Melbourne School of Design Building Archive: a unique learning resource

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Abstract: The construction of the new Melbourne School of Design (MSD) Building offered a unique opportunity to capture and document the entire building design and construction process. Documentation was collected from every stage of the project, from the initial design competition held in 2009 to data generated during the current operational phase. This information has been captured in the Melbourne School of Design Building Archive and made available to staff, students, researchers and the broader university community in order to provide a comprehensive resource for future teaching, learning and research. The archive contains tens of thousands of images, documents, drawings and other items of information generated throughout the life of the project. The aim of this paper is to describe what was learnt from the process of creating an archive of a building project in real time. The major challenge as well as greatest opportunity faced in the process of archiving the project was the live nature of the project. The archive represents an important resource that very rarely exists for building projects and its establishment and the processes involved can be seen as a useful model for the production of similar resources for other building projects in the future.

Keywords: Melbourne School of Design; building archive.

1. Introduction

The University of Melbourne's new Melbourne School of Design (MSD) Building was completed in 2014 and represents a unique example of a 'Living and Learning' building. The building's design creates a pedagogical resource for students and visitors alike. Elements of the building that would normally be hidden have been left exposed, including services and structural elements. This enables the building to be used as a teaching resource, with students not only learning within the building but also from the building itself. This pedagogical approach to the building's design is supported by a digital archive documenting the building design and construction process The development of this digital archive was guided by an archival documentation strategy (Samuels, 1992) geared to meet the pedagogical requirements while not compromising the underlying principles of archival practice. These principles

focus on the documentation of the operational context surrounding the creation and initial uses of the records with the goal that they will be interpretable by those not involved in their creation, especially those in the more distant future, or those from different cultures. The documentation of context results in a contextual information framework identifying all the major agents (people, organizations, activities, events, stakeholders etc.) and the relationships between them. Importantly, the contextual information framework enables the documentation of change through time.

This paper describes establishment of the archive through the collection of born-digital material from a range of sources and discusses the major obstacles encountered. From the perspective of archival science, this project pushed the bounds of conventional practice by purposefully collecting records and documenting the creation of a new university building as the building's design and construction unfolded. As a rule, archival processes are enacted once an activity is fully complete. The paper utilises an autoethnographic research method (Ellis *et al.*, 2011) to take a close look at how this archive was produced and how the challenges and opportunities that arose were addressed.

