

"Are you ready to create digital records that last?" Preparing users to transfer records to a digital repository for permanent preservation

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ABSTRACT

Simon Fraser University (Vancouver, Canada) marked its 50th anniversary by launching a digital repository to permanently preserve the university's digital records of archival value. Simultaneously, the records management program launched a digital readiness project to educate departments about how to create digital records that will stand the test of time. This case study focuses on the training component of the project and details how the university is addressing knowledge gaps among records creators around digital records issues by creating training materials that are openly licensed and may be freely reused. Open educational resources or "OERs" are part of a wider open access movement in education. OERs can be created to address digital records issues and then shared with other institutions that are facing similar challenges in training their users on how to create and maintain good digital records.

This article explains the efforts of one university to prepare records creators for a future of digital records preservation.

KEYWORDS: Digital Preservation, Digital Records Management, OER, Open Educational Resources, Training

CLASSIFICATION: Case study

1.0 Purpose

The purpose of this article is to present a case study of one university's efforts to address the records management implications of implementing a digital repository for their digital records of archival value. This article traces a path that began with applying objective analysis tools such as ARMA's Principles and maturity model to obtain a snapshot of the records environment and to highlight areas of relative weakness. The results led the Records Management (RM) program to identify necessary steps to create a fully-functional electronic records management program. This case study shares one aspect of implementing an electronic RM program: creating training tools about digital records. Specifically, this article argues that much can be gained when institutions invest in creating openly-licensed training tools that can be adapted and reused by other institutions for use in their electronic RM programs.

2.0 Problem statement

The main "problem" in this case study arose, in fact, from a significant achievement. Simon Fraser University, located in the metro Vancouver area in Canada, celebrated its 50th anniversary by successfully launching an OAIS-compliant digital repository, after several years of building the infrastructure, policies, and staff knowledge necessary to support it. The digital repository is housed in the university archives, which has a primary responsibility to preserve the archival records that are created or received by the various faculties, departments, offices, and

committees of the university. The digital repository allows the university to maintain and preserve digital records and accurately render authenticated content over time. Digital records are ingested into the system and wrapped with a layer of metadata that packages together information about how they were created and used with instructions to the computer on how to open them (i.e. preservation metadata). They are fixed into a complete digital object that can be opened in the future, even if the technology that created the original digital record becomes obsolete (Lavoie, 2014).

However, in order to successfully preserve digital records, they must be created and managed according to sound records principles from the very beginning. Records creators need to create good metadata for their files, practice version control, maintain good security and access controls, and otherwise understand how to create good digital records. In this case, university staff are the primary records creators, and they are responsible for creating and managing the majority of the records that will eventually be housed in the new digital repository.

The problem, identified through maturity model assessments, was a records management problem: staff had limited training in creating good digital records of long term value. This article explores how the records management program within the university archives approached the problem by training records creators on good digital records practices, with a focus on long term preservation. As the training is currently underway, this article does not include an assessment of the effectiveness of the training tools nor their ultimate impact on records management practices, but instead proposes a focus on openly-licensed RM tools that can be shared and reused by many institutions who face similar challenges.

2.1. Institutional context

2.1.1. The university

Simon Fraser University (SFU) has a mission to be a different kind of university—to bring an interdisciplinary approach to learning, to embrace bold initiatives, and to engage with communities. It was founded during the turbulent 1960s in North America and has worn the moniker of “radical campus” since its early years (Johnston, 2005). SFU is currently ranked one of the top universities in the world under 50 years of age. It has 6,500 faculty and staff who deliver almost 150 programs to over 30,000 students. Almost from its founding, the university has paid attention to its own records, designating the archives as the repository for its own institutional history (Baird, 1983).

Geographic location impacts the past and present of SFU. It exists in close proximity to a well-established major university, which has a 100-year history and houses a well-known library, archives, and information school that educates new information professionals (University of British Columbia). Key open-source preservation projects, such as Archivemata, were founded and staffed by graduates of the information school. Open-source developers such as Artefactual Systems (<https://www.artefactual.com/>) are headquartered in the area, allowing for relationship-building and easy in-person consultation. SFU has embraced open source projects, including an open-source learning management system (LMS) for its courses and an open-source digital repository for preserving its records of archival value (Quint-Rapoport, 2010, p. 133-150, Simon Fraser University, 2012). These advantages of location and nearby resources benefit the university archives by providing access to well-trained information professionals and innovative digital preservation software.

2.1.2. The archives and digital preservation

The mandate of the SFU Archives and Records Management Department is to acquire, preserve and make accessible records of enduring value of the university, as well as to develop a manuscript collection that relates to various aspects of university life (Simon Fraser University, 1997). Departments of the university organize their records during their active period and transfer them to an onsite records centre during their semi-active period. Records are then transferred into archival custody at the end of their life cycle, or they are destroyed. Using this records management system, the archives has received routine transfers of university records of archival value since the 1990s; before that time, university records were acquired in an ad-hoc manner.

