

Microsoft SharePoint as a Digital Asset Management (DAM) System

By

Harry Hurt

Graphic Communication Department

College of Liberal Arts

California Polytechnic State University

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Abstract

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Harry Hurt

Graphic Communication Department, June, 2010

Advisor: Dr. Harvey Levenson

The purpose of this study is to determine to what degree Microsoft SharePoint can be used as a digital asset management (DAM) system. DAM systems are utilized to manage the creation, storage, utilization, and distribution of digital rich media files such as images, logos, page layouts, and in some cases video and audio files. SharePoint is a popular collaboration system that appears to have many of the attributes of a DAM system. This study develops some baseline definitions of DAM and documents some core functionality that must be present in DAM systems of varying sophistication.

The study then compares the requirements of DAM systems to the documented capabilities of SharePoint to determine areas where the software does not meet the requirements of a DAM system. It also identifies some options available for extending SharePoint's feature set in order to utilize it for a true DAM system.

The results show that SharePoint does, indeed, have many of the attributes of a DAM system, but that it is lacking some core functionality. Possible options for using third-party software in addition to SharePoint are identified, as well.

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Chapter I: Purpose of Study

Since the introduction of color electronic prepress systems in the late 1970s, digital prepress companies have looked for ways to store and manage the tremendous amounts of data surrounding images and documents.

Software developers initially created solutions specifically for the graphic arts industry that allowed prepress companies to manage their files. Over time, these image and document files became known as *digital assets*, and in the early 1990s companies such as Engage, Artesia, Banta, and Xinet developed systems known as *Digital Asset Management (DAM)* systems. Early DAM systems simply allowed users on a computer network to put files into a common repository, search for files, and retrieve files. As DAM systems matured, developers implemented advanced capabilities such as the ability to translate file formats or to automate production workflows.

While DAM system developers were working on products for the graphic arts industry, other developers were creating systems to allow users (mainly in corporate environments) to share files and collaborate on projects over Internet-based websites called *portals*. One such product is Microsoft SharePoint, initially released in 2001. Past versions of SharePoint were aimed at typical corporate users to manage standard word processing, spreadsheet, and presentation files. SharePoint was also intended to manage files content for websites, but past versions were not easily adaptable to meet the needs of the

professional graphics user. In May of 2010 Microsoft released the latest version of SharePoint called SharePoint Server 2010 that promises to be more adaptable.

While traditional DAM systems certainly meet the needs of the graphics professional, they may not fully meet the needs of typical corporate users. Additionally, many DAM systems do not run on Microsoft platforms. Many Information Technology (IT) departments have standardized on Microsoft products and are hesitant to install and support non-Microsoft products. Since SharePoint is a Microsoft product, it is relatively easy for a corporate IT department to embrace. Unfortunately, many corporate IT departments do not understand the specialized needs of graphics users, and many graphics users do not know how to describe their specific requirements to the IT staff. This can lead to an IT team selecting a system that appears to meet the graphics department's needs but may fall short in some key areas.

Another scenario where an IT team might look at implementing a SharePoint-based DAM system is an instance where a company already has an existing SharePoint system and is looking to implement a DAM system. An incremental investment in the existing architecture would have quicker pay off than investing in new technologies and infrastructure. (Woodill, C., 2008)

This study asks and answers the questions: To what extent is Microsoft SharePoint Server 2010 a viable DAM system? What options, if any, are there for adapting it for use by the

corporate graphics user? The hypothesis of this study is that SharePoint may appear to have many of the features of a viable DAM system, but that it cannot fully meet the needs of a graphics professional. It may be possible, however, to adapt SharePoint for use as a DAM system through additional applications or plug-ins.

In order to assess the extent to which SharePoint can be used for DAM, three different levels of capabilities will be defined which will reflect three realistic applications of a DAM system. The capabilities of SharePoint will be compared to the requirements and definitions of each of the three levels of sophistication.

The purpose of the study is to determine if Microsoft SharePoint Server 2010 can be adapted for use as a DAM system, thereby allowing graphics users to leverage an existing or upcoming SharePoint installation.

Chapter II: Literature Review

Definition of Digital Asset Management

In order to understand the features and benefits of a digital asset management system one must first understand what a digital asset is. According a white paper published by *contentmanager.eu.com*: "If you take the literal translation of what a 'Digital Asset' is, then in essence it is any form of media that has been converted into an electronic (binary) format that has a 'value' to a company. (What is a Digital Asset Management System (DAM)?, 2008, p.1) The website *digitalassetmanagement.com* further refines the definition by stating: "Digital assets are comprised of various file types including, but not limited to, the following: product images, lifestyle photography, audio & video formats, PowerPoint, Word, Excel, Auto CAD, Quark, Photoshop, Illustrator, PageMaker, In-Design, PDF, and various other file formats." (*digitalassetmanagement.com*, p1)

A digital asset, then, is an electronic file that can be published in on-line or print media. It follows that digital asset management would include some method of organizing and handling electronic files.

Ventura IT's website states that "Digital Asset Management consists of tasks and decisions surrounding ingesting, annotating, cataloguing, storage and retrieval of digital assets, such as digital photographs, animations, videos and music. Digital asset management systems

are computer software and/or hardware systems that aid in the process of digital asset management.” (VenturaIT.com, p1)

According to *contentmanager.eu.com*:

A Digital Asset Management tool would typically be expected to provide the following list of generic functions:

- Organizing digital assets
- Manipulating digital assets (converting, merging, collating)
- Searching for a digital asset
- Verifying the integrity of digital assets
- Delivery and distribution of digital assets
- Securing digital assets
- Backing up digital assets

(What is a Digital Asset Management System (DAM)?, 2008, p.1)

Additionally, some authors feel that automated workflow management is a key component of a fully-featured DAM deployment. For instance, in a paper for Cognizant Technology Solutions, Amit Sawarkar states: “DAM workflow includes the structured movement of documents or media across an organization for the purpose of performing collaborative processes that include cataloging, development, evaluation, sign-off, and archiving. Workflow management functions include definition, coordination and tracking project status, assigned tasks, versions, overall cost, completion date and deliverables.” (Cognizant, p.5)

One item that is inferred in the above statements is that DAM systems need some method of applying or creating information about the file, called metadata, to the asset in order to make it easier to find the asset. Metadata can include intrinsic information about the file such as file size, file format, dimensions or the date the file was created or modified. Metadata can also include

user-provided information such as descriptions, keywords, or other annotations. The importance of metadata and metadata management are key to the success of any DAM implementation, but lie beyond the scope of this study.

