A practical documentation practice for the management and preservation of digital video/ media and installation art

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1 Introduction

Video's fragility is an old subject. It has been a thorn in the side of audiovisual archivists since the early 1960s, well before it became a topic among other preservation professionals (Fleischhauer 2003). There is thus no lack of technical advice on the preservation of audiovisual materials. Audiovisual archivists know what they are supposed to do to preserve their video collection, e.g., they know how to optimally store their videotapes to prolong their lives; they know that digitization is the best compromise to ensure continual access to analog video materials. Their museums' counterparts, on the other hand, are still not totally confident about what to do with this collection. This phenomenon is not entirely a result of museums' own doings or of the lack of good guidelines,[1] but results from a variety of political and social-historical reasons unique to media art and museums. Perhaps to be fair, even as late as the years 2000-2005, preservation and conservation of media art was still considered a new area in the museum field (Laurenson 2001). Besides, many of the most established best practices to date only address preservation of earlier audiovisual materials and video works, and thus revolve around the use of videotapes (Betacam SP and now more commonly DigiBeta) as a long-term storage medium. Hence, for museums dealing with the ubiquity of digital video files,[2] many uncertainties remain on how to implement theoretical knowledge (from the digital preservation discourse) at an operational level (Pymm 2006); what constitutes best practices is still a fledgling science.[3] This paper is thus redacted for museums faced with the challenge of collecting video/ media art in this digital climate.

Artists have used video to produce art since the 1960s, art museums in the Western world have exhibited and collected media art for almost as long. Video and photography remain two of the most prevailing artistic tools (Perree 2003), and moving image works have become commonplace in major exhibitions around the world.[4]

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1. In fact, there are good resources dedicated to the care and preservation of media art: EAI (Electronic Arts Intermix) and IMAP (Independent Media Arts Preservation) developed a resource guide which can be found at http://www.eai.org/resourceguide/preservation.html (EAI 2009); Preserving Video Art, a project by Netherlands Media Art Institute and the Foundation for the Conservation of Contemporary Art (Dutch abbreviation: SBMK), Netherlands had published their experience at http://www.sbmk.nl/pubs/detail/id/1?lang=en (Wijers, Coelho, and Rodrigo 2003); and Matters in Media Art, a research program funded by the New Art Trust provides guidelines at http://www.tate.org.uk/research/tateresearch/majorprojects/mediamatters/.

2. Digital video file is different from video stored in digital videotapes, e.g., DigiBeta. Digital video file, e.g., QuickTime (.mov) is a computer file quite like a MS Word file; however, videotape stores digital video signals in a linear fashion (Vitale and Messier 2007).

3. One of the more directed digital preservation admonition for audiovisual materials comes from the PrestoCentre (PrestoCentre n.d.).

4. The purported narrative goes that the 11th Documenta, Kasel, in 2002 had so many moving image works that "it would take a full week to view all the . . . works that was on show" (Hamlyn 2003, 43).

However, other than perhaps the big brothers, museums are comparatively oblivious, ill-equipped and therefore lack concerted strategy to manage and preserve moving-image and multimedia materials in their collection. Notable exceptions are museums which specialize in media art; a typical art museum is considered a "non-specialized institution."

The time-based media conservator at the Museum of Modern Art in New York commented on the low staff to collection ratio in managing the media collection, and on how the museum is only recently looking into setting up a conservation video viewing station for its large media collection (G. Wharton, pers. comm.), a need long overdue. At the Heritage Conservation Centre (HCC) in Singapore, tapes and disks are still stored like other antiquities: though in climate-controlled rooms, they are relegated to drawers and shelves. It doesn't take an expert to quickly realize that these tapes and disks, unlike their object-based counterparts such as paintings and sculptures, cannot be left in a state of non-intervention. The state of museums' inaction on this issue is more than an anecdotal observation. A 2008 report published by TAPE (Training for Audiovisual Preservation in Europe) concludes that many non-specialist institutions that hold audiovisual collections face similar problems.[5] Urgent discourse and significant progress on media art preservation have occurred in the Western world in the past decade; however, actual employment of media preservation solutions by non-specialist institutions with mixed-media collections (as suggested by the TAPE report) are not widespread and seem to take a low priority. This art form is not to be disparaged—tuck it away and museums will find themselves in deep trouble when confronted by the big O—obsolescence.

In this paper, using the video art collection under the custody of the Heritage Conservation Centre in Singapore as a case, I propose that museums use an industrial-grade digital asset management system (DAMS) to manage their media collection. Inspired by Waibel (2007), I explain how employing DAMS is a necessary step to manage and provide digital access to the collection, and to achieve basic digital preservation requirements. While some of these recommendations are not new ideas, they may seem a little precocious vis-à-vis more traditional audiovisual archival practices. This is not an attempt to challenge the well-established authority and practices of moving image archives. Rather, this proposal is born out of necessity—a non-volitional approach that museums might have to take to manage the inexorable video technology employed by creators in today's digital world.

