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# A Survey of Open Archival Information System Usage in Canadian Museums

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## Disclaimer

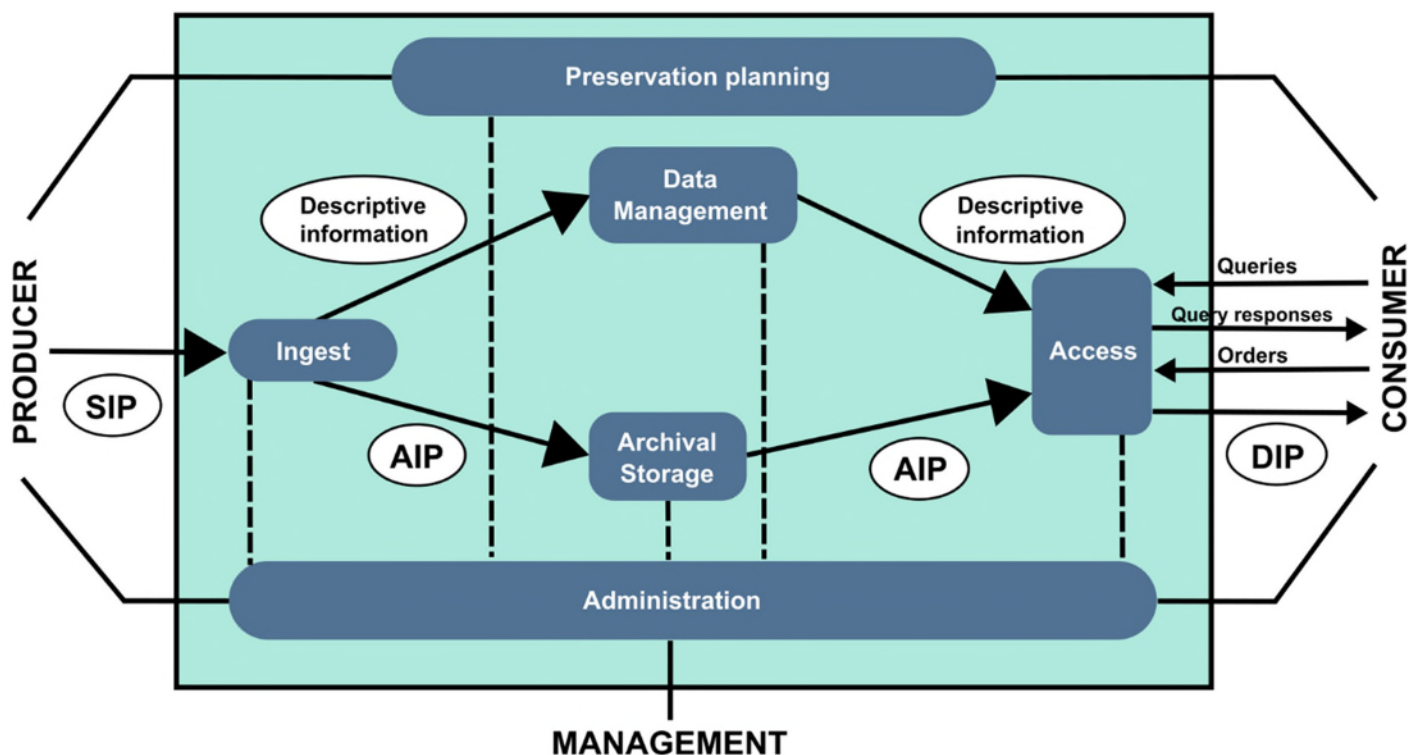
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## Introduction

The Canadian Heritage Information Network (CHIN) has historically championed digital preservation as a core activity in museums by providing [tools](#) and [training](#) for digital asset surveys, digital preservation policy development and digital preservation planning and best practices. Many of these practices originate in the archival community, including the Open Archival Information System (OAIS) Reference Model, which provides a framework for designing and managing digital archives. The [OAIS Reference Model \(ISO 14721\)](#) consists of a range of functions (and their relationships to one another) for ingestion, archival storage, data management, access and dissemination<sup>1</sup>. It is widely accepted in the digital archiving community, and it is a core component of a [trusted digital repository \(TDR\)](#) (PDF format), which is the most rigorous digital archiving certification standard.



Source: [Wikipedia](#)

Figure 1. OAIS framework reference model functional entities. (Please note that a typographical error was corrected in the original image.)

