle point and click in their incarnation on the CD-ROM. The display of "Cutometer" for the *Virtualities* exhibition, however, was just the interactive, displayed on an Amiga in the gallery without the full "Activity Station" sculptural installation. When the "Cute Machine" CD-ROM showed at Casula Powerhouse in 1997, Corompt deliberately chose display furniture that spoke to the aesthetics of the work (Figure 12). These are examples of the variability of an artwork where each expression is equally authentic. The Amiga versions of "Cutometer" and "Sorry" have not survived as they have not been recoverable from the Amiga computer they were stored on. Recognising the variability of works as they were installed problematises the canonising of any one version as the 'correct' one.

Collecting and conserving a work can result in it being fixed or frozen as one particular version (either by selection or elimination) rather than acknowledging the multiplicity of its incarnations (Marçal 2019). The examples above highlight the fact that taking this approach could result in the loss of a fuller understanding of a work. Collecting organisations need to be open to approaching media works with a different mindset that allows variability and changeability to be part of a work. Van der Vall et al suggest thinking in terms of the biography of a work as a way of holding and embracing this history and multiplicity (Van de Vall et al. 2011).

Conservation scholarship has been recognising these needs for some time. For instance, Latour and Lowe argue that "For a work of art to survive, it requires an ecology just as complex as one needed to maintain the natural character of a natural park" (Latour and Lowe 2010). Pugliese and Ferriani highlight the risk of 'institutionalising' artworks through strict practices

that 'petrify' the work in 'one unique version.' Pugliese and Ferriani then argue that the "future of installations is therefore more and more tied to the definition by artists of the limits of authenticity and the 'potential in evolution' of the artworks" (Pugliese and Ferriani 2007). Hölling embraces this changeability proposing that,

rather than freezing their fleeting identity in a singular state, conservation needs to affirm such artworks' inherent changeability, using documentation as a tool marking their relation with and to time... Conservation is henceforth no longer the return to a past 'original state' but the creation of the archive that will anticipate future iterations, based on repetition and difference (Hölling 2014).

4.3 Exhibition Outcomes

In this project, we have been focused on outcomes exploring the restaging of the works, and more are in development; the project has also enabled several re-imaginings of artworks. COVID-19 impacted most significantly on the exhibition stage of the project as organisations had to pivot and direct their resources to the changed conditions created by the pandemic. Public exhibition outcomes were not feasible for many years and budgets were severely impacted by the many disruptions. The effects of COVID-19, however, encouraged the GLAM sector to explore the potential for developing more meaningful engagement with collections online and recognise online audiences more fully within assessments of organisational impact.

4.3.1 Restaging Artworks

On February 10, 2023 we hosted a *Side-by-Side* display in the Swinburne University of Technology Skylounge for the launch of the project "The Australian Emulation Network: Accessing Born Digital



Figure 11 Martine Corompt, "Cute Machine" (1997) CD-ROM. Screenshot.

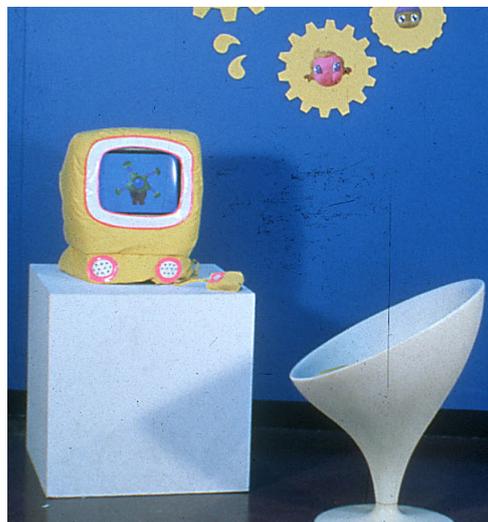


Figure 12 Martine Corompt, "Cute Machine" (1997) Macintosh computer installation. Courtesy of the artist.



Figure 13 Martine Corompt, "Activity Station" (1995) Macintosh computer installation. Courtesy of the artist.

Cultural Collections," which is the successor project to AAMA. A display of six artworks and four games running in emulation in EaaS were shown beside the works running on original hardware, from the Digital Heritage Lab.⁴ The event was designed for an audience of interested GLAM professionals, including many from partner organisations, and researchers. Curatorially, it shared the agenda of *Seeing Double*—to present and examine the viability of emulation—albeit in a less elaborate and brief display. Side-by-Side showcased the breadth and diversity of EaaS's capabilities.

Six media artworks developed for Mac OS9 were shown, alongside the emulations in EaaS running Sheepshaver. These were: Norie Neumark and Maria Miranda's "Shock in the Ear" (1998), Michael Buckley's "The Good Cook" (1998), "Haiku Dada" by Felix Hude (1993), John Collette's "30 Words for the City" (1995), "Cyberflesh Girlmonster" by Linda Dement (1996), and Martine Corompt's "Cute Machine" (1997).

Displayed in a long lineup of vintage machines with emulated versions adjacent, the event revealed at a glance the multiplicity of the legacy systems with all their unique demands and complexity. In contrast, the machines running EaaS were simple contemporary laptops. Whilst the laptop may not be the ideal device for a gallery display the contrast of this familiar and everyday technology to the mix of old computers and display systems visually demonstrated the promise of EaaS: to bring these works into contemporary workflows and work on standard computing. It was an installation designed to build confidence and demonstrate capacity to a select audience who needed to feel secure in committing their organisations to invest time and resources in digital preservation solutions.

The side by side display of an artwork running on original hardware next to the work in emulation is a standard part of our software preservation workflow. It is used to test that the emulation process has not caused any significant loss or alteration to how the work should display, sound, and run. It is used to detect issues with speed, response and the distortion of audio and graphics as well as determining if the work had any deliberate reliance on the idiosyncrasies of legacy systems such as exploiting the interlacing on CRT screens for visual effects. These considerations of the significant properties of the works would have been apparent to the professional GLAM audience in attendance at *Side-by-Side*.

⁴ Four games from AAMA's sister project "Play It Again" were exhibited at the same time, with Beam Software's Nintendo Gameboy title "Choplifter" shown alongside the emulation running in Game Boy Advance. Windows 98 game "Warlords III: Darklords Rising" (1998), developed by Strategic Studies Group and published by Red Orb Rising, was exhibited beside the emulation in QEmu. "Krazy Ivan" PC version by Tantalus for Psygnosis (1995) was also included. These games have been collected by ACMI and can be found in their catalogue. Visitors to ACMI can also access them on site using their own devices, over EaaS.

4.3.2 Art Gallery of New South Wales – Burning the Interface

Our partners at the Art Gallery of New South Wales are developing a re-display of selected works from the "Burning the Interface" exhibition, which originally took place at the Museum of Contemporary Art in 1996 and represented the first major survey exhibition of works on CD-ROM by contemporary Australian and International artists at the time. Acquired into the Gallery's National Art Archive, staff are currently working on the development of a selection of CD-ROM works from this archival collection. These works will be exhibited on a dedicated workstation running EaaS in AGNSW's Research Library and Archive reading room for researchers to access, rather than for general public display. To present these works, two emulation approaches have been considered.

The first approach envisages multiple works accessed from one emulated Mac OS9 desktop, due to the fact that many of the interactive works are CD-ROMs requiring the same Operating System. This means that in emulation, the disk images can share the same environment. This approach would require the user to navigate the Mac OS9 interface to select and load the different works. This solution includes a level of engagement with computing history as part of the encounter with these works, placing the work within a frame that may enrich understanding and appreciation of the work and its themes. It does, however, demand a level of technical literacy to effectively navigate the emulated installation and activate the original works, thus requiring more elaborate didactic information and a higher possibility of user frustration (although user frustration and lack of familiarity with computing interfaces may also be historically accurate in the display of digital art from the era). Alternatively, the emulation of the Mac OS9 desktop featuring a selection of works could be hosted in a locked down webpage within the emulated environment.

The second approach for creating the reading room display is to prepare separately configured environments to host the disk image of each work and use the EaaS HTML/Javascript embed code to create a standalone HTML web page for each. Designed to auto launch the artwork, this approach can assist the user in successfully activating the work and allows the work to be located in a dedicated webpage alongside didactic information including text, images and video. The weblinks for individual

works can be embedded into a themed landing page identifying and introducing the work as part of a curated exhibition. For showcasing the "Burning the Interface" collection, this would allow contextual information about the original exhibition to sit on this landing page alongside the interactive works. There are a number of investigations in place as to the most appropriate practice to secure webhosted work so that it remains accessible only onsite in the museum, with a dedicated reading room station considered the most appropriate in the first instance as it allows for a high degree of security.