Combining and simplifying the definitions and statements above we can determine that a fully-featured DAM system needs to allow for:

- Loading (ingesting) files into the system
- Annotating or applying metadata to the file, both manually and automatically
- Organizing the files through folder hierarchies, attributes/metadata, or some combination of both
- Searching for specific files by either browsing a file structure or searching by metadata
- Converting the file to the appropriate format and size for the end use
- Retrieving, delivering, or otherwise distributing the file
- Securing or controlling access to the assets. For instance, some users may have the ability to delete files while other will not. Additionally, some users or groups of users may not have access to certain collections of files.
- Managing workflow
- Managing schedules

Although contentmanager.eu.com states that backing up digital assets is a requirement of a DAM system, (What is a Digital Asset Management System (DAM)?, 2008, p.1) backing up and archiving of digital assets will not be used as part of the evaluation criteria for this study. Backup and archive strategies are heavily dependent upon the disaster recovery, business continuity, and information technology requirements and policies of a company that installs a SharePoint or DAM system. The variables of those requirements and policies are too complex to include in the scope of this study.

Not all companies implementing a DAM solution need all of the features of a fully-featured DAM, however. Some require just a subset of the full list of features. For instance, a company

that outsources its creative work might not need workflow automation tools, but needs to have the final images available via the Internet or Intranet for corporate divisions around the globe. In this case the company would only need a certain subset of the functions of a full DAM system.

Benefits of Digital Asset Management Systems

DAM systems can provide a wide range of benefits to an organization. Efficiency and greater productivity are perhaps the most obvious, but according to Michael Moon of GISTICS, (Moon, et al, p.6) other benefits include:

- **Cost reduction** – The most tangible aspect of savings comes when current business costs are eliminated or reduced, including costs associated with CD or DVD replication, agency fees, shipping costs, and file transformation.
- **Cost avoidance** – Industry analysts estimate that up to 30% of all content is recreated because it is lost or otherwise mismanaged. Avoiding such costs – as well as unnecessary expenses such as stock or custom photo fees, licensing fines, and other costs that are a direct result of poorly tracked assets – can contribute to earning returns.
- **Strategic value-add resource reallocation** – Simply put, your most highly paid workers – knowledge workers – are spending much of their time searching for content. Streamlining searches allows you to reallocate them to focus on more important strategic business objectives. Many companies fail to convince senior management with the argument that DAM will affect a “hard cost” reduction in search time. In reality, unless DAM will eliminate a dedicated staff position for searching hard drives, CDs, and file cabinets, you still have the fully burdened cost your knowledge workers. Demonstrating a reallocation of resources to more strategic activities (which can lead to revenue generation – see below) is a much more convincing ROI component.
- **Revenue generation** – Often, a DAM implementation creates new revenue opportunities. For example, a media company may discover its new library of materials can be repackaged and offered for sale. In nearly all cases, the accelerated delivery of marketing materials means that sales teams, retailers, and distributors can respond faster to revenue opportunities. This is a key ROI component for financial services firms looking to deploy DAM. Imagine the ability to instantly arm your field sales agents with materials featuring the latest interest rates.

- **Intangible business value** – This category is the hardest to quantify, yet for some organizations, it is the most critical element. Better brand management, more consistent messaging, and improving partner relationships are examples of intangible value. Using rich media in a sales presentation may not only save time and money, but also make the presentation more effective and successful. Often, the least tangible benefits come with the greatest benefit to your organization. Organizations that sell through retail channels can easily outsell the competition simply by making it easier for the retail chain to advertise and promote its products or by making feature-benefit information easily available to sales reps.

Barriers to Implementing DAM in Large Corporations

Companies such as printers, premedia providers, publishers, and advertising agencies specialize in creating or managing digital assets. Since digital assets are so important to them they often implement DAM as a key foundation in their IT infrastructure. In larger corporations such as retailers or manufacturers, only a small portion of the users are directly involved with digital assets. Many larger corporations adopt standard hardware and software platforms and are reluctant to install non-standard systems. Ralph Windsor illustrates this point with the following statement:

Truth #1: Work with the client's IT environment or don't work at all

In larger businesses with centralized corporate IT divisions, making minor changes to a typical browser or desktop setup for significant groups of users involves an epic voyage of change request forms, risk management meetings, deployment and back-out plans before they even get close to implementation. The IT department's priority is keeping email coming in, viruses out and achieving a general level of "just don't touch it" stability. We have learned that it is best to build DAM solutions that will work with no internal changes required for either administrators or regular users - otherwise expect a long, arduous and frustrating wait to get any kind of solution deployed and into active use. (Windsor, 2010)

While it is difficult to obtain statistics about the percentage of corporate IT departments that have standardized around Microsoft products, I believe that it is safe to say that most IT departments

feel comfortable installing Microsoft products. I also believe that given a choice between a Microsoft platform and a non-Microsoft product with similar capabilities, most IT departments would prefer to implement the Microsoft offering. This is partly because major systems in large enterprises need to integrate with each other, and it is often difficult to connect systems from different vendors. Additionally, there are resource-allocation, support, and financial efficiencies to be gained from using applications from a single vendor.

In an interview with Bill Covington of IO Integration, Mr. Covington expressed that one of the greatest obstacles to implementing a DAM system with workflow and schedule management features is that it is very difficult to define the business rules required to create defined procedures and workflows. This is especially true for the creative processes. For example, a company may be able to define timelines and processes for creating a marketing flyer using approved logos, copy, and images, but the processes and timelines for creating the individual elements are more difficult to define and manage because of the highly iterative processes involved with creating the individual elements.

Covington also states that one of the challenges of integrating systems with SharePoint is that SharePoint is very flexible. Programmers can write custom scripts or applications that can work with SharePoint. The system can also be highly configured to perform certain tasks. Because of this there are many possible variables that need to be considered and addressed with each installation. A company with access to highly skilled SharePoint developers may choose to

create their own custom method for performing a task that may also be available in the DAM system that is being integrated with SharePoint.

Most of the literature reviewed pertaining to using SharePoint as a DAM system was in the form of Internet discussions, product reviews, and promotional material from Microsoft or other software developers.

The most current information was found in documentation from Microsoft. It is also presumed to be the most trusted source of information about SharePoint and its capabilities.

