# ALMOST THERE: SIMPLE STRATEGIES FOR PARTIAL PRESERVATION OF COMPLEX DIGITAL WORKS

**Somaya Langley**

National Library of Australia

Over recent years, we have become increasingly aware that our world is in a considerable state of flux – economically, environmentally, politically, socially and technologically. Significant shifts in these areas have flow on effects, impacting on our culture as a whole, in addition to other aspects of our lives. Over the past two decades, we have grown more reliant on a range of technologies, so much so, that for certain sectors of contemporary society, a large proportion of our communication and interaction as well as intellectual and creative output is interwoven with one type of digital mechanism or another.

Articles about a potential and imminent 'digital Dark Age' are beginning to frequent the media, while the general public is becoming aware of just how impermanent our ongoing access to some of the world's digital content might be. Whether this is due to dependencies between the various systems, proprietary commercial software or for a multitude of other reasons, our futuristic dreams are rapidly turning into a nightmarish digital void. Larger cultural institutions have been well aware of these issues, developing mechanisms and workflow processes to combat these challenges for over a decade, but what about the smaller organisations? Typically, small not-for-profit arts and cultural organisations, in both Australia and overseas, do not have access to suitable resources, enabling them to preserve their archives to the similar standards of the memory sector's government institutions. What low-cost strategies have some of these smaller organisations or individual digital archivists and researchers, proposed and implemented, in order to at least partially preserve digital content for the long-term?

By using techniques such as virtualisation and video-cued recall, spanning dance technology performance, media artworks and net.art, selected initiatives, including the International Centre for Art and New Technologies (CIANT) *Artistic Testbed* developed as part of the European Union's Cultural, Artistic and Scientific knowledge for Preservation, Access and Retrieval (CASPAR) project, Documentation and Conservation of the Media Arts Heritage (DOCAM) research and the online net.artdatabase illustrate various approaches to documenting and managing complex born-digital content by way of 'digitising the experience'. Each approach provides a different methodology, enabling active steps to be taken in preserving some of our most fragile digital cultural content.

## INTRODUCTION

Preserving and maintaining access to born digital content has been at the forefront of considerable discourse within the memory sector for over a decade, and while much discussion regarding the challenges and issues presented by the digital environment have occurred, fewer active steps have been taken. These steps are necessary in order to tackle what may be an impending loss of our digital history, right around the corner. Writer and filmmaker Shilo McClean, whose expertise centres on digital effects and storytelling via the digital medium, states:

> ...though wind may have scoured the stone on which our earliest stories were recorded and many a great library has been lost to fire and human conflict, stories have endured. Endurance is their mission and redundancy and reinvention are vital to their survival. Given the means to do so, a story lost in once place will rise again elsewhere. As we develop new technologies, we can reinvent our stories for future generations. Our new tools suit these purposes marvellously well
> (McClean 2010: 3–4).

This is indeed true of current times, where almost anyone (in the developed world) with a hundred or so dollars, a little time on their hands and enough initiative can create reasonably sophisticated digital content. We now exist in an era where everyone can be a producer of creative content, with only a few digital tools at their disposal. Reflective of our 'fast' nations, the speed at which we can create, hurtling

towards yet another technological advancement is often to the detriment of our recent digital past. Keeping these digital creations for extended timeframes, involves more forethought and planning than many might realise. Indeed, it is not just personal digital files that suffer. Our rapid technological supersession also 'leaves the archives of today in a heightened entropic and precarious state' (Østby Sæther 2010: 78).

## THE STATE OF COMPLEX CREATIVE CONTENT

The risk of loss is particularly pertinent to 'complex digital objects' or 'complex objects' – those works that are made up of more than one single digital file, or file type. These works might be constructed from a range of files of different formats (including text, audiovisual and other components), they may have a range of different relationships (and interdependencies) between the files, it may be dependent on external systems (such as server software, or a particular computer operating system), user interaction might be necessary in order to experience the work, or it could be hybrid in form, where only part of the work is digital and the other component is physical. Regardless of what materials the work has been made from, or how it is structured, it is important to regard the digital component as just another medium, another tool for expression. Whatever the creator's reasons, they have chosen the digital environment as the one to facilitate the communication and expression of their ideas. Some creators practicing in the digital environment base their works entirely on the inherent nature of these newly emerging technologies. They exploit bugs in the software or the unintentional characteristics that arise, turning these into the feature of the artwork itself. Despite rapid changes in technology that might leave some of us feeling overwhelmed, it fascinates us all the same.

> *Despite our fears of change, we crave innovation, and that is enough to inspire us to overcome our fears and find new ways to create. It is this desire to make things that has been most powerful in advancing the technologies that drive our current*

*progress in the creative arts*
(McClean 2010: 12).

Regardless of our hesitations, we will embrace each newly emerging technology, and as archivists and conservationists, researchers and librarians, we will re-emerge ourselves, bringing with us the knowledge and practices of the past to meet the challenges of the future. While there are specific characteristics presented by the digital world, which need to be handled in a way that utilises related technological frameworks and infrastructures, it doesn't mean that existing traditional archival and conservation practices should be thrown away. Much can be learnt from the concepts of this tradition. Other traditional tools for managing time-based or spatial creations and can (and already do to some degree) borrow from historical approaches. For example, the musical score is a way of encoding information so the same sounds can be heard, more or less the same, time and time again, while maps provide ways of displaying spatial relationships. Complex digital objects may need to employ these tools of the past in order to more completely document their relationships with time and space, if they are to be successfully retained for future generations.