These workflows will also be applied to the dLux *Matinaze* case study material in due course, making the artworks available for researchers to access onsite.

4.3.3 Griffith University Art Museum

To enable access to the GUAM CD-ROM collections, we installed a freestanding version of EaaS on a Linux machine. (GUAM are currently not participating in the EaaS roll out so do not have EaaS access). This resource currently hosts all eighteen CD-ROMs in their substantial collection of Australian artists' CD-ROMs. They are now accessible for curators and researchers for the first time in many years.

There were several issues in stabilising these works in emulation. Lucy Francis' "Virgin with Hard Drive" (1999) would not initially open with the version of Sheepshaver hosted in the EaaS and required troubleshooting with OpenSLX to be resolved. Troy Innocent's "Soundform" (1998) required a specific form of QuickTime (QT2) that took time to identify. It continues to have an audio glitch in emulation. This was diagnosed by the artist as occurring when an interaction would trigger four channels of sounds simultaneously; the system struggles to play all four at the same time.

The Art Museum is planning to include the CD-ROM works in their dedicated archive display portal located in the museum foyer. The Moving Image and Sound Archive Portal forms part of its public exhibitions which feature a rotating series of curated works from the Archives. Without access to the EaaS, local emulation will need to be set up to support emulation of CD-ROMs. GUAM are intending to launch the display with two works from their collection, Brad Miller's "Digital Rhizome" (1994) and Brad Miller and McKenzie Wark's "Planet of Noise" (1997).

The simplicity of the display is similar to how CD-ROM art was often displayed in the 1990s where a

conventional beige box computer and CRT monitor were placed in a discrete space in the gallery – often the foyer – showcasing work. For example, in the late 1990s, Experimenta worked with the Centre for Contemporary Photography (CCP) to develop the e-media gallery. This featured a changing series of CD-ROM works, and later online works and DVDs. In 1999 this was developed as the touring show *Click*, where a series of CD-ROM works were rotated monthly in galleries.

Interestingly, this curatorial strategy of offering an encounter with the past as a window into the collection also works much as they originally did in the day: operating simultaneously as a technological novelty – now looking backwards rather than forwards – and the opportunity to intimately encounter strange and beguiling artwork.

Whilst the locating of CD-ROM work and later net art out of the gallery in a separate foyer had been criticised by some as further ghetto-isation of media art, Christiane Paul has argued that creating a space that supports audiences spending time with the work is preferable in light of the short attention span of the gallery visitor (Paul 2007).

Some of the historic works translate better for a contemporary audience than others. Whilst the concept of interactivity and navigating with a mouse to point and click is no longer alien as it was to original audiences, contemporary users may expect a more intuitive interface design than some of these earlier experiments, which were created before the protocols of UX were more established.

4.3.4 ACMI

To exhibit some of the optical disk artworks from both Experimenta's and ACMI's collection, ACMI has made imaged artworks accessible via an onsite [online exhibition](#). Extending the experimental work to make videogames playable in the [Play it Again](#) projects, visitors can interact with significant Australian media artworks and videogames from the 1990s to 2000s on their own devices when at ACMI. The media artworks currently available to play are:

- » [Strange Cities](#), 2000, by Tatiana Pentes
- » [The Cute Machine](#), 1997 by Martine Corompt
- » [Haiku Dada](#), 1993 by Felix Hude
- » [Orchestra of Rust](#), 1998 by Chris Henschke

ACMI will continue to work with artists to make more works accessible having added 400 Experimenta titles to ACMI's database and also imaged over 80 optical disks.

It's worth noting that the artworks displayed by the Art Gallery of New South Wales and ACMI go beyond the original case studies of *Virtualities* and *Matinaze*, and indeed, in the case of AGNSW, beyond the dLux archive also. This is explained by the fact that the Gallery, seeing how the AAMA project was making it possible to access these historic media artworks, decided to also accept custody of the important "Burning the Interface" CD-ROM exhibition archive from 1996. Curatorial interest has meant that these works will be made available first, with the *Matinaze* artworks to follow.

Beyond this specific detail, we have imaged all the disks in the ANAT archive, and are well on the way to having a substantial proportion of disks in the Experimenta and dLux archives imaged, a goal that should be achieved by the conclusion of the project.

4.4 Online CD-ROM Exhibition

Currently in development is an online exhibition of Australian CD-ROM art using the capacity of the EaaSI API to embed in HTML. It is designed to profile the art and artists who are featured in the project and select others. This will be an online exhibition that aims to mirror the success that Rhizome has had in amplifying critical appreciation of media art by making it more accessible online (Rhizome 2016), and to reflect on the guerilla nature of the display of much early media artwork whose permanent presence was often unwelcome or uncomfortable in the gallery (Cook 2007; Schleiner 2003). The artworks will be embedded online with didactic information that can enrich understanding of the works and their historical significance. The exhibition is conceived as a resource for educators who may wish to foster deeper understanding of this dynamic era in Australian art history and for curators who may never have had the chance to experience this work. For permissions, we are working directly with the artists. The duration of this exhibition is yet to be determined.

CD-ROM was a transformative technology in media art. CD-ROM's larger data storage capacity (compared to magnetic media) supported fast video and audio playback. Multimedia authoring tools like Macromedia Director designed to output to CD-ROM allowed artists to create work on the computer without the need to program from scratch.⁵ The CD-ROM has a unique place in Australian art history with the prominent role that it played in the 1994 "Creative Nation" Policy which championed and funded the medium arguing "If we can compete successfully in

the CD-ROM market, the experience and skills base we gain will provide a critical foothold for the future development of content for the information highway" (Department of Communication and the Arts 1994). Artists were identified as playing a key role in the research and development of Australia's new technology-driven creative industries. And as part the Federal Government's investment in multimedia, the Australian Film Commission received \$5.25 million over a four-year period to develop experimental multi-media, via its New Image Research Program. Many artists benefited from this funding to support the creation of new work including some of those featured in the AAMA project. The CD-ROM artwork is also remarkable for the striking diversity of creators' practice. Amongst the artists we've interviewed, Norie Neumark is a sound designer and audio producer, Michael Buckley is a filmmaker, Martine Corompt is trained as a sculptor, and McKenzie Wark is a critical theorist.

4.5 Showcasing Scenes

Whereas the challenges of software preservation might draw focus to the singularity of individual works in collections, the social and cultural environment or scene that fostered the creation of a work can be just as significant to collect and display (Straw 2015). A key part of this project has also been the collection of the archives from the media arts organisations, ANAT, Experimenta and dLux that contextualise these works and situate them in communities of practice. Many of the artists represented in the AAMA case studies themselves belonged to subcultures and scenes, each with their own distinct history. VNS Matrix and Linda Dement were part of a local/global cyberfeminism movement. Troy Innocent (Cyber Data, Shaolin Wooden Men) and Don't Shoot the Messenger (Steve Middleton and Attilio Gangemi) were part of the Cyberthon guerilla broadcasts that accompanied Melbourne's rave scene of the 1990s. They used Amiga computers to generate images and animations and hacked broadcast technology to live mix the performance of these works at rave parties. Cyberthon performed live at dance parties connecting computers and cameras to manipulate digital animations, effects and capture live content. They often broadcast their performative mashups live on local community TV. ACMI in collaboration with Adem Jaffers (aka Techno Mandala) have curated an online archive of the scene featuring video of the broadcasts, photography, and interviews. It is an exciting example of the way that curatorial work around media art

⁵ Artists have often spoken in our interviews of 'programming' in Director, but this is usually a reference to using the software rather than programming the computer directly. Director used an easy to learn scripting language called Lingo, and had drag and drop capabilities for placing elements on the screen. While it wasn't necessary to write code, some artists did write code or else collaborated with programmers to allow them to adapt Director more fully to their needs..

can also address the documentation and display of historical scenes providing broader social and creative understandings for the work. Critically, ACMI and Jaffers' endeavours provide context for the work of Don't Shoot the Messenger, whose performance-based work the artists felt was better represented through documentation than by restaging it outside its original context.

4.6 Reimagining

Artist and curator Xanthe Dobbie has been exploring other approaches to the exhibition of historic media arts. Responding to the AAMA project's third aim of investigating the contemporary exhibition and re-display of historical media artworks, Dobbie's research seeks to extend the lifespan of 1990s media art by restaging and remounting heritage works. Their practice-based PhD project "Future Artefact" (2021-2023) addresses the question 'Beyond digital emulation, how can heritage media art be adapted for a contemporary context?' Working with remix and reimagining and restaging in contemporary contexts, Dobbie has explicitly interrogated the ongoing resonance and reverberations of the cyberfeminist movement.