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5. Edwin Klijn and Yola de Lusenet, "Tracking the Reel World: A Survey of Audiovisual Collections in Europe," European Commission on Preservation and Access, last modified January, 2008, http://www.tape-online.net/docs/tracking_the_reel_world.pdf.

2 Definitions

Many commonly-heard terms used in this report—preservation, video art, and media art—are pluralistic in nature and could be easily misunderstood. I will thus begin in a banal way by defining them.

2.1 Preservation

Preservation, in the context of this paper, is how Conway (2010) simply but effectively puts it: an act of "responsible custody" (Barr 1947). So what constitutes responsible custody? Soy (2000) identifies "three core elements of preservation" that can lead to responsible custody: (1) "advocate for the preservation of the collection," which includes developing a mission, policies, and strategies to promote and guide preservation activities, (2) develop and maintain infrastructures to support these activities, e.g., set up climate-controlled storage facilities, and (3) engage "knowledgeable and trained" personnel to carry out these activities. The objective of this paper is precisely to help stewards of video art collections become aware of the issues involved, and what it means to preserve video art (i.e., addressing the three core elements of preservation).

In the realm of audiovisual preservation itself, the term preservation has a specific definition. CCAHA (2009) defines preservation of audiovisual formats as "retaining the content of the original audiovisual materials [possibly on a different recording medium] so that it is safeguarded for future use."

2.2 Video and Media Art

Video art is a misnomer, resulted out of convenience. It is not technically "an art historical category" (Ross 2005, 4). Video art's heterogeneity and lack of a common "aesthetic orientation" had led to a convenient classification of this art form by its medium and its function as a tool (Ross 2005, 4). Likewise, Daniels (2005) emphasizes that a term like video art should "always be used as a tool, and not as a genre concept" (111).

Video in the context of this paper is as Hall and Jo Fifer (1990) defines it: Video "refers to the works of independent producers, usually documentarians or artists, who make videotapes or video installations that are not intended for the mass market of broadcast television" (496).

Media art, as Seijdel (2003) explains, is widely accepted to "refer to art made with technological media" (159). It encompasses video art.

3 Challenges in the Preservation and Management of Digital Video/ Media and Installation Art

Video art lacks materiality and is essentially ephemeral. A work does not exist once the videotape ejects from a player. Similarly, a digital video file is not unlike a

digital document—once electricity ceases, it sits impalpably in a computer, in non-existence. The ability for the file to instantiate itself depends on, for example, the integrity of the medium it resides in and the existence of the necessary hardware and software that can render it. Therefore, video art is not impervious to technology obsolescence. In fact, as video moves from the analog to the digital realm, preservation of video art—or for that matter, preservation of audiovisual materials—will share the same agenda presented by digital preservation (Pymm 2006). How do we ensure that we can re-instantiate a digital video file in the future when technology changes so quickly? At some point, when the technology needs replacement, preservation might mean having to replicate, migrate or even emulate the artwork. How then can we render such actions without meddling with the integrity of the original work?

The good news is a complementary approach that circumvents the need for head-on digital preservation solutions has already been articulated by scholars in the art conservation milieu. The strategy to preserve media art for posterity is through *comprehensive documentation* (Jones 2008; Wijers 2005; Laurenson 1999). For ephemeral and conceptual artworks, documents may be the only emblems of a work that will likely survive in the event when the video tape or file is no longer renderable. Therefore, other than having to preserve the video signals, *good documentation practice,* and *consultation and engagement with artist* are two essential components for the preservation of media art (Wijers, Coelho, and Rodrigo 2003).

However, the act of documentation generates a new problem. In order to capture the immateriality and volatility of this art form, comprehensive documentation is required. Documentation means having to generate myriad documents and records that can represent a work and the contexts in which it existed. These representations can exist in many forms and formats, e.g., paper, digital text, image and moving image. Obviously, these myriad documents and records need systematic management and preservation attention themselves. Furthermore, many of these documents are themselves born-digital (consider, for example, a video documentation of an installation work or of an artist interview) and thus demand as much attention as the video artwork itself! Consequently, how this deluge of digital assets will have to be managed is itself a challenge.

But that is not to say the scene is totally devoid of initiatives addressing this challenge. Some of the initiatives that attempt to conglomerate and present the myriad documentations of media and new media artworks include MANS,[6] CMCM,[7] and

6. MANS—acronym for Media Art Notation System. “MANS is a metadata framework borrowed heavily from the MPEG-21 Digital Item Declaration, a documentation standard from the media industry (Rinehart 2004). The final product of MANS is termed a ‘Score’—analogous to the function of a music score—expressed in a XML/ RDF schema . . . (Rinehart 2004). Being XML-based, this Score can thus be understood by both humans and machines” (Low 2011, 4). For further discussion on this model, see Rinehart (2007).