Now is the time to demand that the fetishisation of the digital environment takes a backseat, that 'digital' is demystified once and for all, and that it is acknowledged as just another tool for creative expression. Perhaps this is already happened with Gen Z, the new generation of 'digital natives' who were born into a world deeply ensconced in digital technologies. To them, these devices and mechanisms are merely seen as part of life; however this does not guarantee long-term survival of digital content. While the digital environment can still be awe-inspiring, it can also be frustrating complex. Many dependencies exist, and often they are hidden or undocumented. Methodologies that may prove useful for preserving and documenting complex works may include visualising invisible networks (Shea 2011), particularly for those creative works that employ wireless or other invisible technologies as essential components. It is not only the works that present new technical challenges for preservation and

conservation, the notion of cultural collections as a whole are currently being redefined. "The archive is in motion, rhetorically, literally and technically..." (Røssaak 2010: 5), and so it should be. To meet the demands of our prospective technologically empowered audiences, "...the future cultural emphasis will be rather on permanent transfer, not storage (without undoing storage, though). There is already an implosion of storage mania into processual data flows, a different economy of the archive as dynamic agency 'online'" (Lovink 2003).

While traditional archival and conservation thinking should not be overlooked, these new technologies also demand new methodologies, in order to manage even more complex relationships, dependencies, idiosyncrasies as well as considerably larger amounts of data. In other words, some traditional conservation and preservation approaches that may be taken as a given, such as handling an individual object at a time, are not scalable in ways that enable management of groups of like-objects (of the digital variety). Because of the (sometimes) technical complexity of digital creations, the responsibility for archiving and conservation can no longer lie only with archivists and conservationists. Digital materials may have dependencies on various technologies, software versions, and other computer add-on devices (including externals known as peripherals and dongles). There are often complex relationships between the various components that make up a digital work. Creators must be encouraged to supply important (and often essential) information as part of the creation, production and presentation of a work. For digital works, a "Sheer Curation" (2011) approach is necessary (Šimko *et al* 2009: 33). They can include the generation and capture of this as part of the workflow process. The information needed is documentation and descriptions that support the work, including metadata, system diagrams, technical requirements (such as operating system platforms, software versions and other dependencies), technical specifications, various kinds of metadata, information on rights (plus collaborators full names and contact details), written, audio or audiovisual recordings of a statement about creators' (and other collaborators')

intents. Ultimately this will grant the work the chance of a longer lifespan. Producing these additional materials should not just be one more thing to add to the creators' 'to do' list – it is imperative that they are supported in order to ensure that not only, is this additional information produced, but the right kind of information is produced. However, this is another topic altogether.

So why, in 2011, after a decade of pondering, are we still discussing the 'how' of digital preservation? There are many hindrances, in addition to the general technical hurdles of a rapidly developing digital society, that have prevented both individuals and organisations, both large and small, from launching into active preservation of their digital content. Not only is there a lack of available international standards for preserving particular file types or complex works, there is a general hesitancy to take steps towards preserving this content because of lack of appropriate knowledge within organisations. There is a lack of tools aimed at individuals or smaller organisations. Technologists are not necessarily employed by the very organisations that need them, and indeed many smaller organisations rely on a reasonable degree of volunteer effort, which is harder to secure the right kind of technologically savvy individuals, who may be able to earn a buck elsewhere, to freely provide their expertise and services. Of course, this is the biggest hurdle that most individuals and not-for-profit organisations face: lack of resources. One obvious solution for sustainable digital preservation is, as stated by David Giaretta, "Money [...] enough of it for an indefinite period" (2011: 8). He continues on, to observe that:

> Within a single organisation, with a continuous supply of adequate funding, the job of digital preservation is at least feasible. However no one can be sure of continued funding, and examples of such continued, and generous, funding are hard if not impossible to find. Instead the preservation of any piece of digitally encoded information almost certainly will rely on one or more chains of preservation each of which is only as strong as its weakest link
> (Giaretta 2011: 41).

The future of our collections as they exist right now cannot be guaranteed. We know that everything in the world is in a state of flux – be that fast or slow – and we (both creators and archivists alike) would do well to fully embrace the philosophy of Heraclitus, who believed that change was the only constant of the universe. If we are able to appreciate this notion, then, how it applies to digital materials is particularly relevant. While the potential decay of a physical object, such as those made from paper, may take one hundred years to break down, depending on where and how digital data is stored, its lifespan may be greatly reduced, to that of only ten years. Storage mediums are often frail, often produced by companies, where it is not in the company's commercial interests for their products to be robust, nor to endure the tests of time. All of this adds up to one major concern: fragility. Our digital content is fragile, and coupled with the range of dependencies that might be found in complex digital objects, we are unable to guarantee will exist several years into the future, let alone a century. So how do we not lose our digital history, or at least some parts of it?