Microsoft's definition of digital asset management, however, does not include any of the file format translation capabilities that are key to most experts' definition of DAM. (Microsoft, Digital Asset Management Overview, 2010)

Microsoft's definition is much closer in line to one of Enterprise Content Management (ECM). While there are many similarities between ECM and DAM, ECM tends to concentrate on managing content for website publication, not for print publishing.

According to a white paper published by Northplains, Inc. (Northplains, Differentiating DAM from ECM, p.2) "Enterprise content management (ECM) solutions offer an efficient method to manage a company's static information. According to Gartner, ECM is really an umbrella term

representing a vision and framework for integrating a broad range of content management technologies and content formats.”

The article goes on to state that “Forcing ECM systems to handle the complexities of DAM requirements only leads to frustration and disappointment.”

ECM does not include some of the functionality, such as file format translation, required by print professionals. In a study published by AIIM (Association for Information and Image Management), author Carl Frappaolo (Frappaolo, p. 11) concludes that out of 353 respondents, less than five per cent use SharePoint for DAM on a significant basis. The study does not describe, however, how many companies intended to use it as a DAM system and were not able to successfully implement it.

A discussion on LinkedIn’s Masters of DAM group had some interesting points about SharePoint’s perceived shortcomings as a DAM system, (LinkedIn, 2010), but I was unable to find any documentation that objectively compared SharePoint’s capabilities to a DAM system.

Review of Literature Pertaining to Systems that add DAM Functionality to SharePoint

Again, the majority of information came from documents written by the software developers, themselves. Reviews of the applications were used as a secondary source, but it was difficult to tell at times whether the review was paid for by the developer or not.

Companies such as Automated Media Processing Solutions do, however position their products as viable extensions to SharePoint. Automated Media Processing Solutions' MediaRich software appears to be an add-on to SharePoint that will provide the features of a full DAM system.

(Automated Media Processing Solutions, 2010)

Chapter III: Research Methodology

The primary research method used in this study was Descriptive Research along with Elite and Specialized Interviews and qualitative analysis.

Descriptive Research, as described by Dr. Harvey Levenson, is used to determine the nature of a situation as it exists (Levenson, p. 24) In this case, the research was used to determine what the current capabilities of SharePoint and other systems. Most of the pertinent information was derived using Documentary Analysis based upon documentation and reports from the software development companies involved as well as experts in the field of Digital Asset Management.

Since the majority of the data collected was from previously published documents, the results were qualitative in nature as opposed to quantitative. Data points will, wherever possible, come from more than one source in order to validate the results. This is referred to as internal validation by triangulation of the data. (Creswell, p. 158)

Elite and Specialized Interviewing methods were used to get an overview of the methods used for integrating a DAM system or plugin with SharePoint, which types of workflows are managed through SharePoint, the reasons clients utilize SharePoint, and potential technical and usability issues arising from integrating with SharePoint.

The Elite and Specialized Interviewing process is used for gathering insights from experts in a particular field as opposed to conducting a survey or asking questions from questionnaire. In a

paper on interviewing process published by the London School of Economics and Political Science (London School, pp. 1-5) the author states that a critical task of this interviewing process is to develop a rapport with the interviewee so that the interviewee will view the interviewer as an “insider” and offer information from an unbiased, neutral perspective. While the interviewer will have a well-defined goal and core set of questions to be asked, an elite interview will take the form of a conversation in order to draw insights and information from the interviewee. Because of the requirements to gain insider status with the interviewee and get him or her to provide information from a neutral point of view, this process may not work well with sales representatives. Sales representatives generally have a vested interest in promoting their company’s products and may not provide neutral information.

The primary questions to be asked during the interview will include:

- Do you have any experience integrating your product with SharePoint?
- What are SharePoint’s strengths and weaknesses for use as a DAM solution?
- What method or methods do you use for integrating with SharePoint?
- Is (or do you foresee) SharePoint integration becoming more popular?
- What are the technical obstacles to integrating with SharePoint?
- What other types of obstacles are there for integrating with SharePoint?
-

The questions will be used as a guide or starting point. The goal will be to lead the conversation in different directions as dictated by the answers provided by the interviewee.

The initial research was used to define the specific requirements of a DAM system. While the basic requirements of a DAM system were introduced in the second chapter, I developed more detailed definitions of individual based on my experience with DAM systems along with information from other sources.

While the benefits of a DAM system are many, some of the obstacles of implementing one can be difficult or expensive to overcome. For instance, as Covington states, a company with extensive creative processes may find that implementing a system with workflow automation features. The same company may, however, gain great benefits by having a system that allows users to have access to images that can be downloaded in multiple file formats.

Therefore, not every company will need a fully-featured DAM system. Indeed, in order to determine to what extent SharePoint can be used for DAM I developed some logical groupings based upon capabilities. The groupings are described in tables populated with the results of the Descriptive Research. The groupings are contained in Table 1 at the end of this chapter.

Next, I compared the capabilities of SharePoint Server 2010 as documented by Microsoft and other sources against the requirements of a DAM system from step one of the research. The data derived from the documentary research was used to populate tables used to determine whether or not SharePoint possesses a certain capability or feature.

The third step of the research was creating a “gap analysis” between the requirements of a DAM system and the capabilities of SharePoint Server 2010. The gap analysis identified any features and functions that are missing from SharePoint Server 2010 that preclude it from being used as a DAM system.

As mentioned earlier, SharePoint can be highly configured and customized. Configuration refers to settings within the core software that can be turned on or off, set to certain values, or tailored to perform a function without writing any additional code. Customization refers to the ability to modify the performance or functionality of a system by writing additional software code. For the purposes of this study SharePoint was considered to possess a function if it can be performed within the core software or configured to do so. Additionally, I did not attempt to ascertain how well SharePoint or other software performs a certain function. This study was based on whether or not the software can perform a certain function, not the degree of sophistication to which it performs the function.

Step four included researching and identifying third-party applications or plug-ins to SharePoint that address the needs identified in the gap analysis.

The results of the research were analyzed and compiled into table form along with descriptions. The tables and results were used to draw the final conclusions of the study.

