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Digital Asset Management System for Small Graphic Design Operations

By

Levy Chandra

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science
in the School of Print Media
in the College of Imaging Arts and Science of the
Rochester Institute of Technology

June 2005

Thesis Advisor:

Professor Franziska Frey (Primary)

Professor Bill Klingensmith (Secondary)

School of Print Media
Rochester Institute of Technology
Rochester, New York

Certificate of Approval

Master's Thesis

This is to certify that the Master's Thesis of

Levy Chandra

has been approved by the thesis committee as satisfactory
for the thesis requirement for the Master of Science degree
at the convocation of

June 2005

Thesis Committee:

Franziska Frey

Thesis Advisor

Bill Klingensmith

Secondary Thesis Advisor

Twyla J. Cummings

Graduate Thesis Coordinator

Twyla J. Cummings

Graduate Program Coordinator

Patricia Sorce

Chair, SPM

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Abstract

According to the 1999 data of the U.S. Census Bureau, more than 75% of graphic design firms are small, with no more than four employees. Currently, there is a limited amount of literature relating to digital asset management (DAM) in relation to this population. These graphic design firms work on various projects using multiple digital assets for each, such as text, images, and fonts. Some firms choose to use proprietary asset management software to manage, search, and backup their assets, while others set up workflows that utilize existing network systems and graphic software.

This research is a case study which observes the current practices of asset management systems in small graphic design firms. First, asset management problems faced by participants were identified. Some of the basic challenges include naming conventions, folder nesting, and digital asset searchability. Most participants in this study want to make improvements in their file management practices.

Graphic design firms can improve their asset management system by keeping themselves informed of current DAM technologies; by relying less on personal memory and more on systematic organization; and by developing a checklist of important items to consider when managing digital assets, namely: naming convention, folder nesting, archiving, backup, searching, and means of asset transfer. In some cases, the solution is as simple as applying available desktop search engines to the workflow.

Chapter 1

Introduction

Statement of the problem

Graphic designers need to work on various kinds of projects, each of which use multiple digital assets, such as text, images, and fonts. These assets can come in different versions, and they often have to be repurposed to fulfill a client's request. More often than not, designers work on more than one project at any given time. At the same time, multiple designers can work on the same projects. The number of files stored is increasing with the increase in storage capacity. Designers need to juggle all this and still meet their project deadlines.

To work in an environment as described above, designers need a system to effectively manage their workflow. An asset management system must help designers to manage, store, and search for files without obstructing their creative workflow. This can be achieved either with a software solution or by designing a workflow using tools available in every operating system. Without a proper asset management system, files can be hidden, lost, or corrupted, forcing designers to waste precious time searching for or even redesigning a job. A weak asset management system may cause financial loss or even disrupt designers' relationships with their clients.

Background and present significance

Digital Asset Management (DAM) is a very powerful tool for managing one's digital assets. Many software companies have created DAM programs and others provide hosted services to their clients.

Small graphic design firms constitute more than half the total number of graphic design firms in the U.S. Many of them belong to start-up designers with few assets to manage. While they may be aware of the need to manage their files, they may not be sure whether they will benefit from investing in a special DAM system. Smaller firms usually do not have dedicated IT personnel to manage digital assets.

On the other hand, the literature review shows that larger enterprises have realized the benefits of DAM systems and implemented them. They are willing to invest time and to finance software and equipment in order to increase efficiency. Larger firms usually do have dedicated IT personnel to manage assets.

The reason for interest in the study

The job of a graphic designer goes beyond creative work. Graphic designers must understand the basic skills necessary to manage their files. This understanding will create a strong infrastructure, which will in turn support the creative process. Unfortunately, many designers do not have the opportunity to acquire these skills at an academic level. Instead, the need to learn management skills is forced on them in real-life experience.

Small graphic designers were chosen as the subject of this study because most of them have not made sophisticated asset management a priority. Additionally, their small scale makes them easier to observe. By analyzing small graphic design firms, I hope to create a basic workflow which they can implement. This workflow may also be useful for other individuals who wish to manage their digital assets.