A number of world-first initiatives and projects have taken place over the past decade, which have addressed fundamental thinking surrounding the preservation of complex, experimental and avant-garde artwork (including digital and media-based), yet much of this has come from a gallery and museum perspective, typically focussing on installation art. Selected projects that have made a significant contribution include *Archiving the Avant-garde* (Rinehart 2002), Capturing Unstable Media Conceptual Model, Forging the Future, *Untitled Media: A Survey of New Media Art* (Gwilt *et al* 2005), and the Variable Media Network.

From the national institutions dotted around the world, there are a number of concepts frequenting the digital preservation field, as actual or potential approaches for managing digital materials. The most common are emulation (creating a software environment that replicates an older computer operating system) or migration (transferring files from an older format to a newer format), or even 'movage' (which refers to the constant shifting of data from storage environment to another). However these are not always solutions that smaller not-for-profit organisations or individuals have the capacity to apply. Instead, this paper focuses on small-scale tangible approaches, including ways of 'documenting around the work' (Langley 2006) for highly ephemeral works. This paper looks at a select set of methodologies and frameworks not merely questionnaires, surveys, theoretical or large-scale conceptual designs.

The select set of projects in this paper have built upon a range of models and thinking – CIDOC Conceptual Reference Model (CIDOC-CRM), Functional Requirements for Bibliographic Records (FRBR), FRBRoo (Doerr *et al* 2009), Open Archival Information System (OAIS), and Interactive Multimedia Performance (Mikroyannidis *et al* 2007) – and have also included a pilot set of digital documentation or preservation case studies in order to test these approaches to preservation of complex digital objects.

# PROJECTS

## CIANT artistic testbed

The European Union's project for Cultural, Artistic and Scientific knowledge for Preservation, Access and Retrieval (CASPAR), which ran from 2006 to 2009, focussed on three areas of data preservation: scientific data (including European Space Agency data), cultural data (including documentation of data associated with UNESCO world heritage sites) and digital artistic works. The project covered methodologies, standards and the further development of a range of technologies, through to training, documentation, testing and evaluation.

As part of the CASPAR project, one of the partner organisations, the International Centre for Art and New Technologies (CIANT) in Prague, Czech Republic, addressed the preservation of 'new media performance' (complex artistic performance-based works) for the purpose of re-performing in the long-term. They specifically focussed on dance and theatre

works that employ a range of technologies, such as data collected from sensor systems that recorded human movement. They selected the performance genre of dance technology as there are so many variables that go together to make up a work; it is time-based, performative, includes sound, video, lighting and theatre design, with a range of technologies integrated into the various aspects of the work, including a motion capture sensor system, generated streams of digital data enabling the dancer/performer to interactively control selected audiovisual elements.

CIANT set up an Artistic Testbed to digitally document these complex works, hoping that by retaining a range of digital components of the work or associated documentation, this would enable future re-staging and re-performance of the work. The only limitation for inclusion of materials in the Artistic Testbed, was that they were in a digital format. Documentation (such as a video recording of a performance), digital files used in the performance (such as the audio soundtrack) and bitstream data (from various different components, such as the DMX lighting data, or the dancer's sensor data) generated as a part of the performance, were retained. The decision to retain the original bitstream data (raw data), was based on practices in the scientific data preservation community, where more advanced ways of interpreting the data may exist in the future. In addition they recognised that it was important to retain information about the workflow as well as the 'intent' of various aspects of the work (such as a written statement from the choreographer, outlining



**Figure 1** | Segment of Hallerstein Model – as displayed in the CIANT Artistic Testbed.

the conceptual ideas behind the dancer's movement) that are either part of or support the 'intellectual entity'[1]. They decided that by documenting the creative process as a whole, right from the abstract artistic idea, through to instructions given by individuals or computer systems, various specifications and diagrams such as the stage plan, script as well as information about the people and organisations involved, this might enable reaching the goal of re-performance in the long-term. They surmised that if the original creators of each component could record their abstract ideas or how the component was constructed, this would provide a more in-depth understanding, and a potential closer representation of the original work, were it to be reconstructed/re-performed in the future. Similar to the Media Art Notation System (MANS) (Reinhart 2007), if the original hardware was not available, then the hardware of the future should be able to be executed, as long as it fulfilled the same functionality as what was used in the past. Essentially, they were hoping that the idea and the intention of each component of a new media performance could be described well enough, in order that the ideas could adapt to future technologies.

---

[1] One of the five 'entities' relevant to digital preservation as defined in the PREMIS data model. An Intellectual Entity is a coherent set of content that can reasonably be described as a unit, i.e. a conceptual object, or something that a human can understand as a meaningful unit of information such as a website, a photograph or a report. An Intellectual Entity may have one or more Representations and may also be made up of one or more Files ("Intellectual Entity" 2005) (Ed.).

