**Digital and hybrid archives: a case study of the William J Mitchell collection**

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The William J Mitchell archive at the University of Melbourne offers an insight into the processing and conservation of hybrid paper /digital collections. There are significant challenges in identifying received materials, in accessing their often rapidly archaic formats and in considering how to conserve these in their purposeful forms as well as native digital forms. This unexpurgated case study describes the collection and the forensic work undertaken to catalogue it and consider this as a resource for the study of Bill Mitchell through his life and development as one of the pioneers in emergence of digital tools and then digital lives, through his works directly and their production. It reports on the challenges posed by the nature of a hybrid paper/digital collection and in the management of such hybrid archives.

**William J Mitchell, digital pioneer**

When William J (Bill) Mitchell died in 2010 he left an archive of his work as a pioneer in the field of computer aided design and a leading thinker in the emergence of digital urbanism. The collection was given by his family to his alma mater, the University of Melbourne, where it was supplemented by items found in the university archive related to Bill's time as a student and visiting academic. The collection comprised hand written papers, published materials and a substantial collection of digital material in a variety of formats and media tracing the development of computer systems and tools. In order to catalogue the digital materials, an extensive forensic inspection of the media was undertaken requiring discontinued hardware to be sourced in order to use the archaic media and a software tools applied to read the bits. The collection therefore represents a distinctive case study in its intersection of subject matter (computational examination of architectural design and urban futures) as it was explored on evolving computational platforms.

Computer-aided design in architecture emerged in the 1960s with foundational work carried out at several universities and initial systems were operational by the 1970s. The field was given definition in Bill Mitchell's 1977 thorough eponymous survey, Computer-Aided Architectural Design. In the following three decades, Bill published another ten books in addition to many journal papers and articles in the popular and professional publications. Although his primary focus was architecture and computation, his publications ranged broadly. Titles included The Poetics of Gardens (1988) that was co-authored with Charles Moore and William Turnbull, The Reconfigured Eye (1992) a critical and early analysis of digital images, and Reinventing the Automobile (2010).

His career took him from Melbourne to the Yale University, University of Cambridge, University of California Los Angeles, Harvard University and finally to Massachusetts Institute of Technology where he was Dean of Architecture and Alexander W. Dreyfoos, Jr., Professor of Architecture and Media Arts and Sciences and directed the Smart Cities research group at MIT's Media Lab. Through this substantial academic career, he taught a large number of students, supervised many doctoral candidates, published very extensively including a column in every issue of the RIBA Journal (London) from February 2003 to April 2006, and was a sought-after lecturer who travelled extensively to speak on the many topics

on which he wrote. A skilful leader, he was also a visionary who surveyed the world in which we live and anticipated the impact of digital technology in many aspects of our lives; as designers offering professional services; as citizens experiencing cities; as travellers using transport; and as consumers of culture.

An erudite writer and with a keen eye, he created and kept material on a wide range of topics. George Stiny, a colleague of Bill at UCLA and MIT, noted in his remarks at a memorial held at MIT in November 2011 that Bill had a remarkable ability to convey the most complex issues in appropriate chunks "so that we could all grasp the marvel yet not be left bewildered by the technicalities" (G. Stiny, memorial address, Cambridge, Mass. November 10, 2011).

Bill Mitchell was a skilful artist and photographer. He collected the work of students across the many decades and used this with attribution in his lectures, often showcasing their emerging work. The archive is a thorough record of the evolution of early digital works in architecture and visual arts, contemporaneously documenting experiments and research that later led to standard practices and commercial applications. He used the latest technologies to produce and store the material. Working as he did at the forefront of the field, the archive documents in itself the evolution of technologies.

**The Mitchell collection**

The Mitchell collection was the University of Melbourne's first significant architectural hybrid physical/digital archive. At the time of its donation to the University of Melbourne in 2012 (?), there were no roadmaps for handling such archives nor examples to follow. The case study here tells the story of an institution encountering the complexities of a hybrid archive and the lessons learned (and stumbles taken). Given the nature of technology, this is certainly not the end story.

The archive contains an astonishing array of materials, hand drawings, transparencies, slides, film, VHS, books, manuscript revisions, printouts of emails, software, iOmega Zip disks, 3.5 inch floppy disks, 8mm Data Tapes, CD(R), DVD, audio cassette and video cassettes, the inventory of Mitchell's office at MIT at the time of his death.