2. Melbourne School of Design Building

The new Melbourne School of Design Building, located at the centre of the University of Melbourne's Parkville campus, is a state-of-the-art academic facility, designed by John Wardle Architects (Melbourne) and NADAAA (Boston). A large-scale laboratory for built environment education and research, the building sets a new standard for design education in the Asia-Pacific region. The project commenced in 2009 with an international design competition. This was followed by the demolition of two existing buildings and construction of the new building from early 2013 until August 2014 (Figure 1).
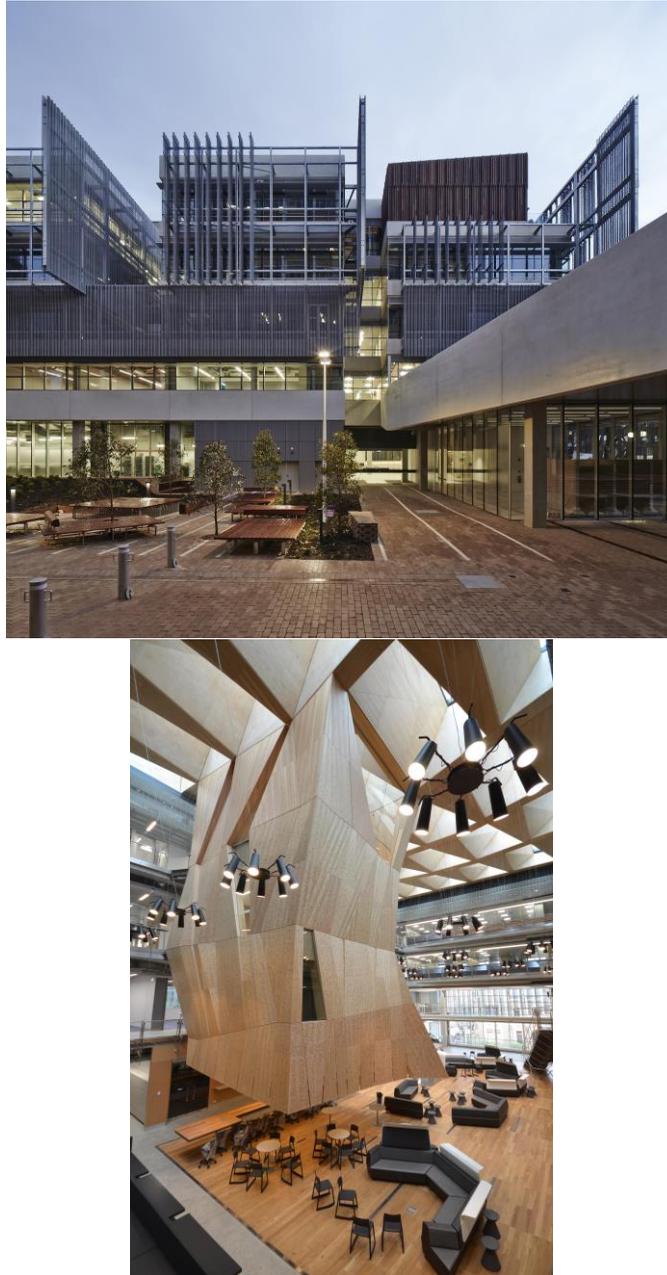
Figure 1: External and internal view of the MSD building.
(source: Peter Bennetts (L) and Peter Ashford (R) (2014))

2.1. A pedagogical resource

Construction projects are one of the most complex human endeavors. They also offer an ideal opportunity for learning and knowledge development that can be used to inform future projects and educate construction industry professionals to help improve the building process. However, the tight budgets and timelines on most construction projects allow little scope for documenting the material to allow learning and creating knowledge both during and after the design and construction process.

Two of the key design drivers for the MSD building project were 'The Living Building' and 'Built Pedagogy'. This focus very rarely exists in building projects and allowed an opportunity to capture knowledge and learn from a real-time project for future use, expanding the broader industry knowledge base of building design and construction processes, especially in the context of an educational building.

In relation to 'The Living Building' focus, it was envisaged that the building would '…act as a laboratory, providing opportunities for staff and students to control, adjust and monitor environmental systems such as sun-shading or natural ventilation'.

Central to the pedagogical approach to the new MSD building was the development of knowledge of the processes, issues and challenges associated with its design and construction. The material generated from the building project, documented in the MSD Building Archive (2015), provides a useful resource for understanding these aspects and allows a comprehensive insight into the building development process. Although the material was mostly generated by parties external to the university, the Faculty of Architecture, Building and Planning (ABP) aimed to create a learning resource, while at the same time meeting the key design objectives for the new building – The Living Building, and Built Pedagogy. This context needed to be strongly considered in creating the digital archive.

The subsequent documentation strategy, which focused on the construction process, was influenced by Samuels' (1992) functional approach to documenting the activities of academic institutions. In her analysis of American university archives and their records appraisal (inclusion) policies, she outlined seven high level university functions. Only one – the governance and administration function, serving to sustain the institution – had to that point been considered generally as defining the collection policy of a University archive. Samuels was controversial in challenging conventional wisdom. Her view of the university as an organism evolving and adapting through time supported the use of social science techniques to plan a documentation policy, including the collection of entirely external (non-institutional) material (Cook, 1994, p. 396).