As there are significant challenges with this form of material, CIANT chose some simple approaches when building their Artistic Testbed. They settled upon a simple model – the process model – in order to describe and map relationships between all the components of a work. Forming what they termed "building blocks" (Šimko *et al* 2009: 33), which consists of a motivator (something that kicks off a process, for example the motivator might be a particular person such as the choreographer), an input (which might be an artistic idea behind the choreography) and an output (which might be the actual physical movement). They also classified components as two types of elements: people and organisations (artists, technicians) or assets (equipment, instructions, descriptions, interactive software patches controlling the audiovisual components, files). The building blocks ontology was then mapped to the CIDOC-CRM model, expressed in Web Ontology Language (OWL). One

studies that including GOLEM, V.I.R.U.S. and Hallerstein. Hallerstein was a large-scale project combining performance, technology and European-Chinese cultural heritage, developed over the period 2008-2009. Performances took place in Slovenia and China, and involved creators, artists and technicians from several different countries and nationalities.

The system they developed for the Artistic Testbed was based on open source environment, implementing a structured wiki (TWiki) and utilising forms within the wiki. This enabled the contributors of the various assets (digital files) to upload them to the wiki. Relationships between an asset and other assets were indicated by selecting from adding information limited set of fields in the form (such as selecting the instigator or the input), enabling the entire work to be dynamically mapped, as shown in Figures 1 and 2.



**Figure 2** | Entire Hallerstein Model – as displayed in the CIANT Artistic Testbed.

The map is generated from the information input into the form fields, and enables the relationships between all the assets and people and organisations to be modelled in way that provides an overall view of the dependencies and associations for a complex new media performance. If new elements were added, or the information of about the elements changes, then this dynamic mapping will automatically update.

component of the Artistic Testbed was an automated process modelling diagram tool, enabling the various components of a work to be mapped out 'on the fly', displaying all the relationships between each of the elements.

## Hallerstein

As the CIANT Artistic Testbed was a pilot research project, enabling the testing and evaluation of a conceptual model, the actual work undertaken was limited to a select set of new media performance case

With the help of some additional tools developed by CIANT staff, including the Performance Viewer Tool, which built on top of the open source media player, VLC, this tool enables the playback of multiple time-

based assets held in the system, as well as a way to shift the start times of each element selected, for synchronisation purposes. Assets that could be synchronised and played back simultaneously might include the audio soundtrack, the video file (which was used as a projection in the performance), the various video documentation captures of the performance itself (shot from different angles), as well as the lighting data and the sensor data from the performer's movement (captured during one of the performances).

## Virtualisation

In addition to the Performance Viewer Tool, a simulation environment was built (in VRML), which included a representation of the theatre stage, and the elements that appeared on the stage. This was the only aspect of the work that required hand construction of a (three-dimensional) digital representation of an asset.



**Figure 3** | CIANT Artistic Testbed – Virtualisation of Hallerstein using the Performance Viewer Tool.

The technique, known as virtualisation, enables the simulation of a performance, drawing on the various time-based assets held within the Artistic Testbed wiki, and synchronising their playback, via the Performance Viewer Tool. The result of this virtualisation is the ability to see a representation of the dancer (a three-dimensional representation whose movement is dictated by the sensor data generated by the human movement of the real performer, captured earlier during one of the actual performances), perform within a three-dimensional space with accompanying soundtrack, video projection and lighting. At the same time as viewing the virtualisation, the video documentation (captured from several different angles during a performance)

is also synchronised (also via the Performance Viewer Tool) onto additional screens, providing greater insight into the performance, than just a single stream video documentation, as shown in Figure 3.

Yet, this approach is not without its challenges. The main difficulty faced was that not all the assets were available. For example, the DMX lighting data was either not recorded, or was not obtained from the lighting technician. Additionally, the various digital files created by numerous individuals involved in the Hallerstein production meant that files were typically stored on many different (often personal) computers, increasing the chance of files being misplaced. As is typical with these projects, there is rarely funding available to support the post-performance documentation and wrap up. For conscientious individuals, some would go to the effort of sorting and handing over various assets (without being paid to undertake this work), which is more often than not, quite time consuming. In addition, in undertaking this kind of in-depth documentation, which requires the actual 'working files', there is a range of intellectual property (IP) concerns that arise. For example, contracts with the various artists meant the IP, for particular sections of the performance (such as the sound or video), was held by the creator, and so they didn't want to hand over files for the purpose of archiving and documentation.

With the overall goal to investigate whether these types of performances could be re-performed in the long-term (such as one hundred years in the future), CIANT staff were somewhat sceptical as to whether this would be possible. However, they were certain that re-performing in ten years was entirely

achievable. This certainty is based on the environment they constructed, an open source structured wiki, auto-generating a map of relationships between the assets. This information could be migrated into an other system in the future with relative ease, or should it fall over, because of the contextualisation of each of the individual assets, and a greater understanding of the work as a whole is already possible, than merely a manifest or a list of files held in a directory structure.

## DOCAM Documentation Model

Documentation and Conservation of the Media Arts Heritage (DOCAM) was a five-year project (2006 to 2010) of the Daniel Langlois Foundation in Montreal, Canada. There were several outcomes from this in depth study into media art preservation, including a range case studies of historically significant works, an extensive glossary of terms known as the 'Glossaurus', the development of a model and framework for the documentation of complex works throughout their entire lifecycles, as well as investigations into addressing the need for new methodologies to capture the experience of audience members when interacting or associating with these types of works.