In 2012 a shipment arrived in Melbourne containing one hundred 24" x 10" boxes and twenty-nine 16" x 10" boxes. Consisting of floppy discs, magnetic tapes, videos, slides, manuscripts, student work, plans and books; it was the largest archive ever donated to the Architecture Building and Planning (ABP) Library. The University's Archives was closed (it had temporarily stopped to taking in any new donations) and with the ABP Library in its temporary relocation site, there was no space to house the collection within the library. Instead, the container load was delivered to the University Library's offsite store, where it was unpacked and shelved and the librarians could discover its contents.

The University hosts many cultural collections, many that fall outside the purview of The University Archives. The ABP Library collection reflects this through the number of significant bequests from the estates of architects and alumni, of which the William Mitchell archive is a recent example. The research value of materials within the archive was immediately evident, as was their potential to attract a global audience and enable new research collaborations for the University. Any plans for processing the archive would have to consider how to facilitate access to the materials. The possibilities of bringing the hybrid

archive into the digital realm presented itself, although it was unclear how this would be undertaken, or what it would look like.

**The slide collection**

A major component of the collection are images in the form of physical slides. This arrived in Melbourne packed in fifteen boxes and was found to comprise approximately 30,000 slides. With limited resources available in the ABP library, work was undertaken incrementally. A pilot digitisation project was undertaken in 2013 aimed to establish a workflow that could be applied to the entire collection should resources be available to uncover issues which might be encountered with the rest of the collection. In 2017 an inventory project calculated the number of slides in order to understand the size of the collection and to predict associated costs, in particular the creation of metadata.

Translating the physical slide collection into digital form will make it more accessible to researchers and students. The current workflow for digitisation projects at the University of Melbourne is informal but usually follows the following progression 1 to establish copyright, 2. secure funding, 3. create metadata and then 4. undertake the digitisation work. In our first attempts to move the Mitchell archive into the digital realm, our pilot project that predated workflow conventions, the workflow was reversed (digitise, metadata, establish copyright) to fit in with staff resourcing and done at a point in time before there was any established guidelines. A library staff member began a work placement at the University's Digitisation Centre where they digitised a select group of slides. From these files, metadata records were created.

Nine folders were selected as being suited to the existing knowledge and interests of the staff member, and as a good representation of the content of the slide collection. The content of folders selected for the pilot project encompassed three areas as representative of the archive and likely to be of high interest to users: Australia (Uluru, landscapes, country, some buildings and Aboriginal rock paintings, representing a general collection), England (large garden estates documented for the book on gardens) and a design studio (representing the teaching dimension). These were selected as being aligned with the staff members general knowledge and also ways to develop the cultural, physical and theoretical descriptors.

During the pilot project, supplementary metadata was created through visual recognition and research (here the staff member's knowledge and interest became crucial). Working on a screen displaying the image and the empty metadata fields, the staff member created 4,260 records of varying levels of completeness. The selected workflow suited the task. Digitising the slides first meant that they were easier to view than in their original format, which facilitated research into their content for metadata creation.

Through this work, it was found that some slides were annotated whilst others were blank. Working with slides poses challenges; because the slides are individually annotated on the slide mount, it can be difficult to decipher not just the annotations, but what they mean, and their context to the overall collection. The scribe uses acronyms whose meaning is uncertain. When there was no understanding of the content of the slide image, a unique identifier was assigned.

Whilst labour intensive, the level of analysis required for the metadata creation also brought to the surface many of the issues involved in moving physical materials into the digital realm. Once the content started to reveal itself, it became uncertain whether Mitchell had taken all the photographs. Discussions have considered whether copyright owner for the photographs within design studio albums is with Mitchell, a studio leader, students, or professional staff from within MIT. The images of the Aboriginal rock paintings required us to seek advice from the University of Melbourne's Copyright Office regarding cultural sensitivities around publishing indigenous works. Before this part of the collection is made public each image will have to be individually assessed for cultural sensitivities.

What the pilot project made clear was that we were unable to anticipate the timeframe for dealing with copyright concerns and ethical issues. This has been lengthy and is still underway. Future work will require us to build a register to track the progression of copyright clearance. Only then will we begin to understand the complexity of this task and its associated costs.

