Digital preservation and enterprise architecture collaboration at the University of Melbourne

A meeting of mindsets

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Abstract – This paper examines a meeting of mindsets at the University of Melbourne, and how digital preservation and enterprise architecture have joined forces to meet goals of the university's Digital Preservation Strategy 2015-2025. We identify the points of connection and similarities between digital preservation and enterprise architecture. We explore how a core foundation for university-wide infrastructure implementation is being achieved through effective collaboration between the Scholarly Services-based Digital Scholarship team at the university (the team responsible for driving digital preservation project work) and the Infrastructure Services-based Enterprise Architecture unit. We investigate the similarities and differences in approach for these two diverse business units within the university context and identify how collaboration between digital preservation and enterprise architecture can continue to drive mutually beneficial digital preservation operations at the university.

Keywords – Digital preservation, Enterprise Architecture, Collaboration

Conference Topics – Collaboration: a Necessity, and Opportunity, or a Luxury?; Designing and Delivering Sustainable Digital Preservation

I. Introduction

Scholarly Services and the Digital Scholarship team at the University of Melbourne has been faced with a continual challenge throughout its three years of active digital preservation project work: how to achieve university-wide buy-in and investment for the people, infrastructure, policy, and processes required to protect and maximize the long- term value of digital assets in a complex environment with many demands on funding and resources. This challenge drives the need to find effective allies within the organization to achieve the required level of implementation and change, including long-term sustainable operations.

With the arrival of a newly-employed Enterprise Architect at the university in 2018, and a forthcoming revamp of the university's Enterprise Architecture Roadmap, the Digital Scholarship team recognised the opportunity to explore how digital preservation infrastructure could emerge as a core university foundation, by working collaboratively with Enterprise Architecture in their capacity as trusted university business and technology design experts. The resulting collaboration has facilitated faster progress for the design and first steps of implementing core digital preservation system infrastructure for the university, and has paved an easier path for future progress to meet the other goals (beyond the technology solutions) of the university's Digital Preservation Strategy 2015-2025 (Culture, Policy, and Organisation goals) [1].

Over the three years of digital preservation project work, the Digital Scholarship team has gathered substantial knowledge about organizational readiness to support digital preservation, including

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analysis of current technology, resourcing, and skills gaps. One of the key questions driving digital preservation implementation at the university is: how best to provide long-term digital preservation storage and services for digital research data, research outputs, university records, and cultural collections?

An internal review of research support services in 2016 analysed many of the elements inhibiting university-wide implementation of digital preservation across these varied domains of research outputs, records, and collections. The review identified a "siloed" way of working at the university as a major cultural barrier inhibiting the development of shared messaging of the value of and need for digital preservation. The wide range of stakeholders who must be involved in the implementation of digital preservation at the university are spread across multiple different business units. Successfully engaging these stakeholders (for whom digital preservation is not currently part of their job description) requires time consuming consultations and engagements.

Driven by the need to work iteratively and simultaneously across all four goals of the Digital Preservation Strategy (Culture, Infrastructure, Policy, and Organisation), and to address the major cultural barrier of siloed ways of working, a majority of the digital preservation project work has been focussed on drawing in the necessary stakeholders through targeted working groups, ensuring key outcomes are clearly defined in advance. These working groups have included key individuals from varied business units (e.g. the Preservation Storage Working Group, tasked with developing key preservation storage criteria for the university, involved central IT, Records, Archives, Library, and research service and infrastructure staff; the Appraisal Working Group, tasked with scrutinizing current collection policies and procedures to inform digital preservation policy development brought together Records, Archives, Library, Collections, and Digital and Data leadership staff.)