7. CMCM—acronym for Capturing Unstable Media Conceptual Model. “CMCM . . . is a conceptual model or more formally known as an ontology developed by the Capturing Unstable Media project. CMCM is an event-based metadata structure that integrates *people*, *activities* (e.g., research or projects), and *documents* (information sources resulting from these activities) (Fauconnier and Frommé

DOCAM Documentation Model.[8] However, these solutions remain theoretical and did not conclude as systems that are directly deployable, e.g., as software modules. Neither were they made easy for users without technical know-how to implement in a real museum setting. Later in section 7.2, I outline how a digital asset management system (DAMS) can fill this role—though not with its limitations—as an implementable first step to the preservation of media art, by serving as a virtual dossier that will allow museums to assume control over these digital assets.

4 Video Art in Southeast Asia

Before I introduce the video art collection at the Heritage Conservation Centre in Singapore, it is necessary to briefly discuss the historical context of media art in Southeast Asia. Video art in Southeast Asia has a different origin and developed in a context significantly different than that of the United States and Europe. This introduction will put in perspective why certain strategies created in Western contexts are received differently in Southeast Asia. Nevertheless, the rigorous discourse of western cultural heritage communities and decades of experience in collecting and preserving video art do provide applicable lessons Southeast Asian custodial institutions could learn from. In addition, video art involves the same inexorable animal—technology—which is not restricted by geographical boundaries. As such, some of the challenges of preserving video art will apply to all museums.

The history of video art in Southeast Asia (if there is one) is starkly short. With the exception of Japan, video as an artist's tool only picked up in Asia in the late 1990s and early first decade of the twenty-first century, as a concomitant of technological consumerism (Van Assche 2010). In Singapore, the idea of collecting this art form in museums was only conceived in the late 1990s (Teh 2011). The first video art was perhaps accessioned into the Singapore Art Museum (SAM) collection in 1998.

The inception of video art in Asia and Southeast Asia is based on different motivations from that of video art development in the Western world (the provisional *international* contemporary art scene). Video art was *approximately* born in the mid 1960s by pioneers such as Nam June Paik and Wolf Vostell; out of the Fluxus movement (Ross 2005; Hanhardt 1990), anti-hegemonic sentiments towards the mass media (Ross 2005), and video-makers' desire to push video—a relatively novel consumer tool at that time—beyond the capabilities of film (Teh 2011). Artists' use of video spread very quickly in the United States and Canada henceforth, more so than in Asia or even

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2003). CMCM is designed to be a syndetic framework to help stakeholders conceptualize and organize the large body of records generated from the usually complex documentation activities" (Low 2011, 5). For further discussion on this model, see Fauconnier and Frommé (2003).

8. DOCAM—acronym for Documentation and Conservation of the Media Arts Heritage. DOCAM proposes a model that can organize digital records generated based on a workflow—the lifecycle of the artwork. Thumbnails of digital documents are arranged like tiles on a wall. Presented as a visual interface, this allows users to see the connection between documents, the stakeholder(s) of the documents, and the stage of the lifecycle the documents exist in" (Low 2011, 6). For further discussion on this model, see DOCAM (n.d.).

Europe (Ross 2005). Southeast Asia video art, on the other hand, started in a different climate—a time when consumer technologies such as PCs, mobile devices and the Internet were ubiquitous (Teh 2011). In addition, its inception bears no animosity but in concordance towards popular culture, unlike the conception of video art in the West (Teh 2011).

The result of video art in Southeast Asia being a late bloomer means that many of the works by Asian and Southeast Asian artists were created on contemporary recording devices. With the exception of a small handful of works by early Asian and Southeast Asian artists who are earlier users of video in the region, many of the works are born-digital. In the Western world, many of the important video works were created on analog formats. The very different social-historical and technological contexts also result in a very "different art." Western video art (especially the earlier works) tends towards experimentation as a tenor to push video's capabilities and thus have "a greater emphasis on form than on content" (Boomgaard and Rutten 2003, 21). In contrast, Southeast Asian video art tends to be more "cinematic and narrative" in nature than experimental (Teh 2011). These contexts can influence preservation approach. If we extrapolate on the climate of how video art was conceived in Southeast Asia, we can safely say that most future works by artists in the region will likely continue to be digital. It is unlikely that artists will employ anachronistic equipment for their work unless as a deliberate attempt to accentuate the differences of these media for art sake. The more narrative and cinematic emphasis of video works by Southeast Asian artists also broadly suggests that when preserving for access, intellectual content might possibly take precedence over aesthetic nuances.

Also as a corollary of the late video art development in Southeast Asia, awareness and urgency on the preservation of media art is only a burgeoning discourse confined to collections management and conservation specialists. It is perhaps fair to say that it has not yet attracted much attention outside this interest group.

5 Media Art Collection at the Heritage Conservation Centre (HCC)

This short summary of video art's conception in Southeast Asia provides the backdrop for the video art collection under the custody of the Heritage Conservation Centre (HCC).

HCC, an institution of the National Heritage Board in Singapore, is the central custodian for the collections belonging to the National Museums of Singapore; one of which is the Singapore Art Museum (SAM)—a contemporary art museum. HCC provides conservation and collections management services to these museums. It is thus responsible for all collections-related services including storage, documentation, preventive and interventive conservation, and conservation research.