This model (an overview of which is shown in Figure 1) does not require the use of any specific software. However, software compliant with the OAIS Reference Model (known as OAIS-compliant software) is the most customary way of implementing the model, and these software programs are unique in that their primary functions are designed around the model's structure.

Early in the process of helping museums implement digital preservation policies and procedures, CHIN recognized that OAIS-compliant software was not an option for smaller institutions. Small museums already have their hands full with the documentation of physical collections. If digital facsimiles of a physical object were being made, then the simplest solution has been to rely primarily on information found in the physical object's collections management record, by including the record's accession number in the digital asset's filename. Likewise, if a born-digital object was held by a museum (an audio interview, for instance), the simplest solution has been to document it as an artifact in the same manner as non-digital objects and to include the object's own accession number in its filename. Indeed, [Nomenclature for Museum Cataloging](#) has a section on cataloguing digital objects for this very reason.

What then of ensuring a digital asset's authenticity, fixity or integrity, or of documenting the asset's provenance, usage rights, context or other features that OAIS-compliant software is designed to maintain? For lack of funding and human resources, smaller museums have been forced to use their existing technology to work around these problems, and in 2019, CHIN published recommendations for these workarounds called [Digital preservation recommendations for smaller museums](#). What remained to be addressed were recommendations for implementing OAIS-compliant software in Canada's larger museums. In setting out to provide such recommendations, CHIN attempted to identify a Canadian museum that was running OAIS-compliant software as a case study in order to learn how such a system might best be implemented. What CHIN found was that any institution running such software was principally an archive, not a museum. The shift in focus then became to understand why museums of all sizes were eschewing the OAIS Reference Model.

## Survey of OAIS usage in Canada's museums

In 2020, CHIN conducted an informal survey of museums. Survey questions were sent via email to members of the Digitization and Digital Preservation Discussion Group<sup>2</sup> as well as to past participants of the "Modern Information Carriers and Digital Preservation" workshop offered by the Canadian Conservation Institute (CCI). The survey consisted of two initial questions:

- Does your museum operate an archive containing traditional (that is, non-digital) materials?
- Does your museum hold digital images (artwork or photographs), audio recordings, video recordings or similar digital media?

For those who answered "yes" to the second question, two follow-up questions were sent:

- If your museum does have a formal digital archive, what archiving software does your museum use?
- If your museum does not have a formal digital archive, what is the main reason for not having one?

These follow-up questions included pick lists of anticipated responses as well as an open-ended "other" option, which allowed respondents to fill in their own responses.

Of the 26 museums that replied, 6 were small museums, 9 were medium-sized and 11 were large museums.

**Table 1: summary of responses to the OAIS survey**

<b>Survey responses</b>	<b>Small museums</b>	<b>Medium-sized museums</b>	<b>Large museums</b>	<b>Total museums</b>
Museums operating a traditional (non-digital) archive	3	6	9	18
Museums holding digital assets (born or otherwise), such as digital photographs, artwork, audio recordings, videos or similar assets	6	9	11	26
Museums holding digital assets and managing a formal digital archive (with archival ingest, digital preservation management and dissemination functions)	0	1	1	2
Museums holding digital assets and not managing a formal digital archive due to lack of need	5	5	5	15
Museums holding digital assets and not managing a formal digital archive due to lack of finances	5	5	6	16
Museums holding digital assets and not managing a formal digital archive due to lack of human resources (time)	3	3	6	12
Museums holding digital assets and not managing a formal digital archive due to lack of training (knowledge)	1	1	1	3
Museums holding digital assets and not managing a formal digital archive because digital asset management systems are seen as a greater priority or substitute	0	1	3	4
Museums holding digital assets and not managing a formal digital archive because digital assets are managed by an external archive	2	1	1	4
Museums holding digital assets and not managing a formal digital archive because the area of responsibility between the museum and the external archive has yet to be determined	0	0	1	1

Note: A small museum was any operation with two employees or fewer and an operating budget under \$200,000. A large museum was one that had 15 or more employees or an operating budget exceeding \$3 million. A medium-sized museum was anything that did not qualify as small or large based on these definitions.

## Discussion of survey results

Of the two museums indicating that they use a digital archive, one of them is known primarily as an archive (the museum is a secondary operation). In this case, Archivematica was being used. The second museum did not use OAIS-compliant software, but rather a Microsoft Access database in which both digital and non-digital assets were recorded.

All of the small museums responded that “lack of need” and “lack of finances” were reasons for not using OAIS-compliant software, save for one museum that had access to an external archive. In medium to large museums, the reasons given were disparate, with only one museum, apart from the archive mentioned above, indicating that an OAIS might be needed “in the future.”