Table 1
Capability Requirement Matrix

	Prod Mgmt	Media Portal	DAM
Loading (Ingesting)Files into the System			
Single File upload	√	√	√
Multiple File Upload	√	√	√
Extract EXIF Metadata During Upload	X	√	√
Extract XMP/IPTC Metadata During Upload	X	√	√
Metadata Handling	Prod Mgmt	Media Portal	DAM
Manually associate metadata with file	√	√	√
Automatically associate metadata with file	X	√	√
Embed or edit EXIF/IPTC/XMP metadata within file	X	X	√
File Organization	Prod Mgmt	Media Portal	DAM
View folder structure	√	√	√
Virtual directory structure based on file attributes	X	X	X
Browse and Search Capabilities	Prod Mgmt	Media Portal	DAM
Ability to browse through folders	√	√	√
View Thumbnails of images	X	√	√
View Thumbnails of non-image files	X	√	√
Search by file name	√	√	√
Search By file attributes/metadata	X	√	√
File Conversion Capabilities	Prod Mgmt	Media Portal	DAM
Ability to convert image formats i.e. JPEG to TIFF	X	√	√
Ability to convert color spaces, i.e. RGB to CMYK	X	√	√
Ability to convert vector artwork to image formats	X	√	√
File Retrieving / Delivery	Prod Mgmt	Media Portal	DAM
Download individual files	√	√	√
Download multiple files	√	√	√
Access Control	Prod Mgmt	Media Portal	DAM
Ability to set roles	√	√	√
Assign users to roles	√	√	√
Assign users to groups	√	√	√
Access control	√	√	√
Workflow and Schedule Management	Prod Mgmt	Media Portal	DAM
Create schedules, timelines, and tasks	√	X	√
Define workflow	√	X	√
Manage workflow steps based on status	√	X	√
Automate workflow processes based on status	X	X	√
Integration with Page Layout Programs	X	X	√

The above table illustrates the capabilities required for the three levels of DAM systems defined for the purpose of this study. The capabilities listed in the major headings were derived from the definition of Digital Asset Management in the second chapter of this study. The specific capabilities and the categorization of capabilities to determine the three levels of Digital Asset Management systems are primarily based on my experience with DAM systems.

Chapter IV: Results

The qualitative data derived from the documentary research was used to compare the capabilities of SharePoint against a fully-featured DAM system. The results are shown in the following table:

Table 2
Capabilities of SharePoint

Capabilities	SharePoint Capabilities	References
Loading (Ingesting)Files into the System		
Single File upload	√	1,2,3
Multiple File Upload	√	2,3,4,5
Extract EXIF Metadata During Upload	√	6,7,8
Extract XMP/IPTC Metadata During Upload	X	6,7,8
Metadata Handling	SP capabilities	
Manually associate metadata with file	√	6,7,8
Automatically associate metadata with file	√	6,7,9
Embed or edit EXIF/IPTC/XMP metadata within file	?*	
	*Unable to determine, assume not available.	
File Organization	SP capabilities	
View folder structure	√	3,4,25
Virtual directory structure based on file attributes	√	10, 25,26
Browse and Search Capabilities	SP capabilities	
Ability to browse through folders	√	3,4
View Thumbnails of images	√	3
View Thumbnails of non-image files	X	11,12,13,14
Search by file name	√	10,26,27,28
Search By file attributes/metadata	√	10,26,27,28
File Conversion Capabilities	SP capabilities	
Ability to convert image formats i.e. JPEG to TIFF	X	15,16
Ability to convert color spaces, i.e. RGB to CMYK	X	15,16
Ability to convert vector artwork to image formats	X	15,16
File Retrieving / Delivery	SP capabilities	
Download individual files	√	17
Download multiple files	√	17
Access Control	SP capabilities	
Ability to set roles	√	18,19
Assign users to roles	√	18,19
Assign users to groups	√	18,19
Access control	√	18,19
Workflow and Schedule Management	SP capabilities	
Create schedules, timelines, and tasks	√	20, 31, 32
Define workflow	√	21,22, 31, 32
Manage workflow steps based on status	√	23, 31, 32
Automate workflow processes based on status	X	24, 31, 32
Integration with Page Layout Programs	?*	
	*Unable to determine, assume no integration.	

Table 3
References For Capabilities Table

- 1 Microsoft Corporation, (2010). *Working with SharePoint document libraries*,
- 2 Microsoft Corporation, (2010). *Add one or more files to a library*
- 3 Microsoft Corporation, (2010). *Working with SharePoint picture libraries*
- 4 Microsoft Corporation, (2010). *Working with SharePoint document libraries*
- 5 Microsoft Corporation, (2010). *Dragging and dropping multiple files*
- 6 Microsoft Corporation, (2010). *Plan Digital Asset Management*
- 7 Automated Media Processing Solutions (2010): *Equilibrium MediaRich Server Metadata Specifications*
- 8 Mile Solutions (2009): *[SP2010] Content Management Changes*
- 9 Microsoft Corporation, (2010). *Create Content type and workflow*
- 10 Microsoft Corporation, (2010). *About metadata navigation in SharePoint Server 2010*
- 11 Microsoft Corporation, (2010). *PDF Thumbnails in MOSS 2007?*
- 12 Microsoft Corporation, (2010). *FAST meets SharePoint - What's Coming in Search for SharePoint 2010*
- 13 Microsoft Corporation, (2010). *Fast Search Server 2010 Evaluation Guide*
- 14 Fried, J. (2010). *Introducing FAST Search for SharePoint: A New Choice in Search*
- 15 LinkedIn, 2010
- 16 Peters, K. (2002). *Equilibrium Launches MediaRich Server for Microsoft SharePoint Portal Server*
- 17 Lademann, A. (2009): *Transferring Files With SharePoint Using Network Places/Drives*
- 18 Microsoft Corporation, (2010). *Managing users and specifying permissions for a web site based on Windows SharePoint Services technology*
- 19 Associated Content, Inc., (2007). *How to Add and Manage Users in Microsoft Office SharePoint Portal Server (SPS)*
- 20 Microsoft Corporation, (2010). *How to: Create and Manage Shared Schedules*
- 21 Hao, E. (2006). *Introduction to SharePoint Workflow!*
- 22 Andrew, P. (2009). *Improvements in SharePoint 2010*
- 23 Microsoft Corporation, (2010). *Metadata-based routing and storage overview (SharePoint Server 2010)*
- 24 Microsoft Corporation, (2010): *Sharepoint 2010 Developer Evaluation Guide*, p.38
- 25 Samman, E., (2008): *Navigating your website in SharePoint*
- 26 Stubbs, P. (2010). *SharePoint 2010 – Exploring the Vast Collaboration Platform*
- 27 Microsoft Corporation, (2010). *Product Feature Details*
- 28 Microsoft Corporation, (2010): *Enterprise Search Evaluation Guide*
- 29 Microsoft Corporation, (2010). *How to Correctly Configure PDF Search in SharePoint*
- 30 Microsoft Corporation, (2010). *Introduction to workflows*
- 31 Microsoft Corporation, (2010). *Walkthrough: Creating SharePoint Workflows*
- 32 Microsoft Corporation, (2010). *Building Custom Workflow Conditions for SharePoint Designer*

It proved difficult to determine if SharePoint did not have certain features, such as the ability to edit embedded metadata or integrate into page layout programs such as Quark Xpress or Adobe InDesign. From experience I believe that the features are not available. I could not, however, find documentation to prove that they were not available.