Dobbie has developed a series of works investigating cyberfeminism that use sampling and remix. These include: "Cloud_Copy" (2021), a 360 VR installation at UQ Art Museum (Brisbane, QLD); "Real_Things", an online quiz and collection of downloadable wallpapers exhibited online for Munch Museum (Norway); "Eidolon", a single-take desktop performance/documentary commissioned by Sydney Opera House for their Shortwave program (Sydney, NSW); "The Long Now", a desktop performance and web-based installation for ACMI's online exhibition platform Gallery 5 (Melbourne, VIC); and Ghost (2022), a curated collection of works for Edition #46 of *Runway Journal*, which Dobbie guest edited that features new work by Virginia Barratt of VNS Matrix.

4.6.1 Matrix Re-Loaded

In 2023, Dobbie created the exhibition *Matrix Re-Loaded* (RMIT First Site Gallery) which placed examples of heritage media art in a contemporary context, re-staging them with accompanying public programming. Original elements from 1990s artworks by VNS Matrix and Linda Dement were installed alongside new works by Dobbie. All works spoke to the history of cyberfeminism, queerness and collaborative mythmaking, with the aim of creating an inter-generational discourse. This operated on several levels:

- » spatially with the installation of the work as historical and contemporary narratives were interwoven;
- » sonically as the sounds of heritage media washed through the space; and
- » relationally through a series of bespoke public programs which reinvigorated themes and methods used in the creation of heritage works.

Heritage works in this exhibition were remounted in their original form.

For Linda Dement's work "Cyberflesh Girlmonster", the artist worked with RMIT technicians to source an original G3 iMac, which could run the original piece on the Operating System it was created on (Figure 14). While the interactive components of the work operated smoothly throughout the exhibition, the speakers in the hardware began to deteriorate, decreasing the sound quality. This is a reality of technological obsolescence, which added an authenticity to the remounting. There is a poeticism to be found in the waning of technology. This work was officially on loan from GUAM.

The installation of VNS Matrix's "All New Gen" (1992-93) featured lightboxes with digital images supplied by the artists and the video "Beg and Jen in the Bonding Booth" loaned from GUAM. (Figure 15.) The visual assets remain striking, resonating with contemporary aesthetics, character drawings of non-binary cyborgs, softcore queer porn and battles against 'Big Daddy Mainframe' continue to hold socio-political and cultural potency.

Alongside these works, Dobbie installed a collection of their own work including a large site-specific mural "The Future is Now, but for How Long?" (2023), which drew inspiration from the work of VNS Matrix and Dement. Spanning from darkness into light, the epic wallpaper drew visual and compositional cues from VNS Matrix's iconic "Cyberfeminist Manifesto for the 21st Century" (1991) billboard and integrated conceptual crossover with Dement's work, drawing on Mary Shelley's *Frankenstein* to speak to a queer history of technology. (Figure 16.)

To accompany the exhibition Dobbie ran a series of workshops which included a cyberfeminist reading group and a collage workshop mirroring the techniques used by Dement to create "Cyberflesh Girlmonster". (Figure 17.) Its participants were asked to create nonbinary cyborg avatars like VNS Matrix protagonist GEN that will be included in a new work by Dobbie. *Matrix Re-Loaded* combined restaging of work, the reimagining of work and critical

Figure 14
Linda Dement "Cyberflesh Girlmonster"(1996) in
Matrix Re-Loaded, 2023. Courtesy of Xanthe Dobbie.



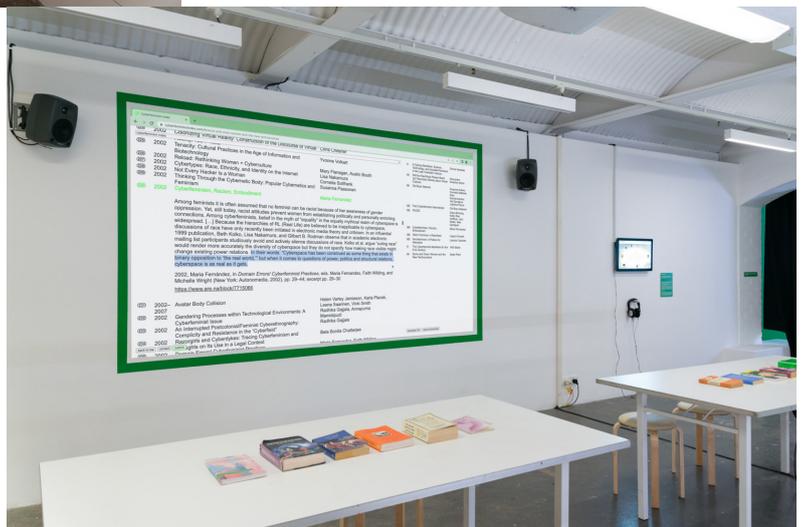
Figure 15
VNS Matrix "All New Gen" (1992-93) in *Matrix Re-Loaded*, 2023. Courtesy of Xanthe Dobbie.



Figure 16
Xanthe Dobbie, "The future is now, but for how long?", *Matrix Re-Loaded* (2023). Installation view. Courtesy of Xanthe



Figure 17
Xanthe Dobbie, "Cyberfeminism Readings Workshop", *Matrix Re-Loaded* (2023). Installation view. Courtesy of Xanthe Dobbie.



engagement with both historical and contemporary discourses of cyberfeminism.

4.6.2 Robin Fox / Stanislaus Ostoja-Kotkowski Archive

The significance of artists reengaging with historic media artworks and reimagining them within new contexts is also illustrated by Robin Fox's award-winning work "TRIPTYCH". "TRIPTYCH" – which won the 2023 "Isao Tomita Special Prize" from Prix Ars Electronica – is a work inspired from his invitation to view the Stanislaus Ostoja-Kotkowski archive at the SLSA. Fox, who works with large scale laser performances, was amazed to see Ostoja-Kotkowski's laser work from the 1980s. He was impressed by Ostoja-Kotkowski's application of a sophisticated Op Art sensibility applied to his computer-based work. In an interview with *Art in America* Fox exclaims "What's amazing is that I'd never encountered his incredible body of work before, and I've been working in the field for 20 years. It's just bizarre to me... I had no idea he made laser work, and that he was one of the first people to do laser shows." Fox's excitement on first viewing the archive in 2021 led him to pay tribute to Ostoja-Kotkowski in a statement on his work for Illuminate Adelaide Festival. This led to an invitation to speak about Ostoja-Kotkowski's work in his hometown Przasnysz in Poland, where Fox hopes to return to perform. Fox's engagement with the archive has provided inspiration that has drawn the neglected historical laser work of Ostoja-Kotkowski back into arts discourse globally.

4.6.3 Irene Proebsting and Barry Brown "Industrial Vesper #11"

Not only are younger artists revisiting historic media artworks of others, as in the Robin Fox example just discussed; some artists are very interested in revisiting their earlier works. Their motivations for doing so vary.

We mentioned Irene Proebsting and Barry Brown's Amiga disks in Chapter 3, whose Scala scripts challenged our digital archivist: she was able to partially resurrect the work, recovering the still images and the black screens (which had been where inter-titles had been located) and getting them to run in sequence, but not the inter-titles themselves. When we showed Proebsting our progress, she realised that the Scala script that we had been working with was not the final one that was shown at *Virtualities*, though it was very similar. She wrote "That Scala script disc seems to have gone missing and so the emulation that I viewed at the Lab is

an earlier version. Also a sequence of 10 archival photographs and text are not appearing in the version I saw either. We are making a re-creation with the image files you provided and also recreating text files (using the same words, but at a higher resolution) to be saved as a HD .mov file." She offered a copy of the HD version for the ACMI collection, which Candice Cranmer, the time based media conservator, was very keen to collect: "I'll also collect any notes like this [our email correspondence] that tells the story of the making and preservation of the work too." The remade "Industrial Vespers #11" will be screened at the Born Digital Cultural Heritage Now conference, to be held at ACMI in November 2023.