SAM is the primary exhibitor and collector of the contemporary art collection stored at HCC. Video and media artworks make up part of this contemporary art collection. Typically, SAM's curatorial team proposes on artworks to acquire and these acquisition proposals are sanction by SAM's acquisition board. Ideally, HCC should provide conservation inputs to acquisition decisions; however, this is still not part of the

regularized process. Otherwise, HCC works very closely with the curators, exhibition managers and technical support specialists from SAM on the care and display of the video and media artworks.

It is perhaps appropriate to highlight that when a museum and its conservation facility are separate entities, preservation priorities might sometimes be disjointed. For instance, in deciding what to collect, the rationalization is often more curatorial than preservation in perspective. Conservation and preservation concerns might not take on high priority in acquisition decisions. Acquisition of works is often characterized by a "buy first and worry later" attitude; or worst still, a "we buy and you worry" approach. But with media art, it is becoming clear that to *access and display* a work means having to *preserve and document* it. These have become intricately intertwined functions. Essentially, preservation considerations have to be at the top of the agenda, and have to happen right at the beginning of the acquisition process or even at the creation of the work. The roles of all the stakeholders—the artist, the curator, the conservator, the registrar, and the technical specialist—are converging and they all share equal partnership in the documentation, display and preservation of the work (Kraemer 2007).

The video and media art collection housed at HCC includes video art on VHS (both NTSC[9] and PAL[10]), DVDs, CDs (with artists' signature of authenticity!); and video art as digital files in flash drives, external hard disks, and optical disks. These digital video might be stored in variety of file formats. The collection consists mainly of single-channel, multi-channels video works and media installations.

6 A Centralized Digital Repository

Digitization of analog video for preservation is already a standard practice in the archival community chiefly because digital signals, unlike analog signals, are nondegradable with any amount of transfer (Pymm 2006; Gladney 2007, 200).

While the approach of storing videos on digital videotapes as archival master is in ascendance, this would not be my suggested approach for the collection at HCC, not to err from convention but for 2 reasons: (1) there are already discussions that the way to go now is to store video as data in hard disk drives (HDDs) or data tapes[11] (Wheeler 2008; Laurenson 2009), i.e., the preferred output of digitization will be a digital file rather than a digital videotape (Pymm 2006; Vitale and Messier 2007), and (2) HCC has a growing number of born-digital video files, but has only a fixed manageable number of analog tapes. The majority of new acquisitions from now on would be from artists shooting on newer equipment, i.e., they will be generating digital video files. The aim is to integrate the analog materials and the born-digital video materials and make them

9. NTSC—acronym for National Television System Committee, a world video standard used in North America and Japan (Weise and Weynand 2007).

10. PAL—acronym for Phase Alternate Line, a world video standard used in most of Europe and Southeast Asia (Weise and Weynand 2007).

11. HDDs and data tapes are considered more reliable than optical storage medium (Gladney 2007, 217).

accessible using one system (i.e., a digital repository). In order to do that, it will be necessary to reformat the analog materials into digital files instead of digital videotapes. Reformatting the analog materials into tapes would not allow them to join the other born-digital materials since they will not be "ingestible" into the digital repository.

7 The Digital Repository: Employing a Digital Asset Management System (DAMS)

7.1 DAMS Can Manage, Preserve and Provide Access to the Digital Objects (Video Files)

The idea of a digital asset management system (DAMS) should not be totally new to museums, since museums of all sizes employ DAMS to manage images of their permanent collection (Waibel 2007). However, the use of DAMS in museums for moving image collection—including video and media art—is not as rampant. We could perhaps advocate the low take-up rate of DAMS to the "media-based preservation mindset [in this area that] is hard to break" (Gladney 2007, 213).

Actually, Gracy and Cloonan (2004) have already antecedently advocated the need for a DAM or MAM (Media Asset Management) system to exert control over media assets. At this time of writing, it is already mature to assert that employing a DAMS (i.e., setting up a digital repository by employing a DAMS) is a necessary first step for museums to manage and preserve their media collection.

A digital repository can fulfill all important aspects of collecting digital objects—collecting, documenting and displaying (Graham and Cook 2010, 202). However, where collecting/managing digital objects (in this case, videos) are concern, museums as memory institutions, would have one more important responsibility, and that is (digital) preservation. Indeed, complete digital preservation solution is more than just employing a DAMS. An institution is said only to be exerting "true" digital preservation if it meets the definition of a "trusted digital repository," i.e., conforming to the standards outlined by the RLG-NARA Task Force in the *Trustworthy Repositories Audit & Certification: Criteria and Checklist* report for example. For museums or institutions with little or no experience in preserving digital objects, achieving these criteria may be formidable.