These working groups have produced essential foundational work that is progressing the Culture, Policy, and Organisation goals of the Strategy, but the Digital Scholarship team was aware of the lack of major progress for university-wide infrastructure implementation to support digital preservation. Small-scale "infrastructure blueprints" (small iterative technology-focussed projects) undertaken over the three years of project work generated learnings for the project staff in relation to the technology and skills required for digital preservation processes, but these projects did not significantly progress to the point of holistic infrastructure implementation. Compelled by the goals of the Digital Preservation Strategy to implement and sustain core university-wide platforms and services for digital preservation infrastructure, the Digital Scholarship team recognised the need to engage initially with the university's central Infrastructure Services, and then subsequently with the Enterprise Architecture team sitting within Infrastructure Services, in order to drive greater visibility of digital preservation project work across the organization. This approach would also help to ensure that digital preservation appeared (and remained) on the emerging Enterprise Architecture Roadmap as a foundational and crucial component of the socio-technical ecosystem of the university.

During the writing of this paper, we searched for examples of information professionals working collaboratively with enterprise architecture to meet digital stewardship goals and can validate Sam Searle's findings that "there is little discussion in the literature about the EA [enterprise architecture] process as a collaborative effort"; and "there are few documented examples of librarians working closely with enterprise architects in higher education or elsewhere" [2].

There are some examples investigating the use of enterprise architecture for application in records and archives contexts [3]; [4], and there is documented experience of the use of enterprise architecture approaches in a library context [5]. However, we have found limited documented evidence of collaborations between digital preservation practitioners and enterprise architects.

This paper explores the mindsets of enterprise architecture and digital preservation, how these mindsets work in the University of Melbourne context, and how best we can collaboratively work together to deliver the Infrastructure goals of the university's Digital Preservation Strategy. We describe how this collaboration has accelerated the

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design and the first steps to delivering the required technology for implementing digital preservation as a core university-wide function.

We are documenting our collaborative efforts in designing and delivering core digital preservation infrastructure in order to share our learnings with others in similar contexts who are striving to implement digital preservation operations across a distributed organisation.

II. Meeting of mindsets: enterprise architecture and digital preservation

A. *Enterprise Architecture Mindset*

As defined by Gartner, enterprise architecture is "the process of translating business vision and strategy into effective enterprise change by creating, communicating and improving the key requirements, principles and models that describe the enterprise's future state and enable its evolution" [6]. Key aspects of enterprise architecture aim to deliver effective enterprise-wide change through holistic solutions that address various organizational challenges, with a scope extending beyond just technology implementation to include governance, people, and processes.

Enterprise architecture emerged in response to a clear disconnect in many organisations between business strategy and the change initiatives that were being funded and implemented. This was particularly evident in IT-heavy projects and often led to large investments that did not assist in achieving the goals of organizations. Numerous audits of project portfolios in larger organizations found that there was significant duplication, and that different solutions were being applied to the same problems in an uncoordinated way. In addition, many organizations were not managing the lifecycles of their technology investments and were not effectively leveraging new technology opportunities. Enterprise architecture thus focuses on optimizing various portfolios and projects that are focused on technology and change, to ensure alignment with organizational strategy and to effectively leverage technology trends. Given that strategy and particularly technology can change quickly, enterprise architecture horizons are often relatively short (3-5 years) and focused on prioritizing investment.

This Enterprise Architecture focus on optimization and standardization is similar to that described by Scott Prater for general IT practitioners: "Most IT shops strive to standardize processes and infrastructure for all their users, to increase efficiency, reduce duplication of effort, and free up time and resources to improve their suite of services and introduce new ones" [7]. As digital preservation is often not one of the standard services offered by IT, issues can arise when attempting to explain to IT staff the need for implementing long-term digital preservation processes, particularly when IT environments have been setup with mandates to respond to the here-and-now challenges of data storage, management, and dissemination, without consideration of long-term requirements.

In order to provide alignment and optimization holistically, enterprise architecture teams need to apply a "continuous practice of describing the essential elements of a socio-technical organization, their relationships to each other and to the environment, in order to understand complexity and manage change" [8]. In addition to this focus on description and documentation, enterprise architecture teams apply standardization and integration as key approaches to the optimization of portfolios and investment. Thus fewer solutions are better, and reuse of information and processes is preferred.