4.7 Virtual loans and Exhibition Infrastructure

In early 2023, an experimental inter-gallery 'virtual loan' took place using EaaS. For the exhibition *Radical Utopia* at the RMIT Gallery, three videogames created by Beam Software Melbourne House were displayed with the support of ACMI. One of these titles, "Mugsy's Revenge" – a 1985 game for the Commodore 64 – was 'loaned' using the online emulation infrastructure of EaaS. ACMI holds a copy of the work in their collection. Originally published on magnetic tape for datasette, the game was imaged as part of the 1980s Play It Again project. It was emulated in VICE within EaaS, and this emulated version was provided to RMIT gallery as an inter-gallery loan. This was an alternative to sharing the game cassette or the .tap file for emulation. Simon Loffler, Creative Technologist at ACMI, explains:

The ACMI collections team uploaded the "Mugsy's Revenge" tape image into EaaS and prepared an environment for it to run in. We then used the EaaS HTML/Javascript embed code to create a standalone HTML web page that ran the emulator centred in a black window. We deployed this HTML web page to an Azure Static Web App so it was accessible to the exhibition space at RMIT. We then used the EaaS environment_id to load "Mugsy's Revenge" in the HTML web page.

This technique allowed RMIT Gallery to simply identify a suitable computer and monitor to support a web browser for the display. No technical expertise or experience in working with emulators or heritage software was required by RMIT Gallery to host this display. In this way, EaaS is transformative as barriers to displaying heritage media art – including access to specialised equipment and expertise and concerns regarding the support of these works – are greatly diminished. In this case, any major issues with the work could be dealt with remotely.

The virtual loan from ACMI to RMIT Gallery harks back to Seb Chan's vision for how EaaS could be used in a gallery or other cultural institution. As long ago as 2017, Chan – then the Chief Experience Officer at ACMI – was keen to use EaaS to exhibit videogames. With the installation of the networked EaaSI in Australia, Chan was excited by its potential to deliver emulated videogames within the gallery, envisaging it as a means to complete a display refresh directly from the ACMI server without the need to close parts of the gallery. The promise that these works could also be supported on-line without the need to have expertise on the floor was also viewed as a positive.

The 2023 display of "Mugsy's Revenge" as part of *Radical Utopia* (2023) and the development of the CD-ROM displays for GUAM and AGNSW demonstrate that this concept of managing the display from the centralised server is feasible. As EaaSI expands to support more environments and peripherals there is the potential for it to play a significant role in gallery infrastructure. In future, EaaSI could underpin the display of software-based works in the gallery offering a nimbler and more cost-effective method of exhibiting the history of videogames, media art and the history of computing. EaaS's creators envisaged such a scenario as early as 2014, when they wrote of "an EaaSI service-provider responsible for efficient hardware utilization and concentration of technical expertise...[lightening] the memory institutions' technical workload and requirements on necessary infrastructure" (K. Rechert et al. 2014). Making it easier for galleries to host public displays of their software collections will significantly increase the opportunities for opening-up once hidden collections and encourage future investment in media art. As EaaSI can be serviced remotely, every institution is not required to invest in-house expertise to build, service and resource such displays. Furthermore, EaaSI supports working remotely with artists allowing them (if they are located where an EaaSI is supported) to view their interactive work behaving on screen remotely for content checks and approvals. In this manner, EaaSI

could become not just a preservation tool but an integral part of a gallery's system for curation and display.

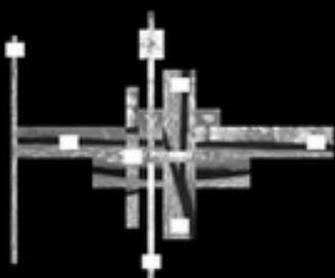
4.8 Remote Research Access

The interest generated by the AAMA project has reached beyond Australia. Since we have been sharing that we have been able to successfully emulate artworks from the case studies, we have received multiple requests from media arts researchers and curators to access historic Australian media artworks included in the project. These requests have come from New York, Germany, and California. Requests have both come directly to the research team, and via artists who have received approaches from researchers and curators. If such requests for access were only coming from researchers, we would have included them in the next chapter. However, given the interest from curators as well, we address them in this chapter given its focus on curation and exhibition.

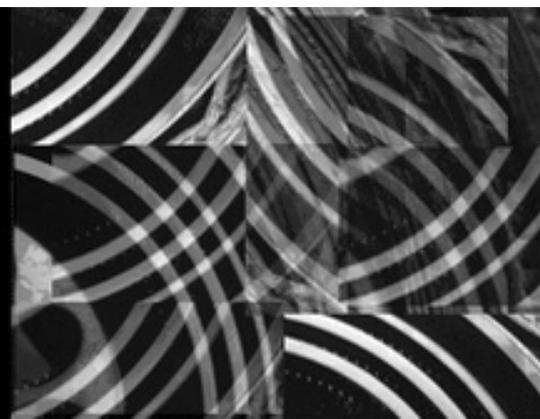
The significant distance between Australia and other continents means that lag can be an issue when accessing interactive artefacts from abroad, limiting the extent to which we can meaningfully share access with interested overseas parties, permissions aside. While it is possible for someone in another country to log on to the Australian network, upload resources and configure environments, there are slower response times when interacting with artefacts, which can be frustrating and also not give a good representation of an artwork's intended performance. However, because we have had access to the Software Preservation Network's hosted node – set up in the US in 2021 – we have been able to develop some workarounds. We detail two instances of workarounds below.

In the first instance, Marina Hassapopoulou, a Cinema Studies researcher at the Tisch School of Arts at New York University, contacted GUAM to seek access to their emulated CD-ROM art collection. We were able to log on to the US EaaSI hosted node and configure several artworks in environments, giving the researcher access to these.

Figure 18 Six stills illustrating text and images reconstructed by Barry Brown & Irene Proebsting as *Industrial Vesper #11* (reconstructed), 2023, HD Video.



PRODUCTION
VS.
DISTRIBUTION



A similar inquiry was directed to us by artist Linda Dement who had received a request from Sarah Steffens, an art historian in Hamburg, Germany, seeking to use Dement's "Cyberflesh Girlmonster" for a case study in their thesis. In this case, because there is not currently an EaaS network in Germany, with the artist's consent we shared a disk image of the CD-ROM artwork with the researcher, who was able to emulate the artwork on their own device. It is, of course, highly ironic that we were not able to assist the German-based researcher as much as we could the American-based one, as EaaS originates from Freiberg University and the team are located in Germany.

In the second instance, Dement contacted us once again after receiving a request from curators at the Los Angeles County Museum of Art (LACMA) to show "Cyberflesh Girlmonster" in an upcoming exhibition. Thinking that the work would not be able to be exhibited, the curators were originally seeking documentation from Dement to exhibit. Dement consulted with our team, and we were able to assist the LACMA staff not just with access to view the interactive on the US EaaS, but also advice on emulating the work for exhibition.

These examples demonstrate how EaaS allows individual researchers and curators to encounter

historical works with ease. In being able to interact with these works they can feel confident to bring them into contemporary discourse and to curate them into exhibitions.⁶ Also illustrated is the ease with which it is possible to work with other EaaS networks where these exist, to overcome geographical barriers to access.

A further detail enlarges on the possibilities of remote access and, indeed, collaboration. As Marina Hassapopoulou's project has developed, she has emailed us to request that we also share access to one particular 1990s Australian interactive artwork with a collaborator in California, with whom she intends to remediate the artwork, with the artist's consent. Such a collaboration not only speaks to the third project aim – to investigate the contemporary exhibition and re-display of historical media artworks, including but not limited to restaging the artwork – but demonstrates how researchers are finding innovative ways of using the emulation networks.

It is to be hoped that in the future, as more EaaS networks are set up around the globe – perhaps as "a federated series of networks" (Klaus Rechert et al. 2021) – those on the Australian EaaS network will be able to offer – and receive – the same level of collaboration with researchers based in Europe and elsewhere as we are currently able to enjoy with those in North America. For the moment, there are plenty of potential cooperative and collaborative possibilities to be explored between participating GLAM institutions in Australia.