The pilot project also raised questions to consider around how to best do this within the University. Who is best to undertake this task; is it the collection manager, the Copyright Office, or the staff undertaking the metadata creation? There needs to be a consideration of who is best skilled to identify the issues and resolve them. Does this work need to be undertaken by one person, or is it better suited to being staffed by people with differing professional expertise? Can the workflow for one section be applied to the entire slide collection or does each sub-section have its own needs?

Copyright needs are unique in each sub-collection. Mitchell's travel slides should be straightforward as presumably he took all his own photos as he was a skilled photographer. The student work requires us to establish if the copyright situation with regards to student work in the United States is the same as Australia, i.e. does the student retain the rights to their own work? If this is the case, we would have to seek permission from every student (it should be noted that from what is known of the slide collection it is often hard to identify students). Would we be required to also secure permission from the institutions where the work was created? The University administration/campus development slide collection would require us to secure permission from the institutions where Mitchell produced the work. Finally, digitising the manuscript collection would require permission from Mitchell's co-authors and publishers. The level of detail that is required in the management of copyright is very significant so an alternative approach is being considered; that is to digitise the collection and store it in a dark archive. From there, work could be undertaken in collaboration with scholars to identify high research value areas of the collection and prioritise these for copyright clearance.

As the work to resolve the copyright questions is underway, we have had to consider how to host these files. The project was conceived as requiring resources for short term storage. The reality is that it has required mid to long term storage. Future storage options would need to assess the feasibility of the digital files being accessible to University staff who need to work with the records. It would be ideal the copyright clearance process could be embedded into the metadata to track progress.

Since the inception of the project in 2013 there has been ongoing discussion about the practice of metadata creation. Metadata was thought to be the best way to create access to the collection. However, there has been a shift away from trying to create complete records to

prioritising making the digital files available and giving the user the tools to be able to curate these collections or add their own metadata.

Creating metadata for 30,000 slides is a considerable task; planning was therefore guided by exigencies: funding, the use of technology and/or platforms available, staffing and knowledge of the collection. The result of the discussions was agreement that we should place more emphasis on providing the tools to enable co-creation of metadata and identify ways to attract scholarly interest to engage with the collection that could guide priorities. A second phase was thus initiated in 2017 that created an inventory capturing the following details: box number: folder name: sheet number: number of slides. Seventy folders were counted, revealing 2,385 sheets of slides and a total of 29,465 individual slides. The inventory revealed the themes of travel, studios, student work, manuscripts (articles, books and book chapters), university administration and campus development.

The images give insights to Mitchell's research interests and intellectual explorations. The travel images are eclectic, reflecting Mitchell's many journeys; the largest sections are of China and USA. Dates on the slide mounts extend from 1982-1985, although not all slides have date stamps. The USA collection has a duality to it which is intriguing; alongside built structures and landscapes, Mitchell photographs patterns made in nature. There are also folders from trips to Singapore, Fiji, Mexico, Australia, Israel, Morocco, Spain, and Japan. The studio collection charts the progress of Mitchell's teaching. For example, there are twelve folders which document the iteration and development of the design studio 'Palladio'. Through the names you can see that the Mitchell took the studio subject Palladio from UCLA, to Harvard, and then to MIT. The student work slide collection inventory reveals little of the content. The descriptions provided are frustratingly sparse.

The folders of design studios and student work are anticipated to have significant research value. This part of archive is known to contain images of computer generated works over decades, charting the intellectual endeavour, design approaches and development in computational technology and evolving computational platforms. The programs from which these are generated may be on the digital media (described below) but are likely to be lost, so these images of the outputs may be the only records that trace an important history of computation in design.

**The manuscript collection**

The manuscript collection consists of eleven boxes of materials related to Mitchell's book manuscripts. Several projects have been undertaken on the manuscript collection. The priority for these projects has been to ensure the physical preservation of the materials and has attracted student volunteers with an interest in cultural collections and conservation. Five students under the Cultural Collections Projects Program, a twelve-week volunteer placement program, have worked on two of the publications – *City of Bits* and *Poetics of Gardens*. Inventories of these collections were created along with notes on condition and storage to assess their condition and recommend action such as rehousing. Mitchell's published books became a reference resource for the students working on both projects.

Students working on the Poetics of Gardens began the project by using a spreadsheet developed at University of Melbourne Archives. The variety of formats of the materials of this collection ('B&W photograph of negatives printed on Kodak paper', 'B&W photograph of negatives', 'Printed CAD (?) illustration', 'Drawing on paper', 'Drawing on paper,

photocopy', 'Transparency', and 'Digital surface elevation model – topographical') meant it had more pressing and obvious conservation issues. Rehousing was necessary as the size and condition of the materials varied widely.

