ASSOCIATION OF NOVA SCOTIA MUSEUMS

Database Systems Analysis

Prepared by
IT & Collections Management Advisory Committee

Association of Nova Scotia Museums

July 2010

This analysis has been prepared in accordance with the Association of Nova Scotia Museum's IT & Collections Management Services 2009/10 work plan as supported by the Nova Scotia Department of Tourism, Culture and Heritage Strategic Development Initiative grant.

Technical and other key term definitions are provided in a glossary at the end of the document.[1]

Background:

In 2002 the Dartmouth Heritage Museum obtained an SDI grant on behalf of a partnership of 18 year round museums. The grant allowed them to hire a programmer to develop a basic collections management database which was built in MS Access 2000. The Passage system was never meant to be a permanent database solution.

Over the next two years, Cemetery and Volunteer/Membership databases were also built. While these two systems have remained largely unaltered, the Collections database has received numerous upgrades over the past 8 years. The database programmer left Nova Scotia in 2007, and while he has provided support on an as-needed basis, no local expert has been engaged since his departure.

Over the past year a number of "glitches" have appeared in the databases, seemingly connected with Microsoft updates. The databases generally run on Windows XP although a few museums are now using them on Windows 7.

In 2009 it was decided that a local IT expert should be consulted to analyze the databases in the following areas:

- test the databases running in Windows 7, identify issues and recommend solutions
- backwards compatibility in MS Access
- easy back-up method
- hardware requirements to run newer software/programs
- list of current issues & desirable new features
- ways to simplify software & ease museums' learning curve
- repair options for current glitches
- alternative database options
- implications of developing centralized management of member databases

Present Reality:

ANSM received two responses to its technical consultation RFP. The first individual asked for $20,000 in order to interview key stakeholders, review the databases, and compile a report of the findings. The second consultant proposed to build a database prototype for $7,000, and viewed it to be unnecessary to do an in-depth analysis of the MS Access systems. These very different responses led the ANSM Managing Director and the Collections Coordinator to meet with the IT & Collections Management Advisory Committee (ITCMAC). After their discussions it was decided to seek advice of technical experts from across the country. These

[1] See Appendix 1 for Glossary of Terms.

included the original database programmer in Alberta, a private IT consultant in New Brunswick, a university webmaster / programmer and a data migration specialist in Ontario, and two IT staff members of the Canadian Heritage Information Network (CHIN) and a database administrator for Info-Muse at the Société des Musées Québecois (SMQ) in Québec. In Nova Scotia, consultants included four webmasters / programmers, a research coordinator and a private IT consultant.[2]

They agreed on the following:

1. We cannot expect to continue to operate on database systems built in MS Access 2000 without encountering major issues, including the loss of data. This is particularly true of the Collections database as it has received many patches and upgrades, resulting in a rather complicated design structure.

2. IT Consultants will not take on a supportive role with our current MS Access systems as Access is no longer as widely used as it was in 2002.

3. A mySQL-based system would better meet our needs and allow us to identify a local expert to provide assistance. mySQL is also a more widely used database structure than MS Access, which would ensure easy migration to another platform if/when necessary.

4. Maintaining 55 localized setups instead of one centralized system is a strain on time and resources.

5. Moving to a web-based system would allow much more flexibility – little/no issues with aging equipment, multiple users working simultaneously, security settings for various levels of access, easy sharing with the general public, and easy reporting on use, collection statistics, etc.

This feedback (and the fact that it was unanimous) was not anticipated, but the ITCMAC feels that this information must be dealt with in a very timely manner before any more major issues are encountered by the participating museums.

Participants in the Passage initiative are small, community museums with modest budgets, resources, computer knowledge and experience. These organizations are spread across the province in predominantly rural areas, and while most have high-speed internet, several are still working on dial-up. There is also a wide variety of equipment in museums – it is very common for museum computers to be more than five years old and to have received few or no hardware/software upgrades since their purchase. This is unlikely to change in the near future, and must be taken into account as a serious issue when examining database options.

Current Database Issues:

Over the past 8 years numerous issues have been encountered with the MS Access databases. These can be categorized into

[2] See Appendix 2 for full list of names.

user-based and system-based errors. User-based errors are most prominent at seasonal sites where short-term staff and volunteers work with the database without the proper orientation or on such an occasional basis that knowledge retention is a challenge. Several sites have also encountered issues when employees have either accidentally or purposefully deleted data.