Comparison of DAM Categories and SharePoint

After tabulating the capabilities of SharePoint, I compared the results against the capabilities matrix in order to compare SharePoint against the three categories of DAM systems established earlier. The results are shown in table on the following page:

Table 4
Comparison of DAM Categories and SharePoint Capabilities

	Prod Mgmt	Media Portal	DAM	SharePoint Capabilities
Loading (Ingesting)Files into the System				
Single File upload	√	√	√	√
Multiple File Upload	√	√	√	√
Extract EXIF Metadata During Upload	X	√	√	√
Extract XMP/IPTC Metadata During Upload	X	√	√	X
	Prod Mgmt	Media Portal	DAM	SP capabilities
Metadata Handling				
Manually associate metadata with file	√	√	√	√
Automatically associate metadata with file	X	√	√	√
Embed or edit EXIF/IPTC/XMP metadata within file	X	X	√	?*
				*Unable to determine, assume not available.
	Prod Mgmt	Media Portal	DAM	SP capabilities
File Organization				
View folder structure	√	√	√	√
Virtual directory structure based on file attributes	X	X	X	√
	Prod Mgmt	Media Portal	DAM	SP capabilities
Browse and Search Capabilities				
Ability to browse through folders	√	√	√	√
View Thumbnails of images	X	√	√	√
View Thumbnails of non-image files	X	√	√	X
Search by file name	√	√	√	√
Search By file attributes/metadata	X	√	√	√
	Prod Mgmt	Media Portal	DAM	SP capabilities
File Conversion Capabilities				
Ability to convert image formats i.e. JPEG to TIFF	X	√	√	X
Ability to convert color spaces, i.e. RGB to CMYK	X	√	√	X
Ability to convert vector artwork to image formats	X	√	√	X
	Prod Mgmt	Media Portal	DAM	SP capabilities
File Retrieving / Delivery				
Download individual files	√	√	√	√
Download multiple files	√	√	√	√
	Prod Mgmt	Media Portal	DAM	SP capabilities
Access Control				
Ability to set roles	√	√	√	√
Assign users to roles	√	√	√	√
Assign users to groups	√	√	√	√
Access control	√	√	√	√
	Prod Mgmt	Media Portal	DAM	SP capabilities
Workflow and Schedule Management				
Create schedules, timelines, and tasks	√	X	√	√
Define workflow	√	X	√	√
Manage workflow steps based on status	√	X	√	√
Automate workflow processes based on status	X	X	√	X
Integration with Page Layout Programs	X	X	√	?*
				*Unable to determine, assume no integration.

Gap Analysis

The combined results were then reviewed to identify any areas where SharePoint might be deficient for use as a DAM system. If a SharePoint capability met or exceeded the requirements across all categories it was removed from the list. The resulting list was used to compare the requirements of the three levels of DAM systems against SharePoint's capabilities in order to determine the extent to which SharePoint can be used as a DAM system. The resulting list is shown below.

Table 5
Gap Analysis

	Prod Mgmt	Media Portal	DAM	SharePoint Capabilities
Loading (Ingesting)Files into the System				
Extract XMP/IPTC Metadata During Upload	X	√	√	X
Metadata Handling	Prod Mgmt	Media Portal	DAM	SharePoint Capabilities
Embed or edit EXIF/IPTC/XMP metadata within file	X	X	√	?* *Unable to determine, assume not available.
Browse and Search Capabilities	Prod Mgmt	Media Portal	DAM	SharePoint Capabilities
View Thumbnails of non-image files	X	√	√	X
File Conversion Capabilities	Prod Mgmt	Media Portal	DAM	SharePoint Capabilities
Ability to convert image formats i.e. JPEG to TIFF	X	√	√	X
Ability to convert color spaces, i.e. RGB to CMYK	X	√	√	X
Ability to convert vector artwork to image formats	X	√	√	X
Workflow and Schedule Management	Prod Mgmt	Media Portal	DAM	SharePoint Capabilities
Automate workflow processes based on status	X	X	√	X
Integration with Page Layout Programs	X	X	√	?* *Unable to determine, assume no integration.

Results of Specialized and Elite Interview

I was able to secure one true elite interview with Bill Covington with the Dallas office of IO Integration. IO Integration is headquartered in Cupertino, California and is one of the nation's leading system integrators of Xinet software solutions. Xinet is an industry leader in production systems for the graphic arts.

Questions asked during the interview:

1. What method or methods do you use for integrating with SharePoint?
2. Do you foresee SharePoint integration becoming more popular?
3. What are SharePoint's strengths and weaknesses for use as part of a DAM solution?
4. What are the technical obstacles to integrating with SharePoint?
5. What other types of obstacles are there for integrating with SharePoint?

As the interview was not recorded, the answers below were transcribed from notes taken during the interview.

Methods Used:

Two separate methods: Xinet's suggested method and IOI's more successful model. Xinet's method is based upon installing Xinet Portal on the same server as SharePoint. Perhaps not as successful as initially hoped due partly to conflicts with Microsoft's Internet Information Services (IIS) web server. Portal requires the use of the Apache web server and there are some conflicts between the two web servers running on the same server. Xinet most likely designed the configuration based upon the first client request, but found that it needs to be customized for each installation.

IOI uses separate servers for Portal and WebNative and a variety of custom-written authentication modules. This takes advantage of the strength of MS's authentication and access control. There are two main authentication integration methods: one uses a generic login for each volume that the user is granted access to, the other creates a specific user with access to the appropriate volumes and permissions. Advantage of the first method is that it is much simpler to implement. The second method has the advantage of being more secure and

traceable, but requires more sophistication. It also has the advantage of allowing access to only a specific portal site, not every site on the server, as the current version of Portal does.