The records management protocols were mainly designed for a paper environment, and in practice digital records tended to fall outside their scope. Digital records are at risk due to format obsolescence, lack of metadata, and, until recently, the absence of coordinated SFU preservation strategy. Without an effective digital preservation program, these records – and SFU's institutional memory – would simply be lost.

To fulfill its mandate, the Archives developed the technical infrastructure and policy tools for permanently preserving digital objects. The Archives' digital repository implements the functional requirements of the Open Archival Information System (OAIS), an ISO standard and reference model. The OAIS framework establishes minimum requirements for a digital preservation repository along with a set of archival concepts that address all the major activities of an information- preserving repository (International Standards Organization, 2012b). SFU's digital repository is not formally certified as a “trusted digital

repository” (International Standards Organization, 2012a) but its development is guided by best-practices and professional standards such as the “trusted repositories audit and certification” checklist to ensure the long-term accessibility, usability, and authenticity of digital archival records (Center for Research Libraries and Online Computer Library Center, 2007).

Much of the digital preservation system at SFU has been created from open-source technology. The digital preservation infrastructure is built on Archivematica, an open-source system developed by Artefactual Systems. Archivematica provides an integrated suite of free and open-source tools that allows digital objects (e.g., digital records of the university) to be processed from ingest to access. Archivematica implements a micro-services approach to digital preservation, in which the OAIS information entities - Submission Information Package (SIP), Archival Information Package (AIP) and Dissemination Information Package (DIP) - move through a series of services using a Unix pipeline design pattern. The services are modelled on OAIS functional requirements as outlined in the ISO standard (International Standards Organization, 2012b). Several recent pilot projects and case studies reflect the increasing use of Archivematica as a digital preservation solution in libraries, archives, and data repositories (Kirchner et al., 2013, Miller, 2015, Sprout and Jordan, 2015). Additionally, the tools, policies, and reports created by SFU to manage digital preservation have been licensed under Creative Commons and can be used by other institutions that are building their own digital preservation repositories.

However, in order to profit from the robust preservation services now offered for digital university records, departments of the university must transfer their digital records to the university archives. Without this piece, systematic transfers will cease and the

concentration of the “documentary residue” of the university’s activities into the archives will no longer reflect its ordinary and routine course of business (Duranti, 1994, p. 342). This threat to the existing system led the RM program to evaluate its current state and to create a plan of action.

2.1.3 Records management

The records management program provides a primary means of creating and disseminating knowledge, training, and tools about best practices in creating and managing all types of university records. Records creators use retention schedules and file plans to manage their department’s records. File plans tell creators how to classify and organize their records, and retention schedules define how long records of a given type are required to be kept and whether they are to be destroyed or sent to the Archives at the end of their life cycle.

Previously, digital university records were either managed in a decentralized manner, remaining with their creating departments in digital form in shared drives, desktops, or document repositories (and taking on the many risks associated with this practice), or they were transformed into an analogue equivalent via the “print-to-file” method. This latter method required units to print digital documents or emails to paper and to maintain a paper filing system for these records. This method allowed departments to access the services of the RM Program, which includes physical storage space for semi-active records in an onsite records centre as well as same-day retrieval of any box or file deposited into the records centre by the department. While some RM tools apply equally to analogue and digital records, such as retention schedules and file plans, the benefits of onsite storage space and retrieval of files have only existed for analogue records. Before the digital preservation

repository, there was no centralized way for the university to keep its digital records of archival value and therefore no procedures, policies, or tools to manage them.

2.2 Moving towards digital records management

In surveying North American university archivists in the past few decades, researchers have consistently found that between 30-50% of universities and colleges operate a records management program. SFU is among the minority of institutions that have developed sufficient tools and procedures for managing university records and ensuring that those of archival value are transferred to the archives for permanent preservation. Among higher education institutions with an established program for systematically managing and preserving their institutional records, far fewer report having established an electronic records management program - around only 10%.

In 1982, 60% of 95 U.S. universities and college archives reported no records management program (Burckel and Cook, 1982, p. 421). In 1990, 148 out of 449 (or 32.9%) of U.S. universities reported an RM program (Skemer and Williams, 1990, p. 537). In a longitudinal survey during the 2000s, researchers found 36% of 193 institutions had a full time records manager in 2005-2006. When the same group was surveyed again in 2009, 47% reported employing a records manager out of 126 respondents (Zach and Peri, 2010, p. 114-115). This same survey found that 7% of universities in 2005 reported having established an electronic records management program, while this increased in 2009 to 9%. Many more universities - 51 out of 148 - reported being in the planning stages of developing an electronic records management program in 2009 (Zach and Peri,

2010, p. 114-115). Although there is an increasing trend for universities and colleges to have electronic RM programs, it is still relatively uncommon in North America.

