Minnesota Digital Library Signature Project
Database Software Evaluation:

Report and Recommendation
April 2004

To: Minnesota Digital Library Coalition Steering Committee

Fr: MDLC Database Subcommittee:

Core Members
John Butler, University of Minnesota
Miranda Novak, CSB/SJU
Jason Roy, Minnesota Historical Society
Bill Tantzen, University of Minnesota

Other Members
Virginia Dudley, MINITEX
Jeff Johnson, University of Minnesota
Marj Kelly, Minnesota History Society
Mary Klauda, Minnesota History Society
Rose Sherman, Minnesota History Society

Charge:
To conduct a comparative evaluation of the University of Minnesota's IMAGES and DiMeMa's CONTENTdm software, and to recommend which should serve as the system for "Minnesota Reflections," the Minnesota Digital Library's signature project.

Methodology:
Populated installations of both systems were examined and evaluated using an instrument adapted from the "List of Ideal Database Features," from Penn State's Visual Image User Study (VIUS).[1] System documentation, where available, was also reviewed.

For IMAGES, the University of Minnesota's production instance of IMAGES was used. Discussions with IMAGES' software developer also informed the analysis of the system's capabilities. The search interface for IMAGES is at: http://digital.lib.umn.edu/ .

For CONTENTdm, an evaluation version of the software was acquired (v. 3.6), installed at the University of Minnesota, and populated with approximately 5,700 records and corresponding images from the U of M's digital collections and one compound manuscript file from the St. John's collection. In addition, the Acquisition Station, which is client software for administrative access to the system (for metadata creation, object upload, and overall collection management), was distributed to members of the subcommittee for their review. Full access to CONTENTdm's tutorial and help files (i.e., documentation) was also made available to the subcommittee. The search interface for this installation of CONTENTdm is at: http://mndigital.lib.umn.edu/.

In its review, the subcommittee prepared a comparative evaluation of prioritized system features, which is presented in Appendix B. From these data, the subcommittee synthesized a Pro/Con Summary, presented in Appendix A, which focuses on the significant strengths and weaknesses of each system in the considered context of the signature project.

Recommendation:
The subcommittee recommends that CONTENTdm be acquired to serve as the system for "Minnesota Reflections," the Minnesota Digital Library's signature project.

CONTENTdm currently delivers more of the features that are highly prioritized for the signature project than IMAGES currently does (see Appendix B). Of particular note are CONTENTdm's support for compound objects and presentation/personalization capabilities, which are both of interest to the signature

[1] The Penn State instrument is available at: http://www.libraries.psu.edu/vius/6.1.pdf

project. Review of CONTENTdm installations in support of projects quite similar to the MDL's endeavors, such as in Louisiana and Washington to name a couple, lend additional confidence to this recommendation.

A few other points about CONTENTdm deserve noting. DiMeMa has an active software development program for CONTENTdm, which should see the implementation of METS and JPEG2000 within the timeframe of the grant. CONTENTdm also has considerable administrative user documentation, which should aid in training on use of the system as well as day-to-day use. Both the cost of CONTENTdm and its pricing model are considered very reasonable. The turnkey nature of CONTENTdm, as well as its relatively low cost may allow the grant to shift *some* of the budget planned for IMAGES development to other areas of the grant (e.g., digitizing, creating metadata, etc.).

It should be noted, however, that CONTENTdm will not run itself. Needs for system administration continue under any system selected. Also, although "turnkey" in many respects, CONTENTdm will require stewardship for accounts management and security, software and database configuration, distribution of client software, and troubleshooting and vendor liaison activities.

In conclusion, the subcommittee is confident that CONTENTdm will provide a functional and attractive platform for launching and supporting the MDL signature project. Towards the end of the grant period, the software's functional and technical performance should be evaluated in the context of other options that will be available at that time.