Authentication module is set up to automatically create new users and set up appropriate access on the fly in approximately two seconds. Security ticket is created for later review. Can also be set up with step for admin interaction and approval or even fully-manual user setup.

Either method requires that SharePoint groups be created first and analogous Xinet users, groups and volumes be set up and maintained. Changes made on SharePoint must be reflected on Xinet side.

Data is not imported into Sharepoint, but the two sites are linked. Portal site must be skinned to look like Sharepoint site. Query information is passed from Sharepoint to Portal. (Inferred that the degree to which data could be cached on Sharepoint could be customized, as well.)

Do you foresee SharePoint integration becoming more popular?:

Seeing more requests for SharePoint integration, but only 50 percent of customers elect to proceed once they understand the effort and cost involved. Biggest obstacle is imposing business rules and discipline on creative processes. "You can't automate chaos."

Strength of SharePoint:

User authentication, access control, ease of integration into existing enterprise infrastructure.

Weakness of SharePoint:

Lack of true DAM capabilities. SharePoint also has significant resource commitment to be successful.

Issues with integration:

Major issue with SharePoint integration is similar to that of WebNative: System is so open and extendable that it becomes difficult to narrow down choices and/or decide which system is best-suited to integration. Often the temptation is to build too complicated a system.

Identifying Plugins or Systems to Fill the Gaps

One additional step needed to be performed in order to complete the research: solutions to fill the gaps needed to be identified, if possible. From past experience I had identified Xinet's WebNative and Portal systems as one possible solution. My conversation with Mr. Covington confirmed that it would address the needs. Through additional research I found ADAM

Software’s ADAM Connector for SharePoint and Equilibrium’s MediaRich suite of applications. These two systems appeared to have all of the features necessary to bridge the gap between a standard SharePoint installation and a full DAM system. In order to maintain consistency I evaluated all of the potential solutions and placed the results in a table similar to the ones previously used:

Table 6
Capabilities of Software Options

	SharePoint Gaps	ADAM	Equilibrium	Xinet	References
Loading (ingesting) files into the system					
Extract XMP/IPTC Metadata During Upload	X	√	√	√	1,5,7,10
Metadata Handling					
Embed or edit EXIF/IPTC/XMP metadata within file	X	?* * Documentation inconclusive	√	√	5,7,10
Browse and Search Capabilities					
View Thumbnails of non-image files	X	√	√	√	4,5,11
File Conversion Capabilities					
Ability to convert image formats i.e. JPEG to TIFF	X	√	√	√	3,6,11
Ability to convert color spaces, i.e. RGB to CMYK	X	√	√	√	3,6,11
Ability to convert vector artwork to image formats	X	√	√	√	3,6,11
Managing workflow and schedules					
Automate workflow processes based on status	X	√	√	√	1,2,8,3,10
Integration with Page Layout Programs	X	√	√	√	1,9,10

References

- 1) Adam Software, (2010). *Let the Media Flow*
- 2) Adam Software, (2010). *Add BPM capabilities to your PIMS & DAM solution with ADAM Workflow.*
- 3) Adam Software, (2010). *SDL Tridion and ADAM Software to offer integrated marketing technologies for multichannel brand expression,*
- 4) IT-Enquirer.com, (2010). *Digital Asset Management Feature Roundup Series: ADAM*
- 5) Equilibrium, Inc., (2010), *MediaRich Server Whitepaper*
- 6) Equilibrium, Inc., (2010), *MediaRich Core Image Formats*
- 7) Equilibrium, Inc., (2010), *MediaRich Metadata Specification*

- 8) Equilibrium, Inc., (2010), *Corporate Fact Sheet:*
- 9) Roszkiewicz, R. (2007) *Under the Hood: InDesign Server and Automated Publishing*
- 10) Xinet, Inc., (2007) *Administration Guide WebNative WebNative Venture*
- 11) Xinet, Inc., (2007) *Custom Image Order.*, [Brochure], Berkeley, California

Chapter V: Conclusions

The main objectives of the study were to determine: to what extent SharePoint could be used as a viable DAM system, and if not, what options are available to allow SharePoint to be used for DAM.

Can SharePoint be used as a true DAM solution?

Based on the gap analysis, it is clear that SharePoint cannot be used as an “out of the box” DAM solution. While it has many of the capabilities of a DAM system, it falls short in a few key areas.

Most importantly, SharePoint is not able to handle the file translation processes that are key to a digital asset management system. File translations are one of the cornerstones of DAM, allowing for repurposing of rich media such as images and logos. Another key concept of a DAM system is the ability to automate production tasks such as distilling files to a PDF or applying color profiles. In addition, SharePoint is not able to create thumbnail views of non-image files such as Quark Xpress, Adobe InDesign, and Adobe Illustrator files. These file formats are extremely important to users handling rich media, especially for print production.

Another important ability of a DAM system is the ability to embed EXIF (Exchangeable Image Format) or XMP (Extensible Metadata Platform) metadata into files that support those protocols. This is important because embedding the information into the files means that the metadata

always travels with the file. If the metadata is embedded, a file can be exported from one system and imported into another and still retain key information about the file. Common information used in XMP and EXIF include such items as the photographer's name, copyright information, date of creation, subject, title, caption and keywords. All of this information is important for rights management as well as production efficiency.

To what extent can SharePoint be used for DAM?

In order to determine the extent to which SharePoint can be used for DAM I created two other categories of systems: a media portal, and a production management system. These are based on what I believe are real world scenarios.

Some companies might need a system that allows for collaboration and production management. In this scenario, many of the production processes such as photo retouching or logo creation would take place outside of the system, or perhaps even be outsourced. Managing the deadlines or reviewing and approving files would happen inside the system, though. A file could be uploaded to the production management system and then reviewed by the people involved in the approval process, for instance. A system like this requires the ability to create users and assign roles as well as the abilities of creating workflows and schedules. SharePoint excels at these functions and can most certainly be used as a production management system.

Other companies might need a system that falls between a production management system and a fully-featured DAM system. The media portal definition was designed to fit that need. One

scenario for using a system with these capabilities is that of a company that needs to allow users to have access to images in various formats at all times. An example would be a manufacturer (such as a faucet manufacturer) that wants to allow distributors around the world to have access to the latest images of their products. Their distributors may need a print-quality image, and image for a web page, and one for a PowerPoint presentation of a single product. A media portal would allow for all of those versions of an image to be created from one master file. Therefore a media portal would require the file translation capabilities of a DAM system, but not the automated workflow features. SharePoint is not suitable for this because it lacks the file format translation capabilities.