B. *Digital Preservation Mindset*

The various information professions that have a stake in, and that are involved in digital preservation activity (e.g. libraries, archives, museums, records management) have time-honoured mandates for preservation and custodianship of the scholarly, scientific, and cultural record, and bring a long-term mindset to their various organizations and institutions.

Information professionals working within the digital preservation field have a wide range of valuable knowledge and skills: how to ascertain the value of digital assets, and how to ensure good practice for preservation of and access to digital assets over time, being two key areas. These skills are becoming integral to organizations dependent on digital materials, "for now it is librarians and archivists, the custodians of the past, that are the advance-guards of the

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future. They have worked with open approaches to software development, data practices and scholarly communication for years. These communities, networks and processes are a vital part of the solution" [9].

Scott Prater provides a useful perspective of the difference between the mindset, needs, and priorities of the archivist as opposed to the priorities of IT practitioners, particularly when talking about digital preservation: "when the discussion turns to digital preservation, there may be a divergence in priorities and understanding. While the archivist's priority is on making sure their digital assets are preserved and accessible forever, the IT personnel's focus may be on making current data publicly accessible, making sure that systems are running smoothly right now" [7]. The fundamental differences in approach that result from the mandate to preserve and access digital materials forever and the imperative to ensure things are working smoothly in the now are some of the elements that make it so difficult to meld the mindsets of digital preservation practitioners and IT practitioners for the benefit of the organization's long- term digital stewardship goals.

Digital preservation practitioners charged with implementing digital preservation capabilities bring an understanding of complex information management, the ability to manage change over time, and knowledge of robust standards and frameworks that enable long-term management and preservation of information. Models in the digital preservation field such as the Three Legged Stool [10] usefully demonstrate how to develop sustainable digital preservation programs that adequately address the socio- technical complexities involved in long-term preservation of information.

C. The Two Mindsets: Similarities and Differences

Both the enterprise architecture and digital preservation fields of practice are concerned with socio- technical complexity and managing change, and both have a holistic mandate across an entire organisation. Both fields use frameworks, including models, standards, and reproducible methods, and have a key approach of documenting and visualizing complex domains. Experts in both domains have used various approaches to "divide and conquer" the breadth and complexity, including in the University of Melbourne context the use of frameworks that separate "concerns" (for example into People, Process, Data, and Technology for Enterprise Architecture [11], and Culture, Infrastructure, Policy, and Organisation for Digital Preservation) [12].

There are, however, some key differences between the domains, with enterprise architecture struggling to achieve true long-term focus, often restricted to effective planning with horizons of less than a decade. Enterprise architecture teams also tend to focus on data and information more as something to be dealt with rather than as an asset, with older data often seen as something to be "archived off" and devalued. This is evident in the naming of a widely used cloud archive as "Glacier". These aspects are driven by an underlying imperative to optimize outcomes from limited resources, which tends to be linked to a focus on cost and financial risk. This drives the "automate as much as possible" approach that assumes people are an expense to be removed.

In contrast, from a preservation perspective, information can gain greater value over time, with the risk focus dominated by emphasis on "held in trust" and the impact on resources (especially the ongoing financial resources required for long-term digital preservation) as a consequence. In addition, digital preservation practitioners have inherited an understanding from archival mandates and principles that the "human" aspects are critical, and believe that the identification of the items to be preserved will require judgement and may never be fully automatable.

A good example of the differences we have discovered in the University of Melbourne context between the two "tribes" is the use of the phrase "long-term". For Enterprise Architecture this may be as short as 5 years, where for digital preservation this may be centuries.

III. Digital preservation and enterprise architecture at the University of Melbourne

As a world-class research institution, the University of Melbourne generates considerable digital materials of enduring value that will be relied upon into the future to support the university's

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functions, accountability, and legacy. Management of digital information is now increasingly recognized as a critical capability for the university, and the ability to find and leverage the "gold" is particularly important.