The City of Bits collection consists of photocopies, printouts, newspapers and articles. The student rehoused and labelled each document with a number. This numbering system maintained the order in which they were found in the boxes in case that was significant in any way. The details collected included keywords or handwriting notes. The student also made notes when creating the inventory that give a quick synopsis of the content, e.g. 'A printout of an email to an email list regarding the internet, with questions about the NSFNet ceasing to exist and what this means for the Internet.'

Within this collection are printouts of three hundred and thirty-seven emails (roughly 30-40% of the entire collection). The significant number of emails in this archive shows an attempt at curation, foresight, and/or possibly an out of date practice. Finally, there are annotations made by either Mitchell or researcher for the book, Anne Beamish.

These annotations offer the researcher an insight into what was of interest to Mitchell and his colleagues. There are two hundred and eighty-nine instances of keywords, and ninety distinct keywords. "Telecommuting", "Games", "Cities", "Electronic Funds Transfer" and "Internet" are the most often used keywords. "Gender", "Communication History", "Telecommunications", "Privacy", and "Telephone" are the next most commonly found keywords.

**Film/video collection**

Inside two of the boxes that made it to Melbourne were one hundred and twenty-five films/videos in VHS format. In a first attempt to make a record of this collection, the films/videos were photographed as they sat on the shelves at the library's store. Some of the titles in this collection suggest the breadth and historical importance of the material, such as *CAD at Nikken Sekkei* 1987, *Prof. William Mitchell "Globalization of Design"* Date: 25/01/2002 and *The Graham Foundation presents E-topia: Telecommunications & the City of the 21st Century*, undated.

In February 2017, a researcher identified the tapes she wished to view but then had to locate a working VHS player on which to view the recordings. As the University begins to divest itself of the machines that support obsolete technologies, the ability for researcher to work with such formats is becoming more limited. Digitisation of AV by 2025 is the recommendation of the National Film and Sound Archive as tape that is not digitised by then will be 'most likely lost forever' due to diminishing system support and technical skills [1]. More of these challenges are discussed below in this chapter.

A more thorough list of titles of the film/video collection has been created by the researcher. The next steps are to undertake a preservation assessment and digitise videos where preservation needs are greatest. Changes to the Copyright Law in late 2017 allows for a digital copy to be made for preservation purposes. Once digitised, the next stage will be to analysis the collection for areas of high research value, and work to obtain rights to enable

[1] Deadline 2025: Collections at risk (2015) National Film and Sound Archive https://www.nfsa.gov.au/collection/curated/deadline-2025

open access. A key selection priority would be for original materials that had been created by Mitchell or where he had been the subject. Decisions must be made as to how and where to store these files whilst this work is undertaken. Ideally, any technological solution would allow researchers to add metadata to the files to expose the content of the collection.

**Personal library- books, collected journals and other work**

Mitchell's personal library collection when unpacked amounted to fifty-seven shelves of books. Processing this volume of material had to be undertaken onsite at the store. A student of the Faculty was employed to create an inventory database using the ISBNs to minimise manual handling and create an efficient workflow. One thousand seven hundred and forty-seven records of the 2,331 items were then created by using the ISBNs to generate data from the Library of Congress catalogue. Additional notes were added to the excel spreadsheet, e.g. 'unopened', '2 copies', 'and 'Signed by Duvvuru Sriram'.

The approach to generating the list was rough and ready but had the advantage of quickly documenting the collection. Since then a second version of this database has been created using the reference management software, Zotero, harvesting richer data via their inbuilt ISBN feature. As the software develops, there are greater possibilities for enhancing and sharing the database records. Future work planned involves further analysis of the subject coverage of Mitchell's Library using APIs and analysis tools.

As the work with Mitchell's Library already required manual handling of the items, in this reconceived workflow we would use a mobile phone camera to quickly document any annotations, attaching these images to the records in the database. This additional element in the database would allow future researchers to access to these images, offering them a better experience than reading a transcription of the annotation.

Working towards the hybrid archive we plan for interactivity with the archive - building new ways for the researcher to interact directly with the digital elements of the archive and add their own annotations. In this reconceived project, we will investigate technological and cultural ways to engage researchers. Through accessing the images within the database, the researcher can see the original inscription/ annotation deciphering it for themselves and ideally, they would be able to add their description of the annotation into the database.