Appendix A: Pro/Con Summary

CONTENTdm

Significant Strengths	Significant Weaknesses
Functionality/Technology ▪ Ability to create and manage compound objects ▪ My Favorites / light table /educational functionality (aspects of the "toolkit" that we've committed to explore in the grant) ▪ Customizable user interface (via style sheets) ▪ Strong data export capabilities, including OAI-provider compliance ▪ Capacity to support (and enforce) controlled vocabularies, with thesaurus batch loading capability ▪ Availability of a wizard to establish and store queries for presentation to users ▪ Considerable administrative and end-user documentation available. ▪ Friendly GUI admin interface ▪ MrSID-ready (i.e., for large image compression and viewing capability) ▪ Has established development tree, including incorporation of JPEG2000 and the ability to export into the METS standard. Implementation/Business Considerations ▪ Turnkey (relatively speaking) -- would allow the project to focus on training, configuration of the instance, database quality control measures, and interface design ▪ Very affordable and uses a scaling price schedule that is a good fit for a growing installation like the MDL. The first three pricing levels are as follows: – Level 1: max 8,000 stored images for $6,000 one-time and $1,000/year ongoing – Level 2: max 32,000 stored images for $12,000 one-time and $2,000/year ongoing – Level 3: max 64,000 stored images for $18,000 one-time and $3,000/year ongoing Field tested by similar installations -- many state-wide consortium projects have used CONTENTdm. Others have noted that CONTENTdm is easy to learn and meshes well with the Dublin Core.	Functionality/Technology ▪ Uses proprietary "black box" database (does not run on SQL), which likely present limitations for local applications development/customization, direct querying of the database, etc. It is not known whether the MDL will have need for this capability and, if we do, whether or not DiMeMa would provide us with an API to work with the database. ▪ No range searching, which may carry some importance for date searching in a database of historical content ▪ Some unknowns about performance and scalability for very large-scale installations (which the MDL signature project is far from being). Some of CONTENTdm's architectural components are proprietary and, as a result, less is known about their performance and scalability. Implementation/Business Considerations None

IMAGES

Significant Advantages	Significant Disadvantages
Functionality/Technology ▪ Architecture is open, robust, and highly scalable ▪ Date range searching ▪ Has relevancy retrieval capability, in addition to text-based options ▪ Web-based record creation and editing tool (no client software, java applets required) ▪ Highly customizable interface(s), using XSL style sheets ▪ Strong data export capabilities, including OAI-provider compliance Implementation/Business Considerations ▪ An instance for MDL is already available to be used ▪ Expertise exists with the IMAGES architecture	Functionality/Technology ▪ Support for compound objects not available ▪ Light table/presentation options not available ▪ Capacity to use/enforce controlled vocabularies not available Implementation/Business Considerations ▪ Some significant development (and expense) would be required to achieve some of the target functionality of the grant project, in particular with respect to compound object management and "Toolkit" functionality ▪ Little documentation currently available

APPENDIX B: Functional Attributes of IMAGES and CONTENTdm Systems: Comparative Evaluation for Support of the MDL Signature Project

#	Category	Subcategory	Feature	MDL Priority	IMAGES	CONTdm	Comments
1	Security		There is a web interface to accounts-authorizations management	2	No	No	Conducted thorugh Apache
2	**Security**		**There are several categories of administrative users to whom privileges may be assigned**	**3**	**No**	**Partial**	**CDM allows the assignment of System Administrators or Collection Administrators.**
3	Security		There are several categories of privileges that may be assigned to administrative users (e.g. viewing thumbnails, viewing full images, adding user-generated descriptions, editing records, creating new records & adding image files.)	3	No	No	
4	Security		There are several categories of images with various restrictions	3	No	No	Although this capability is possible to effect outside of the system proper.
5	**File Management**	**Data Structures**	**Whole-to-part, or parent-to-child, relationships can be constructed for associating one or more records. For example: multiple views of a single building (aka, accommodation of complex or compound object records)**	**1**	**No**	**Yes**	
6	File Management	Data Structures	Repeatable fields may be linked. For example: a field for "creator" may be repeatable and authority controlled. Another field for "creator role" may be repeatable and authority controlled. Values for these two fields may be linked for display. (Philip Johnson, architect; Michael Thompson, landscape architect; Holman and Frank, engineering design.).	2	No	No	NOTE: CDM does have the capacity for the creation of master tables.
7	**File Management**	**Data Structures**	**Software provides a means for the data administrator to map the metadata scheme of an incoming collection to the system's standard schema**	**2**	**No**	**Yes**	
8	File Management	Federated Access	System provides access to several separate subcollections (either by frequently importing data from several sources, or by running searches across several sources).	1	Yes	Yes	
9	File Management	Federated Access	The collection or sub-collection may be introduced by a selection of the images it contains and a brief text description or the sub-collection.	1	Yes	Yes	This can be achieved by the development of a web front-end to the subcollection. Both systems offer style sheet capabilities in this regard.