Scholarly Services and Enterprise Architecture are two distinct and distributed business units at the University of Melbourne. Both have university-wide goals to improve the way the university functions by streamlining business processes and offering sustainable services for teaching and research.

Scholarly Services is a business unit that includes the university's librarian and archivist "information managers", and it is the custodian and champion of the university's ten- year Digital Preservation Strategy. The Digital Scholarship team within Scholarly Services is the responsible division for driving the goals of the Strategy through iterative digital preservation project work (ongoing since March 2016). A key objective of the Digital Scholarship team is to leverage state- of-the-art technologies to guide the ways in which teaching, research, and engagement are performed to ensure that scholarly information resources are sustained through time.

The Enterprise Architecture team within Infrastructure Services works with business and technology stakeholders to develop roadmaps and plans which optimize investment in technology across the university. This is achieved by:

- Defining agreed target states which can be used to better coordinate and align multiple initiatives
- Helping ensure that the trade-offs between longer- term operational efficiency and short-term value generation are identified, debated and resolved
- Identifying focus areas from an operational/ IT perspective which allows better targeting technology investment
- Assessing new demand for alignment to roadmaps and recommending technology options
- Developing solution architectures to support the delivery of business initiatives.

A. Analysing Terminology Differences

As an exercise to better understand the terminology, topical, and conceptual differences between digital preservation and enterprise architecture at the university, we applied qualitative analysis techniques to compare two sets of core documentation. One set of documents was the internal digital preservation policy framework, currently under development, and the other the internal Enterprise Architecture Handbook.

The internal digital preservation policy framework covers all of the elements considered essential for providing a common understanding of how digital preservation activities are undertaken at the University of Melbourne. The framework serves as an initial point of reference for understanding:

- How the university approaches digital preservation
- The current state of digital preservation at the university
- Who is responsible for various digital preservation activities
- How sustained funding is ensured
- How to make decisions about what to preserve
- How to develop operational procedures for digital preservation work across varied and multiple domains that are responsible for digital content generation and management

The internal Enterprise Architecture Handbook documentation contains material that is used by architects to help describe the structure and activities of the Enterprise Architecture team at the university. It contains the operating model for enterprise architecture, the roles and responsibilities of enterprise architects, and a clear description of university stakeholders, the range of services provided, and the architecture governance structure that ensures the most effective management and use of IT.

An initial analysis of term frequencies within these documents indicated significant differences in the terminology of each practice. (Textual analysis was undertaken using the tools Voyant [13] and NVivo [14]). Word clouds of the most frequent terms are a simple demonstration of this apparent difference. (Figure 1.)

Figure 1 Digital Preservation term frequency cloud top, Enterprise Architecture bottom

A Correspondence Analysis [15] was applied to the combined set of documents to further investigate terms and document similarities. (Figure 2.) The analysis confirmed that both the associated term distribution, especially the most frequently used terms, and the corresponding document sets are at opposite ends of the most significant dimension. However, the analysis also revealed a cluster of common lower frequency terms shared by both sets of documentation: ("management", "standards", "support", "required", "process", "strategies", "decision".)

An approach was then adopted to begin exploring topics and more abstract concepts. The aim was to determine if the apparent document separations were simply "language" differences between the two practices. Computational topic modelling was used to extract the ten most probable topics in both of the sets. The Latent Dirichlet allocation technique was used for topic modelling with over 20,000 iterations performed on each set [16].

Topics resulting from this technique are essential groups of commonly associated and likely related terms found throughout the texts. This revealed that the majority of the common lower frequency terms (found in the Correspondence Analysis) also formed part of the ten most probable topics in both of the sets. This could indicate an overlap in the key topics, or it could represent a change in

the areas to begin appropriating language from the other (a result of collaboration).