This case study looks at a university's efforts to become part of this small but growing group. With the implementation of a digital preservation system, the RM program evaluated its current services, identified gaps where the needs of digital records could be better addressed, and developed an action plan for creating tools to assist records creators with their digital records needs.

3.0 Prior research

3.1 Long term digital preservation standards

It is crucial that the records of the university maintain their value over time. With digital objects, "we want to know they are what they purport to be and that they are complete and have not been altered or corrupted" (InterPARES 1 Project: Authenticity Task Force, 2002). The reliability of digital records is linked to records creation and allows them to stand for the facts they are about, while authenticity protections allow records to continue to have value as evidence of past actions or decisions and retain their trustworthiness (Duranti and MacNeil, 1996, p. 54-56). Digital preservation, with its aims to ensure the maintenance over time of the value of digital entities, is about "maintaining the semantic meaning of the digital object and its content, about maintaining its provenance and authenticity, about retaining its interrelatedness, and about securing information about the context of its creation and use" (Ross, 2012, p. 45).

Long term digital preservation requirements such as those described above have been recognized as crucial to the success of sustainable, large-scale digital repositories. One of the first models that gave a common vocabulary and structure for a repository that would be able to accomplish the processes of acquiring, processing, preserving, and providing access to digital information was Open Archival Information System (OAIS). The OAIS is a reference model, a type of standard that is purposely designed to be implementation independent, and it was developed in open forums to be broad in scope through inclusive consultation with a diverse set of actors (Lee, 2009).

An OAIS is defined as "an archive, consisting of an organization of people and systems, that has accepted the responsibility to preserve information and make it available to a Designated Community" (International Standards Organization, 2012b, Section 1-1). The reference model comprises a functional model, describing what an OAIS must do, as well as an information model that indicates what an OAIS must have in its collections (Lee, 2009, p. 4025). The functional model includes key entities called SIPs, AIPs, and DIPs (Fig 1). SIPs come into the OAIS from records creators, AIPs are generated from SIPs and managed within the OAIS, and DIPs are derived from one or more AIPs and produced to give access to users (International Standards Organization, 2012b, Section 1-10). The OAIS has become the reference model of choice and has become widely used as the basis for research and development on digital archives (Lee, 2009, p. 4027). The OAIS model was formalized into an International Organization of Standardization (ISO) standard in 2002 and was further updated in 2012 (International Standards Organization, 2012b).

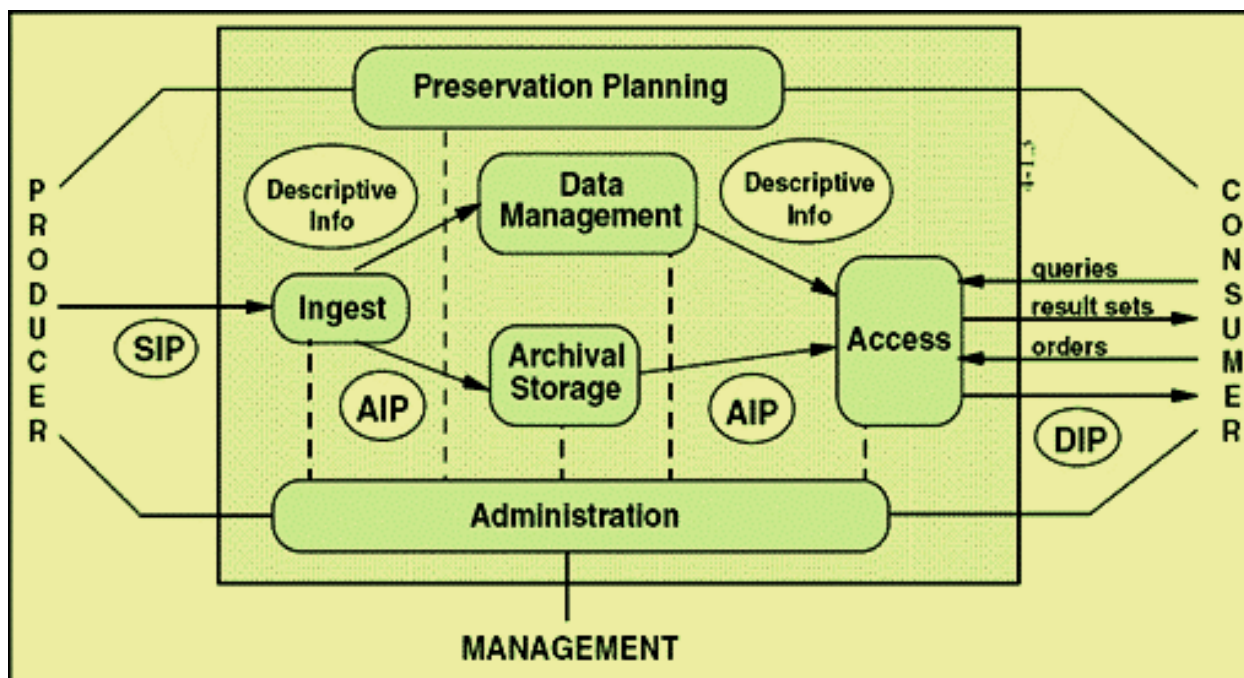


Figure 1. OAIS model, sourced from Wikimedia Commons.

