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# Reflections on Preserving the State of New Media Art

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## Abstract

*As part of its work to explore emerging issues associated with characterisation of digital materials, Planets has explored vocabularies and information structures for expressing the properties integral to the value of digital art. Value encompasses those qualities that must be understood and captured in order to ensure that art works' sensory, emotional, mental and spiritual resonance remain. Facets of interactivity, modularity and temporality associated with digital art present some critical questions that the preservation community must increasingly be equipped to answer. Because digital art materials exhibit fundamental multidimensionality, validating the successful preservation of creative experience demands the explication of more than just file characteristics. Understanding relationships between objects also implies an understanding of their respective functional qualities. This paper presents a Planets' vocabulary for encapsulating contextual and implicit characteristics of digital art, optimised for preservation planning and validation.*

## Introduction

As pointed out by Bruce Wands [12], art communicates simultaneously on sensory, emotional, mental and spiritual levels. For digital varieties, these levels of impact and our comprehension of value are based not just on tangible characteristics, but on many additional contextual factors that may be permanent or transitory, localised or global and either physical or conceptual. Furthermore, those qualities considered intrinsic to works may be similarly difficult to characterise. Contemporary art typically establishes, encourages and demands greater dialogue than more traditional fruits of creativity. Whereas paintings or sculptures are largely consumed in a passive manner by audiences, digitally equipped installations promote a high degree of often distributed user involvement. Meaning can be less than self evident; unlike more traditional art where the materials used are largely subservient to the implicit message, it is commonplace within contemporary works for specific component materials to have tremendous implications for the overall interpretation. These issues are consistent across the digital landscape - complexities of interpretation, consumption and application are commonplace, and can be contrasted with physical materials with implicit, unambiguous usefulness. Numerous logical and physical layers must exist to support the presentation and understanding of digital information, which can be contrasted with analogue information, which exists largely atomically. More layers introduce more complex dependencies between those layers; any preservation action (to alter the format of a digital image component for example) can have implications far in excess of the intended extent of the intervention. Rinehart expresses this in terms of the separability of the physical and the logical, which in turn creates opportunities for variations of behaviour and performance [9]. While this can

contribute towards the value and impact of the creative expression, it introduces difficulties to those seeking to characterise and preserve that which is definitive in and around a digital work.

A further complication is the often modular nature of contemporary installations, whereby components operate based on inputs from discrete linked systems. This introduces further levels of complexity for those seeking to ensure their longer term accessibility. Lynn Hershman Leeson's *Synthia* provides a good example, whereby an animated character onscreen responds physically to stock market data arriving from a live stream. Partially contextual, partially intrinsic, the flow of data must nevertheless be made persistent in order to enable the piece's correct exhibition. We see similar phenomena within the digital context more generally; applications and file formats are increasingly networked, and are more and more reliant on decentralised services. How we deal with the preservation challenges associated with maintaining third party services or user contributions is particularly challenging. Web archiving appears trivial when dealing with simple networks of linked, static web pages. When the relationships between scripts, users, web services, databases and rights management systems become more intricate and integral, preservation becomes less akin to photocopying and more like performing organ transplant surgery, with all of the risks that digital materials will be 'rejected' within their anticipated preservation environment.

From the conservator's perspective, documentation assumes a critical role. In those cases where art relies on bespoke, deteriorating materials, externally managed and originating services or a critical mass of community involvement there may be no way to ensure its availability. Nevertheless, the maintenance of appropriate documentation can assist conservation and preservation strategies, most notably offering opportunities to characterise value and express priorities for individual works. This can then inform the selection of subsequent conservation or restoration strategies, and ensure their consistency with creative intention. Gaby Wijers, the Dutch conservator of The Netherlands Media Art Institute, describes the perspective of the 'variable media approach', which argues that "the best way to preserve artworks in ephemeral formats, from stick spirals to video installations to Web sites, is to encourage artists to describe them in a medium-independent way, so as to help translate them into new forms once their current medium becomes obsolete" [13].