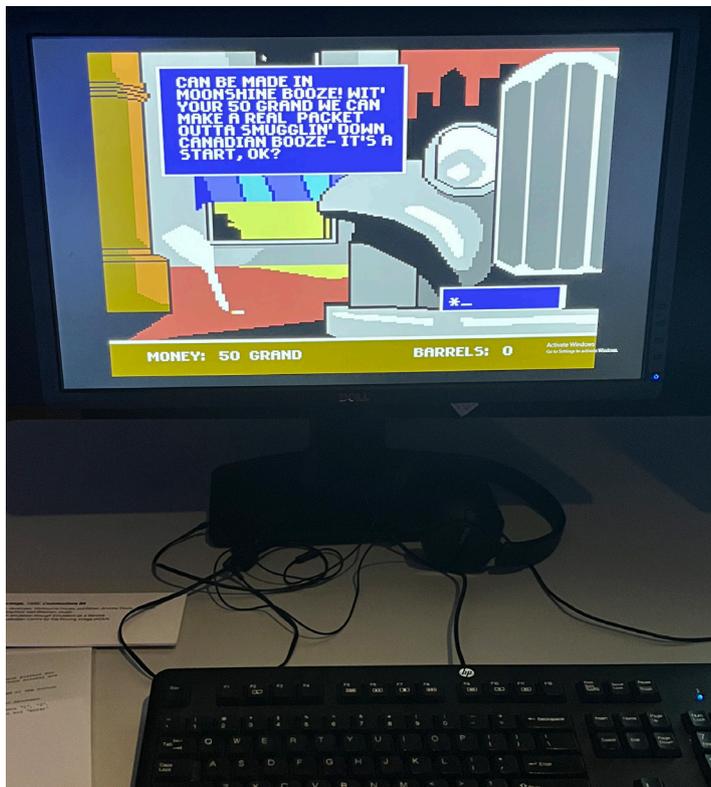


Figure 19 Setting up EaaS hosted Beam Software, "Mugsy's Revenge" (1985), *Radical Utopia*, RMIT Gallery, 2023. Courtesy of Helen Stuckey.

⁶ The lively critiques the 1990s CD-ROM artworks offer of emerging technology resonate with current debates, opening up many critical and curatorial possibilities.

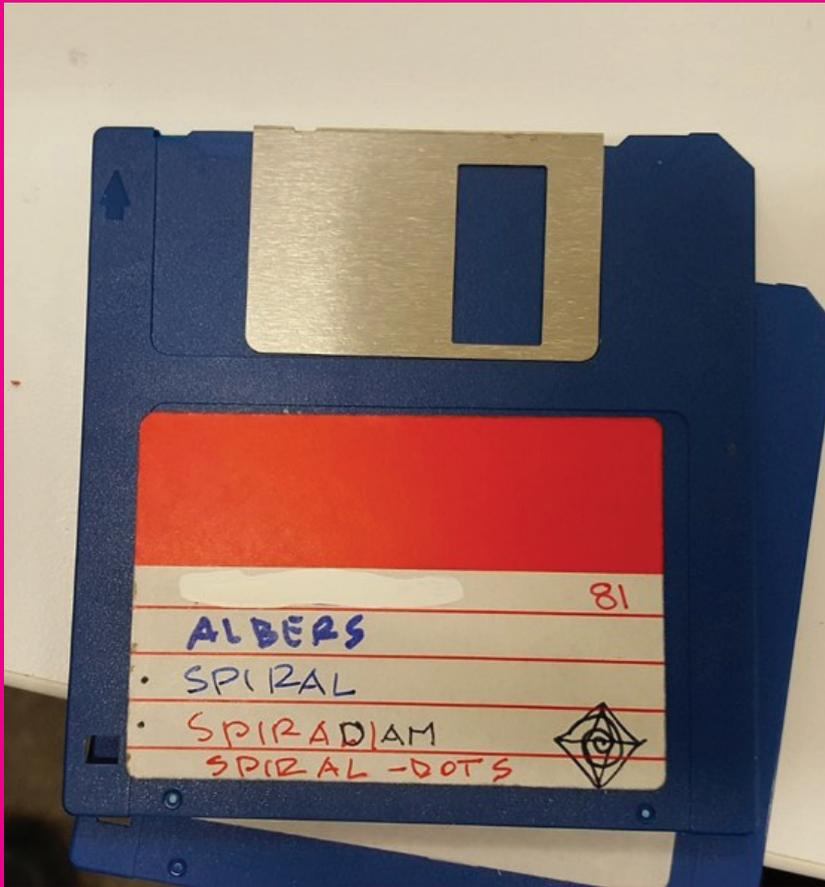
ADD
THE
TOTAL
READING
IN
HALF
MILLIMETRES



AND/OR FURTHER MORE

Chapter 5

Researching Media Arts



Stan Ostojka-Kotkowski often drew on his disk labels, coming up with neologisms such as 'Seamandel' and 'Bublebrot'. Images courtesy Melanie Swalwell.

There is often the perception that there is no media arts content held in cultural institutions. This is in large part because born digital collections are largely invisible in Australia's cultural collections (Swalwell and de Vries 2013). While the collecting of media arts has undoubtedly been hampered by the preservation challenges, it's not the case that there are no institutional holdings. At present, there are some collections of media art in public institutions, but because these are scattered across institutions, the national public collection lacks coherence. Discoverability is a challenge, because there is no Trove for galleries (Trove is Australia's union catalogue). Basically, we don't know who has what.

As we have already noted, only a relatively small portion of work by digital media artists has made it into Australian institutional collections. Typically, material has been held in the archives of organisations with no conservation resources (which are just starting to be taken into the custody of larger organisations), or in artists' own archives. And despite the publication of important local historical surveys (Zurbrugg 1994; Jones 2011; Tofts 2005), many artworks still have not been documented.

The collection and preservation challenges – discussed in earlier chapters of this report – mean that scholars wanting to undertake research with historic media arts content face special challenges. It can be a struggle to study artworks that are only ten years old. Difficulties with access mean digital media art history is frequently not taught in university curricula (Gye 2011). The inability to study and teach these artworks means that cultural memory is at risk. Artist Leisa Shelton summed the situation up succinctly in 2016: "Australia was at the forefront internationally in the development of media arts. It's not that we don't have a history and lineage, it's that we don't know it" (interview with Melanie Swalwell).

In this chapter, we focus on some of the contributions this project has made towards enabling the writing of media arts history, beyond providing access to previously inaccessible historic media artworks themselves. First, we discuss the mapping of existing holdings of media artworks in Australian collections. Second, we discuss the processing of and gathering permissions for materials contained within the ANAT collection at the SLSA, so that collection materials can be made accessible. Finally, we point out the ways that researchers – amongst them, media art historians – and collecting organisations will benefit through the EaaS infrastructure being rolled out and the greater levels of access that it will make possible.

5.1 Surveying Media Arts in Australian Collections

We conducted a survey-based study to document media arts holdings in Australian collections. Aware that this was a local knowledge gap, we sought to discover and build a more comprehensive picture of the media art held around the country in the collections of various cultural organisations. This was an extension of our view that the various collections included in this project – the ANAT, dLux, Experimenta, GUAM, and Stan Ostojka-Kotkowski collections – comprise the beginnings of a distributed national media arts collection. Clearly, we are not the only ones thinking this way (AHRC 2021).

Imagining holdings as a national collection is partly influenced by the need to collaborate on digital preservation challenges. Whilst this has long been recognised, the 2014 Mansfield et al CSIRO report "Innovation Study: Challenges and Opportunities for Australia's Galleries, Libraries, Archives and Museums" specifically made this point in relation to the GLAM sector: "Digital preservation urgently requires coordinated, national, cross-sector approaches to avoid losing access to historical digital materials" (Mansfield, T., Winter, C., Griffith, C., Dockerty, A., Brown 2014). Apart from this digital preservation pragmatism, we are also imagining a moment in the more or less immediate future when diverse collections can be rendered accessible through a single platform, EaaS, augmenting their usefulness and accessibility to researchers. Viewing holdings in terms of a "national collection" is helpful in gaining the funding for infrastructure: it is easy to understand the efficiencies and benefits of shared digital infrastructure, as we are setting up in Australia (Swalwell 2022).

What this means for researchers is that the moment is not very far away when they will be able to access an emulated digital media artwork from a collection on the West coast of the country, immediately followed by another from a collection held on the East coast, from their own computer. In a nation as big as Australia that holds considerable appeal (including the potential to make travel more efficient in a time of carbon constraint), but the potential for comparative analysis from different collections is also compelling.

Apart from the benefits to researchers of enhancing discoverability, we see significant advantages for organisations with collections in having this data on other organisations' collections. Apart from helping collections to be better understood by putting them in a national context, such knowledge also creates new possibilities for collaboration across and

between institutions. Knowing which institutions hold which artworks should usefully inform acquisition decisions, allowing gaps and any overlaps to be analysed. Even in the early stages of assembling the survey response data, the museum and gallery professionals from our partner organisations found it fascinating to see how their holdings – which they knew well – were complemented by those of other institutions.