Criteria and a checklist have also been developed for the purposes of auditing digital repositories. Called the Trustworthy Repositories Audit and Certification: Criteria and Checklist (widely known as TRAC), the checklist sets out the organizational and technical infrastructure required to implement trustworthy repository for digital entities (Center for Research Libraries and Online Computer Library Center, 2007). Drawing on TRAC and other audit criteria developed simultaneously in Europe and Australia, an ISO standard for the full audit and certification program for digital repositories was formalized in 2012 (Dryden, 2011, p. 129, International Standards Organization, 2012a). Of these robust standards, the SFU digital repository complies with the OAIS model and follows best practices set forth in TRAC, while striving towards eventual certification as a trusted digital repository.

3.2 Open culture and open educational resources

Instructional tools that are intended to be reused and repurposed are called “open educational resources” or OERs. OERs are part of the open culture movement, which has numerous sub-parts that may be amalgamated together and described as having some or all of the following attributes: online or digitally mediated, largely made possible by the Internet; acts of creation and production resulting from collaborative and cumulative, rather than individual, effort; and freely available (Deuze, 2007, Lessig, 2004, Lovink et al., 2007).

OERs are teaching and learning materials that are freely available online for everyone to use. Used for education and training purposes, OERs include full courses, course modules, textbooks, lectures, digital assets such as a single file (e.g., image, audio or video clip), learning activities such as homework assignments or quizzes, and more (Littlejohn et al., 2008, p. 759). OERs are available at no cost and are used on various educational platforms, including those that are limited to enrolled students. Some examples of this type

include learning managements systems (LMS) such as African Virtual University or SFU's Canvas. Another open LMS, iKamva, was developed by the University of the Western Cape, an early adopter and innovator of open content and open learning management with Knowledge Environment for Web-based Learning (KEWL) in the early 2000s (Keats, 2003, Keats, 2009, p. 49). Other recent examples of OERs include massively open online courses (MOOCs) that are available to anyone with an internet connection. OERs are distributed in various ways, including content repositories dedicated to openly licensed material (e.g., Creative Commons, OER Commons, OpenUCT). See Appendix A for additional OER repositories.

Open licenses are explicit agreements about the open nature of the work to which they are applied. OERs are often, but not always, explicitly licensed under an open license to facilitate easy sharing and reuse (Creative Commons, 2015). One type of open license, Creative Commons licenses, are agreements to promote collaboration and sharing of individual resources (e.g., journal articles, musical works, books, photographs, artwork) and to protect aspects of openness. Creative Commons licenses exist in various forms and allow for different types of sharing, attribution, and commercialization, but all permit anyone to use and share the licensed resource in some way, without first seeking permission from the creator(s).

4.0 Methodology

This case study arose because of a fundamental change in the record keeping environment at the university: the implementation of a digital preservation system with the capacity to serve as the long term repository for the records of the university. The creation of a digital preservation repository sparked a re-examination of the university records systems

and, ultimately, led to the implementation of an electronic records management program.

To understand what, if any, changes were needed to enable records creators to transfer university records into the digital repository, the existing RM program was analyzed. The first step was to conduct an assessment of the current record-keeping environment using eight key principles defined by the records and information professional association, ARMA International. Designed to paint a more complete picture of what effective information governance looks like, ARMA's Principles are recognized as the *de facto* standard within the records management community (Lemieux et al., 2014, p. 127). These principles include: accountability, integrity, protection, compliance, availability, retention, disposition and transparency.

According to the Information Governance Maturity Model, there are five potential levels of records program maturity for each of the eight principles (ARMA International, 2013). The maturity model serves as a foundation for assessing the adequacy of record-keeping programs by identifying five levels of maturity: Level One – Substandard, Level Two – In development, Level Three – Essential, Level Four – Proactive, Level 5 – Transformational. There are three to eight statements associated with each principle and level combination. An organization may determine their current level of development by identifying the combinations that best describe their organization.

The assessment revealed that the university emphasized accountability, availability, compliance with retention and disposition rules, and the protection of the personal information of students, faculty, employees and others. Overall, the university information system and the RM program has been developed to Level 3, which is considered the essential and adequate level to attain in order to meet administrative, regulatory, and legal

requirements of the organization. However, the analysis also revealed issues specific to digital records. Existing policies, procedures, and training tools did not give substantial coverage to metadata, determining the authoritative record, and choosing file formats to ensure the authenticity, reliability, usability and integrity of digital records needed for the longer term. The assessment also suggested that existing training tools did not adequately address issues of retention and disposition as they relate to digital records.