## A Wider Applicability

Whereas the digital preservation community has sought to align its primary objectives with the challenges faced within traditional records management, archiving and librarianship domains, comparatively little work has concentrated on its relationship with art conservation and restoration. The creative domain is increasingly coming to terms with art works with digital characteristics, and fraught with the accompanying issues of obsolescence and

potential inaccessibility. However, these are comparable to many of the problems that have been faced for some time by conservators of contemporary art in a more general sense. For several years artists have combined unstable materials comprised of bespoke components. These have had often complex meaning, dependent on the status of disproportionately tiny characteristics. We have heard many times of the seemingly arbitrary way in which minimal technological disruption or loss can have catastrophic implications for access to digital materials. Likewise, a restoration process for contemporary art that replaces a material component with a seemingly equivalent alternative may fundamentally alter or detract from its creative value.

Contemporary art conservation and digital preservation have a lot in common. Digital materials are objectively more easily destroyed, or divorced from appropriate representation mechanisms (as good as destroyed) than their physical, analogue counterparts. Similarly, 'meaning' (more or less synonymous with 'significance') is increasingly difficult to trace within the digital context, as multi-media and multi-modality are increasingly visible fixtures across the landscape of information creation and consumption. Users' perceptions of elements within Internet web pages and their respective importance have changed throughout the platform's short lifetime. The Internet, once primarily a tool for supporting publication has evolved into a much more experiential phenomenon. Interactivity, initially an ancillary part of the web browsing experience, has become core. The culture of conversation between individuals and systems, facilitated with web based resources is now commonplace. Tools are being used in diverse, often experimental ways, even within mainstream digital contexts.

Perhaps the most notable common characteristic shared by contemporary art and digital content is in terms of immediacy of risk exposure. Paintings, sculptures, published manuscripts and books each enjoy a reasonable 'grace period' following their conception, within which one can assume their survival without intervention. This period offers relevant stakeholders plenty of opportunities to determine meaning, significance or value that must be maintained. In contrast, digital materials, like much contemporary art, demand often immediate action. Considerable onus is placed on speculative anticipation of future use, with often limited evidence available to reference in one's characterisation, and subsequent preservation action decision making.

Reflecting these similarities, we present an initial approach to new media art documentation that supports the explication of scalable, variable and relatable elements, while where possible maintaining the possibility of their exposure to more mainstream preservation resources such as DRAMBORA [8], Plato [11] and the Planets Testbed [1]. We reflect a philosophy popular among the art conservation community, and consider the documentation process as analogous to the conception of musical scores. Documentation is not itself the work or a surrogate of it, but instead intended to be a comprehensive reference resource to enable its recreation, reexhibition or reperformance at a later date. This implies elements of "physical preservation", such as migration of intrinsic media assets to more stable formats, or emulation of legacy software environments. In addition though it demands the contextualisation of the work, the definition of creative specifications and the explication of steps taken to conceptualise and deliver the work. Furthermore, there is an implicit assumption that new me-

dia will be variable, and prone to evolve to reflect the contextual variation that inevitably accompanies the passage of time.

## Previous Work

As a foundation to much of this work, the National Archives of Australia's approach to preservation has focused on the performance aspects of digital information [4]. Rather than considering things only in terms of bits, files, objects or collections their model presupposes that for every discrete item of digital information one can distinguish between elements of source and process. Source describes that which is ostensibly the physical or logical object itself. This will often be a computer file or encapsulated collection of files. But in isolation, and unlike analogue media forms such as books, photographs and paintings, their meaning is not self evident. Analogue media do operate within the same performance model, but required interpretative or representation processes are generally unified, ingrained and well understood. Assuming basic literacy, and comprehension of a particular text's language, we expect analogue content to be accessible and understandable. In order to make informational sense of digital content, there may be numerous associated requirements, characterised as software or hardware dependencies, or as semantic or contextual interpreters that assist usability and understandability of encoded materials.

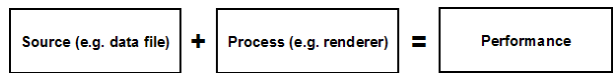


Figure 1. National Archives of Australia Performance Model

With the Media Art Notation System (MANS) [9], Rinehart acknowledges the performance characteristics of new media art materials, and seeks to conceive implementation independent means of describing materials' value. The vocabulary is intended to be sufficient to describe objects, collections, events and activities, interrelationships, behaviours, choices, contingencies and variables. Like a musical score it is focused on supporting recreation of the work; its success depends on the avoidance of ambiguities that would prejudice the authenticity of any recreations. *Discretion* is a critical component of maintaining variable work. It equips curators to adapt works to reflect contextual changes over time, to implement appropriate preservation strategies and to determine what is and is not required to ensure the work's creative value remains consistent over time. Within MANS artists have greatest discretion to exercise choice (or sanction a default selection), with contributors and agents, hosts and owners, presenters, and finally the general public, having gradually less and less opportunity to inform the curation process.