We sent out a survey with the aim of finding out what we could about the nation's media art holdings. We wanted to know: (1) where Australian media arts holdings were; (2) how many artworks were held by Australian institutions, and (3) which media formats they were on. While this information would generate new knowledge in and of itself through addressing the knowledge gap and building a more comprehensive picture of the distributed national media arts collection, we were particularly interested to collate information that could support future research and the preservation of these artworks.

In designing the survey, we opted for a wide and inclusive definition of media arts, recognising that it is a difficult term to pin down. There is a great diversity of practices and artworks may be labelled differently by different organisations – electronic art, computer art, new media art, video art, sound art, time-based media, even installation. We also recognise there are likely to be storage media containing documentation, for example of performances. In designing our survey, and collating the data we received, we chose not to restrict our definition any further, instead telling recipients: “we're interested in all of it”. This ensured that we were likely to receive the broadest range of information possible.

We began by developing a list of institutions that were considered likely to have existing media arts holdings. Beginning with peak bodies (such as the National Association for the Visual Arts and the Australian Museums and Galleries Association), we added state and territory art galleries; public galleries; state, local, and university libraries; and Artist Run Initiatives. Ultimately, we compiled and contacted a list of 662 contacts. We also encouraged recipients to pass the email on.

We developed a dual approach to gathering the data. This was intended to recognise the variable capacities within smaller and larger institutions. For those with more sophisticated collections management systems, we asked for as much information as they were willing to provide. For those without, we created a one-question Survey Monkey (“What types of media formats do you have,

and how many of each?”). Given the project's focus on ensuring the preservation of these media arts holdings, we were careful to request only information that could be accessed without launching the media itself. That is, we were interested in the information that could be gleaned from simply looking at the media art's carrier or protective case: such as artist, year of production, and format type.

We set a cut-off date of 2010, in keeping with the project's focus on historic digital media art.

The survey was sent to 662 organisations via email. A total of 422 were either non-delivery or no response. From the remaining 240, there were 9 responses with no media art, and 44 responses with media art in their collection. At the time of writing, 15 organisations have shared their spreadsheets of media art holdings with us. This is obviously a low response rate. Possible reasons for the low response rate include that in the interests of thoroughness, we cast the net very broadly. For instance, we approached all public libraries in each state and territory using their generic email addresses; we suspect that many of these addresses might not have found their way to the most appropriate person to answer the query, and/or these libraries might not have any holdings, and/or the organisation might not have had the time to respond to such a query. In addition, many galleries are not working with an open access model of sharing information, as most libraries do. Some remain cautious about sharing their collections information.

5.2 The “Media Arts in Australian Collections” Database

The “Media Arts in Australian Collections” database was designed and built by Denise de Vries to display the catalogue records of the organisations that shared their media arts collections data with us in spreadsheet format. The data were analysed and a naming convention for field names was developed. The database was first published online in 2020 at <http://www.aama.net.au/maac>. Real time data sharing is beyond the scope of this project, but results will be added for the duration of the AAMA project (de Vries and Swalwell 2020).

The database fields are shown in Table 2.

A relational database was developed with associations between the significant features of the collected works. Figure 20 illustrates the relationships between data entities. An item of work may be in more than one collection, and therefore at multiple organisations. There may be one or more

Table 2 Fields developed for the “Media Arts in Australian Collections” database

Field Name	Description
Organisation	» The name of the organisation which holds the work
Title	» The title of the work
Acquired	» How and/or when the work was acquired by the organisation. E.g.: when purchased, donated, funds provided by
EarliestDate	» Year of earliest date of the work
LatestDate	» Year of latest date of the work
DateComment	» E.g.: undated works, multiple works dating from 1985 to 1990
Duration	» Duration in minutes of time-based works
MediaDesc	» Description of media on which the work is made. E.g.: digital video, colour, without sound, continuous loop, reel to reel tape, 16mm film, DVD, CD-ROM, Blu-Ray
Dimension	» Dimension for viewing the work. E.g.: aspect ratio: 4:3, or H: 850mm W: 600mm
Thesis	» PhD, Masters or Honours exegesis
Condition	» Condition of the work on acquisition
Copyright	» Copyright holder of the work
RelatedCollection	» E.g.: Australian art, International art
Artists	» The names of all artists credited
Credit	» Acknowledgment of gifts etc. E.g.: gift of ...
Notes	» Descriptive summary of work or artefact
Accession/Eprint/Sierra/Arch	» Organisation’s unique identifier within their collection

artists for a work and those artists may collaborate with a variety of artists on other works. These relationships enable the data to be retrieved in different data sets.

The database is searchable in a variety of ways: by artist, title, organisation, and media type. In addition, a search may be limited within a date range. The results of a search can be downloaded in csv (comma separated values) format which can be opened in most spreadsheet and text editing applications.

These different ways of searching are to assist in identifying and locating works, as well as providing researchers with a cross-institutional view of collections (in keeping with our project’s subtitle “towards a national collection”). It not only enhances discoverability by disclosing to researchers which organisation has holdings of a particular artist’s work; it also allows for analysis of holdings of

artwork by a particular artist across collections, thus enriching understanding of the diversity and depth of archival holdings.

As at 13 November 2023, there are 4,823 records of works from 15 organisations. The organisations are from all states and territories except Tasmania and the Northern Territory.

5.3 Observations on Database Entries

The MAAC database enables reflections on the types of works that different organisations acquire or have previously acquired, and the way in which these complement each other. Responses came from a mix of large galleries, city and regional galleries, university libraries, libraries, and other national collecting institutions, such as the National Film and Sound Archive. Even though the dataset is still reasonably small, we can already start to see national holdings as a sort of ecosystem where the

holdings of one organisation can provide context for another. For instance, there are six Marina Abramovic holdings across Flinders University Art Museums and the AGNSW (the focus is holdings within Australian institutions, not Australian artists). This would be useful for a performance studies scholar or curator to know.

Geographical reasons are presumed to sometimes explain why certain artists are collected by certain organisations, ie. the artist lives locally or has a connection with the organisation or an archive is gifted to the institution. The AGNSW has significant holdings of the Sydney-based Pat Larter's works (186), which the artist's husband gifted after her death (Mendelssohn, 2019).

Some artists are well represented; others not so well. For instance, there are 119 entries with Stelarc as artist. Many of these are at ACMI (which has taken his archive), with SLISA, AGNSW, University of New South Wales (UNSW) Library, Flinders University Art Museum and GUAM also holding items by Stelarc. Media artist Dennis del Favero is listed as artist on 7 entries, with holdings in 4 organisations: ACMI, Curtin University Art Collection, the University of New South Wales Library, and the Art Gallery of New South Wales. Collections that have responded also have respectable holdings between them of the work of important contemporary women artists such as Tracey Moffatt, Joyce Hinterding, and Patricia Piccinini.

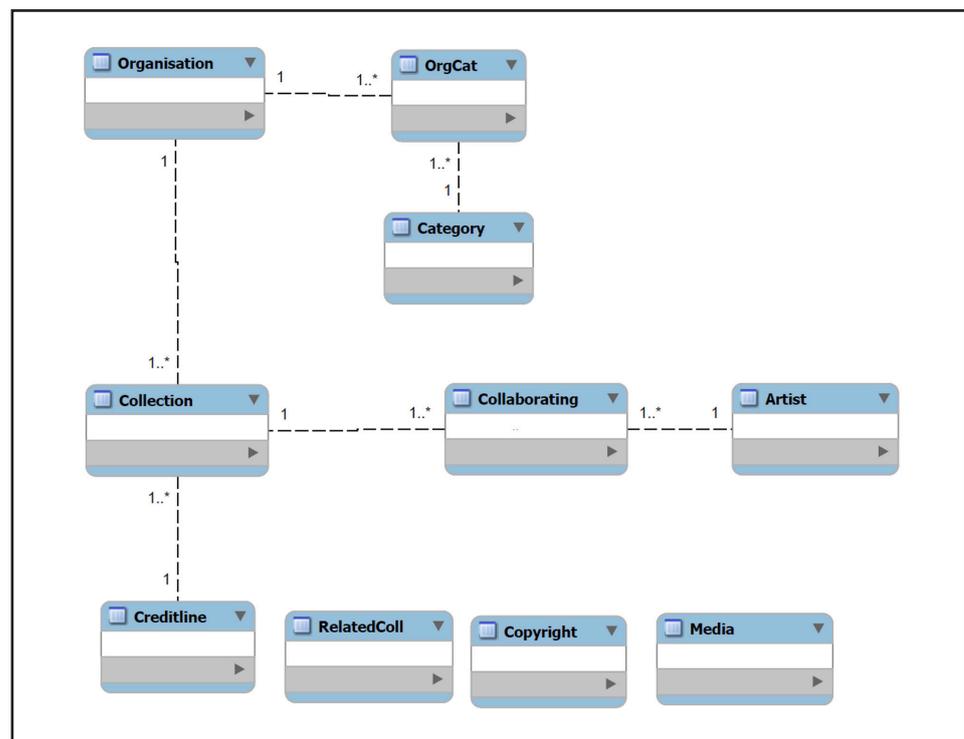
One of the reasons for undertaking the survey and building the database was to gather knowledge that could inform collecting. To do this, we need