User-related issues include:

1. Deletion of database.
2. Deletion or moving of supporting files, resulting in run-time errors on affected records (sometimes all records).
3. Confusion over child forms (grey box fields) for Source, Original Owner, Manufacturer, and Merchant fields, resulting in overwriting of correct data, thereby attaching incorrect data to numerous records.
4. Quality-related issues resulting from data enterers not following nomenclature and data dictionary standards.

System-based errors have been increasing in frequency and severity over the past year. These include:

1. Data dictionary links ceasing to function.
2. Quick Search glitch whereby the system does not initially accept the first few characters that are typed, requiring the user to re-enter the search criteria.
3. The database "remembering" previously attached image files and displaying them in records when no image file has been attached (instead of displaying the 'image not available' jpeg).
4. Record-by-record navigation no longer working in numerical order.
5. Inability to see image files in the networked database.
6. Having to open the networked database prior to the master database in order to work in both at the same time.
7. The database freezing and requiring re-opening of the program while navigating through the system record by record.
8. Inability to edit records without removing attached image files.
9. Inability to select previously documented entries in the child forms, requiring the creation of duplicate entries.
10. Selected fields' status changing in the design view, making the field required or changing data entry format rules.
11. Inability to print short records.

12. Inability to change child form information (grey box fields) for the Source field after the initial entry has been made.

13. Inability to change child form information (grey box fields) back to a blank entry in the event of incorrect information being entered and requiring correction.

14. Seemingly random run-time error messages appearing, affecting various functions of the database. The majority of these have been fixable by importing the museum's database tables into a blank copy of the Passage database.

15. Selected object records becoming read-only, preventing museum workers from updating information.

16. Corruption of the database resulting in an unrecognizable file format that cannot be opened. One such database was recovered through a recovery program, but another required re-installation of a backup copy.

17. Inability to create mailing labels in the Volunteer/Membership database.

Microsoft Access Compatibility

Built in MS Access 2000, many museums have since upgraded to MS Access 2003. Upon opening the database in this version of Access, the user is greeted with a security warning that the database content may not be "safe". Users are prompted to either trust the content, or not allow it to open. Full functionality of the database exists when the user trusts the content and allows the database to be opened, but many members have expressed concern and frustration with these security warnings.

While not an error, we have also found that MS Access 2007 and 2010 allow the user to access and make changes in the design view of the database. When initially built, these features were hidden from the user as a safety precaution. The Collections Coordinator has encountered several summer staff who have made design changes that have affected the functionality of the database, proving that it is better if the participating museums do not have such access.

MS Office 2010 was released to the general public in June 2010. Since that time, one member museum has purchased a new laptop and MS Office Suite. The Passage volunteer has tested all of the database features to determine usability and has unfortunately discovered that the child forms are not accessible. As the Source field is required, this means that new information cannot be entered.

Membership Feedback:

As the Collections Coordinator has conducted site visits, database concerns have been discussed with member museums. Everyone agrees that ANSM has approached the database renewal project in the correct way. The members have all approved of our process of consulting with industry experts as well as individual users. They trust that through this process,

the best possible system will be chosen and will meet their museums' needs.

Every Passage participant has been consulted. Their feedback follows:

1. Everyone is concerned about the learning curve associated with moving to a new system. This is particularly true for seasonal sites and newer members as they are still getting used to the MS Access database.

2. Everyone would like to have a system whereby multiple users can add or edit information at the same time and from different computers and/or locations.

3. Everyone agrees that if we move to a web-based system, the information cannot be made public automatically (even between participating museums), but should be shared in a method similar to the current "Include on the Web" checkbox that allows uploading to Artefacts Canada.

4. Everyone would like to have a keyword search feature, and better search capability in general. Many people find the current search functions cumbersome and inadequate.

5. Everyone wants to keep and improve on the data dictionary feature.

6. Everyone wants to have consistent formatting for date fields.

7. Many were initially concerned that moving to a different system would mean having to re-enter all of their information.

8. Many are concerned over the amount of space taken by the databases and associated images on their computers. This causes their aging equipment to slow down and several have experienced crashes.

9. Many recognize that the current system has reached its limit and new features cannot be easily added.

10. Many would like to have more control over the system, such as allowing users to create customized reports (perhaps through a report writer feature) and having different levels of logins so that the general public, summer students, staff, etc. can all access the amount and kind of information that they require.

11. Many would like the ability to easily compare collections with their fellow participating museums, allowing for easier coordination of shared exhibits. Recent additions to the group expected that this was how the system operated and was a main reason why participating museums like the program.