To summarize, a stock installation of SharePoint is not suitable for use as a DAM system or a media portal. It is, however suited for managing production.

A company that has an existing SharePoint installation or is planning on implementing SharePoint does have some options available, however. There are at least three options available for extending SharePoint's capabilities to that of a DAM system. While there are options available, it must be noted that this study does not address the ease of integration or the degree of sophistication to which the options work.

ADAM Software's ADAM SharePoint Connector and Equilibrium's MediaRich for SharePoint are both systems designed to connect with SharePoint. Xinet's WebNative and Portal suite is a proven standalone DAM system, as well. The Xinet software can be integrated with SharePoint,

as well. The ADAM solution may have one shortcoming in the ability to embed XMP metadata into files, but in an interview with IT Enquirer (IT Enquirer, 2010) the company's CEO states that the software can integrate with Adobe Bridge, which does support the embedding of XMP data. (Adobe, 2010)

In conclusion, Microsoft SharePoint Server has many of the functions required of a DAM system, but cannot function as a true standalone DAM system. It can, however be used for a production management system or be extended for use as a DAM system by third-party software applications.

References

- Woodill, Christopher. *Technology Trends for 2009* (2008): April 14, 2010 <<http://chriswoodill.blogspot.com/2008/12/technology-trends-for-2009-for.html>>
- digitalassetmanagement.com, *Digital Asset Management Solutions* (n.d.): April 14, 2010 <<http://digitalassetmanagement.com/solutions.php>>
- contentmanager.eu.com, *What is a Digital Asset Management System (DAM)?* (2008) April 14, 2010 <<http://www.contentmanager.eu.com/dam.htm>>
- VenturaIT.com *Digital Asset Management* (n.d.): April 14, 2010 <<http://venturait.com/digital-asset-management.html>>
- Cognizant Technology Solutions, (2001). *Digital Asset Management* [White Paper] Sawarkar, Amit
- Moon, Michael, et al. (November/December, 2007) *Best Practices in Digital Asset Management*, Insert to *KMWorld Magazine*. P.6
- Windsor, Ralph. *Daydream Digital Asset Management Blog* (2010): April 17, 2010, <<http://damblog.daydream.co.uk>>
- Microsoft Corporation, (2010). *Digital Asset Management Overview (SharePoint Server 2010)*: April 24, 2010 < <http://technet.microsoft.com/en-us/library/ee414276.aspx>>
- Northplains System Corp.,(2009) *Differentiating DAM from ECM – What do you Really Need?* [White Paper]
- AIIM (2009) *State of the Market: MicroSoft SharePoint*, Boston, Massachusetts, Frappaolo, Carl
- LinkedIn, *Masters of Digital Assets* [Internet Forum], Smith, S. (2010): April 24, 2010 <http://www.linkedin.com/groupAnswers?viewQuestionAndAnswers=&gid=1275367&discussionID=1343496&sik=1275966036664&trk=ug_qa_q&goback=%2Eana_1275367_1275966036663_3_1%2Eafs_1275367_1275966036664_1>
- Automated Media Processing Solutions (2004-2009) *Equilibrium Releases MediaRich 4.0 for WSS 3.0, SharePoint 2007 and 2010*: May 6, 2010: <<http://www.equilibrium.com/2010/04/equilibrium-releases-mediarich-40-for-wss-30-sharepoint-2007-and-2010-with-video-export-and-batch-pr.html>>
- Levenson, Harvey R. (2001), *Some Ideas About Doing Research in Graphic Communication*, Atascadero, California, The Good Neighbor Press and Services

Creswell, John W. (1994) *Research Design, Qualitative & Quantitative Approaches*, Thousand Oaks, California

London School of Economics and Political Science (2002), Notes on Elite Interviewing, EPIC Workshop, Florence, May 2002: May 15, 2010 ,
<<http://www.lse.ac.uk/collections/EPIC/events/Interviewing.pdf>>

Microsoft Corporation, (2010). *Working with SharePoint document libraries*: May 15, 2010:
<<http://office.microsoft.com/en-us/windows-sharepoint-services-help/working-with-sharepoint-document-libraries-HA001141287.aspx>>

Microsoft Corporation, (2010). *Add one or more files to a library*: May 15, 2010:
<<http://office.microsoft.com/en-us/windows-sharepoint-services-help/add-one-or-more-files-to-a-library-HA010092919.aspx#BM3>>

Microsoft Corporation, (2010). *Working with SharePoint picture libraries*: May 15, 2010:
<<http://office.microsoft.com/en-us/windows-sharepoint-services-help/working-with-sharepoint-picture-libraries-HA001123335.aspx>>

Microsoft Corporation, (2010). *Working with SharePoint document libraries.*: May 15, 2010:
<<http://office.microsoft.com/en-us/windows-sharepoint-services-help/working-with-sharepoint-document-libraries-HA001141287.aspx?CTT=5&origin=HA001219414>>

Microsoft Corporation, (2010). *Dragging and dropping multiple files.*: May 15, 2010:
<<http://blogs.msdn.com/b/sharepoint/archive/2010/01/08/sharepoint-2010-list-view-blog-series-part-2-using-the-new-sharepoint-lists.aspx>>

Microsoft Corporation, (2010). *Plan Digital Asset Management.*: May 15, 2010:
<<http://technet.microsoft.com/en-us/library/ee414275.aspx#Section5>>

Automated Media Processing Solutions (2010): *Equilibrium MediaRich Server Metadata Specifications* (v1.0) [White Paper]: May 15, 2010: <<http://www.equilibrium.com>>

Mile Solutions (2009): *[SP2010] Content Management Changes.* : May 15, 2010:
<<http://sharepoint-sandbox.com/index.php?/SharePoint-2010/Content-Management/sp2010-content-management-changes.html?directory=14>>

Microsoft Corporation, (2010). *Create Content type and workflow.*: May 15, 2010:
<<http://technet.microsoft.com/en-us/library/cc262735.aspx>>

Microsoft Corporation, (2010). *About metadata navigation in SharePoint Server 2010*: May 15, 2010: <http://technet.microsoft.com/en-us/library/ff608067.aspx#bkmk_about_mdn>

Microsoft Corporation, (2010). *PDF Thumbnails in MOSS 2007?.*: May 15, 2010: <<http://social.technet.microsoft.com/Forums/en-US/sharepointgeneral/thread/c11004af-339c-48ae-892a-d02825fc4c>>