-- Priorities weighted as follows: 1=High, 2=Medium, and 3=Low

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10	**File Management**	**Federated Access**	**Each sub-collection may employ different metadata schemes. Different record display formats may maintain the field-names from these different data sources.**	**3**	**No**	**Yes**	
11	File Management	Image Storage	Master images may be in several formats (TIFF, JPEG, etc.).	1	Yes	Yes	
12	File Management	Image Storage	Display images are generated on the fly from a single master image.	2	No	No	Display image files can be generated from a master image file, but images on the fly cannot be.
13	File Management	Image Storage	Image management includes a recording of MD5 signatures	2	Yes	Yes	To be clear, the capability here is NOT the automatic recording of the MD5, but rather the capacity within the metadata record to hold these data.
14	Data Input/Editing	Associated Metadata	The names assigned to shopping carts and/or saved presentations are recorded in each record of the pictures used for the presentation, establishing a cohort status for these records.	3	No	No	
15	**Data Input/Editing**	**Authority Control**	**Contents of a field may be restricted to selections from a preloaded thesaurus.**	**2**	**No**	**Yes**	
16	**Data Input/Editing**	**Authority Control**	**Contents of a field may be restricted to selections from a authorized list of terms written by an authorized user.**	**2**	**No**	**Yes**	
17	**Data Input/Editing**	**Authority Control**	**Mechanism is available to pre-populate selected fields automatically through software-assignment of value (ID number, image paths) or with repeating values at the discretion of the administrator(e.g., copyright statement).**	**2**	**No**	**Partial**	**CDM supports a mechanism for making global changes at the collection level. The function allows for a single field to be set to a specified value for all fields in the collection.**
18	Data Input/Editing	Authority Control	Those entering data may submit terms for consideration for the authorized list.	3	Partial	Partial	Can be accomplished by adding a link on the edit page to a suggestion form.
19	**Data Input/Editing**	**Importing Data**	**Records and images may be imported in batch modes. Preferably using a variety of input formats (delimited text, VRA Core, etc.).**	**1**	**Partial**	**Yes**	**Files can be batch-loaded into IMG but not as a distributed function. Rather it must be fully accommodated by the system administrator.**

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20	Data Input/Editing	Importing Data	Records can be edited online through a web browser.	1	Yes	Yes	IMG uses a web form; CDM uses a java applet that functions over http.
21	Data Input/Editing	User Contributed Data	At least one field in every record will be available for end user-contributed descriptive data. Permissions on writing to such a field will be different than other record fields. These fields should be repeatable so that several users may provide separate descriptions of the same picture.	2	No	No	
22	Data Input/Editing	User Contributed Data	Fields for user-contributed description should have the capability of unlimited character length (or an extremely high limit).	2	N/A	N/A	
23	Data Input/Editing	User Contributed Data	The contents of user-contributed fields may be moderated by a user with a higher level of security permissions who may elect to accept or reject the user contributed description.	2	N/A	N/A	
24	Retrieval	Browsing	Users may browse on any one of a selection of indexes.	2	No	No	
25	Retrieval	Browsing	If aforementioned feature is available, then browsing lists include the number of postings for each index entry.	2	N/A	N/A	
26	Retrieval	Browsing	If aforementioned feature is available, then users may select more than one term from a browsing list.	2	N/A	N/A	
27	**Retrieval**	**Light Table**	**If light table is available, then users may sort and re-sort thumbnails in the light table. The preferred method for this action is clicking and dragging.**	**1**	**N/A**	**Yes**	**CDM allow for sequencing of images on the light table, but not thorugh click and frop functionality.**
28	**Retrieval**	**Light Table**	**If a light table is deemed necessary, then the associated text for any image should be readily available. Need to determine what information to associate with the image.**	**1**	**N/A**	**Yes**	
29	**Retrieval**	**Light Table**	**The light table should be able to accommodate a large number of thumbnails.**	**1**	**N/A**	**Yes**	**CDM allow for up to 100 images on the light table**