While a comprehensive digital preservation program demands more than just having a DAMS in place—the good news is, setting up a DAMS (a system that is readily deployable from the market) is already plying digital preservation (Waibel 2007). The question perhaps is, how that is so. According to the criteria on the technical infrastructure of a trusted digital repository, a repository needs to be able "to ingest, manage, and provide access to digital objects for the long term" (RLG-NARA 2007, 21). These are functions DAMS can fulfill. In addition, having a DAMS in place would address the issue of media obsolescence (since video signals will be "liberated" from a particular eclipsing physical carrier), and would also address the issue of format obsolescence to some degree (by facilitating format checks and migration[12]) (Waibel 2007).

12. Format checking and migration are the reviewing of files (which can involve both manual and semi-automated processes) for near-obsolete formats. Such checks then allow users to initiate a migration action of converting these files to newer formats.

Even though employing DAMS is not a promise of having *long-term* access to a digital collection; it certainly provides institutions with an organized system to manage their video and media collection in its currency, on a daily basis, which is what is fundamentally important. Some of the benefits of engaging asset management systems are listed by Baca, Coburn, and Hubbard (2008, 126). A DAMS can (1) serve as a centralized repository for all the digital files; (2) promote "consistent metadata capture"; and (3) "bind digital content and metadata together," otherwise, tapes and DVDs sit on physical shelves separated from their metadata which is in a database.

Finally, DAMS also resolve to provide access to these video assets. A persistent problem that plagued many media art archives is the lack of accessibility to a work in its entirety to scholars, curators and the interested public (Schieren 2005). It is common to see only still images of video artworks or 10-seconds preview on online databases. Schieren illustrates that like how a viewer needs to see a complete painting (even if it's a reproduction) to generate the necessary impression, it is crucial for researchers to be able to see the full extent of a video work. Yet Gladney (2007) reasons that the cost of handling and viewing is usually one of the highest costs of maintenance for audiovisual collection; and therefore advocates seeking solutions that will reduce the frequency of handling. Having a DAMS is one such solution. A video, when deposited into a DAMS, could be streamed over the network; i.e., the video work can be delivered to the computer screen of internal (museum staff) and/or external (public) audiences on-the-fly in full or in parts.[13] Instead of having to maintain old playback machines, rely on staff for retrievals and meeting viewing appointments, internal researchers and curators can do a self-service to view the video works over the network via the DAMS. In today's networked environment, people are increasingly expecting on-demand access to information via the Internet (Schieren 2005). Researchers and curators are no exception.

7.2 DAMS Can Serve as a Digital Dossier for Complex Media and Installation Art

Apart from serving as a repository for the management of the video artwork itself, DAMS can also serve as a repository for the surrogates and documentations of complex media art.

As discussed earlier in the paper, preservation of media art is all about documentation. Many projects that pry into the preservation of contemporary art forms predicate that these art forms [especially (new) media, installation, and conceptual art] be represented and documented by as many forms and formats as possible, i.e., texts, visuals, videos etc. There are two situations that could possibly generate or result in a deluge of digital files and record types:

1. The need to capture the intangible aspects of a complex media work

   The need to capture the immateriality of a media work would likely require unconventional documentation strategies. For example, how would one capture

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13. Not all DAMS will have this capability. Some customization to the system or additional modules may be required.

"user experience" of say an interactive media installation? Capturing user experience using text can be challenging. In such instances, audiovisual recordings might be more useful (Fromme and Fauconnier 2005). Similarly, documentation of intangible impressions such as light, sound, and motion would call for unconventional methods such as video documentation and alternative visual documentation of the gallery space (Inside Installation 2007).

2. The need to capture the "evolution" of a complex media work

A media installation, or for that matter any installation work, can evolve over its lifetime or can exist as different manifestations such as when a work undergoes a technology upgrade or is displayed in different venues. Each of these manifestations or occurrences can generate different types of documentation (Fromme and Fauconnier 2005). For example, metamorphosis of media installation to suit different exhibition venues is not uncommon, and as Schieren (2005) predicates, it is good practice for museum staff to do visual documentation of these presentation modes every time the work is set up in a different context/ venue. Also, "upgrading" of a media work is inevitable. This would also likely result in new sets of instructions, drawings, images etc. that will need to be managed.

Indeed, museums are generating many digital objects in many forms in their attempt to document complex media works. At HCC for example, digital files that are important documentation of installation artworks are generated at every instance. Conservators, documentation specialists, curators might take pictures of installation processes (which are important records for future re-installation of the work), but might not know where to "keep" these images. Similarly, even if important video documents were created (e.g., video documentation of installation processes, artist interviews), they are, at best, burned into DVDs or stored in a common computer folder; or at worst, still in the memory of the video camera, unorganized. Therefore, concatenating documents are not properly managed and put together**.** This is largely because there is no systematic workflow to deal with such installation images or video documents. When these born-digital documents are not centrally stored or properly archived for future access, they can only be as good as lost.