3. The MSD Building Archive project

The MSD Building Archive project involved capturing, collating, organising and documenting as much of the material generated from the design and construction of the building project as possible, as the project unfolded. The aim was to make this material available and easily accessible to the broader university community for teaching, learning and research purposes. This would ensure that this living and learning building could be used as a resource indefinitely into the future, even well beyond the life of the building itself. As most of the records or information objects created as a consequence of the design and construction process were digital, the focus of the archive project was on the assemblage, documentation and curation of the digital materials. The management of the paper surrogates of the records was deemed out of scope for this project although it is acknowledged that some of these records may contain valuable annotations and be a more accurate record of what actually transpired on the building site.

3.1 Project team and stakeholders

In June 2012, before the demolition of the existing buildings, the Faculty of Architecture, Building and Planning asked the University's eScholarship Research Centre (ESRC) (2015) to assist in archiving the information and material created as part of the MSD building project.

The ESRC, established in 2007, has a research agenda and practical experience focused at the junction of archival science, social and cultural informatics and the humanities. Up until this project the Centre addressed the challenges of documenting records to create archival collections after their operational use had been served. The major risk here being the lack of access to personnel involved in the project with intimate knowledge of the story of the records. The creation of the contextual information framework in which to situate the records was done after the fact and contingent upon the records that survived. Archival work in this context was more akin to archaeology with a happenstance salvage aspect. For the Centre, archival projects involve the two distinct but entangled processes of documenting records and documenting context. To enable this, the Centre developed two related but independent electronic systems, the Heritage Documentation Management System (HDMS – for documenting records) and the Online Heritage Resource Manager (OHRM – for documenting context). As the MSD Building Archive project was running concurrently with the design and construction process and records were being generated in multiple places, the OHRM, with its more flexible open network functionality, was selected as the primary focus for the MSD Building Archive with the goal of documenting the context of the project as it happened rather than after the event.

Other stakeholders and collaborators included The University of Melbourne Archives and the University's Records Services, who provided advice on appraisal and present and future storage of the digital material. ABP were designated as the owners of the material from the design and construction process and provided copies of the digital material to the ESRC. The original sources of these resources included ABP itself, the builder Brookfield Multiplex, architects NADAAA and John Wardle, and university staff, who contributed thousands of images.

3.2. Scope of data assets

The resources contained within the MSD Building Archive cover every phase of the project, from the initial design competition, to the design process, pre-construction activities (demolition of existing buildings, services redirection, propping of an existing heritage façade and asbestos removal), construction and post-construction. All the material provided to the ESRC for archiving was in digital format. There were a range of resource types provided, including images, videos, sketches, drawings, documents, presentations, WebEx screenshots, renders and data. The archive also includes images of the previous buildings in which ABP was housed (Architecture and Old Commerce buildings).

3.3. Archives and records assumptions

There are various attitudes that are considered in this paper and frame the following discussion. Firstly, the traditional and narrow view of archivists in the academic context, according to Samuels (1992), had been that universities exist to sustain themselves as institutions and that the selection of records only needs to support that function. This is a perspective inherited from government archivists who tend to operate on the assumption that only a small percentage of records created during day-to-day operational activities has value in the longer term and are worth the investment of archival documentation. This assumption dates from pre-digital archival practice and was partly driven by the

limits of physical storage and the budgets available for manual documentation activities. However, this view reflects a bureaucratic perspective and does not take into account alternate perspectives and value propositions, for example the specific needs of the MSD Building Archive. While the advent of digital technologies and their use in records creation processes has opened up possibilities for more extensive archival collections, as a rule archival policies and practices are still dominated by a pre-digital mindset.

Secondly, at the other extreme, the advent of the digital world has created a general community sense that it is possible to keep everything, that a 'Google' style search will allow users to easily find what they are seeking, and that those materials and their supporting systems will be miraculously preserved into the foreseeable future. Sadly or perhaps fortunately, this knowledge utopia has failed to materialise. The digital world has significantly disrupted managed and effective record-keeping practices. For example, the ease of duplication and sharing via email of other means has led to massive duplication of materials across multiple distributed environments. In this world a Google style search is likely to reveal vast numbers of de-contextualized copies. Assessing the value and meaning of any particular record has proved to be problematic.