In the survey’s comments section, museums of all sizes indicated that digital assets were often recorded in a collections management system, and medium to large museums commonly reported using a digital asset management system (referred to as a “DAM”) to handle and publish digital assets. In fact, four respondents (all medium-sized or large museums) identified a DAM as being either a priority over an OAIS-compliant archive or as being a substitute for one. This makes sense to some degree, as the ultimate goal of any digital preservation system is to make content accessible.

## Summary of survey findings

Museums are not using an OAIS to manage digital assets. The only exception was where a museum had access to a formal digital archive through a parent or partner institution. One might suspect that the lack of usage is attributable to a lack of understanding regarding the value of OAIS-compliant software, but this is unlikely. All museums surveyed are either members of the Digitization and Digital Preservation Discussion Group (a group that has discussed and demonstrated OAIS-compliant software) or they are past participants of a CCI digital preservation workshop, where the OAIS Reference Model was introduced and its use and value were discussed. Moreover, many of the museums surveyed have formally trained archivists on staff, and only 3 out of 26 museums indicated “lack of training (knowledge)” as a barrier to implementation. It is more likely that the decision not to use an OAIS is informed and that the cost-benefit ratio was calculated to be low, relative to other solutions.

## Implications of findings

CHIN’s [Digital preservation recommendations for smaller museums](#) provides solutions for institutions that do not have sufficient resources to manage an OAIS. In this web resource, a number of recommendations are made regarding how to preserve digital assets using a collections management

system and the triggers a museum might consider in deciding when to migrate to an OAIS-compliant software program later. Specifically, the resource recommends that a museum should consider switching over to a full OAIS-compliant solution when it is able to afford doing so and if

- preserved content cannot be accessed to the satisfaction of the museum;
- the authenticity of accessed content (a known weakness arising from the recommendations) cannot be guaranteed to the satisfaction of the museum; or
- the total time and resources spent preserving, managing and accessing content with the given recommendations exceeds those that would be invested with a traditional OAIS reference model.

While these triggers were established with small and medium-sized museums in mind, it is clear from the survey that they apply to museums of all sizes.

A second implication of the survey can be found in the informed decision by larger museums to seek out DAMs in lieu of OAIS-compliant software that have few (or altogether lack) web publishing features. CHIN has not reviewed vendor's claims to OAIS-compliance in DAMs (nor conversely, DAM features in OAIS-compliant software), but these vendor claims do exist. If a DAM is being considered by a museum, and a formal digital archive is not already in place, CHIN encourages the museum to consider systems adhering to the OAIS Reference Model.

Finally, it should be acknowledged that digital preservation is not necessarily digital archiving. Digital preservation is any activity that helps ensure long-term access to digital materials. The National Digital Stewardship Alliance's levels of digital preservation (reproduced in Table 2) clearly illustrate this.

**Table 2: the National Digital Stewardship Alliance’s levels of digital preservation**

Functional area	Level 1: know your content	Level 2: protect your content	Level 3: monitor your content	Level 4: sustain your content
Storage	<ul style="list-style-type: none"> <li>• Have two complete copies in separate locations.</li> <li>• Document all storage media where content is stored.</li> <li>• Put content into stable storage.</li> </ul>	<ul style="list-style-type: none"> <li>• Have three complete copies with at least one copy in a separate geographic location.</li> <li>• Document storage and storage media, indicating the resources and dependencies they require to function.</li> </ul>	<ul style="list-style-type: none"> <li>• Have at least one copy in a geographic location with a different disaster threat than the other copies.</li> <li>• Have at least one copy on a different storage media type.</li> <li>• Track the obsolescence of storage and media.</li> </ul>	<ul style="list-style-type: none"> <li>• Have at least three copies in geographic locations, each with a different disaster threat.</li> <li>• Maximize storage diversification to avoid single points of failure.</li> <li>• Have a plan and execute actions to address obsolescence of storage hardware, software and media.</li> </ul>
Integrity	<ul style="list-style-type: none"> <li>• Verify integrity information if it has been provided with the content.</li> <li>• Generate integrity information if it is not provided with the content.</li> <li>• Virus check all content; isolate content for quarantine as needed.</li> </ul>	<ul style="list-style-type: none"> <li>• Verify integrity information when moving or copying content.</li> <li>• Use write-blockers when working with original media.</li> <li>• Back up integrity information and store a copy in a separate location from the content.</li> </ul>	<ul style="list-style-type: none"> <li>• Verify integrity information of content at fixed intervals.</li> <li>• Document integrity information verification processes and outcomes.</li> <li>• Perform an audit of integrity information on demand.</li> </ul>	<ul style="list-style-type: none"> <li>• Verify integrity information in response to specific events or activities.</li> <li>• Replace or repair corrupted content as necessary.</li> </ul>