A critical shortcoming of the MANS approach is its apparent prioritisation of *physical* aspects of preservation, with less focus on the origins of particular information properties of value. Preservation must be focused on maintaining logical or functional elements (where function can be extended to encompass elements of creative impact, this is particularly true). Relationships between MANS' Parts and Resources should be made more explicit, in order to relate proposed preservation solutions (or, much more usefully, potential preservation risks) to both logical and physical aspects of the overall work.

It is critical that preservation planning is moored to both the

tangible realities of a piece and its cumulatively realised expression, function or message. This critical dimension is best expressed in terms of significant properties. The InSPECT project [6] presents a workflow aimed at their identification. InSPECT adopts a terminological foundation quite traceable to that of MANS. Its FBS model (derived from Gero's Function-Behaviour-Structure Framework [3]) defines *Function* as broad purpose, *Behaviour* as a stakeholder's perceived outcome or consequence, and *Structure* as those elements of a given digital object that support a behaviour's realisation (significant properties). Stakeholder and object analyses demand engagement with diverse stakeholders and identification of functional facets of value. InSPECT does not prioritise the views of any individual stakeholder (unlike MANS) although it is suggested that within the artistic context the creator should enjoy greatest discretion for defining critical behaviours and properties.

## Characterising New Media Art Context

The primary purpose of recording contextual dimensions is to make explicit those external or situational influences that must persist or be recreatable to realise or perform a work and preserve original artistic intention. Context is distinct from implicit components, dependencies and stakeholder relationships, in that it may surround, influence and reflect either the global work (or in even wider terms whole collections) or just individual information facets. Many facets are represented as points on a continuum variability and evolution of a work implies movement along this continuum, and reflects the different contextual properties that may still surround and legitimise a work. Each contextual dimension describes discrete or sliding scale characteristics and practical factors that influence them.

Context is distinct from content in terms of the extent to which it can be realistically preserved. We cannot hope to maintain every aspect of context. From even before a work's creation, at the moment an idea is first conceived by the artist, context is dynamic. In some respect one might consider context as the embodiment of much of the preservation challenge. Objects and their associated representation mechanisms may themselves change over time (for example, in the case of 'bit-rot'), but the greatest challenge for preservation professionals is keeping up with change that is wholly contextual, whether realised in financial, technological or cultural terms. This is almost always a reactive process, except in those niche cases where context is controllable. That which is beyond the control of the preserving agency is a good definition of context, and the best means of distinguishing it from content.

In this context, preservation requires the establishment (with the input of artists) of an acceptable spectrum for contextual deviation. For example, what spatial restrictions are tolerable on a particular installed piece? What opportunities are there to transfer content to new media devices? What wider contextual factors (for example a financial recession) must be documented and integrated within a work to maintain its meaning when those factors are changed and forgotten? In these respects the line between context and content (particularly objects' associated dependencies or process elements) may appear blurred; the preservation process demands the specification of that which is content, and that which is a relevant, but not integral contextual factor. Likewise, for each

contributing factor, tolerable parameters and descriptions of associated documentation requirements should be made explicit.

## Source

Components employed by new media artists exhibit little evidence of standardisation, and therefore the conception of a single vocabulary that is sufficient to encompass all possible component elements is difficult. We consider the component elements to resemble the source dimension of an information performance. Where objects' value is self-evident and has no explicitly defined associated process elements this can be made explicit, but such objects are rarely conceivable: even the most static object will have some kind of dependencies for its comprehension.

A problem may be that the level that components are conceived at may differ from the optimal level for addressing their preservation. A composite object like an Internet web page is a good example of something that may be created as a single whole but preserved as multiple discrete parts each with implicit preservation challenges and appropriate solutions. Documentation must support the greatest granularity of expression required to maintain the entirety of the work. For that reason, like with each dimension discussed here, the activity must be undertaken at the level of properties.