12. Many agree that it would be nice to allow visitor feedback in a web-based system, but that this must be vetted by the museum.

13. Many would like improved multimedia functions, such as the attaching of video, audio, and 3d image files.

14. Some members would like to have a centralized system that would also allow for localized backups of their data.

15. Some members feel that while the latest addition of the duplicate record feature makes their work much easier, the combined archival/artifact designation has not been helpful and has caused confusion, so should not be included in the new system.

16. Some members would like to be able to print blank catalogue records from the system for use in the museum, with fields in the same order as the database to allow for easy data entry.

17. Some participants would like the system to work with genealogical holdings.

18. Several members have asked how moving to a new system will affect the $250 renewal fee.

19. Several participants would like to be able to use a Mac instead of PC.

20. Several members would like the system to ask for changes to be approved instead of being automatic.

21. Several members want to be able to print reports with multiple thumbnail images as opposed to the current single large image per report.

22. Several participants would like the system to incorporate the Chenhall Nomenclature, offering suggestions for terms and automatically filling information such as the Category and Sub-category fields.

23. Several members would like to be able to undo changes made to records

24. Several members would like to be able to add images by dragging and dropping the file into the database record, with the system automatically reformatting the file.

The Future:

It is expected that museums' collections and archival holdings be more accessible to the public, regardless of geography. Many museums have embraced this and now provide access through their websites. While uploading information to Artefacts Canada has proven beneficial, we cannot garner usage statistics and have received numerous complaints about how the website works.

One of the ways that the IT & Collections Management Advisory Committee identifies the needs of participating museums is through the Collections Coordinator's discussions with museum staff/volunteers. More often than not, these discussions are about the database and its relation to museum operations. This consultation process allows for the identification of provincial trends, serving as a kind of unofficial needs assessment. With the expansion of the

service, it may become more difficult to see trends and similarities between the museums. As the ITCMAC has identified, moving to a centralized database system would allow ANSM to identify common issues and easily obtain relevant user statistics for funding proposals and reports.

As ANSM seeks to expand the Passage Project into a core service, there could potentially be another 60+ museums interested in taking advantage of database services. With one project person on staff, it would be impossible to provide adequate support to these additional sites. While the remote assistance program Crossloop has drastically improved off-site support, it is not enough to ensure adequate support to a large number of participants. More importantly, it would be irresponsible of ANSM to open database services to new members given the instability of our current MS Access system.

Opportunities:

Nova Scotia is not alone in examining standardized collections management software. Manitoba and Nunavut are at the beginning of the standardization process. The Inuit Heritage Trust (IHT) has expressed the desire to work together on this project in order to find a solution that will work for them as well, and are willing to share costs. For IHT, this means that ANSM will provide some much needed mentorship as they begin the digitization process. It also allows them to access technical experts as there are none locally who can assist them in navigating such a large-scale project. For ANSM, this means some much needed financial support that could help to expedite its own process.

Moving to an improved system would also allow us the opportunity for integrating with various social media platforms. This is a standard feature in almost all collections management software currently on the market. While uploading to Artefacts Canada increase the museums' level of online exposure, they could also be sharing information on popular websites such as Facebook, Twitter and YouTube. By increasing the museums' audience through an integrated database system, the database becomes a much more powerful tool for the museum. With these integration features, it would allow museums to obtain more information about their collections and attract new audiences and volunteers.

There is tremendous potential for development in a web-based system. Some examples include integration with social media, and advertising through Google could be integrated to help offset the costs of hosting and managing the system. The system could be connected with websites such as Routes to your Roots and NovaScotia.com that would increase the profile of museums and heritage in general.

Review of Database Options:

Seven database options were seriously reviewed. These were CollectiveAccess, Drupal, eHive, Emu, Omeka, PastPerfect, and the current MS Access Passage database. Prior to their selection, the Collections Coordinator conducted an audit of available options. Cost, available features, hardware/software

requirements, and ease of use were all reviewed to determine whether or not the system was worth further consideration.

After comparing seven database options, it became readily apparent that neither eHive, Emu, nor PastPerfect would work for the current Passage participants because of the annual subscription costs. The majority of museums would be unable to pay the annual subscription fees. Neither could ANSM cover such costs, especially as we look at extending the number of participants beyond the current cap of 60 museums.

The reasons for migrating away from the current MS Access system have been previously documented. In addition, the system has been included in the comparison of options table in order to show how it measures up to the six other systems.