The pedagogical purpose of the MSD building meant the archival record of the design and construction process had to be, as much as possible, the whole record and the capture of the project materials needed to occur concurrently with the design and construction process to optimise the capture of related contextual knowledge through direct access to people and systems. This entanglement of the archivists, records managers and architects in the documentation and preservation process from the outset meant that the diversity of assumptions and understandings of what the archival process actually involved had to be confronted.

3.4. Systems for data capture

The Online Heritage Resource Manager (OHRM) system and methodology were selected to develop the MSD Building Archive. The OHRM utilises relational database technology and is capable of producing a range of standards-based dissemination formats including xml and html. The OHRM has been used to make online encyclopedias or registers, and manage related information from archival, bibliographic, audio and video sources, as well as photographs. Data is captured in the OHRM to document entities (primarily people, organisations, concepts, places and events) and resources (information objects and cultural artefacts) based on archival and related cultural informatic standards (International Standard Archival Authority Record for Corporate Bodies, Persons and Families (ISAAR (CPF), 2011) and Encoded Archival Context for Corporate Bodies, Persons and Families (EAC-CPF, 2012) (2012)). For this project, the design and construction activities were mapped by making connections between related entities to build a network of information around a subject, for example, a project stage can be related to archival and bibliographic references and digital resources such as multipage digitised documents, images, sound files, and movies, and to other related or sequential processes. The OHRM can produce web pages and exchange data with other digital resource repositories and search engines, such as Trove (2015).

HP TRIM (Total Records Information Management) (2007) is the University's Electronic and Records Management System supported by Records Services. It is available to all University departments to manage their records, regardless of format, and meet their recordkeeping obligations. HP TRIM was initially proposed as the repository for much of the data in the Archive. In contrast to the OHRM, HP TRIM is essentially a flat file system with a primary focus on operational records management and is not geared to capture the broader context of the records and the multiple time and location-based relationships between entities. HP TRIM was also deemed unsuitable as the content in TRIM could not

be easily accessed by unauthorised users. The decision was made to focus instead on contextual data and curated subsets of the documents and images in the OHRM.

Aconex (2015), a commercial project content management system, was used to store and transfer documentation between project participants during the design and construction phases of the project. This web-based communication platform was designed to facilitate the management of a building construction project and was not geared to meet archival needs. Aconex, as a massive repository of all documentation generated from the construction of the building, was appraised as a valuable source of records that could provide the information on the construction of the MSD building in a useable form.

The initial plan was that the OHRM would hold a description of the attributes (the metadata) of a digital information object, and map these to other related resources and entities. The digital material received from ABP – images, drawings, videos, etc. – would all be registered in HP TRIM. In this way, it was thought that both the interest of Records Services in keeping the project records (legal requirements), and the MSD Building Archive project objectives could be served. It was hoped that Saffron, a third-party web interface developed for HP TRIM, would provide a web mediated link or citation point for each digital object described in the OHRM, so that archive users would be able to access (view and download) files kept in HP TRIM. However, this capability was not available during the first phase of the project.

Using the OHRM to categorise the distinct project phases allowed the Archive to grow responsively as the construction of the building unfolded. This categorisation also supported subsequent access to the materials. A key requirement of the Archive was that the documentation contained within it was organised in a way that not only reflected the way the building project developed but also aligned with the accepted structure of the processes and components of a building design and construction project. This helped ensure that individual items or groups of items could be easily found by users of the Archive and that relationships between items could be easily seen and explored.