to know if there are currently overlaps or gaps in collections. On current data, there do not appear to be too many overlaps. For example, an artist included in our study, Ian Haig, is listed as artist on 14 entries in the database across 5 institutions, with only limited overlap ("K-Rad Man" and "Astroturf" are in more than one collection). Largely, holdings are complementary with few or no overlaps, as in the case of Bill Seaman, who is collected by ACMI, UNSW Library, and GUAM. This reinforces the importance of context: that contributing to the database allows an organisation to see and have their holdings viewed in the context of holdings elsewhere. Without this, there is no way to know whether acquisitions might be overlapping with an existing collection.

It is also clear that there are some significant gaps in holdings, based on the current data. Holdings are very limited for the important cyberfeminist group, VNS Matrix, confirming their claim, cited earlier, that "very little of their work is in gallery and museum collections". While their work has been widely exhibited, their work is largely held by university galleries where it is held. Granted, many of the artists of this era were working outside the gallery system, a point that highlights the significance of the GUAM's collection and the new media arts archives now being stewarded by our partner organisations. In another example, a search for the Australian media artist Ross Gibson (who made several CD-ROMs, often with Kate Richards) reveals that only one of his disks is held, at ACMI.

Many important media artworks are not in the collection of any cultural institution. There are

Figure 20
Relational modelling for the
"Media Arts in Australian
Collections" database.



currently few Australian media artists of the 1990s showing up in the database. It is ironic, that the CD-ROMs that were printed en masse and sometimes given away by artists are not showing up in greater numbers in these collections. Perhaps this is in part due to a perception that if they were given away they were not worth collecting, but by the same logic, many people who had strong individual collections of CD-ROMs have not kept them. At the time of writing, the database has just 178 results for CD and 100 when the search is narrowed to 'CD-R'.

Net.art seems to be an area where collections are non-existent. Thinking about overseas collections of Australian media art – the Rose Goldsen Archive at Cornell University, the recent Rhizome “Internet Art Anthology” (which included VNS Matrix and Mez amongst its 100 works, running in EaaS) would seem to hold more Australian net.art than our own GLAM sector, based on survey responses at the time of writing.

Exciting from a research perspective is where an artists' holdings include an entry listed as “Donation from the Australian Network for Art and Technology” at the SLSA. Many of the artist files in that donation contain documentation. These are a treasure trove for researchers and will provide primary source materials for them to mine for decades to come. However, some well known media artists only appear in the dataset because they have donated their ANAT file to the SLSA: for example, no artworks by Anna Munster are held, but her ANAT artist file ensures she has an entry.

While it might be that collection holdings of important art movements and artists have historically been developed over the course of decades, time is not a luxury available to digital media art. Another danger is that some organisations – such as university libraries, which often collected media art on CD-ROMs in this period as it was being taught in media production and art departments – might have some of these media artworks without realising that they can be emulated, meaning these works are at risk of being deemed obsolete.

One of the impacts of this project should be to give organisations greater confidence in making existing collections accessible and acquiring new collection items. Born digital collecting is now more feasible.

Obviously, our conclusions are limited by the dataset which only represents those who responded to the survey. While we will continue to upload data to the database over the course of the research project, it is not resourced in an ongoing way

and so is time limited. The database provides a snapshot of holdings of Australian media art by those organisations that responded, at the time of their response. This is ‘proof of concept’ that a cross-institutional view of collections enriches understanding of the holdings (presences and absences), diversity and depth of collections across the nation. There is significant potential to expand the database. As more collections are included, both the confidence in the analysis and the benefits will increase. The data could be reworked or incorporated into a more substantial union catalogue in the future, and we have built the database with that in mind.

For now, researchers can access and download information, according to title, artist, media type, and the organisation that holds the work. They should then contact the relevant organisation for further information on the work and whether it can be accessed. Works may be in the process of being indexed, catalogued, and preserved.

5.4 Processing the ANAT Archive

The ANAT collection was donated by ANAT to the SLSA in 2014. The collection comprises artist files and the ANAT video library with 62 digital media disks and 289 videocassettes containing documented examples of artwork submitted to ANAT by over 250 Australian and international artists, often as part of the process to apply for ANAT program opportunities. The list of artists includes Moira Corby, Ian Haig, Patricia Piccinini, Sally Pryor, Ross Harley, Peter Morse, Robin Best, Linda Carroli, Lloyd Sharp, Peter Charuk, Di Ball, John Tonkin, Linda Dement and Stelarc to name just a few. The video library includes ANAT Summer Schools, singular video works by individual artists and collaborative works, along with multi-composite videos featuring a collection of video works by artists.

The collection was arranged and described to item level by the SLSA Archivists, with database records created containing descriptive and technical metadata. Content has been digitised, preserved and made available either in the Library, or online where permission allowed. Much of the processing of the ANAT archive was conducted by SLSA archivists, but the project team assisted with the imaging of computer disks and seeking of permissions. The various parts of the process – particularly the description of the archive and the permission process – were inter-related, owing to the necessity of being able to tell a rightsholder about the contents of a file for which permissions were being sought.

5.4.1 ANAT Disks

There were 62 digital media disks in the ANAT archive (19 data CDs, 3 sound discs, 19 3.5 inch floppy disks, 3 data DVDs, 15 DVDs, 2 Syquest Cartridges, 1 Zip disk). All but one of the disks in the ANAT collection have now been imaged (one SyQuest disk was not able to be imaged). The imaging was done in two stages: 38 disk images were initially made at Flinders University in 2014, prior to the donation to SLSA. The remaining disks were imaged at Swinburne's Digital Heritage Lab, with the help of interns. We provided the disks images to SLSA for them to examine and possibly emulate. To date, SLSA has not been a participant in the EaaSI rollout, so the Library does not have EaaSI access.

5.4.2 Permissions

Successfully imaging computer disks so that the content is stabilised is, of course, only part of the process of making born digital content available to researchers. And the ANAT archive is a complex repository containing a variety of analogue and digital materials on different types of media carrier: files can include print ephemera (letters and correspondence, curriculum vitae, and applications for funding and participation in ANAT Schools); photographic slides and prints; videocassettes containing copies of original video work and/or documentation of installation and performance works; and computer disks. There are 357 files on artists and collectives in the ANAT archive, representing the intellectual property of over 427 creators.

When the Covid-19 pandemic forced the re-consideration of the research plan, we decided to re-direct resources that had been earmarked for a survey of the three media arts collections (dLux, Experimenta, and ANAT) into clearing permissions for the ANAT archive. Archivists had begun this work soon after the acquisition in 2014; Dr Leonie Cooper was employed to continue contacting artists to request permissions from those who hold copyright in the materials, so they could be made accessible to researchers and the public.

We will be publishing a separate account of the intricacies of the permissions process, and so give just a brief account of what we did here. At the beginning of the process in March 2022, the SLSA provided an Excel sheet that contained metadata on each file (up to 'S') organised by Archival Number with information on the creators, and a 'description of holdings' with the years (or approximate) and the extent of holdings. A permissions document had

also been created – adapted from our permissions proforma – for the purposes of the ANAT archive. The document asks copyright holders to select one of four options based on Creative Commons licences that, in summary, permit the SLSA to digitise and put material on their catalogue that could be downloaded and published without restrictions, or only with written permission from the artists. Artists can also select an option that allows for material to be remixed or reused for non-commercial purposes, or request that material remain only accessible within the Library (and not online). The document offers the option of including a statement to be lodged with the material, grant permission for use on social media and for educational purposes, and allow the SLSA to store contact information.