**Born digital collection: the need for digital forensics**

Thirty-one CDs, fifty-two 8mm data cartridges, two hundred and thirty-six discs, and three reels of file were delivered, comprised of a range of media and dates when created (as determined by inspecting the data stored).

| Type | Number | Date Range |
|---|---|---|
| **iOmega Zip disks** | 103 | 1995-2001 |
| **3.5 inch floppy disks** | 242 | 1985-1993 |
| **8mm Data Tapes** | 49 | Unknown |
| **CD(R)** | 34 | 1992-2003 |
| **DVD** | 2 | 1999-2003 |
| **Audio Cassette** | 3 | Unknown |

This portion of the archive presented particular challenges. Magnetic and optical media are subject to degradation and corruption over time, especially if they have not been stored under proper archival conditions. Left untreated they will continue to degrade until they are completely unreadable. The process to rescue and preserve the contents of the media involve a number of steps outlined in the data curation workflow we have developed (Figure 1). One technologically challenging part of this workflow involves capturing a digital 'image' of each disk or media item. A digital image is a single file that can store the entire contents of a physical disk including files and structural information.

For the Mitchell collection we utilised a system called the Forensic Recovery of Evidence Device (FRED) to create disk images. The FRED system is more commonly used by police and other investigators to preserve a trail of digital evidence in criminal or civil proceedings, but is now being used in an archival context, where it is used to preserve both the original disk contents and the metadata associated with disks and files. An important part of the system is the write-blocking hardware that ensures that any disk or media connected will not be written to and will therefore be a true bit-for-bit copy of the original. Once the identical copy has been made, further curation work can be done on the digital copy instead of the fragile original item.

As an innovative thinker, it is not surprising that Mitchell was an early adopter of technology, and in particular Apple computers. The Apple Macintosh was first released in 1984 and was particularly suited to visual and design tasks through the innovation of a graphical user interface and mouse. The Mitchell archive contains almost exclusively Apple formatted floppy disks and software from the mid to late 1980s.

Early Macintosh disks are particularly challenging to preserve as they use a filesystem called HFS that is not readily readable by modern computers. In order to read these disks an additional piece of hardware called a Kryoflux was required to act as a bridge between the floppy drive and the FRED system. The Kryoflux has been developed by the software preservation society to enable the preservation of older magnetic media. It does this by creating a raw bit stream from the disk that can then subsequently be processed to create the disk image. In this way, many different filesystem types can be accommodated. The Kryoflux was able to create disk images successfully from nearly all of Mitchell's floppy disks.