3.5. Disposal, storage and access

The University of Melbourne's Records Services, Archives, Property and Campus Services and Legal Services in conjunction with the architects and contractors contributed to discussions on the appraisal and disposal of the materials and the user obligations associated with access and use. There was a particular focus on material that is usually destroyed. As a rule, access conditions are determined according to categories of material, rather than on a document by document basis. There was some uncertainty about the architects' contractual arrangements, particularly regarding copyright, for which Records Services offered assistance with locating relevant contracts.

Discussions about access protocols for MSD Building Archive documentation aimed not to hinder access, but to establish protocols and clarify the obligations of those who are granted access to documents. Records Services drafted an Access to Records and Archives form and an Access checklist to assist with this, currently on trial by the University's Property and Campus Services.

4. Results

4.1 Archive structure

As noted in Section 3.4, the system used to create the MSD Building Archive, the OHRM, was historically used to map contextual information from a wide range of sources, such as archival and published

material, photographs, audio and video. The conceptual model and the derived informatics of the OHRM were based on entity and resource types and concepts from archival science. The entities and resources are interconnected by defined relationships which can be richly annotated and spatio-temporally constrained as required. This 'relationship-as-entity' model enables the creation of a contextual information network or framework that can be geared to meet specific purposes. It is also well situated to contribute data to the emerging Linked Open Data frameworks.

In addition to the network approach to discovery, to gear the use of the Archive for teaching and research, a faceted search capability became a key requirement for accessing and displaying the content of the Archive. This required a search functionality that could return a display of images and other documentation as a visual search result rather than as a simple list. Selecting an image from a grid view, accompanied with minimal text, opens it on screen and allows the user to scroll, zoom in and view the image and its related information in detail. This information (metadata) has two purposes: firstly, to inform the user of key attributes such as title, date taken, creator of the image or document, and rights of attribution and use. Secondly, the metadata extracted from the digital objects maintains links to the source material, and helps categorise the material.

4.2. The MSD Building Archive web resource

The first iteration of the MSD Building Archive online resource was launched on 11 December 2014 as part of the official opening ceremony of the new MSD building.

The online archive developed provided access to more than 8,000 images and hundreds of other documents in the archive in what is intended to be a useful and meaningful way. Alignment with user needs was a major consideration in this phase of the project. The focus on highly structured data and curated subsets of documents and images led to the development of the faceted search interface (see Section 4.1 and Figure 2), supported by a more traditional encyclopedic approach to presenting the contextual data.

In addition to searching, the Archive content can be browsed by selecting any of the pre-established search categories. The key categories are the project phases of the MSD building project, adapted from the construction program. There are six project phases: 1. Old ABP building and pre-existing conditions, 2. Design competition, 3. Design, 4. Pre-construction, 5. Construction, 6. Post-construction.

Other search categories or filters are: Resource type filters – a list of all the types of data (i.e. images, videos, drawings, renders, WebEx, sketches, data, documents, audio, 3D models); Entity type filters – digital object, publication, archival resource; Repository filters – a list of repositories for the data processed in the OHRM: HP TRIM (Records Manager), University of Melbourne Archives; Date – shows a list of date ranges, for example: 2000-2001, 2002-2002, 2009-2009, etc..