The conceptual model developed as part of the research, the DOCAM Documentation Model, is an adaptation of the Functional Requirements for Bibliographic Records (FRBR) model, first published in 1998 by the International Federation of Library Associations and Institutions (IFLA). To date, very few Australian organisations have implemented FRBR, due to the work involved with migrating flat catalogue (or other) databases, to a hierarchical structured framework.

The Australian Music Centre is one national organisation that, as part of the development of their Virtual Repository Model (VRM) and online service, successfully implemented FRBR. In undertaking this work, they found it necessary to add a small extension to the FRBR model, to suit their specific needs regarding defining various instrumentations (Australian Music Centre 2009). The DOCAM

Documentation Model also takes the same approach of extending the FRBR model, yet the extension occurs in a different way to the Australian Music Centre. The additional element included in the DOCAM Documentation Model, is similar to the Media Art Notation System (MANS) approach – breaking down the structure of a work to the individual component level.

Drawing together these two recognised models into a single approach enables the displaying of relationships between the various components of the work, as well as the contextualisation, by additional documentation and other information surrounding the work, such as a record of audience member experiences.

In addition to the adapted model, a visualisation interface was developed, providing users with a graphical means of displaying relationships between the components as well as the organisations and individuals involved with the work (such as creators, contributors or exhibiting organisations). Graphic icons provided an indication of a particular file type, such as an audiovisual or textual file.

Both the implementation of the conceptual model and the development of the interface would demand the allocation of technically skilled resources, which a smaller organisation would not necessarily be able to implement with their existing staff. Yet, there are some strategies that can be followed through, relatively resource free.

## An Oral History of Media Art

With the emergence of technology facilitating the 'interactive experience', the role of the audience becomes increasingly prominent. Many media artworks, such as David Rokeby's seminal work, the *Very Nervous System* (*VNS*), developed in 1983, is an interactive sound environment that responds to body movement and gesture utilising a range of sensor technologies which enable user interaction. As researcher Lizzie Muller (2008) outlines in her paper, Towards an oral history of New Media Art, both American philosopher John Dewey's views on art,

dating back to the 1930s as well as David Rokeby's observations of his own arts practice involving technology and computing, is about the experience as a whole. Muller (2008) states:

> *New media artworks cannot be considered or treated simply as objects. Their full existence occurs when they are used; in other words, they exist, in a very literal way, 'in experience'.*

No longer is preservation of digital works just about an 'object'. It is essential that thinking expands to consider the preservation of artistically constructed systems and environments. In addition, elements surrounding the work should also be documented including audience member's direct interaction with the system created and how this is experienced and even observed. In the case of Rokeby's *VNS*, the work is entirely dependent on an individual audience member's physical movement within the space, as it is this movement that invokes the sound. Given that interactive media artworks often rely heavily on the audience, Muller (2008) observes that they are "... a kind of silent majority in the historical records of new media art – much talked about but rarely heard from".

Muller in collaboration with curator, researcher and writer, Caitlin Jones, developed several frameworks for capturing 'audience experience', as well as focussing on a select set of case studies, including another of Rokeby's works, *The Giver of Names.* The first of their frameworks is based on the well-known practice of oral history recordings. There is nothing particularly new about this approach, however Muller (2008) indicates: "I have not found any archives that feature interviews with non-professional audience members". While this approach is not without critique, such as the potential inexperience of audience members (Muller 2008), it does offer a fresh approach to contextualising media-based works, particularly when they are discovered and accessed via the archive. This is strategy for describing and documenting complex media artworks, utilising already available methodologies and simple technologies that many individuals and organisations could put into practice straightaway.

## Video-Cued Recall

One of three methods Muller developed for capturing audience experience via interviews, the Video-Cued Recall enables audience members to describe their experience of interacting with a media artwork, whilst watching a video of them within the space.

> *...participants (either general audience members or invited participants) are video taped while they experience the artwork. They are then immediately taken to a separate room, where they are shown the video and asked to simultaneously describe their experience in as much detail as possible. The final record is the primary video with the report as a voice over*
> (Muller 2008).

While simple, the approach is somewhat time-consuming and so audience who consent to the process need to be made aware of this. Details of the work, which might not be garnered from the documents and files that are used to construct the work, can be captured via the audience member's description of their experience.

Additionally, it is conceivable that in the case that all the various technical components or information for an interactive artwork not available in the future, then details could be gathered from these audience interviews, describing the environment and the interactivity, which might assist future archivists and conservationists with reconstructing aspects of the work. If this is not possible then these interviews form a good record of what the work was like the work at the time and 'fresh' in the audience member's mind – instead of anecdotal references captured further down the track.