Microsoft Corporation, (2010). *FAST meets SharePoint - What's Coming in Search for SharePoint 2010*: May 15, 2010: <<http://blogs.msdn.com/b/enterprisesearch/archive/2009/10/28/fast-meets-sharepoint-what-s-coming-in-search-for-sharepoint-2010.aspx>>

Microsoft Corporation, (2010). *Fast Search Server 2010 Evaluation Guide.*: May 15, 2010: <<http://www.sharepointproconnections.com/article/sharepoint/Introducing-FAST-Search-for-SharePoint-A-New-Choice-in-Search.aspx>>

Fried, J. (2010). *Introducing FAST Search for SharePoint: A New Choice in Search*: May 26: <<http://www.sharepointproconnections.com/article/sharepoint/Introducing-FAST-Search-for-SharePoint-A-New-Choice-in-Search.aspx>>

Peters, K. (2002). *Equilibrium Launches MediaRich Server for Microsoft SharePoint Portal Server.*: May 23: <<http://www.internetretailer.com/2002/11/27/equilibrium-launches-mediari-server-for-microsoft-sharepoint-p>>

Lademann, A. (2009): *Transferring Files With SharePoint Using Network Places/Drives*: May 23, 2010: <<http://blog.fpweb.net/transferring-files-with-sharepoint-using-network-places-drives/>>

Microsoft Corporation, (2010). *Managing users and specifying permissions for a web site based on Windows SharePoint Services technology.*: May 24, 2010: <<http://office.microsoft.com/en-us/windows-sharepoint-services-help/managing-users-and-specifying-permissions-for-a-web-site-based-on-windows-sharepoint-services-technology-HA001119404.aspx>>

Associated Content, Inc., (2007). *How to Add and Manage Users in Microsoft Office SharePoint Portal Server (SPS)*: May 24, 2010: <http://www.associatedcontent.com/article/144213/how_to_add_and_manage_users_in_microsoft.html?cat=59>

Microsoft Corporation, (2010). *How to: Create and Manage Shared Schedules*: May 24, 2010: <<http://technet.microsoft.com/en-us/library/bb326287.aspx>>

Hao, E. (2006). *Introduction to SharePoint Workflow!*: May 24, 2010: <<http://blogs.msdn.com/b/sharepoint/archive/2006/06/07/introduction-to-sharepoint-workflow.aspx>>

Andrew, P. (2009). *Improvements in SharePoint 2010.* :May 24, 2010: <<http://msdn.microsoft.com/en-us/magazine/ee335710.aspx>>

Microsoft Corporation, (2010). *Metadata-based routing and storage overview (SharePoint Server 2010)*: May 24, 2010: <<http://technet.microsoft.com/en-us/library/ff608093.aspx>>

Microsoft Corporation, (2010): *Sharepoint 2010 Developer Evaluation Guide*
47 pgs, pg 38

Samman, E., (2008): *Navigating your website in SharePoint.*: May 20, 2010:
<http://www.clarku.edu/offices/its/kb/software/sharepoint/SharePoint_navigating_a_site.pdf>

Stubbs, P. (2010). *SharePoint 2010 – Exploring the Vast Collaboration Platform*: May 26, 2010:
<<http://www.windowsitpro.com/article/sharepoint/SharePoint-2010-Exploring-the-Vast-Collaboration-Platform-.aspx>>

Microsoft Corporation, (2010). *Product Feature Details*: [Video] May 24, 2010:
<<http://sharepoint.microsoft.com/en-us/product/Pages/Feature-Details.aspx?Capability=Search&FeatureID=15>>

Microsoft Corporation, (2010): *Enterprise Search Evaluation Guide*. [Manual] Redmond, Washington

Microsoft Corporation, (2010)., *How to Correctly Configure PDF Search in SharePoint*: May 24, 2010: <<http://support.microsoft.com/?id=555209>>

Microsoft Corporation, (2010). *Introduction to workflows.*: May 24, 2010: <
<http://office.microsoft.com/en-us/sharepoint-server-help/introduction-to-workflows-HA010154424.aspx#BM1>>

Microsoft Corporation, (2010). *Walkthrough: Creating SharePoint Workflows.*: May 24, 2010:
<<http://msdn.microsoft.com/en-us/library/ms580283.aspx>>

Microsoft Corporation, (2010). *Building Custom Workflow Conditions for SharePoint Designer.*:
May 24, 2010: <[http://msdn.microsoft.com/en-us/library/cc161068\(office.12\).aspx](http://msdn.microsoft.com/en-us/library/cc161068(office.12).aspx)>

Adam Software, (2010). *Let the Media Flow* May 27, 2010: <
http://www.adamsoftware.net/studios/ADAM_solution.asp>

Adam Software, (2010). *Add BPM capabilities to your PIMS & DAM solution with ADAM Workflow.*, May 27, 2010: <http://www.adamsoftware.net/studios/workflow_studio.asp>

Adam Software, (2010). *SDL Tridion and ADAM Software to offer integrated marketing technologies for multichannel brand expression*, May 27, 2010: <
<http://www.adamsoftware.net/sdltridion/index.asp>>

IT-Enquirer.com, (2010). *Digital Asset Management Feature Roundup Series: ADAM*. May 25:
<<http://it-enquirer.com/2010/03/25/digital-asset-management-feature-roundup-series-adam/>>

Equilibrium, Inc., (2010), *MediaRich Server Whitepaper*: May 25:<
<http://www.equilibrium.com/library/>>

Equilibrium, Inc., (2010), *MediaRich Core Image Formats*: May 25:<
<http://www.equilibrium.com/library/>>

Equilibrium, Inc., (2010), *MediaRich Metadata Specification*: May 25:<
<http://www.equilibrium.com/library/>>

Equilibrium, Inc., (2010), *Corporate Fact Sheet*: May 25:< <http://www.equilibrium.com/library/>>

Roszkiewicz, R. (2007) Under the Hood: InDesign Server and Automated Publishing., *The Seybold Report*, 8, 5

Xinet, Inc., (2007) *Administration Guide WebNative WebNative Venture*. (8.03 r2), [Manual], Berkeley, California

Xinet, Inc., (2007) *Custom Image Order.*, [Brochure], Berkeley, California

Adobe, Inc., (2005) *XMP for Creative Professionals*: May 25, 2010:
<http://www.adobe.com/products/xmp/pdfs/xmp_creativepros.pdf>