In InSPECT a component is defined as a unit of information that forms a logical group. Components consist of identifiers, descriptive information, associated function, a preservation level, relationships, and a specification registry entry detailing a third party resource that provides additional information about the component. While components are intended to be accompanied by some kind of process in order to realise an information performance there is little within the InSPECT work that makes explicit how significant properties of those processes should be recorded.

## Process

When we speak of component dependencies within digital preservation we may instinctively dwell on issues of software and hardware. What plugins must be installed in a particular web browser to ensure that embedded video plays back correctly? What kind of display hardware boasts a sufficient contrast ratio to adequately represent blacks and whites? But there are also semantic and contextual dependencies that inform the appreciation of particular art works. Within the sphere of variable media art many such dimensions are implicit within the coverage of context above. A critical requirement is the definition of not only wider, relevant and globally applicable contextual factors, but also those that play specific roles in the interpretation and usefulness of source objects.

Clearly, the determination of significant properties of software is challenging - application of the Performance model is made especially so since software performance is usually considered analogous to data process, and a contribution to data performance. It can be argued that there is little value in considering software as a performance in its own right, instead simply acknowledging its role as process counterpoint to a data source within an overall information performance.

A natural starting point for considering associated process is the OASIS Reference Model [2], which describes the role of representation information in the interpretation of data objects, and their realisation as information objects. Representation informa-

tion is required to lend understandability to data - while not tightly aligned with the concept of process within the performance model this seems a natural association, and is workable in most situations.

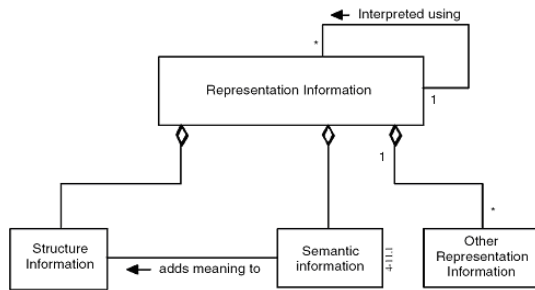


Figure 2. OAIS Representation Information Model

We can synonymise software performance and data's associated process. Its application to a data source yields a data performance. This is broadly akin to the role of representation information in converting a data object to an information object. The *JISC Framework for Software Preservation* [7], presents a four layer model for software that is roughly analogous to the Functional Requirements for Bibliographic Records [10] model of Work, Expression, Manifestation and Items. The extent to which this approach is applicable to new media art preservation is unclear. In some respects the model is fairly applicable, and art works themselves often exhibit the same variety of layers of realisation. At a more granular level when we look to new media art to determine means of describing required process we might find the model less helpful. New media art software is frequently bespoke in many cases it represents the unique creative development. Sometimes it represents both data source and process (in the case of executable art for instance). At some level of the technical realisation there is a more traditional software dependency, at the level of virtual machine, compiler or operating system for example.

### Temporality

Frequently, the most distinguishing characteristic of new media art (as opposed to other forms of digital information) is its quite legitimate potential for variability. The *Variable Media Questionnaire* [5] is a tool intended to facilitate new media art preservation, by providing a structure within which artworks can be characterised and appropriate approaches conceived and associated. By making explicit the parts of new media art that are prone to change over time, or with implicit temporal variable qualities, it aims to equip practitioners to collaboratively affect their appropriate evolution. It is quite proper that the vocabulary should be expected to evolve over time to reflect emerging requirements and opportunities. This implies not only the static definition of a work at the time of its completion or exhibition but also a sliding scale of acceptability which respondents are encouraged to present to legitimise subsequent preservation interventions.

### Vocabulary for Preserved New Media Works

The vocabulary for Preserved New Media Works collates a complex set of information that may relate to multiple individual

instantiations of a work across space and time. Likewise it is sufficiently loosely defined to support additional variability within the process of preservation. Our vocabulary is positioned firmly within the domain of new media art preservation. Instead of focusing on the description of materials 'in and of themselves' we look to conceive a description of the preserved new media work as a whole. This implies that some elements of preservation infrastructure become implicit within the work itself. While perhaps not part of the piece envisaged by the creator these become nevertheless integral to its ongoing survival. Naturally, as the artist's view takes on such critical importance within this domain, additions must be satisfactorily sanctioned. Failure to obtain such sanctions (which may in some circumstances be conferred by stakeholders other than the artist) immediately detracts from a piece's authenticity. For example, the unauthorised use of emulation to recreate a software-based installation may appear to retain many characteristics of a work, but must be sanctioned in order to ensure it remains compatible with the creative value.