## net.artdatabase

Another challenge presented to archivists and preservationists, by creative practitioners working in the digital environment, is net.art. The rise of the internet and associated technologies in the 1990s meant this genre of work became a predominant medium for digital artists. Creative practitioners suddenly found they were (potentially) able to access much larger audiences, and explored all the nuances

that this new online world had to offer. Pushing the limitations of the technologies only in their infancy, they exploited bugs in the software, such as the European net.art duo JODI. The works they produced typically had many dependencies, including specific web browser versions or browser plug-ins, and sometimes required a reasonable degree of configuration to get the net.art work working. Consider then the difficulty future-proofing these art works. While archiving the web has been occurring internationally, including Australia, since the mid-1990s, archiving dynamic sites – particularly those that do not function in standard ways – replicating the experience for future users is a considerable challenge, and "only a very small percentage of the works are static enough to archive through copying or backing up the data" (Thalmair 2011).

net.artdatabase (Figure 4) is a newly emerging project, which seeks to document complex net.art. The individuals behind this, Constant Dullaart and Robert Sakrowski, have a background in working in the field of creation, curation, archiving and reinterpreting web-based work. In 1999, Sakrowski began to develop netart-Datenbank, a German online database for the 'collection, documentation and presentation of net art'. (Incidentally, this is also undergoing development and will become fully publicly available again in late 2011). Another project of Sakrowski's is CuratingYouTube, which began in 2007, and seeks to select a range of videos centred around a particular hosted on the prominent site, YouTube.

The net.artdatabase borrows approaches from both of these previous projects, and perhaps complimentary to Muller and Jones' approach to archiving audience experience, the net.artdatabase intends to archive the 'private usage' of net.art works. The documentation technique is two-fold. Begin by recording an 'over the shoulder' view of the user and their interaction with the computer, browser and of course the net.art work. Second, record a time-based screen capture of what is occurring on the computer screen. Dullaart and Sakrowski suggest that the user is situated in a non-clinical environment, such as their own home; somewhere they would typically interact with this form of work. Both videos produced are then uploaded to YouTube. While only two individuals are responsible for the developing the overarching project, anyone can contribute to the project, following the instructions found on the website. Instructions provided including information on what metadata is required (including the computer hardware and software used) and how to tag the video, once it has been uploaded.



**Figure 4** | net.artdatabase – displaying screen capture and user interaction videos.

This is a true community-driven 'guerrilla archiving' project in that it does not have a particular institution behind it, nor does it have any kind of financial support. Due to the lack of any funding infrastructure, this has informed decisions surrounding the technical infrastructure.

*We decided to use YouTube because we don't have to run extra servers and the services are a safe and easy bet in archiving video for the future, easily accessible by other participants, including the possibilities for tagging and managing playlists* (Thalmair 2011).

Whether YouTube withstands the test of time is yet to be seen, however this is a well-considered decision, and no doubt future management of content and possible migration strategies will be considered as necessary. While the net.artdatabase is still in its
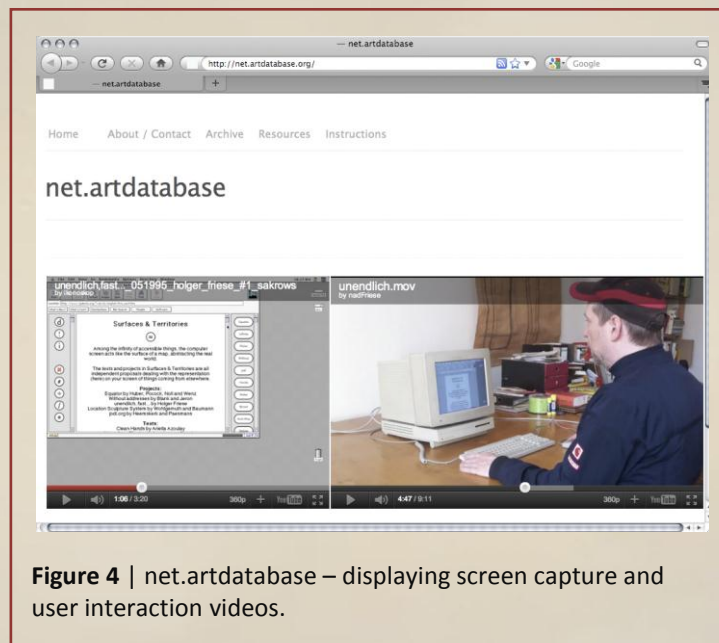
early stages, the developers experience and knowledge in this field is expansive and the approach has been conceived in a way that ensures the documentation of this type of complex digital works, provides a view into the actual interaction, complimenting more traditional web archiving practices of the past fifteen years. Thanks to a cooperative development partnership with Humboldt University in Berlin, Germany, which will begin in late 2011, a considerable amount of documentation of net.art works will be produced.

These forms of complex digital works, such as net.art and media art works, produce new modes of interaction and audience experience. The way they are constructed forms a web of relationships, rather than more traditional linear formats of books, sound recordings or videos.

> *The computer is a connection machine. A lot of new media art, especially network-based work doesn't have spatial dimensions* per se*, but nodes and levels of connection*
> (Dietz 2006).

Because of the experiential nature of these works, the approach may not be to preserve the digital object; instead it may be to 'digitise the experience'. In other words, capture various aspects of the environment created by the artist(s), and document several interactions (via different viewpoints) of the experience itself. It seems only logical that that the creation of these new modes of production should inform and extend current archiving practices; ones that embody similar capabilities that are exploited by these emerging digital practices. We cannot stop artists, musicians and writers from being inventors and innovators – nor should we. Their role is to create using whatever resources are available, and their work should take any form that is desired.

> *Whatever the medium, be it images, live performance or literary narrative, the aim is the expression and communication of emotions and ideas*
> (McClean 2010: 4).