The permissions document needed to describe the material in each file to the copyright holder/s. When the process began in March 2022, the descriptions were limited as the SLSA was still processing the ANAT materials. Describing the contents of a file sufficiently for an artist to recognise materials that could be over 30 years old – and often contained ephemera arranged for the purpose of showcasing their practice to ANAT – was an obvious challenge. Sometimes, scans of slides were shared with artists, who understandably asked to see materials to 'jog their memory'. In about 10% of the files – 45 in total – content was stored on digital media carriers and the contents of disks was unknown. These disks had been imaged but not emulated, and so we opted to export a directory listing to send to artists so they could at least know the names of the files they were being asked to grant permission for.

Permission documents were sent to 91 artists, with 65 returned (approx. 70%). Nine files are still in process, awaiting digitisation to resolve queries or requests for copies. Of the 45 files containing digital carriers, 30 of the copyright owners could be contacted. 25 files were described. 11 permissions documents were returned, with four in progress. Material for which the Library has permission is currently (or will soon be) available to access either via their online catalogue or in the Library. Holdings for the ANAT archive can be viewed on the SLSA catalogue via an "Archival Number" search for BRG 391.

5.5 EaaS's Benefits to Researchers

We discussed the potential for virtual loans and exhibition in Chapter 4, detailing the requests for access to media arts content that we've received from scholars and curators overseas. As people become more aware of the possibilities – and what is held in Australian collections, generally and also courtesy of the "Media Arts in Australian Collections" database – there will be more requests.

We are looking forward to a time when shared digital infrastructure will allow content to be accessed from across the national collection. We are in the process of building "The Australian Emulation Network", based on EaaS, with infrastructure funding received from the ARC LIEF scheme. Each participating organisation manages its own node and controls what is shared, making it possible to observe relevant permissions, embargoes, and cultural protocols. This is a model that suits the distributed collection – and the geographic scale of a big country such as Australia – very well. We expect the benefits also to flow to the collecting organisations who participate and are able to make collections requiring emulation available for researchers to access.

At the moment, GLAM organisations are typically able to provide researchers with onsite access to complex born digital collections content. Unless they have specific agreements in place to provide online access – as SLSA have sought for ANAT artists' files – that is the default position based on the Copyright Act. Future changes to Australian copyright law – as were proposed by the Department of Infrastructure, Transport, Regional Development and Communications' 2021 Discussion paper (Department of Infrastructure, Transport, Regional Development and Communications 2021) – might make it possible for collecting institutions to also offer off-site access to users. Such legal reform would maximise one of the features of EaaS, whereby access to files such as artworks can be granted without the files themselves being distributed. For researchers, it would realise the vision of accessing an emulated digital media artwork from a collection on the West coast of the country, immediately followed by another from a collection held on the East coast, from their own computer.

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Glossary of terms

ANAT - Australian Network for Art & Technology was founded in 1988. It is a nonprofit organisation dedicated to supporting artists working with science and technology through a range of programs including residencies, workshops, symposia, and publications. ANAT is based in Adelaide, South Australia.

API - Application Programming Interface. A software interface that connects different software applications allowing their systems to exchange selected data.

Applesauce - Disk imaging hardware device developed by hobbyists capable of capturing and accessing files from the majority of 3.5" and 5.25" floppy disk formats.

Basilisk - see emulators. Basilisk II is an Open Source 68k Macintosh emulator.

bit rot - A generic term used to describe data degeneration on storage media where stored data is corrupted or rendered unreadable.

disk image - A disk image is a byte by byte, sector by sector copy representing the content exactly as it is on the original storage device including both data and structure information.

dLux MediaArts - dLux MediaArts is a not-for-profit art organisation for artists working with emerging technologies. dLux is focused on the curation and touring of media arts exhibition and skills development for artists. Based in Sydney, New South Wales, dLux evolved from Sydney Super 8 Group founded in 1982 who became the Sydney Intermedia Network in 1990 before taking the name dLux MediaArts in 1998.

emulation - Emulation is a digital preservation strategy where an earlier computer hardware and software environment is recreated as a program that can be run on a current machine.

Emulation as a Service (EaaS) - Emulation-as-a-Service (EaaS) is an open-source software stack, originally developed by the bwFLA project at the University of Freiburg, now maintained by OpenSLX. It allows for emulated computing environments to be assembled, configured, and accessed via a modern web browser.

Emulation as a Service Infrastructure (EaaSI) - EaaSI is shorthand for the Scaling Emulation and Software Preservation Infrastructure program of work. The EaaSI project builds on EaaS developing the system for improved functionality, resource exchange, and Virtual Reading room services. This work is being developed in conjunction with the EaaSI Network communities in the US and Australia.

emulators - include Basilisk, Sheepshaver, DosBox. The use of software to develop an emulator that replicates the hardware environment and behaviours of an earlier computer operating system. An emulator allows old software to be run in the emulator environment on current computer systems.

Experimenta - Experimenta Media Art is a not-for-profit media arts organisation based in Melbourne, Victoria supporting artists working with technology. Its focus is on exhibition of new work originally presenting a biennial festival. It was established in 1986 as Modern Image Makers Association (MIMA) and changed its name to Experimenta Media Art in 1996 shifting its focus from experimental film to multimedia.

GLAM sector - the Galleries, Libraries, Archives and Museum sector

Kryoflux - Floppy Disk imaging hardware developed for professional preservation workflows, with sophisticated tools for analysis and broad disk compatibility. Supported by a range of training and services to support data recovery, copy protection and replication.

Sheepshaver - see emulators. Sheepshaver is an open source emulator of Apple Macintosh capable of running OS7.7.2 to OS9.0.4

Virtual machine - In digital preservation a virtual machine is a form of replicating a historical hardware system that directly accesses the CPU. Virtualization involves creating virtual instances of physical hardware, enabling multiple operating systems to run on a single physical machine. Unlike emulation, which mimics hardware, virtualization partitions existing hardware into multiple isolated environments.

VMware - VMware is a virtualization and cloud computing software provider. Oracle VMware is an example.

Appendix 1

Artworks Studied

Title of Artwork	Artist/s	Year	Case study
"A Digital Rhizome"	Brad Miller	1994	GUAM
"Basilisk and a universe of dirt"	Lloyd Sharp, "Panos Couros, Lloyd Sharp, Wayne Stamp "	1999	GUAM
"Cyberflesh GirlMonster"	Linda Dement	1996	GUAM
"East Timor Identity Resistance & Dreams of Return"	Michael Buckley	1999	GUAM
"In My Gash"	Linda Dement	1999	GUAM
"Metabody: From Cyborg to Synthborg"	Merlin Integrated Media (Jeffrey Cook, Sam de Silva & Gary Zebington)"	1997	GUAM
"OmTipi"	Dorian Dowse	1996	GUAM
"Pearls of Wisdom"	Di Ball	1996	GUAM
"Planet of Noise"	Brad Miller, Mckenzie Wark	1997	GUAM
"Sandlines"	Paul Brown	1997	GUAM
"Soundform"	Troy Innocent and Ollie Olsen	1998	GUAM
"Tales of Typhoid Mary"	Linda Dement	1996	GUAM
"The Cute Machine"	Martine Corompt	1997	GUAM
"The Good Cook"	Michael Buckley	1998	GUAM
"The Michelangelo Project"	Nola Farman	1995-1996	GUAM
"Virgin with Hard Drive"	Lucy Francis	1998	GUAM
"I Am A Singer"	Megan Heyward	1997	GUAM, Matinaze 97
"Men's Work"	Peter Charuk	1996	GUAM, Matinaze 97
"Haiku Dada"	Felix Hude	1993	GUAM, Virtualities
"[anon]"	Sol Pandiella-McLeod	1996	Matinaze 97
"Elvis Presley"	Ross Franks	1997	Matinaze 97
"EZI-BABE"	Janet Merewether	1997	Matinaze 97
"Molasses"	Ross Franks	1997	Matinaze 97
"Postcard from Tunis"	Sally Pryor	1997	Matinaze 97
"Shock in the Ear"	Norie Neumark	1998	Matinaze 97
"The Fan"	Ross Franks	1997	Matinaze 97
"The Inside of Houses"	Bronwyn Coupe	1996	Matinaze 97
"The Swear Club"	Michael Buckley	1994	Other
"30 Words for the City"	John Colette	1995	Virtualities
"Cutometer"	Martine Corompt	1995	Virtualities
"Fractil and Middlebrot"*	Don't Shoot the Messenger (Steve Middleton & Attilio Gangemi)	1995	Virtualities
"Hack"	Ian Haig	1992	Virtualities
"Industrial Vesper # 11"	Irene Proebsting & Barry Brown	1995	Virtualities
*not emulated			

LOADING...