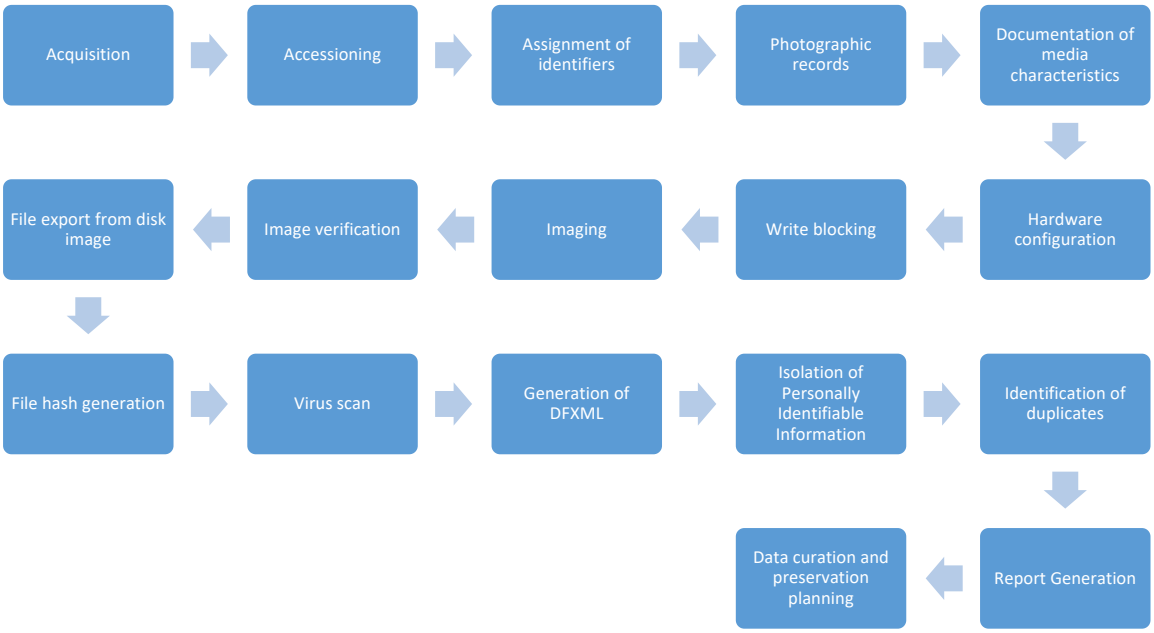


Figure 1: Data Curation Workflow

From the mid to late 90s, iOmega Zip disks were the removable media of choice mainly due to their much larger storage capacity and Mitchell used more than 100 Zip disks up until 2001. Zip disks present their own digital forensic challenges when it comes to creating disk images. Working Zip drives are no longer sold and sourcing working second-hand Zip drives is becoming harder and expensive, especially drives that connect through modern USB interfaces. Also, because of the age of the technology, the drives were unreliable and would sometimes fail under continued use. Processing over 100 disks put quite a strain on the old drives and we needed to replace the Zip drive twice.

A potentially large cache of material in Mitchell's archive is present on magnetic tapes although this material has not yet been successfully processed. The required tape drive was purchased and initial tests show that data is present. However, without knowing the parameters used when recording the information on the tape, it is not straightforward to extract the data. We have tried all of the commonly used configurations, but none of these have yielded results – this is a work in progress.

All the successfully recovered disks had their contents loaded and indexed using the Forensic Toolkit (FTK) software. FTK can load disk images and identify and extract known and unknown file types on the disks. Having all of Mitchell's digital media in FTK meant that the collection could be viewed as a whole, timelines could be established and duplicate files identified. It also allowed powerful searching across all files to identify those of potential interest to scholars.

Copying the files off the disks is only the beginning of the story, we also need to understand the contents of the files and work out how the files can be preserved on an ongoing basis. This is not such a problem for simple file types such as text or data files that can still be opened with modern programs. However, many file types are too old to be opened by modern software. Even some ubiquitous programs like Microsoft word are not backwards compatible with files this old. In order to open and preserve these files, one option is to migrate each file to a newer or more preservable format. Usually this will involve creating a version that uses

an open standard, such as PDF for documents, or CSV for spreadsheets. However, this kind of migration is not always possible. There may be no modern equivalent open standard, or the system or software might be so old or have a very small user-base and there is no migration path. In fact, many of Mitchell's files represent source code and original software that was experimental and has not been developed on an ongoing basis. They represent a snapshot in time of Mitchell's work process during this period. In the case of bespoke software like this, one option is to find a computer from that era with the right hardware and operating system capable of running the software. An alternative is to run an emulation of the original computer (an emulator is a program that recreates the original computer environment on a modern computer).

Finding and running older hardware is unlikely to be viable in the long-term; second hand computers are becoming harder to find and more and more expensive as their scarcity value increases. A more sustainable option is to run virtual machines that can emulate the processors and operating systems of older Macintosh computers. There are many emulators written for Macintosh system and we have successfully run some of Mitchell's earliest computer programs. Emulation as preservation strategy is advantageous as it allows us to focus on preservation of the container that runs the emulator. By preserving the emulation environment, we can theoretically preserve and access any file or program written for that environment. The downside is that the emulator may not work as well as the original. It needs to be tested comprehensively to make sure it is running the software correctly. We are now investigating how to run a web-based emulation service to provide access to this material.

Building this digital forensic capability at the University of Melbourne has allowed us to apply what we have learnt to subsequent digital collections – most notably the Germaine Greer archive. The Greer archive was acquired by the University of Melbourne in 2013 and contains just under 600 items of digital removable media including floppy disks, CD-Rs and USB sticks dating from 1985 to the present as well as a number of whole computers. Like Mitchell, Greer was an early adopter of technology. On the whole, Greer's files were more straightforward to read and extract, however there were still some unique challenges. Her word-processing software on her earliest IBM computer was quite obscure and saved files in a non-standard way. Like Mitchell, she adopted the Apple Macintosh as her computer of choice soon after they became available. By using the same workflow and technology that had been developed during the Mitchell project, we were able to successfully process all of Greer's legacy media. The Greer archive is also a hybrid of analogue and digital material and presents the same challenges of linking this material together.