### Preserved New Media Work

At the top-most level of our information infrastructure we have the concept of a Preserved New Media Work. This has a number of sub-dimensions, which must be related and rationalised in order to determine preservation challenges and equip ourselves to satisfy them appropriately. It is at this top level that we associate descriptive metadata information, and other registration details that describe the work as a whole. There is value in presenting this information at the level of work, although further granularisation at the level of individual components and contextual elements enables more sophisticated and finely tuned recording, and associated preservation planning.

### Functional Component

MANS is an attempt to apply the concept of musical scores to a new media context. Creator Rick Rinehart's goal is to present the preservation activity as a process supporting works' recreation, acknowledging its finite lifetime in any particular physical form. In truth, the approach has appeal in every preservation context. A critical foundation for this are means to describe both the intellectual object of preservation, and those physical material manifestations of that information. Both are sources, requiring further elucidation with the association of process, to realise an information outcome. Content within a new media art piece may be as potentially diverse as one could possibly envisage, including real world objects, digital media, and combinations of both. More critical than considering objects in tangible terms is their expression as measurable (and functional) properties, ideally in a manner that is agnostic to any transitory, non-specific implementation. MANS elects to approach preservation as an activity that practically focuses on tangible system components (Resources), with an expectation that their preservation will safeguard the more intellectually (or functionally) specific Parts. This seems short-sighted we need not retain physical equivalence to ensure the sustainability of logical meaning. For example, it may be possible to replace multiple discrete media assets (e.g. still images, sound materials, interview transcripts) with a single subtitled video and retain every aspect of original information value. The message is the critical point at which persistence must be sought the physical building blocks are merely means to that end.

Even where artists stipulate conditions that appear to concern only matters of physicality, we must interpret those in intellectual terms. If a particular model of display device must be used for example we must consider that in its functional terms (i.e., its creative significance), rather than interpreting it as a material requirement. We should not assume a 1:1 correspondence between material and intellectual components.

The functional component is best expressed in terms of properties, as described within the InSPECT significant properties framework. This affords a level of measurability that is required to validate preservation efforts, and to make explicit acceptable boundaries for variability which are an intrinsic part of especially these kinds of materials.

### **Version**

New media works are dynamic and therefore may have multiple manifestations available simultaneously or along a time line. The version element provides a means to accommodate this dynamic quality, with the potential for multiple instances of a work which may vary but nevertheless represent the same conceptual piece. Although material aspects of the work may vary across versions the functional components (expressed primarily in terms of associated, and a bounded range of property values) will remain consistent.

### **Material Component**

A complication facing the preservation community is that factors threatening our information often do not do so directly. Although the preservation goal is targeted on the sustainability of more intellectual or functional facets, it is often tangible and physical characteristics that are threatened by specific preservation risks (for example, the risk of file format obsolescence). This is not uniformly true we also face challenges such as insufficiency of semantic representation information for example, but the disconnect demands an understanding of the interrelationships between each dimension.

We distinguish a work's functional and material character to support better preservation decision making. Material components are intended to encapsulate a physical, and, one would anticipate, transitory dimension of a work. Their availability is threatened by preservation risk, which demands our awareness of the relationship between risk and materiality. Having established such links, of greatest importance is their relationship with intellectual properties, and by extension function.

### **Component Dependency**

Both material and functional components exhibit dependencies, and again we must make this relationship explicit within our vocabulary. Dependencies describe those facets of process (in the language of the Performance model) that must exist to support the realisation, from a content source, of an information performance. These may assume myriad forms, including technical or other infrastructural (most obviously software), procedural or contextual dependencies. Once more, these dependencies are expressed at the level of a preserved work, meaning that there are a number of examples included primarily due to the role they perform within the preservation process.

### **Work Context**

Context describes factors that exist beyond the control of the preservation environment, but that contribute to either its function (and associated properties) or are necessary as dependencies to realise a material components performance. Context is a critical dimension for documentation, since it cannot be manipulated directly by the preservation professionals. There is scope to absorb evidence of contextual elements into the PNMW as documentation, and these are encapsulated as material components.