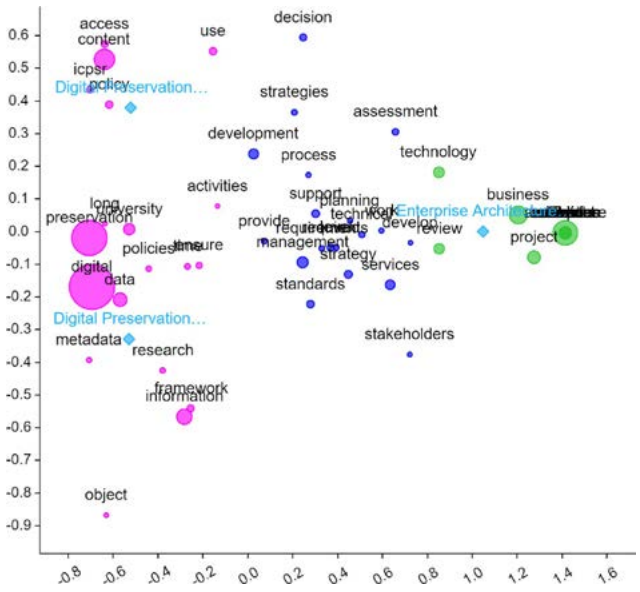

Figure 2 Correspondence Analysis of Documents. Light blue points and labels indicate documents and relative distance (Digital Preservation found left, Enterprise Architecture found right). Other colours represent clusters of terms, and each point/circle is a term with relative distance the association between terms. The point/circle size indicates relative frequency of each term.

An open coding approach was then applied to the digital preservation policy framework documents to identify the initial abstract concepts with closer analysis, and a number of core responsibilities were identified within the Enterprise Architecture Handbook documentation (see Table 1).

Digital preservation concepts and enterprise architecture responsibilities

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Digital preservation concepts	Enterprise architecture responsibilities
Active management	Active management for change
Awareness	Business vision
Managing risk, meaningful access	Business strategy
Changing technologies	Information and technology
Consistent practice, continued authenticity	Consistent practice
Organizational direction	Organizational direction
Roles and responsibilities	People, processes
Documenting	Documenting/describing
Sustainable funding	
Community engagement	
Value	

TABLE I

The digital preservation concepts identified involved: active management, awareness, changing technologies, consistent practice, continued authenticity (of digital content), managing risk, meaningful access (ensuring this for digital content), organizational direction, roles and responsibilities, sustainable funding, wider community engagement, documenting, and the concept of value.

The Enterprise Architecture documentation identified a number of overlapping responsibilities: "consistent practice", "documenting" and describing, active "management" for "change", "organisational direction" which involves business vision and strategy. Enterprise architecture explicitly deals with layers of the business – people, processes, information and technology – as does digital preservation, which is also clear from the range of concepts identified.

Digital preservation can bring a different perspective to an organisation that complements enterprise architecture, as suggested by the differences in concepts and focus areas, and further confirmed by discussions between the teams. We recognise the need for ongoing, sustainable funding as a core digital preservation concept, as well as investing in community engagement (e.g. developing guidance for content creators to better implement measures for sustainable digital materials; encouraging community sharing of digital preservation knowledge and expertise). Also highlighted though the digital preservation documentation is the importance of the concept of long- term "value," which drives many digital preservation methods.

The assumed point of connection between both practices would typically be the technology systems or IT requirements, and initial engagements with Enterprise Architecture by the Digital Scholarship team at the University of Melbourne were actually triggered by this need. However, the qualitative analysis of alignment we have undertaken indicates a broader range of connections and similarities between the two practices.

This analysis was useful in demonstrating to us that it is essential to find ways to work with this "meeting of the mindsets", as we both approached this collaboration with different methods and approaches. There were also the initial assumptions to overcome, including that digital preservation was looking only for a technical solution, whereas the Digital Scholarship team was attempting to communicate to infrastructure staff the need for holistic inclusion of the cultural, policy, process, and governance elements that must be developed and enhanced in conjunction with any technology "solution".

Our combined experience was that the initial struggle between Enterprise Architecture and the Digital Scholarship team at the university in understanding each other was, in fact, related to the framing and the use of language. For many in Enterprise Architecture there is a "corporate" mindset, which is focused on cost, whereas digital preservation is about "trust", where the organisation is responsible for the long-term management of digital assets.