Because of the interest in recovering data from legacy media, we are now extending this service to the wider University community through a self-service forensics machine based in the University's digital studio. Staff and students will now be able to use this facility to recover material from their own digital archive to prevent potentially important digital files from being lost forever.

**Conclusion**

The William J Mitchell Archive is a significant investment by the Faculty which is partnering with the library to make our first foray into recovering digital information from obsolete media and making it available to researchers. The project aims to emphasises digitising original materials when there is a research priority to do so, consider how the researchers can

discover connections and understand the archive, be responsive to researcher needs so technologies, tools and platforms are investigated and trialled per needs.

This case study illustrates that processing a hybrid archive in this context is necessarily about accessing expertise and building collaborative relationships as much as it is about resourcing, funding and project planning. At this point, the authors would like to acknowledge the staff who have contributed to the work done on the archive.

Because of the scale and diversity of the collection, the aim in this hybrid archive is not to digitised everything at once and consider the project complete, but rather to constantly adapt and rethink the way the materials are being presented as we gain greater insights to the contents and their potential uses.

After four years of work, the work of processing the archive and moving it into the digital realm is still in progress. While the University has well established roles, processes, and funding for physical infrastructure projects such as buildings, the construction of a digital archive is not something well understood. The University has a long history of developing significant collections however is still relatively in early days for digital archives. Since receiving the archive, the librarians have been involved in initiatives to establish workflows, access expertise within the University and build capacity for developing digitized collections. However, practices are being tested and there are still many unknowns.

This case study has outlined the approach taken with the Mitchell archive and plans for building a digital presence. The challenges outlined give further thought as to how institutions can engage with technological solutions, resourcing, how to fund the activity, and what to prioritise.

The work done to date on the Mitchell Archive has divided the archive into small subsections, taking advantage of scholarly interests, fluctuating resource levels and the availability of professional expertise. Projects have been developed around Mitchell's personal library, his manuscripts, and his collections: slides, film, and digital media. This approach has had the added advantage of resourcing the smaller projects and learning lessons fast. The alternative of attempting to create one giant project to cover the entire volume of materials and the incumbent issues that come with each format would have had a very different outcome.

We are also challenged to consider how a collection might be prepared for archival purposes. What materials should be packaged up? Should paper and digital duplicates be included? Should you have the foresight to pack along with them the software packages? Should old hardware be included in case they are difficult to source (and what about the cables)? How should the collection be described, for example to reduce the need to forensically inspect each piece to determine its presentation. The appraisal criteria for such collections have not yet been written.

With so many unknowns, it would have been very hard to build feedback loops into a large project and be responsive to them. Through the smaller dissected approach, many people have been drawn in to be involved with the Mitchell archive, bringing their professional expertise and enthusiasm for the project. Understanding the requirements for each smaller project has evolved out of an understanding of the characteristics of the physical materials or

the born digital component and in thinking of way the researchers can discover connections and understand the archive through providing digital inventories.

**Acknowledgments**

The project has been a collaborative effort and we wish to acknowledge the many individuals who have contributed to the project from a number of organisations. Most importantly, we recognise that the opportunity to work on this collection was offered to us by Jane Wolfson, Bill's wife, when she asked if we could care for the archive. Jane has been readily available to assist in several aspects of the relocation and organising of the archive. Within the University of Melbourne, colleagues from Collection Access and Delivery, Copyright Office Digital Scholarship, Faculty of Architecture, Building and Planning – in particular colleagues in the Architecture, Building and Planning library, University of Melbourne Archives, and the University Digitisation Centre have all contributed key knowledge, procedures and effort to enable the work. We also recognise the contributions from the RMIT University design archives and State Library of Victoria, Picture Collection.

**Author Bios**

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**Peter Neish** is the Research Data Curator, Digital Scholarship at the University of Melbourne. He works across the University in partnership with researchers on a wide range of data management projects. He has interests in data management training, planning and data forensics. The University's data forensics lab, which Peter leads, won the 2016 VALA Award. Peter has previously worked at the Victorian Parliamentary Library and the Royal Botanic Gardens Victoria, using his background as a researcher and computer scientist to make databases and information more available, standards-based and linked. He has contributed to national and international data initiatives and transfer standards.

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