CollectiveAccess is a museum management database system built in mySQL. Previously known as Open Collections, it is increasing in popularity and receiving very good reviews from its users. The system is open-source, so customization would be required, but basic features already exist and development continues in the system. This means that new features will periodically come available without requiring work by ANSM.

A Drupal system would use mySQL as the database structure and use Drupal as the front-end. This would mean building an entirely new database system instead of choosing one that is already in existence. This would ensure that our current fields and features remain intact. As a front-end or user-interface, Drupal can be designed to look as closely to our current system as desired, or can be simplified for ease-of-use. On the downside, Drupal treats all data as being equal, meaning that it does not distinguish between information that must remain private for legal or administrative reasons. Neither does it enforce any metadata standards.

While eHive would work for some of the smaller institutions, it is cost-prohibitive for the larger museums. While we could investigate a cost-sharing cooperative approach, the smaller groups would likely object to paying for the online housing of larger museum's collection information if they qualified for the free account. We would also be unable to garner statistics from the system as it is hosted in New Zealand.

EMu is a proprietary system that could be adjusted to accommodate different museums' collections and allow multiple logins. The problem with the system is that it has a rather complicated interface and so is not very user-friendly. Also, as previously mentioned the cost is prohibitive.

Omeka appears to be one of the more flexible existing systems in terms of functionality, but can only be used on the Linux operating system. Not all Windows or Mac programs will operate in Linux, so an analysis of compatibility issues would need to be done. The downside of Omeka is that it uses a different standard for vocabulary and documentation (Library of Congress) than CHIN and Nomenclature 3.0. Reviews of the system say that it is far more useful as an online exhibit development tool than a collections management tool.

PastPerfect is one of the most widely used and highly respected collections management programs on the market, although

there are many negative online reviews of the system. Aside from the cost, this system would be localized instead of centralized, and would require a steep learning curve for many Passage participants. There is also the issue of support, as there is currently one support technician in Canada, with the rest being located in the U.S.

Conclusions:

It is the recommendation of the IT & Collections Management Advisory Committee that ANSM adopt the use of CollectiveAccess to replace the current MS Access collections database. In terms of flexibility, ease-of-use, support and cost, this is by far the best available option. While open source, the developers provide regular updates to the system (at least one every year) and are in regular communication with users to determine how to improve the system. As discussed in the Opportunities section, this system will allow for growth and partnership possibilities.

Given the provincial government's Nova Scotia Broadband Initiative, all of the Passage participants are able (and eager) to work in a web-based system. Since participants would be able to use any computer with an internet connection, CollectiveAccess could be easily adopted by others who may wish to take advantage of ANSM's database services. In order to minimize the learning curve, the fields and functions of the MS Access database can be duplicated in a customized CollectiveAccess system.

It is possible that new users may fall under the category of museums (particularly those that are in rural locations or are historic houses or one-room schools) that do not have an internet connection on-site. By promoting CHIN's internet support program, it is likely that more museums would be able to get internet access in the museum itself, but there will likely be some historic properties that will remain without access for at least a couple years. In the meantime, new users could work in CollectiveAccess from home or at public libraries or CAP sites.

Given the many opportunities that are associated with CollectiveAccess features, such as the ability to incorporate the manufacturers' database, a phased approach should be taken to the database renewal project work. By creating a prioritized list of possible work, partnership opportunities will become apparent, and ANSM staff will be better able to incorporate tasks into their work plans. The initial work will consist of customization and data migration of a limited number of sites for beta-testing of the system, and could feasibly be completed by Spring/Summer 2011.

Comparison of Options

System & Requirements	MS Access (Passage)	Collective Access	Drupal	eHive	EMu	Omeka	PastPerfect
Bandwidth	n/a	Anything[3]	Dial-up	Broadband	n/a	Dial-up	n/a[4]
Display	1024x768 resolution	Anything	Anything	Anything	16 bit memory card, 1024x768 resolution	Anything	1024x768 resolution
Free Hard Drive Space	3.5GB	Anything	2GB server, Anything for client	Anything	100MB+ server, 100MB client	Anything	140MB[5]
Memory	256MB	Anything	1GB server, Anything client	Anything	1GB server, 256MB client	Anything	512MB[6]
Network Card	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Operating System	Windows	Windows, Mac, Linux	Windows, Mac, Linux	Windows, Mac, Linux	Windows	Linux	Windows
Processor	500MHz	Anything	Anything	Anything	133MHz	Anything	1GHz

[3] Speed of system depends on number of users and amount and type of content, ie video clips will require more bandwidth than image files.
[4] 100mbps for networked database.
[5] Also requires an additional 12MB per 1000 records and 200MB per 1000 images.
[6] Windows Vista requires 2GB RAM.