No doubt, as mentioned in Section 3.1, scholars and academia have attempted to conceptualize creative methods of documentation or proposed ways to manage these document avalanches, but most of these are not directly deployable solutions. For instance, MANS is a structural metadata created specifically to document complex media art; but to this end, it remains a theoretical framework—we cannot expect all collections managers and catalogers to understand how to navigate or generate an XML score for example. Likewise, the DOCAM documentation model reveals a very thoughtful design; unfortunately, I do not believe that it has been made into a software tool for museums to use as part of their daily operations. What museums need is deployable software or digital library systems with an end-user interface that is "useable" for museum personnel. That is where DAMS can come in.

DAMS are specially design to house different types of digital objects. Museums can therefore optimize on this by making a formal home out of DAMS for such digital objects. DAMS could serve as a repository space for these myriad document types, i.e., the video documentation; images of installations/de-installations; diagrams; documents of artists' drafts/ drawings/ installation plans/ layouts etc. In short, any unconventional documentation forms and formats that cannot be captured in the standard fields of a museum's collections management system.

Schieren (2005) sums it up well, "the aim of the database [digital repository] is to present the documents, to collect them and serve as a temporary material depot for subsequent readings of media art in various dimensions" (77).

With regards to how documents could be organized in the digital repository, the CMCM Conceptual Model (Fauconnier and Frommé 2003), inspired by the CIDOC-CRM, could be a source of reference. The CMCM model[14] helps stakeholder articulates activities that have happened to an artwork, and thus provides a framework to organize the resulting pieces of documents based on these activities/ occurrences (Fromme and Fauconnier 2005, 181). Let's use an example to illustrate this. Consider Bill Viola's *the Sleep of Reason* mentioned earlier. *The Sleep of Reason* is a media installation first installed at the Carnegie International in 1988. During its lifetime, the piece has gone on loan many times to different venues and has been upgraded at least twice—in 2000 and 2011. How the documents/ assets related to this work can hypothetically be organized in a DAMS, is explained as follows. This is also shown schematically in figure 3.

Each of the assets (images, videos, texts, etc.) in the repository will have their own corresponding metadata record (see green arrows in figure 3). One of the proposed fields (i.e., metadata element) will be the *Event* field, which can be 'tagged' to every piece of asset. For instance, all the images generated as a result of say a loan to Helsinki in 2011 can be tagged as, e.g., Event (type): Loan; Event (place): Helsinki (circled in figure 3). Similarly, any resulting documents/ assets generated from the upgrade of the work in 2000 can be tagged as, e.g., Event (type): Upgrade; Event (date): 2000.