In addition, because of the University drive to develop "business cases" that quantify the value of the investment in adding new capabilities (such as digital preservation), the monetary component often dominates. We have also found a need to distinguish digital preservation requirements from a more records management approach that focuses on compliance (which enterprise architecture teams are often more familiar with than they are with digital preservation).

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With non-digital preservation staff there is still a need to clarify why digital preservation is required. We have found that "stories" are useful to overcome language and conceptual differences: for example, reference to significant investments that the university has made in particular collections and the consequent need to effectively "preserve" that investment. Another "story" that resonates widely is the example of climate change research, which needs to identify longitudinal datasets and to leverage diverse sources such as ice cores and tree ring data.

By identifying and appreciating our differences in terminology, and recognising common areas of connection and the extensive range of organizational and socio- technical levels on which we need to engage with each other not just for the initial infrastructure design and solution, but also into the future – we are better placed to realise the broader goals of the university's ten-year Digital Preservation Strategy.

IV. The collaborative journey of digital preservation and enterprise architecture

The collaborative journey has not been easy, and it has taken over a year of continual engagement to arrive at the constructive point we now find ourselves. This was due to a range of factors, including issues caused by:

- Changeable funding cycles for university projects
- Fluctuating rules around the development of business cases for new projects
- The issues involved in identifying and subsequently engaging with the right technology experts who understand drivers and needs for digital preservation
- The challenge of having a range of key stakeholders not fully understanding how broad and wide-ranging digital preservation requirements are across the university.

A. The Catalyst and Way Forward

The Digital Scholarship team began seeking collaborative ways of working with the university's central Infrastructure Services unit in late 2017, in order to drive implementation of a university-wide core digital preservation platform and service. At this early stage, the Digital Scholarship team was actually not aware of a new iteration of the role and function of Enterprise Architecture that had recently been put in place within the broader Infrastructure Services unit.

Initial engagements with Infrastructure Services and Solution Architects (who focus on delivering specific and well-defined technology solutions) were not ideal, in that the skills needed to drive the overall platform design for digital preservation at a university-wide level are more aligned with the role of an Enterprise Architect. This appreciation took time to emerge and was the most significant barrier for the Digital Scholarship team to overcome. Solution Architecture in the university context is concerned with a smaller subset of the functions that an Enterprise Architect performs. A Solution Architect was able to help the Digital Scholarship team to identify potential solutions to defined problems, assist with implementation planning for those solutions, and help put in place governance and change management to help embed the solutions. However, what digital preservation infrastructure implementation at a university level for various different domains of digital content requires in the first instance is an architecture vision, an overall design, and a plan for how that vision could best fit within the business and information systems architecture of the university. These areas are the remit of Enterprise Architecture.

The positive outcome from the considerable time and effort put into this first engagement is the knowledge sharing we were able to do: both the Digital Scholarship team and the university technology experts were able to share their expertise with each other, creating greater awareness of each others' roles and challenges, thus enabling both cohorts to arrive at greater tolerance and understanding – a progressive place to be, for future work together. Having learned a lot from this initial engagement, in June 2018 the Digital Scholarship team engaged with a newly employed Enterprise Architect tasked with enhancing the research domains of the university (e.g. the business systems and processes for supporting research practice). A common language was established by utilizing the OAIS framework [17] and we began quite quickly to understand the value in working together.

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The skills that the Enterprise Architect brought (high- level platform design thinking and an understanding of how the university-wide technology landscape functions and interacts), combined with digital preservation expertise, enabled us to collaboratively formulate a design for a core foundation platform and the associated processes suitable to the university context. The digital preservation project governance endorsed this enterprise design plan in July 2018, and the latter half of 2018 delivered an extensive evaluation process for procurement of a digital preservation system (Figure 3.)