The second phase of the project was to cluster the identified gaps into similar types of problems and to address them. The groups included: policy gaps, internal procedures gaps, and record creator knowledge gaps. Each of these areas was addressed with a targeted project. This article focuses is on the knowledge gap project, which resulted in training resources designed to be used by records creators at the university, as well as potentially reused by other institutions that are developing their own e-RM program.

5.0 Reusable and sharable RM training resources

5.1 Who?

As Rusbridge et al. (2005, p. 31) point out, the “long term stewardship of digital assets is the responsibility of everyone in the digital information value chain”, not just the information professional. In a university setting, archivists, records managers, and IT staff share records responsibilities with departmental staff, faculty, and administrators who create, receive, and manage records. The analysis phase of the project suggested that creators of records would gain from training on good digital records practices, and SFU record creators are the initial audience for new RM training tools. The potential secondary

audience for the tools is records creators in any university with an electronic records management program.

5.2 What?

The topics for the training tools came from the analysis phase of the project and were based on ARMA’s Principles. For each of the Principle statements where the university records system that was less than Level 3, the statement was reframed into a recommendation for action. The majority of the gaps were about protecting the integrity of digital records. Any problem that resulted from a gap in knowledge and could be addressed by training was then framed as a training topic.

Training topics included:

- Authenticity and chain of custody
- Metadata for archival digital records
- Authoritative records and version control
- File formats and file naming conventions

To address the knowledge gaps, training tools were designed. SFU has an instructional design team to assist instructors in how best to design and deliver educational content, and their expertise informed the format and structure of training tools. Drawing on the media asset production model they developed (Fig 2), a Tool Profile template was designed as part of the project. See Appendix B for the Tool Profile template.

For each potential training tool, a Tool Profile was completed. The Tool Profiles detailed the learning outcomes of each training tool, as well as the intended audience, content, longevity of the content, delivery and distribution plans, media durability, and details on how the design of the tool would

increase or decrease its likelihood of being reused by other institutions for their own work. Some tools address institution-specific topics and may not be good OER candidates.

The Tool Profiles made it easier to identify tools that could be developed as OERs for wider use.