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30	**Retrieval**	**Light Table**	**A light is available. Note: a light table is a space for sorting and creating sequences of images. Its functions may overlap somewhat with those of Result Display and Shopping Cart. It may be possible that its functions are subsumed by those two. If presentation tools are part of the interface, the functions of the light table may also overlap with the presentation tools.**	**2**	**No**	**Yes**	
31	Retrieval	Result Display	Short-form display of results will include fields selected by the sub-collection administrator.	1	Yes	Yes	
32	Retrieval	Result Display	Short-form display of results will include thumbnail images.	1	Yes	Yes	
33	**Retrieval**	**Result Display**	**User may mark thumbnails for selection, mark all, clear marks, etc.**	**1**	**No**	**Yes**	
34	Retrieval	Result Display	The result display should be able to accommodate a large number of thumbnails in a single screen.	1	Yes	Yes	
35	Retrieval	Result Display	User may sort short-form display of results by a selection of fields.	2	No	No	
36	Retrieval	Result Display	End user may customize the result display: the number of thumbnails displayed may be chosen from a list of options.	2	No	No	
37	Retrieval	Result Display	End user may customize the result display: thumbs only, thumbs with captions, captions only, short records only, or the default: thumbs with short record displays.	2	No	No	Administrative customization may be done using style sheets in both applications.
38	Retrieval	Search History	Searches may be limited by any search criteria (or sets may be combined).	2	Partial	Partial	The onlysearch limit that both CDM and IMG offer is limit by collection.
39	Retrieval	Search History	Previous searches may be redisplayed, preferably from cache.	2	No	No	This is also dependent on variables external to the systems.
40	Retrieval	Searching	User has options to select one from several available search modes, with some possible options including: Keyword, Field specific Keyword, Pattern match, Concept search, Numeric range, or Browse.	1	Yes	Yes	
41	Retrieval	Searching	Keyword will search all of the text in all of the fields chosen by the system administrator for this index.	1	Yes	Yes	
42	**Retrieval**	**Searching**	**Keyword search accommodates truncation and wildcard searching.**	**1**	**No**	**Yes**	**CDM offers right-hand truncation**