14. See note 7 above.

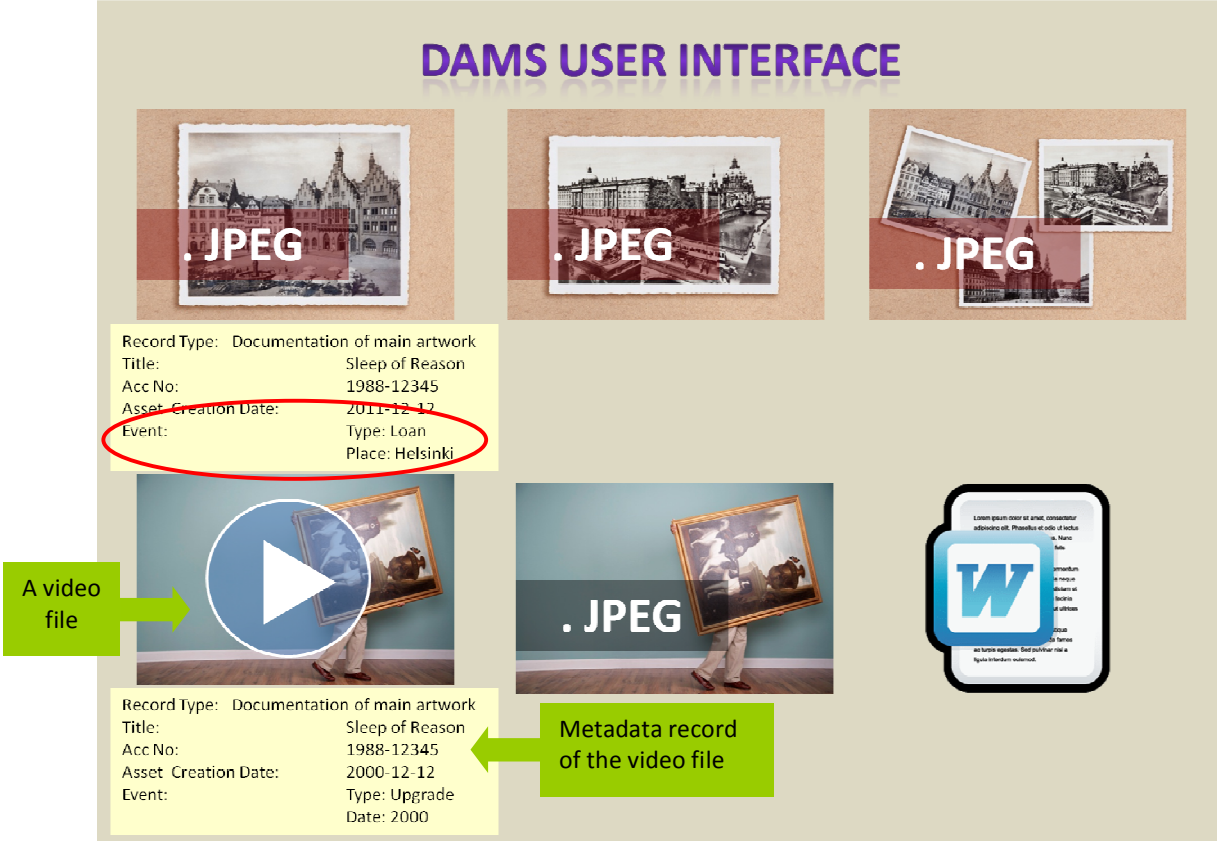

Figure 1. Shows an impression of how a DAMS user interface might look like. There are six digital assets in this DAMS mockup: four JPEG files, one video file, and a Word document. Hypothetically, these image files, the video, and the text document are generated as a result of the different activities/ occurrences that have happened to the work.

When a user wishes to call up all the documents generated from the upgrade in 2000, he/ she will be able to sieve them out by filtering "Event." All the related documents/ assets resulting from that event (in CMCM terms: activity or occurrence) will be collocated. This is a formative idea; further deliberation will be needed for any actual implementation.

Many DAMS are available in the market and they vary in sophistication. Not all DAMS support moving images and some system customization might be required. While there are systems that are based on open standards, some of the most established and sophisticated DAMS which has the capabilities to support moving images are made for enterprises, and are thus proprietary systems. A prudent consideration is to select a system that supports easy export of data and assets for any future migration. In addition, the system should have the ability to export associate metadata into a proprietary-neutral vehicle such as XML. In this way, data will not be locked into any proprietary system (Baca, Coburn, and Hubbard 2008).

One final point about the digital repository is this: the digital repository need not meant to be a replacement of any systems in a museum, particularly the Collections Management System (CMS), even though DAMS can be customized to serve as a CMS. CMS and DAMS serve different purposes. Consequently, the DAMS could integrate with

the Collections Management System to optimize on the functionalities of these two systems that may not necessarily be fulfilled by any one alone. In other words, museums should find a strategy for the two systems to co-exist in harmony (Waibel 2007) if their DAMS is not already their CMS.

7.3 Metadata

A metadata record is comparable to a catalog record (Andreano 2008). Each video file (digital object) needs a catalog record or profile about them. In this section, an application profile (AP) for use in the digital repository (DAMS) is proposed.[15] A set of metadata elements (as seen in table 1) which can be used to record each video file, is suggested. These elements are adopted from existing schemas and in consultation with literature, specifically Bachmann (2010) and Agnew, Kniesner, and Weber (2007).

Table 1. Metadata element list. This element set is meant for a single digital asset (e.g., one video file).

Element	Examples	MPEG-7 (top elements)	PREMIS	Auto/ Manual
Record type	Main-Artwork	DescriptionMetadata DS*	-	Manual
Title of work	In Love for the Mood	-	-	Manual
Edition No.	1 of 3	-	-	Manual
Accession No.	2010-12345	-	-	Manual
Color/ Black & white	Color	-	-	Manual
Sound/Silent	Sound	-	-	Manual
Artist Name	Wong, Ming	CreationInformation DS	-	Manual
Asset Creation Event	Digitized from analog media	CreationInformation DS	2.2eventType	Manual
Asset Creation Source	Analog media 1999-12345			
Asset Creation Date	2009-12-12	CreationInformation DS	2.3eventDateTime	Manual
File name	LoveForMood..avi	-	1.6 originalName	Auto
ID Owning Department	HCC DR Object ID	-	1.1 .1objectIdentifierType	Auto
Digital Asset ID	xxxx	-	1.1.2objectIdentifierValue	Auto
Repository Name	HCC	-	3.1.1 agentIdentifierType	Manual
Ingest date	2011-12-12	-	2.2eventType 2.3eventDateTime	Auto

15. Application profiles as defined in Zeng and Qin (2008): “Application profiles usually consist of metadata elements drawn from one or more metadata schemas, combined into a compound schema by implementers, and optimized for a particular local application” (112).