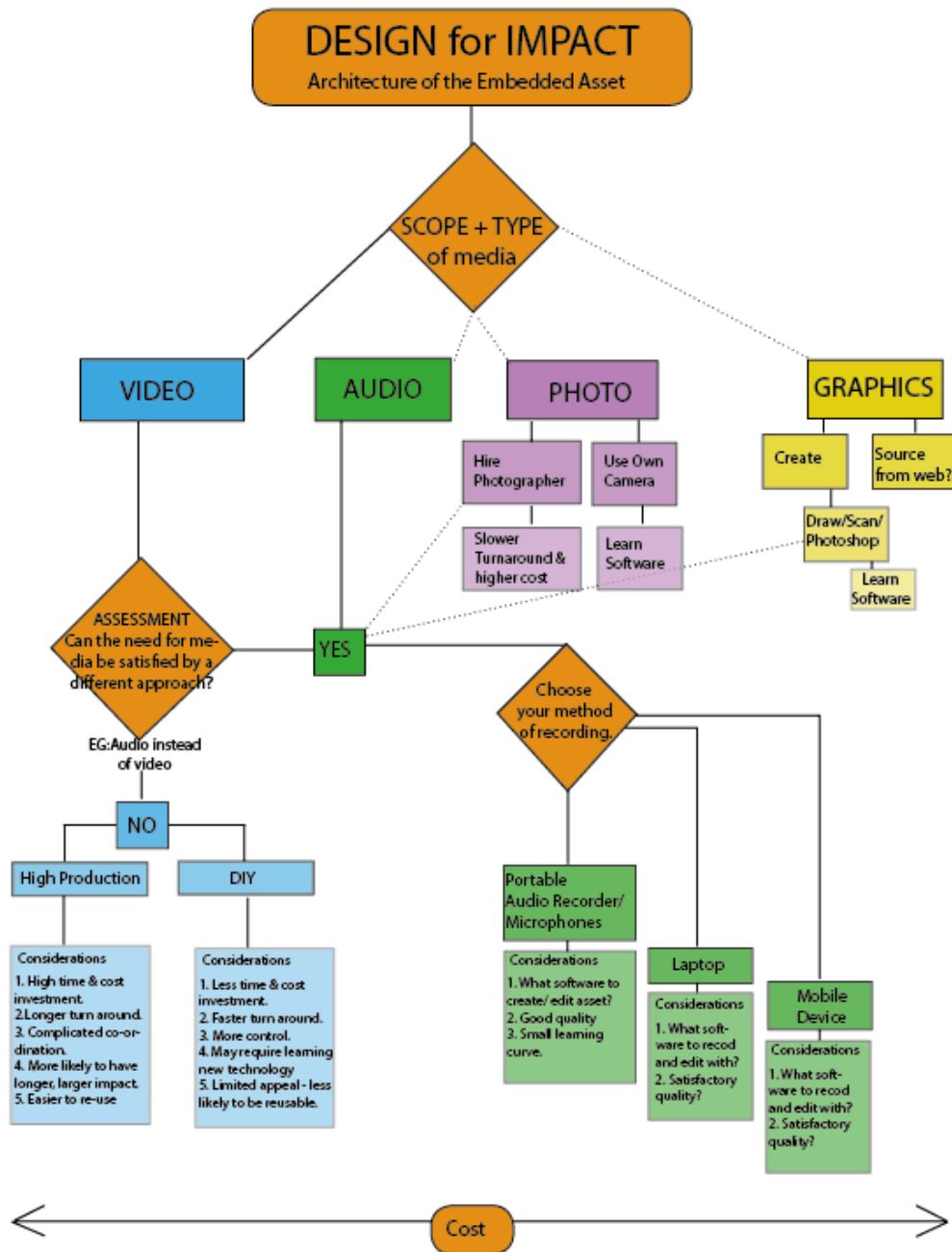


Figure 2. Adapted from “Mapping for Impact: Media Evaluation and Creation Model,” licensed under CC-BY-SA by Simon Fraser University Teaching and Learning Centre

The tool analysis phase of the project showed that, while it may not be possible to create every training tool for a generic audience, there are considerable opportunities to create shareable OER assets on topics of digital records management. As an example, file naming conventions are a topic that may apply to many institutions. A file naming convention tends to have some generic elements, including a date, name of the digital record (e.g., committee minutes, report to the Board of Governors), and version control information. To train records creators on how to develop or apply a file naming convention when they are naming digital records, a training tool could contain content that may apply to one's own institution but which may also be reusable by other institutions as well. The longevity of the content will be fairly stable, since the purpose of a file naming convention is to establish a template that can be used over and over again for consistency and integrity purposes. The content may be delivered visually to represent the structure of a file naming convention, orally to describe the elements of a convention, or interactively to allow the audience to apply a naming convention. The last elements of the template - media durability and tool design for reusability - involve taking into account considerations of format (e.g., video, audio, visual graphics), distribution (e.g., send via email, deliver in person, download from a webpage), and stability of the media (e.g., widely-used application, interoperability between systems, hosted on platform within institutional control, ease of migration). The variables above were considered together to arrive at a decision of the type of tools to create.

Several tools were developed as part of the project, including visual graphics that were themselves repurposed from openly-licensed graphic tools produced by another university, instructional videos using screencast software, and a series of audio podcasts on the general digital RM topics above. The podcasts in

particular offered a distribution method that fulfilled several reusability criteria. Audio is relatively easy to capture on mobile phones, computers, or with inexpensive microphones. It is easier to edit, smoothly cut, or change compared to video (which itself contains both audio and visual elements). Audio formats include relatively stable .wav that can be shared in an uncompressed format as well as compressed formats such as .mp3 that allow for easier download or streaming access. Audio editing can be done in well-supported open-source software such as Audacity. Audio files also tend to require less bandwidth and storage space and may be easier to access in areas with less internet connectivity.

Audio also presents challenges as a training format. Unlike video, it contains no visual elements. It is a “telling” medium, not a “showing” medium and it may present barriers of language and accessibility to those who are hard of hearing or who speak languages other than the one chosen for the recording language. An audio file can be presented with a written script to mitigate some of these barriers (e.g., enabling translations into other languages). Depending on the content, an audio file may also be embedded in a webpage next to a visual graphic to add a “showing” element to the training.

5.3 How?

To fit in with the open-source nature of SFU's digital repository itself, the RM program created openly-licensed training tools that can be adapted and reused by other institutions. Whenever possible, open-source software were used to produce the training tools. The tools were licensed under one of the Creative Commons licenses, CC-BY-NC, which allows for open distribution, sharing, editing, and repurposing of the content, as long as credit is given to the original creator and there is no commercial use.

5.4 Next steps

With some key training tools finalized and others in development, the next stage of the project is to assemble the tools into an open online training course. The course will be built on the open learning management system used at the university, Canvas by Instructure. It will be initially offered only to the university staff for evaluation and refinement. The goal is to then distribute the course in the open, unrestricted version of Canvas Commons, so that anyone can participate in the course or can use the training tools to create their own Canvas course.

Creating an electronic records management program involves multiple components, including policy work, developing new procedures for electronic records (e.g., procedures for transferring records into the digital repository), and creating training tools to address knowledge gaps among records creators. When these have been completed, the next steps include evaluating the program to determine its impact. During the evaluation stage, the ultimate impact of the training materials on encouraging good digital records practices will be assessed. A key measure will be the extent to which departments are able to successfully transfer digital records of archival value to the digital repository. If successful, the university archives will continue to fulfill its mandate to acquire, preserve and make accessible university records of enduring value into the future.