Functional area	Level 1: know your content	Level 2: protect your content	Level 3: monitor your content	Level 4: sustain your content
Control	<ul style="list-style-type: none"> <li>Determine the human and software agents that should be authorized to read, write, move and delete content.</li> </ul>	<ul style="list-style-type: none"> <li>Document the human and software agents authorized to read, write, move and delete content, and apply these.</li> </ul>	<ul style="list-style-type: none"> <li>Maintain logs and identify the human and software agents that performed actions on content.</li> </ul>	<ul style="list-style-type: none"> <li>Perform periodic reviews of actions and access logs.</li> </ul>
Metadata	<ul style="list-style-type: none"> <li>Create an inventory of content, also documenting current storage locations.</li> <li>Back up inventory and store at least one copy separately from content.</li> </ul>	<ul style="list-style-type: none"> <li>Store enough metadata to know what the content is (this might include some combination of administrative, technical, descriptive, preservation and structural).</li> </ul>	<ul style="list-style-type: none"> <li>Determine what metadata standards to apply.</li> <li>Find and fill gaps in your metadata to meet those standards.</li> </ul>	<ul style="list-style-type: none"> <li>Record preservation actions associated with content and when those actions occur.</li> <li>Implement metadata standards chosen.</li> </ul>
Content	<ul style="list-style-type: none"> <li>Document file formats and other essential content characteristics, including how and when these were identified.</li> </ul>	<ul style="list-style-type: none"> <li>Verify file formats and other essential content characteristics.</li> <li>Build relationships with content creators to encourage sustainable file choices.</li> </ul>	<ul style="list-style-type: none"> <li>Monitor for obsolescence and changes in technologies on which content is dependent.</li> </ul>	<ul style="list-style-type: none"> <li>Perform migrations, normalizations, emulation and similar activities that ensure content can be accessed.</li> </ul>

Table 2 shows that digital preservation can be carried out to varying degrees. While having OAIS-compliant software will make attainment of the higher levels easier, an archive of any sort is not necessarily required.

As digital content increases in our museums, so does the need to establish policies and procedures that follow best practices to preserve these assets. However, there is no single solution, and the path that any museum chooses should be suited to its resources and needs. The museums that



responded to this survey are generally well informed, and none (save for those already with access to a digital archive) considered open archival information systems to be a priority, nor must it be. More practical approaches will likely involve either CHIN'S [Digital preservation recommendations for smaller museums](#) (whether your museum is small or not), a DAM that integrates some of these recommendations or a DAM that is OAIS-compliant.

## Glossary

### **archival information package (AIP)**

An archival information package consists of content information and associated preservation description information, which is preserved within OAIS-compliant software.

### **authenticity**

The assurance that a record or asset is what it purports to be (in other words, it is trustworthy) and that it is free from tampering or corruption.

### **context**

Data about the digital asset's creation, preservation and relation to other objects that make the asset's origins, composition and purpose clear.

### **dissemination information package (DIP)**

A dissemination information package is derived from one or more AIPs. It is sent by the archives to the consumer in response to a request to the OAIS-compliant software.

### **fixity**

The assurance that the bits composing a digital asset have remained unchanged.

### **integrity**

The assurance that the digital asset is complete and unaltered in all essential respects.

### **provenance**

Data about the origins of the digital asset.

### **submission information package (SIP)**

A submission information package is delivered by the producer to the OAIS-compliant software for use in the construction or update of one or more AIPs and/or the associated descriptive information.

## usage rights

Data about how the digital asset may be used, by whom and under which conditions.

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Published by:  
Canadian Conservation Institute  
Department of Canadian Heritage  
1030 Innes Road  
Ottawa, Ontario K1B 4S7  
Canada

Cat. No.: CH57-4/26-2021E-PDF  
ISBN 978-0-660-40475-2

## Endnotes

<sup>1</sup> Consultative Committee for Space Data Systems, 2012.

- 2 The Digitization and Digital Preservation Discussion Group is an informal group of digitization and digital preservation specialists from small to large institutions located in the National Capital Region and across Canada.