System & Requirements	MS Access (Passage)	Collective Access	Drupal	eHive	EMu	Omeka	PastPerfect
Software Installation	Yes	No	No	No	Yes	Yes	Yes
Setup							
Centralized	No	Yes	Yes	No[7]	Yes[8]	No	No
Web-based	No	Yes	Yes	Yes	No	Yes	No
Features							
Customizable	No	Yes	Yes	No	No[9]	Yes	No[10]
Audience feedback	No	Yes[11]	Yes	Yes	No	Yes	No
Automatic backup	No	Yes	Yes	Yes	No	No	No
Geographic Mapping	No	Yes	Yes	Yes	Yes	Yes	No

[7] Community groups can be created in the system
[8] Not part of the standard package, but is available as an option.
[9] Web interface is customizable.
[10] Clients can choose from a list of extra features at time of purchase but cannot change the look of the database.
[11] Can be built into the public website/front-end

System & Requirements	MS Access (Passage)	Collective Access	Drupal	eHive	EMu	Omeka	PastPerfect
Multimedia files	Image	Audio, Image, Video, Documents, PDF, links	Audio, Image, Video, Documents, PDF, links	Image	Audio, Image, Video, Documents, Spreadsheets	Audio, Image, Video, Documents, Powerpoint	Audio, Image, Video, Documents, PDF, links[12]
Multiple logins[13]	No	Yes	Yes	Yes[14]	Yes	Yes	Yes[15]
Cost	Free[16]	Free[17]	Free[18]	Free – US $800[19]	$5,000	Free	US $540[20]

[12] Not part of the standard package but is available as an option.
[13] Includes the ability to set different levels of access.
[14] New feature being added sometime over next 18 months.
[15] Only if networked.
[16] Free to the museum, but ANSM pays for MS Office Professional licenses. Through TechSoup this costs $20 per license.
[17] The database is free, but costs would be involved in customization, data migration & server/website hosting ($1,
[18] This would be a customized system, so while the basic structure is free, costs would be incurred to create additional features and to do system backups.
[19] Cost is dependent on usage. The free account limits use to 50MB, 5000 objects, and 200 images. Beyond this, annual subscription fees apply.
[20] Annual subscription fee.

Appendix 1

Glossary of Terms

Bandwidth – The data transfer capacity of a network, measured in bits per second.

Child Forms – Sub-forms that are used to display information from multiple tables. In the Passage Access database, sub-forms are recognized as grey boxes next to fields and are used to connect the same Source, Original Owner, Manufacturer, or Merchant information to multiple object records.

Info-Muse – French-language website that is comparable to Artefacts Canada, managed by the Québec museum association (Société des Musées Québecois).

Linux – is an operating system that was designed to provide personal computer users a free or very low-cost operating system comparable to traditional and usually more expensive systems. It is especially popular among computer programmers.

mySQL – An open-source relational database management system that runs as a server, providing multi-user access to a number of databases. It is known for its high performance, stability and ease of use, and runs on a variety of operating systems.

Appendix 2

Technical Consultants

Barrette, Hugo – Spécialiste en informatisation des collections, Réseau Info-Muse, Société des Musées Québecois

Benson, John – Owner, Eaglez Consulting Services

Blanchard, Jonathan – Webmaster and Web Services Platform Administrator, The Chronicle Herald

Castle, Victoria – Online Marketing Officer, Stewardship Programs & Promotion, Nova Scotia Department of Tourism, Culture & Heritage

Cloutier, Richard – Museum Information Management Consultant, Heritage Information Consulting

Harlow, Terri – Web & Graphic Design Coordinator, Pier 21, Canada's Immigration Museum

Kaufman, Seth – Developer, CollectiveAccess, Whirl-i-gig

MacDonald, Corina – Heritage Information Analyst, Canadian Heritage Information Network

Morris, Peter – Systems Administrator, Heritage Division, Nova Scotia Department of Tourism, Culture & Heritage

Murray, David – Business Intelligence Management: Data Migration, Ernst & Young Inc.

Schwinghamer, Steven – Research Coordinator, Pier 21, Canada's Immigration Museum

Smith, Garvin – President & CEO, Presponse Technologies Inc.

Taylor, Shannon – Corporate Electronic Information Manager, Canadian Heritage Information Network

Whitehouse, Michael – Coordinator of Communications and Technology, Athletics Department, Wilfrid Laurier University