Most of the project phases also have sub-categories corresponding to the construction program, traditional building design and construction activities or building elements. For example, the Design phase has four sub-categories (schematic design, detailed design, construction documentation and tender) and five sub-sub-categories, which in this case are resource types (Figure 3). The online archive can also be searched via keyword or phrase, entered in the search box. The results are shown in a grid view in the centre of the screen (see Figure 2). Results can be interrogated further by selecting one or more of the resource type filters, and other sub-categories.
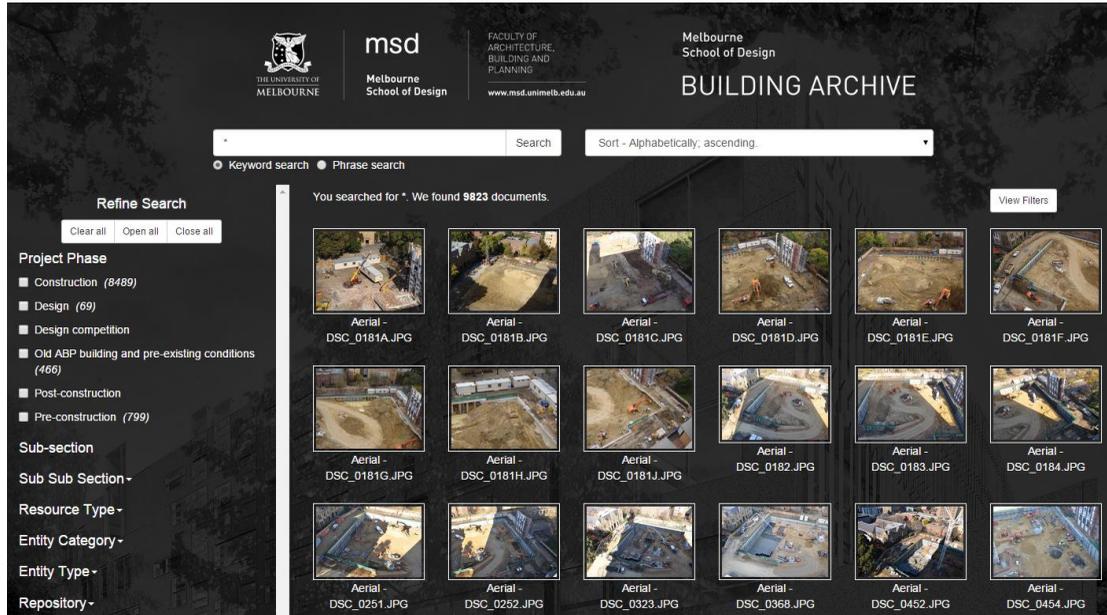
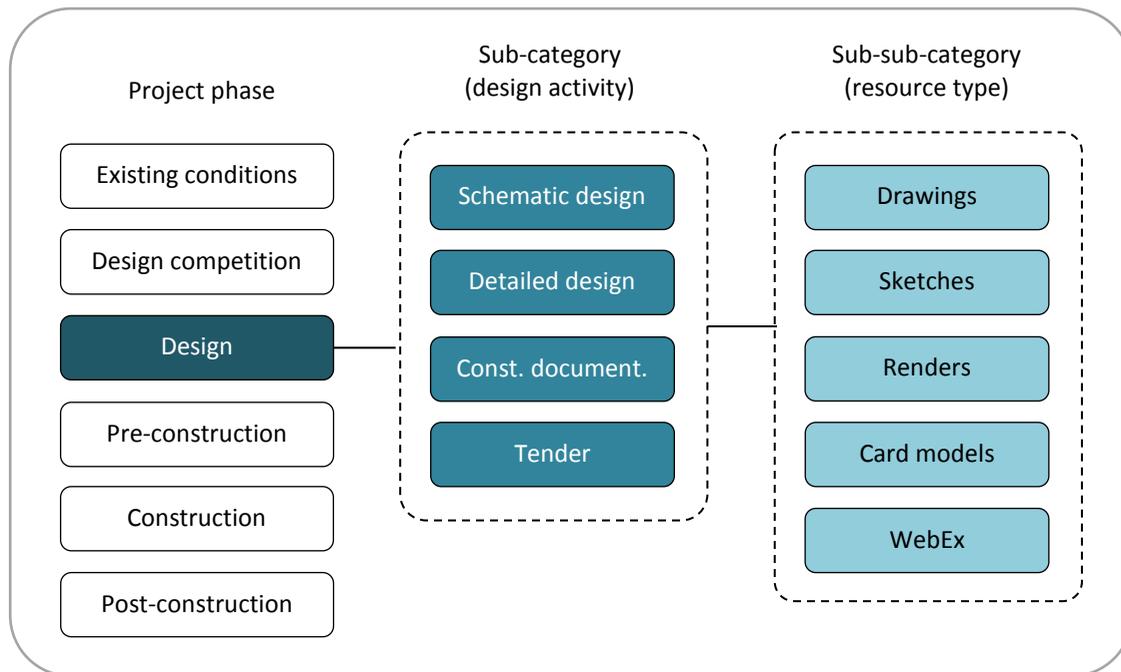Figure 2: MSD Building Archive search interface.