Chapter 2

Literature Review

1. Introduction

In the graphic arts industry there has been a rising awareness of the need for systems to organize digital files. Many graphic design firms now offer the service of managing their clients' digital assets. Young and small graphic design firms would do well to pay close attention to their file organization systems.

From personal experience, I have found that many graphic designers are comfortable with their current systems, and do not feel the need to invest in a specifically designated DAM system. However, as the number of their sources, projects, and clientele increases, graphic designers will realize the unavoidable necessity of a good asset management system. This literature review will illustrate factors that influence the way graphic designers work and think. There are available technologies that have not been extensively used, such as searching features and metadata filing options, available in graphic software.

2. Graphic design firms

2.1. Background

A design studio is an entity with a definite name and identity. Services can include simple design or carrying a project from concept to completion. Graphic designers are employed in different kinds of businesses, industries, and institutions. Some designers work in an inhouse division as a part of a bigger company. An inhouse graphic design department is often referred to as an art department, an art and design department, an art services department, a design department, a design services department, a creative services department, a creative group, or a graphic group (Fleishman, 1992).

A design studio can be as small as a single freelancer. A freelance graphic designer may have worked for others for some period of time, or be a recent graduate who wants the freedom of working solo, and simply starts his or her own small graphic design firm. Freelancing offers the designer the opportunity to deal directly with the client, but it does require a higher degree of discipline (Fleishman, 1992).

2.2. Job titles at a design firm

In a design studio, there are many people involved, all with different titles and tasks. In a graphics department, positions can be at a managerial level, creative or design level, support level, or entry level. At the managerial level, the designer's job title would be creative director, design director, corporate art director, creative service manager, or design manager. The creative or design level includes the titles of senior designer, designer, senior art director, art director, and graphic editor. The support level personnel

are called junior designers, assistant designers, deputy art directors, associate art directors, assistant art directors, production artists or art associates. At the bottom of the ladder is the entry level, which includes the assistant designer, junior designer, and interns. In addition, some design firms also utilize the help of freelancers (Heller, 1999).

Many graphic designers work on a variety of projects that involve switching media according to the demand of a specific job or client. The media range from paper to screen, and each has its own requirement with a unique focus and target. It is difficult for a designer to focus on just one type of media because of the limited project demand and competition (Heller, 1999). Different design specialties include corporate design, book design, music/record design, information design, editorial, advertising, environmental, new media, motion, and type and lettering (Heller, 1999).

2.3. Managing creative people

Managing a creative team is different than managing a data-entry processor team. In order to manage a creative team, a manager has to maintain a balance between freedom and structure. If the manager gives too much freedom, the team will be chaotic. On the other hand, a confining structure will hinder the team's creativity. The best managers of creative personnel understand "that the creative process is not linear and that treating creative employees like workers in a widget factory may backfire." (Tischler, 2004)

Since the value of a product varies greatly with individual creativity, managing creative professionals requires great sensitivity. Design firms need to maintain good relationships with their designers because a design firm's most important assets are not

machinery, software, capital, raw materials, or inventory, but people. A firm that employs more than one person can only be successful when it can harmonize the efforts and talents of multiple individuals, which requires effective people management. “Creative people need rewards and attention more than most people.” (Gold, 1995) In order to improve a designer’s performance, an employer needs to define what needs to be improved, identify specific shortcomings, and be patient. It helps for the employer to think of him/herself as a coach.

Traditional management techniques involve finding a system that works perfectly and making people stick to that system. This is not how creative professionals work. They are encouraged to break the mold, which will be a problem since DAM is an all-or - nothing system that has to be maintained with consistency (Romano, 2001). The good news is that creative professionals expect employers to teach and train them. Just like many other professionals, designers expect to be kept informed and to know where they stand at all times. They have a hunger for learning and trying new things (AIGA, 1989).

2.4. The designer-to-client relationship

Design firms need to give clients what they expect, make a profit, and produce materials that will attract more clients, while at the same time creating a working environment for themselves and for their employees that is pleasant and creatively and financially satisfying. Clients need design firms to be creative and imaginative, experienced and dependable, and responsive and flexible. A proper asset management system will help graphic design firms serve all of these needs (Gold, 1995).