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43	Retrieval	Searching	Keyword search will include the possibility of Boolean operators and proximity indicators.	1	Yes	Yes	Yes to Boolean (in both cases); only proximity searching available in either system is bound phrase.
44	Retrieval	Searching	The fields indexed for field-specific keyword searches may be selected by the system administrator.	1	Yes	Yes	
45	**Retrieval**	**Searching**	**Numeric ranges may be searched for date or other numeric fields.**	**1**	**Partial**	**No**	**IMG allows date range searching. While CDM currently supports Text, Date, and Full-text data types, date reange searching is not supported.**
46	Retrieval	Searching	Pattern match searches will attempt to match variant spellings and forms of names.	3	No	No	In IMG, this functionality is available by means of Oracle tools, but is not implemented.
47	**Retrieval**	**Searching**	**Concept searches will include stemming, synonyms, word frequencies, or other linguistic search techniques to broaden the results of searches and to attempt to order the results by relevance.**	**3**	**Partial**	**No**	**IMG employs Salton's relevancy scoring formula (algorithm) in its Basic Search mode. This addresses some, but not all, aspects of relevancy retrieval.**
48	Retrieval	Shopping Cart	Records and thumbs selected from result displays may be saved into a shopping cart.	1	Yes	Yes	
49	Retrieval	Shopping Cart	Shopping carts may gather the results of several searches in a single session.	1	Yes	Yes	
50	**Retrieval**	**Shopping Cart**	**Shopping carts may be named and saved for use in multiple sessions.**	**1**	**No**	**Yes**	
51	Retrieval	Shopping Cart	The contents of a shopping cart may be displayed at any time. This display may be in the same format as the result display or as the light table display.	1	Yes	Yes	
52	Retrieval	Stored Queries	End users may store queries in the system for later use.	1	No	No	
53	**Retrieval**	**Stored Queries**	**Collection administrators may create queries in the system and position them behind links for end users to invoke.**	**1**	**No**	**Yes**	
54	Outputs	Downloading	Any image display may be downloaded.	1	Yes	Yes	Not really a function of the system.

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55	Outputs	Downloading	Any display of results, shopping cart, or presentation may be downloaded as a single file (or, if necessary as a text file and associated image files).	2	Partial	Partial	This is accomplished through the shopping cart/favorites function. Associated image files are not included, however.
56	Outputs	E-mailing	Any printable or downloadable output may be emailed.	3	No	No	Note: this is not to say that files downloaded from the system cannot be emailed.
57	Outputs	Exporting	Large quantities of records and images may be exported in batch mode, in a variety of formats, including XML, tab-delimited, and to METS. If METS options is not currently available, when might it be and at what expense.	1	Yes	Yes	Note: CDM has introduction of METS as a Fall 2004 deliverable.
58	Outputs	Larger Image Displays	Click on thumbnail (or some other simple procedure) opens an image window with a larger image display. (Preferably in a new window.)	1	Yes	Yes	However, in doing so neither IMG or CDM opens a new window.
59	Outputs	Larger Image Displays	Larger displays have zoom, pan, or other MrSid capabilities. Also, there is a timetable for JPEG2000 support, which should deliver this support before the end of the grant period.	1	No	No	CDM has indicated that these capabilities are in development.
60	Outputs	Larger Image Displays	Many large display windows may remain open (for comparison, etc.)	2	No	No	
61	Outputs	Metadata	Support for OAI-PMH, enabling collections metadata to be available for harvesting.	1	Yes	Yes	NOTE: CDM also supports the export of collection metadata to an appropriate format for use in an OCLC SiteSearch database
62	**Outputs**	**Presentations**	**Presentations allow customizing sequences of selected images for either classroom-presentation, or web-style presentation (for example, web tutorials or web image review drills). The tools for presentation may overlap with the light table or shopping cart functions.**	**2**	**No**	**Yes**	
63	**Outputs**	**Presentations**	**Presentations allow for single or twin sequences of images to be created, in much the same way as people may use one or two slide projectors.**	**2**	**N/A**	**Yes**	
64	Outputs	Presentations	Texts from database records may be easily moved into presentations, but will not be required in presentations.	2	N/A	No	
65	Outputs	Presentations	Presentations must be given a name when saved.	2	N/A	No	