6.0 Key conclusions

Given the increasing use of Archivematica and other digital preservation infrastructure in a wide variety of institutions, it is anticipated that many others will be struggling with the same challenges of long term preservation of digital records. It is also expected that more and more universities will move to implement or further develop electronic records management programs for their institutions, resulting in a portion of these institutional records being transferred for long term preservation in digital repositories. This article details the process undertaken by one university to assess its current state of readiness to manage digital institutional records and the steps taken to address the identified gaps. A major area of focus for creating an electronic RM program is addressing the knowledge gaps of records creators through training, so that the digital records they create are authentic, reliable, and trustworthy evidence of the university's history.

Universities and other institutions can find benefits in online training. Specifically, institutions can benefit from reusing educational assets created by others as well as designing their own OERs with an eye on creating assets that can be shared among the wider global community of records creators. Designing for future reuse and share ability is a key aspect of open culture with benefits to many types of users, and it demands planning and attention to design considerations. Open source tools and open formats help address some aspects of designing for reusability; thoughtful planning and testing with potential users can help in ensuring that the tools can be repurposed by other institutions later on.

APPENDIX A

List of resources for open educational assets (OERs) on records management. Developers of RM OERs may consider depositing into these or other repositories for others to use.

Name	Location	Notes
Wisc-Online	https://www.wisc-online.com/	Contains RM resources under <i>Business Management & Administration</i>
African Virtual Network OER @ AVU	http://oer.avu.org/	Currently no RM resources
OER Commons	https://www.oercommons.org/	Large repository, includes course on eRM and health records
Jorum	http://www.jorum.ac.uk/	Contains OERs on digital preservation
OER Africa	http://www.oerafrica.org/	African-produced OERs
List of OER repositories	https://oerqualityproject.wordpress.com/2012/10/22/directory-of-oer-repositories/	Multilingual list of OER repositories

Appendix B

Tool Profile Sheet

Tool/Asset profile	
<u>Overview</u> What will this tool do? What is it for?	
Function	
What specific function will it have related to digital RM?	
Problem resolution	
What problem(s) does this solve?	
Scope	
Digital records, archival	Other

How is this tool useful for digital records of archival disposition?	Does this tool have additional utility for digital records for a destroy disposition? Does this tool have additional utility for non-digital records?
Digital preservation	
How is this tool related to the digital repository?	
Audience	
Who is the tool intended for? Could other users of other institutions be a future audience? (<i>e.g., Could this become an OER?</i>)	
Learning outcomes	
What are the primary learning outcomes connected to this tool?	
Content (develop)	
<p>What content MUST be included in order to achieve the learning outcomes?</p> <p>What content COULD be included to maximize impact, extended distribution, achieve additional learning outcomes, etc.?</p> <p>How long will it take to create? Will you need to buy or have access to new software or equipment? Will you need training? Does it rely on technologies that change rapidly?</p>	
Impact (design)	
<p>What design elements will help communicate the message? <i>e.g., audio, visual design, colours, linked data</i></p> <p>Is it solving a problem or improving the existing learning experience? Does it increase learner engagement?</p>	
Distribute (structure)	
<p>How will the tool be distributed?</p> <p>How will learners access it? Will they be able to see it on a mobile device?</p> <p>How will learners with disabilities access it?</p> <p>What kind of copyright will be used?</p>	

Longevity
How long does the tool need to last? Should it have reusable, alterable, remixable components to increase longevity? How often will the tool need to be updated to remain useful?
Media
What is the media used to build this tool? What is the media used to deliver this tool?
Testable?
How will you know if this tool is successfully addressing the problem that it is linked to? Is it testable?

References

- ARMA International. (2013), "General Accepted Recordkeeping Principles®: Information Governance Maturity Model", Overland Park, KS: ARMA International available at: <http://www.arma.org/docs/bookstore/theprinciplesmaturitymodel.pdf?sfvrsn=2> (accessed 18th February 2016).
- Baird, D. (1983), "Origins of the SFU Library and Archives: Don Baird interview (March 29, 1983)", *F-231-3-4-0-0-14*, Vancouver, Simon Fraser University Archives.
- Burckel, N. C. and Cook, J. F. (1982), "A profile of college and university archives in the United States", *The American Archivist*, Vol. 45, pp. 410-428.
- Center for Research Libraries and Online Computer Library Center (2007), "Trustworthy Repositories Audit & Certification: Criteria and Checklist", Chicago, The Center for Research Libraries and Online Computer Library Center, Inc.
- Creative Commons. (2015), "What is OER", available at: https://wiki.creativecommons.org/wiki/What_is_OER%3F (accessed 31st July 2015).
- Deuze, M. (2007), *Media work*, Polity, Malden, MA.
- Dryden, J. (2011), "Measuring Trust: Standards for Trusted Digital Repositories", *Journal of Archival Organization*, Vol. 9 No. 2, pp. 127-130.
- Duranti, L. (1994), "The Concept of Appraisal and Archival Theory", *The American Archivist*, Vol. 57, pp. 328-344.
- Duranti, L. and MacNeil, H. (1996), "The Protection of the Integrity of Electronic Records: An Overview of the UBC-MAS Research Project", *Archivaria*, Vol. 42, pp. 46-67.
- International Standards Organization (2012a), "ISO 16363:2012 Space Data and Information Transfer Systems - Audit and Certification of Trustworthy Digital Repositories", Geneva, International Standards Organization.