It is the role of the new generation of archivists, conservators and preservationists to be abreast of these technologies, the way in which ideas are expressed using these mediums, the intent of the creator(s) and to have an understanding of the creative work within the context of the audience. Yet it need not be the larger institutions that undertake this work alone:

> *While professional conservators have only managed to future-proof a tiny sliver of new media artworks created since 1980 in any systematic and extensible way, a global community of dispersed amateurs has safeguarded the lion's share of a different genre of early computational media: video games*
> (Ippolito 2010).

Depending on their formats and storage environments, the fragility of digital works means that time is of the essence. We shouldn't necessarily wait until the big institutions have 'solved' the problem, as for some works, it may well be too late. It is possible, by adapting techniques and best practice already used within archiving and conservation practices, plus some of the methodologies discussed in this paper, that we are able to take some active steps now, and by doing so, dispel our anxieties about the approaching digital dark age.

## CONCLUSION

While the wait for simple tools, suitable for small not-for-profit organisations, continues, it does not mean that nothing can be done in the meantime. Audience experience oral histories can be recorded, the intent of the artists and creators can be documented, taking a sheer curation approach – various files can be captured during the production and presentation phases of complex creative works, scores can be sketched out for time-based works, and even hand-dawn system diagrams or diagrams that display relationships between different components provides a map of how the work might be reconstructed or re-performed together in the future.

The approaches that draw on process modelling, screen captures, video-cued recall and virtualisation provide mechanisms that take into account the complexity of digital and hybrid works being created by contemporary practitioners. While these

approaches are not completely 'off the shelf' solutions, they provide various ways of taking active steps towards preserving our digital heritage now. Real solutions for meaningful preservation of complex digital objects are not inconceivable, as they may have seemed a decade ago.

While we might not yet be 'almost there' in terms of the ultimate robust solutions we desire, what some of these frameworks, models and methodologies allow us to do, right now using the tools at hand, is to capture and record the necessary components of a complex work. Additionally, they provide ways of documenting various aspects surrounding the work itself, ultimately helping to contextualise it. Using these new conservation and archiving approaches for installations, interactive media works, complex technology performances and other ephemeral and emerging forms of creative work might facilitate experiences that enable audiences of the future to feel as if they were 'almost there'.

# REFERENCES

"Digital curation" (2011, August 12). In: *Wikipedia, The Free Encyclopedia.* [online: http://en.wikipedia.org/wiki/%20index.php?title=Digital_curation&oldid=444424896 Accessed 18.09.2011]

"Intellectual Entity" (2005) In: *Paradigm.* [online: http://www.paradigm.ac.uk/workbook/glossary/intellectual-entity.html Accessed 15th Oct 2011].

Australian Music Centre (2009) "FAQs – 'The Back End'".
[online: http://www.australianmusiccentre.com.au/documents/media/AMC_Media_Relase_27Apr09_03.pdf Accessed: 08.10.2011]

DEKKER, A (2011) "Capturing a cultural aesthetic: documenting net art". Interview with Constant Dullaart and Robert Sakrowski.
[online: http://net.artdatabase.org/about/ Accessed 09.10.2011]

DEKKER, A (ed) (2010) *Archive2020: Sustainable Archiving of Born-Digital Cultural Content.* Virtueel Platform: Netherlands.

DIETZ, S (2006) *Collecting New Media Art: Just Like Anything Else, Only Different.* NeMe.
[online: http://www.neme.org/524/collecting-new-media-art Accessed 09.10.2011]

DOERR, M, LE BOEUF, P and BEKIARI C (2009) *FRBRoo, a Conceptual Model for Performing Arts, Institute of Computer Science.* Foundation for Research and Technology Hellas, Crete.
[online: http://www.ics.forth.gr/isl/publications/paperlink/FRBR-CRM-performances_final.pdf Accessed 09.10.2011]

FISCHER, U and SAKROWSKI, R (2011) *<archiving.netart>.* Pecha Kucha, Berlin. [online: http://pechakucha.de/webplayer/PK_25/04_SakrowskiFischer.html Accessed 09.10.2011]

GIARETTA, D (2011) *Advanced Digital Preservation.* Springer-Verlag: Berlin.

GWILT, I, LEE, E, AMITANI, S and HINSHAW A (2005) *Untitled Media: a survey of New Media Art, Creativity and Cognition.* University of Technology Sydney.
[online: http://www.creativityandcognition.com/UntitledMedia/ Accessed 19.09.2011]

HODIN, JI (2009) *Can Museums Collect New Media Art? The Need for a Paradigm Shift in Museum Conservation.* Sotheby's Institute of Art, New York.
[online: http://cool.conservation-us.org/coolaic/sg/emg/library/pdf/hodin/hodin_2009.pdf Accessed 12.10.2011]

IPPOLITO, J (2010) *Learning from Mario: Crowdsourcing Preservation.* [online: http://three.org/ippolito/writing/learning_from_mario/ Accessed 17.09.2011]

LANGLEY, S (2006) *Complex Digital Objects: Friends of the National Library of Australia Inaugural Travelling Fellowship Report.* National Library of Australia: Canberra. [online: http://www.nla.gov.au/pub/gateways/issues/84/story05.html Accessed 08.10.2011]

LOVINK, G (2003) *Archive Rumblings: Interview with Wolfgang Ernst.* [online: http://laudanum.net/geert/files/1060043851/ Accessed 08.10.2011]

MACDONALD, C (2010) *Documenting User Experience in Interactive Artworks.* [online: http://vagueterrain.net/content/2010/03/documenting-user-experience-interactive-artworks?page=2 Accessed 08.10.2011]

MCCLEAN, S (2010) "The Digital Playing Fields: New Rulz for Film, Art and Performance". *Platform Papers* 24. Currency House: Sydney.