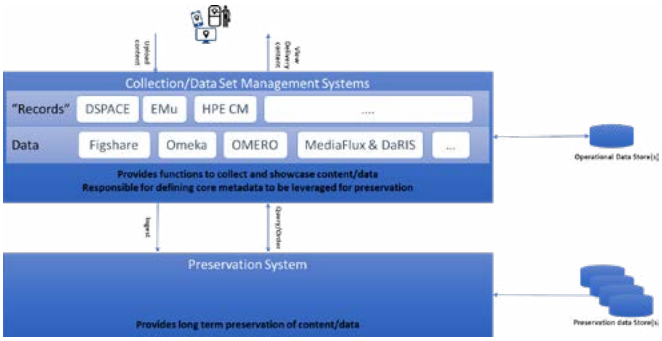

Figure 3 Design for a core foundation platform suitable to the university context, with planning and funding activities underway to implement and begin an ongoing process of ingestion.

V. Learnings

With this collaborative approach, the Digital Scholarship team has achieved much greater success with current digital preservation business cases, and we have greater hope for our future business cases as we seek the next phase of funding for project work. The partnership with Enterprise Architecture at the university has directly supported and strengthened our joint success, and we are now aiming to embed a more sustainable funding stream for digital preservation than the current situation of two-year funding cycles. The level of respect typically afforded to enterprise architects by an organization can make them powerful allies for driving organizational change, as Sam Searle articulates: "In our organisational context, enterprise architects are trusted by very senior executives; they are perceived as neutral and objective, and the processes that they use are understood to be systematic and data-driven" [2].

Digital preservation project work at the university has greatly benefited from the two-way knowledge exchange and the benefits of the enterprise architecture mindset to drive the change of business processes to support long-term preservation and access for digital materials. Digital preservation knowledge, concepts, goals, and processes can be disseminated and communicated more easily throughout the organization, in conjunction with Enterprise Architecture improvement work across multidisciplinary teams at the university. Through this collaboration, the Digital Scholarship team now fully recognizes the essential role of Enterprise Architecture in the university ecosystem, how we can best align our strengths, and how we can overcome differences in approach towards a common goal.

A concrete outcome of the collaboration for the university is that digital preservation and related aspects such as digital collection management have now been added to the internal Enterprise Capability Models and Roadmap to ensure they are addressed with the same importance as other core capabilities such as Enterprise Resource Planning (ERP) and Student Management. In addition, the Enterprise Storage Strategy now includes digital preservation as a "first class" capability that is to be supported for all university data domains, along with current, backup, and archive storage tiers (Figure 4.)

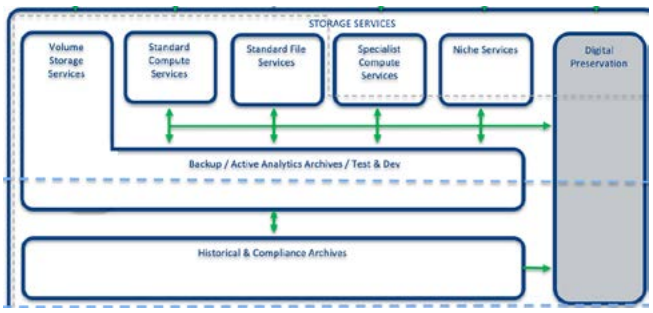

Figure 4 Enterprise Storage Strategy including Digital Preservation (far right) as a "first class" capability underpinning all university data domains

Because of this meeting of the mindsets of digital preservation and enterprise architecture, there is now wider understanding that digital preservation is an entirely new capability being added to the organization, one that underpins and helps enable many of the university's strategic goals. There is

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more understanding throughout the wider central Infrastructure Services team that digital preservation is a capability that requires a technology foundation, but also one that requires ongoing work around resourcing, policy, process, and governance, in order to make it function effectively and enhance the organization's ability to maximise the long-term value of its digital assets. Now, there is a collegial two-way appreciation: digital preservation needs to engage with Enterprise Architecture regarding holistic layers and an enterprise approach; and Enterprise Architecture has discovered an understanding of digital preservation as a holistic platform and program of organizational change, enhancing technology solutions.