### **Stakeholder**

The diversity of roles and priorities that contribute to the creation, documentation, preservation and consumption of art hints at the complexity of the characterisation process. Artists themselves are most naturally assumed to be the best arbiter of that which has value within a piece. Likewise, they are often relied upon to sanction preservation interventions that may potentially prejudice its value. The Variable Media Questionnaire assumes the contribution of artists, with their creativity exploited to establish baselines for a work's preservation and future recreation. This is consistent with other approaches like the Modern Art: Who Cares? [14] documentation model, which incorporates a section used to contain or reference interviews and general information about the responsible artist.

It is critical that relevant agents are engaged with in order to negotiate preservation challenges in a manner consistent with the work's message. The artist's perspective at the point of a work's creation is uniquely compelling (notwithstanding possible collaborations from third parties or assistants), but once free of their creative process, the work and its creator are by no means synonymous, and the exclusivity of their relationship is no more.

The view that work and maker are not interchangeable appears to be broadly adopted. A piece's meaning is established by a curator with reference to the artist's contribution, not exclusively on the basis of it. Artists can contribute more information about a piece's origins, inceptions and assembly than any other. But they cannot claim sole knowledge of what it has become since leaving their custody. Art historians and curators are responsible for such interpretation. In the event of an artist's death or non-availability, it need not be the case that the associates, kin or estate of an artist are best equipped to comment on the meaning of his or her work. Nevertheless, many argue of the criticality of artist intervention at every stage of the conservation process, and this may be realised by reference to the results of initial dialogue, or through an ongoing conversation. Sometimes artists are unavailable to assist in the ongoing interpretation of meaning and of discrepancies between condition and meaning. On other occasions, artists adopt a far more participatory role within the conservation of their work. When the Dutch *Van Abbemuseum* displayed and approached to purchase Suchan Kinshita's work *Show*, the artist willingly discussed the piece's future preservation and replacement of its parts, and proposed that she write a set of instructions that would describe the parameters for the piece's installation and performance, and what discretion was available on the part of curators. Furthermore, she suggested the appointment of named trustees that would remain available to support the work in the event of threats to its integrity [14]. InSPECT's stakeholder analysis appears to assume a common level of influence from those associated with a given digital object, although it makes sense in the creative con-

text to confer primary responsibility (if welcomed) to the artist, especially when little time has passed between its conception and the commencement of the characterisation and preservation processes.

The other broad dimension of stakeholder intervention is identification of preservation risk and challenge. For bespoke, highly complex technical materials this may presuppose the input of wider constituencies than simply curators. Technological contributors for example are very well placed to comment on information dependencies implicit within any code they have implemented for a specific work. Curators must assume primary responsibility for preservation risk awareness, although as described above this assumes a close understanding of the relationships between a work's tangible assets and softer facets of message and value, expressed as properties.

### Information Property

Information properties are the focus of the preservation effort, and are potentially limitlessly diverse. Each specific property has a number of individual facets. They are relatable to both functional and material components, and to stakeholders, who are at least partially responsible for their definition, and for establishing bounds of acceptability for variation of those properties over time.

### Conclusion

This paper introduces a new vocabulary for supporting media art preservation, intended to satisfy some of the shortcomings of domain-specific and mainstream documentation approaches. Future work will evaluate its applicability and capacity within a range of real-world new media conservation and curation environments.

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### Author Biography

Andrew McHugh received his LLB/Hons in Scots Law in 2000 and his MSc in Information Technology in 2001, both from the University of Glasgow. Working for the Digital Curation Centre he was the primary author of the *Digital Repository Audit Method Based on Risk Assessment (DRAMBORA)*, and both system architect and developer of its web accessible surrogate, *DRAMBORA Interactive*. Since March 2008 he has been part of the European Commission funded *PLANETS* project, and in January 2009 he assumed operational control of *HATII's* contribution to the project. Andrew is a Co-Principal Investigator for the EU FP7 funded *3D-COFORM* project seeking to develop and validate a digital preservation component for a repository of three dimensional digital materials. Andrew is currently undertaking a PhD in Computing Science, exploring the role of machine learning in preservation validation, also at the University of Glasgow.

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