MIKROYANNIDIS, A, ONG, B, NG, K and GIARETTA D (2007) *Ontology-Driven Digital Preservation of Interactive Multimedia Performances.*
[online: http://www.alexmikro.net/wp-content/uploads/axmedis2007-caspar20071022-v1-4-a.pdf Accessed 01.01.2011]

MULLER, L (2008) "Towards an oral history of new media art". *Daniel Langlois Foundation.*
[online: http://www.fondation-langlois.org/html/e/page.php?NumPage=2096 Accessed 08.10.2011]

ØSTBY SÆTHER, S (2010) "Archival Art: Negotiating the Role of New Media". In: Røssaak, E (ed.) *The Archive in Motion: New Conceptions of the Archive in Contemporary Thought and New Media Practices*, Nota Bene 2. Novus Press: Oslo. [online: http://urn.nb.no/URN:NBN:no-nb_digibok_2011081506111 Accessed 8 October 2011]

RINEHART, R (2002) "Archiving the Avant-garde: Documenting and Preserving Variable Media Art". In *D-Lib Magazine* 8(5). [online: http://www.dlib.org/dlib/may02/05inbrief.html#RINEHART Accessed 17.09.2011]

RINEHART, R (2007) *The Media Art Notation System: Documenting and Preserving Digital/Media Art.*
[online: http://www.coyoteyip.com/rinehart/papers_files/leonardo_mans.pdf Accessed 18.09.2011]

RØSSAAK, E (2010) "Preface". In: Røssaak, E (ed.) *The Archive in Motion: New Conceptions of the Archive in Contemporary Thought and New Media Practices*, Nota Bene 2. Novus Press: Oslo. [online: http://urn.nb.no/URN:NBN:no-nb_digibok_2011081506111 Accessed 08.10.2011]

SHEA, P (2011) "Visualising Invisible Networks as Collaborative Arts Practice". *17th International Symposium of Electronic Art (ISEA)* 2011, Istanbul. [online: http://isea2011.sabanciuniv.edu/paper/visualising-invisible-networks-collaborative-arts-practice/ Accessed 18 September 2011]

ŠIMKO, V, MÁŠA, M and GIARETTA, D (2009) "Long-term digital preservation of a new media performance: 'Can we re-perform it in 100 years?'". *IFLA PAC International Preservation News* 47. [online: http://www.ifla.org/files/pac/IPN_47_web.pdf Accessed 26.06.2011]

SPARKS V (2008) *Don't PANIC! Examining Preservation webservices Architecture for Newmedia and Interactive Collections as a Practical Tool for the Preservation of New Media Art.* Association of Canadian Archivists – McGill Student Chapter.
[online: http://acamcgill.pbworks.com/f/VanessaSparks.pdf Accessed 17.09.2011]

THALMAIR, F (2011) *Re:Interview #015: Ever-Changing Chains of Work.* [online: http://cont3xt.net/blog/?p=4567 Accessed 09.10.2011]

WIENCEK, F and LAUKE, SS (2011) "The (Re)Mediation of Experience". *17th International Symposium of Electronic Art (ISEA)* 2011, Istanbul. [online: http://isea2011.sabanciuniv.edu/paper/remediation-experience-case-study Accessed 02.10.2011]

# AUTHOR BIOGRAPHY

Somaya Langley has worked in a range of fields encompassing the production, presentation, preservation, broadcast and delivery of creative content, with a particular focus on the digital environment. She has worked in a range of roles that include Digital Project Officer at the Australian Music Centre and Producer in the Australian Music Unit at ABC Classic FM. She was Production Manager of the 2010 International Society of Contemporary Music (ISCM) World New Music Days festival, in 2009 was Co-Curator of Transit Lounge, a partner project of Berlin's transmediale festival, and 2008 and 2009 was a Creative Co-Director of the Electrofringe festival, held in Newcastle, Australia. In 2010 and 2011, she undertook a consultancy for the Australia Council for the Arts to produce a scoping study report on Archives in the Digital Era.

Somaya is also a practicing sound and media artist whose work focuses on technologically mediated embodied and immersive experiences, with her work being presented in conferences and festivals in Australia and internationally. In 2007 she undertook a collaborative residency at STEIM in Amsterdam, researching the relationship between gesture, sound and technology and in 2008 and 2009 she was a participant in the research project Thinking Through the Body, funded through the Australia Council for the Arts ArtLab Initiative.

She currently works as a Digital Preservation Specialist at the National Library of Australia, currently defining preservation metadata, and in her previous stint at the Library, worked on the development of MusicAustralia and the Library's Digital Collections delivery systems.