Figure 3: Design phase sub-category and sub-sub-category filters.

5. Discussion

The creation of the MSD Building Archive was a unique application for the OHRM which had previously been used for historical, text-based research data and was developed using archival data standards. The MSD Building Archive was created using only digital materials. The challenge was that the OHRM, initially conceived as a tool to produce encyclopedic and archival descriptions, was useful to produce descriptive, detailed documentation of an entity, but lacked the capacity to display large sets of images well, which became one of the main objectives. It soon became clear that a grid-view and full-screen view of images and a targeted search for accessing the Archive was needed. This resulted in a complete redrafting of project priorities and the development of an application to act as an image display as well as a search tool.

All the material provided for archiving was in various digital formats. The data was made available as each stage of the project concluded. The live nature of the building/archive project and large volume of the data, particularly digital images, drawings and audiovisual material added more complexity to the management and processing of the digital assets. Assumptions had to be made about the likely number of documents to be included and their arrangement within the Archive structure. These unknown and unspecified elements made budgeting and forecasting time and staffing difficult. It is clear that it is easy to underestimate resources required.

Aconex was anticipated as a useful source for all the project data. It was thought that the large amount of information created and stored in digital format would make the process of creating the Archive easier. Regrettably, the Aconex system created a collating and archiving challenge that proved to be out of scope for the first phase of the project. When a sample of the data was analysed the team identified potentially useful data and metadata, but omissions in content were also noted. The structure and categorisation of the vast number of information objects within Aconex were not immediately usefully for the purposes of the Archive. On examination, the data mining necessary for extracting relevant documentation and placing it within the structure of the Archive would have exceeded resources. The task would have been to transform that data into a format transferable between systems, such as the OHRM and HP TRIM. Additionally, the extraction of the data required specific proprietary applications. Aconex offered API enablement and developer network access to suitable application interfaces to download the data, however the purchase price exceeded the initial Archive budget. The University's Records Services team investigated whether anyone had successfully integrated Aconex data with HP TRIM and no examples were found. While apparently possible, time and money precluded attempts to do so in the initial phase of the project.

According to a report of a 2004 interview of Australian preservation specialists, an effective digital preservation strategy should not be based on proprietary data formats or systems (Harvey, 2011, pp. 105-106). Clearly, a mixture of proprietary and in-house systems was used, which shows that the curation process was highly adaptable, as well as highly challenging. A positive outcome was that all data formats were considered, successfully documented and preserved in the digital archive.

Additionally, there were queries about the intellectual property in this information and the need for traditional archival and records practices such as disposing of certain classes of records (tender documents), and making clear distinctions between what records had ongoing corporate business uses and which records had immediate broader use in the Archive. The University's Records Services and University Archives provided valuable support in managing copyright and granting authorisations for

access to the material, and with decisions on which material to publish. Discussions on long-term storage for the material have commenced, and are ongoing.

Long-term storage and future accessibility of the material posed further challenges. How would future system changes or upgrades affect the ability to retrieve and view the existing material? Would the raw material have to be migrated to a different resource format so it could be accessed? Hardware and software should be maintained in working condition, so that the digital materials can be accessed in future (Harvey, 2011, p. 132). How much data storage would be needed? For example, the time-lapse material, shot on three cameras, consists of approximately 1,200 high resolution images per camera per month (approximately 10 GB per month per camera). At the time of writing it was stored on a server of the company providing this service with back-ups in Melbourne and Singapore. The entire collection of images requires storage of more than 1 TB and was beyond the capacity of the ESRC server hosting the MSD Building Archive website. A future storage location under the control of the University needs to be negotiated. These discussions have been started, and concerns only partially resolved.