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66	**Outputs**	**Presentations**	**Presentations may be saved to the user's machine. Presentations may be run without a live connection. (Although client software may be required.)**	**2**	**N/A**	**Yes**	**Yes, by means of CDM's PowerPoint Plug-in option**
67	**Outputs**	**Presentations**	**Users may incorporate their own image files and texts into a saved presentation (without these becoming part of the database, and could be in a file outside of the database).**	**2**	**N/A**	**Yes**	**Yes, by means of CDM's PowerPoint Plug-in option**
68	**Outputs**	**Presentations**	**Presentations may be easily added to html environments such as course web pages.**	**2**	**N/A**	**Yes**	
69	Outputs	Presentations	Custom texts may be added to presentations by the user.	3	N/A	No	CDM -- not directly with the My Favorite's slideshow option. However this can be accomplished by use of CDM's PowerPoint Plug-in option. IMG's allows custom text to be added to an image, but only on a per-item basis.
70	Outputs	Presentations	Random sequence option is available for student drills.	3	N/A	No	
71	Outputs	Presentations	For student drills, texts may be easily toggled on or off.	3	N/A	No	
72	**Outputs**	**Presentations**	**Presentations may be exported in such a way (perhaps IMS description) that they may be easily incorporated into course management system applications.**	**3**	**N/A**	**Yes**	**Yes, by means of CDM's PowerPoint Plug-in option, and not by further applications integration.**
73	Outputs	Printing	Any system display may be printed.	1	Yes	Yes	Not really a function of the system.
74	**Outputs**	**Record Displays**	**Full record displays will include the full record and a thumbnail.**	**1**	**Yes**	**No**	**CDM thumbnail display includes only partial record information. Its reference image display is accompanied by the full record, however.**
75	Outputs	Record Displays	In a full record display, fields not used for a subcollection will not be displayed.	1	Yes	Yes	
76	Outputs	Record Displays	Short record displays will include selected fields from the full record by the system administrator.	1	Yes	Yes	
77	Outputs	Record Displays	An extremely brief text display, a caption, may be needed to accompany thumbnails in the light table, the shopping cart, or the options chosen by users for the result display.	1	Yes	Yes	

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78	Outputs	Record Displays	The fields selected for short record displays may vary from one sub-collection to another.	2	Yes	Yes	Yes, when access is through customized collection-level interfaces.
79	Outputs	Record Displays	The field chosen for the caption may vary from one subcollection to another.	2	Yes	Yes	
80	Personal Database		System allows sub-collection managers to design and build web forms acting as custom retrieval interfaces (to the sub-collection or to the entire collection).	1	No	No	Not a collection management levels.
81	Personal Database		Sub-collection managers may design or redesign the database for the sub-collection in consultation with an authorized system administrator.	2	No	Yes	
82	**Personal Database**		**The system is capable of helping people manage small collections separately. It should give administrative users who are authorized to manage these sub-collections control over adding records and images, editing existing records, replacing existing images, and creating name authority lists. This could be achieved in at least two ways: 1) min-versions of the dbms for local machines, or 2) control over these functions for one sub-collection in a centralized database.**	**3**	**Partial**	**Yes**	**CDM's Acquisition Station (client) is designed to facilitate this kind of control. IMG's only collection management tool that can be used in a distributed way, is its web-based record editor.**
83	Personal Database		If personal database management is achieved in a centralized database, the sub-collection manager should be able to set most protections for individual images and to define authorized user-groups.	3	No	Partial	CDM does provide some image rights options—banding, branding and watermarking—to display copyright information or indicate ownership of items in a collection
84	Assessment	Transaction Logging	Basic usage statistics reporting module available.	1	No	No	Not within the system proper.
85	Assessment	Transaction Logging	Transactions are logged so that terms with zero matches may be examined for possible improvements in the content of the system.	2	No	No	With IMG, there would be some control in implementing a function like this. With CDM, there would be a dependency on the vendor to implement the feature.
86	Assessment	Transaction Logging	Transactions are logged so that a selection of searches may be analyzed qualitatively -- the type of user can be identified and the exact sequence of actions can be recorded.	3	No	No	IMG's architecture is open to achieving a function like this. CDM is not so.

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87	Assessment	User Feedback	Users are requested to submit comments about the system. Perhaps this is done with a web form -- preferably one accessible from most screens.	1	No	No	No, but easily accomplished.
88	Assessment	User Feedback	Users are requested to submit requests for pictures they did not find. Perhaps this is done with a web form -- preferably one accessible from most screens.	2	No	No	No, but easily accomplished.

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