- International Standards Organization (2012b), "ISO/IEC 14721:2012 Space data and information transfer systems -- Open archival information system (OAIS) – Reference model", Geneva, International Standards Organization.
- InterPARES 1 Project: Authenticity Task Force. (2002), "Requirements for Assessing and Maintaining the Authenticity of Electronic Records", Vancouver: InterPARES 1 Project, available at: http://www.interpares.org/book/interpares_book_k_app02.pdf (accessed 11th March 2012).
- Johnston, H. (2005), *Radical Campus: Making Simon Fraser University*, Douglas & McIntyre Publishers, Vancouver.
- Keats, D. (2003), "Knowledge Environment for Web-based Learning (KEWL): An open source learning management system suited for the developing world", available at: http://technologysource.org/article/knowledge_environment_for_webbased_learning_%28kewl%29/ (accessed 26th December 2015).
- Keats, D. (2009), "The road to Free and Open Educational Resources at the University of the Western Cape: A personal and institutional journey", *Open Learning*, Vol. 24 No. 1, pp. 47-55.
- Kirchner, I., Bertelmann, R., Gebauer, P., Hasler, T., Hirt, M., Klump, J., Peters-Kotting, W., Rusch, B. and Ulbricht, D. (2013), "Workflows for ingest of research data into digital archives-tests with Archivematica", paper presented at the American Geophysical Union Fall Meeting Abstracts, San Francisco, CA.
- Lavoie, B. (2014), *The open archival information system reference model: Introductory guide*, Digital Preservation Coalition.
- Lee, C. A. (2009), "Open Archival Information System (OAIS) Reference Model", in Bates, M. J. and Maack, M. N. (Eds.) *Encyclopedia of Library and Information Sciences*, CRC Press, Boca Raton, FL, pp. 4020-4030.
- Lemieux, V., Gormly, B. and Rowledge, L. (2014), "Meeting Big Data challenges with visual analytics: The role of records management", *Records Management Journal*, Vol. 24 No. 2, pp. 122-141.
- Lessig, L. (2004), *Free culture: How big media uses technology and the law to lock down culture and control creativity*, Penguin, New York.
- Littlejohn, A., Falconer, I. and McGill, L. (2008), "Characterising effective eLearning resources", *Computers & Education*, Vol. 50 No. 3, pp. 757-771.
- Lovink, G., Scholz, T. and Conrad, T. (2007), *The art of free cooperation*, Autonomedia, New York.
- Miller, K. C. (2015), "Cloud-based Digital Preservation Services for Small or Midsized Institutions: Results of a pilot study of Archivematica+ DuraCloud", paper presented at the Archiving Conference, Los Angeles, CA.
- Quint-Rapoport, M. (2010), *Open Source in Higher Education: A Situational Analysis of the Open Journal Systems Software Project*. Phd thesis, University of Toronto.
- Ross, S. (2012), "Digital Preservation, Archival Science and Methodological Foundations for Digital Libraries", *New Review of Information Networking*, Vol. 17, pp. 43-68.

- Rusbridge, C., Burnhill, P., Ross, S., Buneman, P., Giaretta, D., Lyon, L. and Atkinson, M. (2005), "The Digital Curation Centre: A Vision for Digital Curation", paper presented at the Local to Global Data Interoperability-Challenges and Technologies, Sardinia, Italy.
- Simon Fraser University. (1997), "Policy I 10.01: Archives, Recorded Information Management, and Freedom of Information and Protection of Privacy", Vancouver: Simon Fraser University, available at: <http://www.sfu.ca/policies/gazette/information/I10-01.html> (accessed 30th June 2015).
- Simon Fraser University. (2012), "LMS@SFU: Principles and Needs to Inform the Determination of a LMS at SFU.", Vancouver: Simon Fraser University, available at: <http://www.sfu.ca/content/dam/sfu/canvas/PDFs/LMSNeedsAssesstReport.pdf> (accessed 25th July 2015).
- Skemer, D. C. and Williams, G. P. (1990), "Managing the Records of Higher Education: The State of Records Management in American Colleges and Universities", *The American Archivist*, Vol. 53, pp. 532-547.
- Sprout, B. and Jordan, M. (2015), "Archivemata As a Service: COPPUL's Shared Digital Preservation Platform/Le service Archivemata: La plateforme partagée de conservation de documents numériques du COPPUL", *Canadian Journal of Information and Library Science*, Vol. 39 No. 2, pp. 235-244.
- Zach, L. and Peri, M. (2010), "Practices for College and University Electronic Records Management (ERM) Programs: Then and Now", *The American Archivist*, Vol. 73, pp. 105-128.