6. Conclusion

Understanding the nature of the documentation available, its structure, its value, how it would ultimately be used and the relationships between different aspects of the project were some of the greatest challenges faced in the development of the MSD Building Archive. This is something not typically considered for construction projects.

The creation of the MSD Building Archive has been a complex undertaking, with much work remaining to be done. The successful completion of the project entailed challenges requiring changing scope and direction as it evolved. The successful outcome depended mostly on the clarification of the purpose of the Archive (as a learning and teaching and research resource), how the material was to be accessed and viewed (search and image handling), and the ability to trace each data item back to its source. This in turn defined the practical tasks of the participants.

Alignment with user needs was a major consideration in this project. The focus on highly structured data and curated subsets of documents and images led to the development of a faceted search interface, supported by a more traditional encyclopedic approach to presenting the contextual data. While the HP TRIM and OHRM systems had their specific applications for this project, adaptation and further development was necessary to satisfy the purpose of the Archive and accessibility of its content.

Discussions on data management, including addressing storage of data, future maintenance and system compatibilities are important to maintain data integrity and the ability to track back to the original source, and need to be ongoing.

It is difficult to perceive this project as final. The Archive has potential to become a living and growing resource, with material added as the new MSD building continues to evolve. Often, the means and support required for establishing and maintaining such a resource is significantly underestimated. A plan for ongoing data management and funding for resources required to perform the ongoing maintenance are key considerations.

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References

Aconex (2015) Available from: Aconex <http://www.aconex.com> (accessed 20 July 2015).

Cook, M. (1994) Archives, *Journal of Academic Librarianship*, 19(6), 395-396.

Ellis, C., Adams, T.E. and Bochner, A.P (2011) Autoethnography: an overivew. Forum: Qualitative Social Research, 12(1), Article 10 – January 2011. Available from: <http://www.qualitative-research.net/index.php/fqs/article/view/1589/3095> (accessed 14 September 2015)

EAC-CPF (2012) Encoded Archival Context for Corporate Bodies, Persons, and Families. Available from: EAC-CPF <http://eac.staatsbibliothek-berlin.de> (accessed 20 July 2015).

eScholarship Research Centre (ESRC) (2015) Available from: eScholarship Research Centre <http://www.esrc.unimelb.edu.au> (accessed 20 July 2015).

Harvey, R. (2011) Current Topics in Library and Information Practice: Preserving Digital Materials (2nd Auflage), Walter de Gruyter, Munchen, DEU. Available from: ProQuest ebrary (accessed 2 September 2015).

HP TRIM (2007) Available from: HP Records Manager <http://www.unimelb.edu.au/records/corporate/trim.html> (accessed 15 July 2015).

ISAAR (CPF) (2011) International Standard Archival Authority Record for Corporate Bodies, Persons and Families, 2nd Edition. Available from: International Council on Archives <http://www.ica.org/10203/standards/isaar-cpf-international-standard-archival-authority-record-for-corporate-bodies-persons-and-families-2nd-edition.html> (accessed 20 July 2015).

MSD Building Archive (2015) Available from: Melbourne School of Design <http://archive.abp.unimelb.edu.au> (accessed 20 July 2015).

Samuels, H.W. (1992) Varsity letters: documenting modern colleges and universities. Metuchen, N.J., Society of American Archivists and the Scarecrow Press. Available from: Hathi Trust Digital Library <http://catalog.hathitrust.org/Record/002588281> (accessed 9 September 2015).

Trove (2015) Available from: National Library of Australia <http://trove.nla.gov.au> (accessed 20 July 2015).