Imported by	Tyan	-	3.1.2 agentIdentifierValue	Auto
Status of material	Archival master; Derivative	MediaInformation DS MediaProfile D	-	Manual
File size	1234567 bytes	MediaInformation DS	1.5.3 size	Auto
File Format	AVI	MediaInformation DS	1.5.4.1.1 formatName 1.5.4.1.2 formatVersion	Auto
Compression	Uncompressed	MediaInformation DS	1.5.1 compositionLevel	Manual
Total Run Time/ Extent	03:12:24:20	MediaInformation DS	-	Auto
Video Origination Format	VHS, U-Matic	MediaInformation DS	-	Manual
Regional Encoding Format	NTSC; PAL	MediaInformation DS	-	Manual
Aspect Ratio	4:3	MediaInformation DS	-	Auto
Codec	H.264	MediaInformation DS	-	Auto
Frame Dimensions	640 pixels x 480 pixels	MediaInformation DS	-	Auto
For Public Use: Y/N	-	UsageInformation DS	-	Manual (Default: No)
Rights	Unrestricted access	UsageInformation DS	4.1 rightsStatement	

*DS: Description Scheme

MPEG-7 and PREMIS are recommended as source schemas for the proposed element set. MPEG-7 is designed specially for moving images materials, and caters specifically to digital files (Agnew, Kniesner, and Weber 2007). It thus has the relevant technical and administrative metadata information for our use here. Similarly, PREMIS would have the preservation metadata elements that we can borrow from. MPEG-7 and PREMIS are among the few most suitable standards for this purpose, though both are complex metadata standards. The next step would be to map these elements to the CIDOC-CRM to ensure that this proposed metadata is extensible and compatible to this important ontology.

Considering the extensiveness of MPEG-7 and especially PREMIS, many elements can be adopted and our metadata set could potentially be very long. But for ease of application, the set of elements is kept as simple as possible and only essential elements are chosen. Table 1 shows a list of suggested elements. The idea is that metadata records in the DAMS be used only to describe digital assets, i.e., digital video files; while metadata records in the CMS (collections management system) is used to describe tangible video assets, i.e., physical artifacts such as a videotape or DVD. Thus, only metadata elements that cannot be captured or not already in the CMS should be considered for the DAMS application profile. However, repetition of some elements may be unavoidable.

That brings us to another important consideration: in the designing of the application profile, use of any elements that are already in use in the CMS should be kept to a minimum. Since the DAMS metadata record would be linked to the CMS, those

elements that are already in use in the CMS should as far as possible not be repeated in the DAMS application profile. Repeating elements in the two systems is poor efficiency as that would mean having to key in one same value twice (once in each system) (Waibel 2007). The only reason why elements can to be repeated is for the two systems to "talk" to each other and for the purpose of resource identification by a user. Example of an element that might have to be repeated in both systems is "Accession Number." And ideally, these repeated elements in the DAMS should be mapped to that in the CMS, and the values of these shared elements extracted from the CMS. In short, duplication of data should be kept to a minimum. How the CMS and DAMS would interoperate is an art in itself that would require careful and extensive planning. This would therefore not be covered here.

Most DAMS would support some degree of metadata extraction. That means, when a digital file is ingested into the system, certain metadata, e.g., file-related information including file name, file format, and file size, could be extracted from the digital object and populated into the relevant fields in the DAMS. Such auto-generated metadata should be exploited as far as possible. Those elements that could be populated automatically should be allowed to do so instead of relying on humans. This will minimize errors or inconsistency in metadata entries (Gladney 2007).

Finally, before expending time and energy on configuring the DAMS according to the application profile (AP), it will be prudent to test out the AP by "cataloging" a sample collection of artworks with it. Conducting actual cataloging would reveal potential problems or inadequacies that can be improved before scaling it for use in a repository.

8. Conclusion

Zippay (2005) laments that "more than three decades after video first emerged as an art form, we are still discussing its recalcitrance and problematics" (195). Today, seven years after that statement was published, we are still having the same discussion but tackling new challenges. Typology of media used to be discrete—photography, film, video. However, as video gets transformed into digital formats, it will no longer be a "media-based art" (Seijdel 2003). A video will no longer manifest as a physical object, but a digital object.

To manage these video assets, museums are confronted with a new challenge—digital preservation. This paper suggests that museums need not be intimidated. There are *practical* ways to handle this challenge. It will, however, first take a change in mindset. Employing "media-based" preservation strategies for born-digital video files is a decelerating approach and not a viable option.

Although digital technology is becoming the standard method of preserving video art, the art conservation world has also come up with strategies for preserving complex media works that circumvent "true" digital preservation. These strategies involve unconventional documentation of the work by using methods like video recordings and visual representations. However, this poses challenges in itself as we find ourselves coming back full circle to the same problem: having to manage a deluge of

born-digital media materials. Also, while academic and research initiatives and strategies for documenting/preserving media art abound, most of them cannot be easily implemented. Museums are burdened by growing digital assets that require preservation. As an effective first step towards digital preservation, this paper suggests that a robust digital repository employing enterprise-standard DAMS is what museums need. This is a practical solution that museums can employ immediately. Not only would a digital repository serve as a repository for the actual video art itself, it can also serve as a virtual dossier to manage the myriad digital documents generated as a result of preservation requirements.

In the end, successful preservation of video art is about access. Having the necessary rights to provide access and committing to sustaining a digital repository are crucial actions museums have to take to fulfill their role as responsible stewards of the collection. A digital repository with capabilities of networked access would help museums meet communities' expectation of access and retrieval.

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