We acknowledge that not all organisations embarking on the implementation of digital preservation will have an Enterprise Architecture function or equivalent role with which to collaborate. However, many of the terms, concepts and in particular fundamental differences, that were explored in our "meeting of mindsets" are not exclusive to enterprise architects and are common to other technology specialists. The holistic mindset common to both digital preservation and enterprise architecture has provided the opportunity to better place digital preservation within the enterprise at the University of Melbourne. But through sharing our findings we seek to enable others to recognise differences and find common ground more easily with IT practitioners in general.

The broader message we have to share from our particular case study is that the influence of good interpersonal relationships cannot be overstated in the quest for successful collaboration to realise digital preservation goals. Collegiality, an openness to change, preparedness to listen, and general willingness and determination to challenge existing organizational structures and operations that do not facilitate effective digital preservation implementation have all been major factors in this particular collaboration. Even the act of collaboratively writing this paper has had immediate cultural impact within the university – the development of the paper has generated wider awareness of digital preservation goals and their importance, and it has enabled further collegial connections to be built across our previously siloed and unconnected business units, paving the way for collaboration into the future.

The advice we have to share with other organizations faced with the need to implement digital preservation is to continually seek and maintain relationships with those who need to be key stakeholders in managing digital materials, wherever they sit within the organization. Although this can be a challenging path to follow, it can also be a powerful way to progress with digital preservation goals. Forging and maintaining such relationships can be achieved in part by persistently aiming for clear terminology understandings, and clear communication of needs and mindsets. We offer a message of hope and persistence: clarifying the why and what of the organization's digital preservation goals so that everyone understands the purpose and the benefits can help to forge the relationships that enable action. Our experience reflects the advice offered by Scott Prater in that "what is true in life is also true in digital preservation discussions: generosity, mutual respect, and patience win the day...frame requests as interesting problems...not as demands to be met" [7]. By collaboratively tackling the "interesting problems" that digital preservation presents and ensuring that all the required mindsets are included early on when embarking on the journey, it is possible to find common ground to move forward together, utilising different skillsets to meet shared goals.

VI. NEXT STEPS

The work that has been undertaken through this collaboration thus far is highly focused on the technological aspects of implementing a university-wide digital preservation technology foundation. But to continue evolving, we need to explore further how the collaboration and relationship building with Enterprise Architecture at the university can enable the other priorities (Culture, Policy, and Organisation goals, not just Infrastructure) within the university's Digital Preservation Strategy [1]. Through the three years of project work for digital preservation implementation that has been undertaken so far, including outreach and advocacy (e.g. workshops, presentations, consultations), policy, procedure, and processes analysis and reviews, and pre-ingest and ingest workflow developments with various existing expertise at the university, we have a solid foundation for further engagement.

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Our analysis comparing the terminology, topical, and conceptual differences between digital preservation and enterprise architecture can be taken further, particularly by investigating a comparison of the standards and frameworks utilized by each field of practice. By examining how these standards complement each other, and how they diverge, we may better understand how best to work together to achieve our various aims and to implement digital preservation functionality across a large distributed organization. We have also started thinking about possible applications of emerging technologies, such as machine learning, within the business systems of the university, and how the logging practices of digital preservation metadata could be a key enabler for this planning and implementation. Analysing what such processes would require, and how especially digital preservation metadata could be used, could prove a valuable next step for the university.

We find ourselves having a similar broad aim for the future as Searle's own case study goal: "to encourage other librarians [digital preservationists] to learn more about architects' work practices and to seek opportunities to apply EA methods...for the benefit [of] the organisation as a whole" [2]. We also have a keen interest in sharing the results of this collaboration with the wider enterprise architecture community (e.g. at enterprise architecture conferences and events). Broader sharing of the benefits of collaboration between enterprise architecture and digital preservation could help pave the way for establishing value in long-term thinking within other increasingly corporate- focussed organizations.

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