There are two ways in which a graphic design firm can make more money: by handling more jobs or by charging higher prices. The ability to charge a higher price depends on the demand for the firm's services. The ability to handle more jobs, on the other hand, is within the power of the design firm to control (Gold, 1995).

“Manually repurposing clients' images can quickly inflate billable hours. Automatically repurposing ... is not only saving time, [but]...also saving a client's money.” (Jacobs, 2003)

2.5. Designers and organizational skills

Many designers will arrive at a state of disorganization, not because they intend to, but because their intuitive natures will balk at the rigid structure that has been imposed upon them. But in fact, to be successful, graphic designers must realize that creativity and control support each other. “The most consistently high-quality design work tends to come from well-organized, well-managed shops.” (Gold, 1995) To have control means to finish the required project well, on time, and at a profit. Designers must recognize this and make it a habit.

3. Digital Assets

Just like every other graphic arts company, small graphic design operations need to manage their digital assets. Every company has a library of assets that are valuable to the company. These assets consist of images, templates, text, etc. (Romano, 2001) It is impossible for me to cover every asset category that designers use to do their projects.

The following section will discuss some of the most commonly-used assets, including images, text, and typefaces, which all need managing and controlling.

3.1. Images

3.1.1 *File format*

Designers work on projects in different image formats—PICT, TIFF, EPS, and JPEG, to name a few. To make matters more complicated, they also require different resolutions, color settings, and other specifications. Table 1 explains the most commonly-used image file formats.

Table 1. Image file formats (Kenly, 2004):

PICT	The original Macintosh format, developed in the early stages of electronic publishing. Initially, PICT only supported eight-bit images, but later development created a PICT format that can contain up to 24 bits.
TIFF	Tagged Image File Format. This format has been adopted by ANSI (American National Standards Institute) and ISO (International Organization of Standards). TIFF files convert vector images to bits. TIFF files are preferred because “they print the same regardless of the imagesetter or plate setter used.” (Kenly, 2004)
EPS	Encapsulated PostScript files support both raster and vector data. They also support embedding several functions during RIP (Raster Image Processing), including transfer curves, which allow for lighter or darker images during printing.
JPEG	Joint Photographic Expert Group files are much smaller, which increases transmission speeds. However, image quality is usually sacrificed during JPEG compression.
DCS	Desktop Color Separations separate an image into five separate files. One file acts as a preview file, which serves as the FPO (For Placement Only). The rest are four high-resolution CMYK files, which are required during RIP. When the file is proofed using a digital color proofer, the user is required to combine all DCS files into a single EPS file.
PostScript	It is often called a page description language because it works with pages and documents. It is device-independent and can convert images and keystrokes into data that the RIP of printers, imagesetters and platesetters can convert into spots.
PDF	Portable Document Format files allow users to print and preview a document without using the original creator software. It is created by using Adobe Distiller and can be imaged on any device that creates halftone dots. Another advantage is that it is searchable and relatively small.
GIF	Graphic Interchange Files are limited to eight bits. This file format is widely used on the Internet.
CTLW	This file format has two components: CT (Continuous Tone) and LW (Line Work). It was created by Scitex and works on the Scitex RIP as a single file.

3.1.2. Image Resolution

By knowing the proper resolutions required for specific input and output options, designers will be able to manage their assets more effectively. Kenly (2004) states that both input and output devices define image resolution. Input resolutions come from digital cameras and scanners. Output resolutions come from desktop printers, imagesetters, and platesetters. Resolution is ultimately defined as the number of tiny elements per inch used for input or output (Kenly, 2004).

To correctly determine the right image resolution, designers must work backwards. First they need to know the size of the image that will appear in print. Generally, images with an average amount of detail are scanned at 1.5 times the number of lines per inch (lpi) at which they will be printed. Images with less or more detail are scanned accordingly, between 1.3–2 times lpi (Kenly, 2004).

3.2. Text

Another asset that requires managing is text. Text is separated into content and format. For designers, text content comes in the form of page-layout files. Files with simpler design requirements can be produced using word-processing applications. Very complicated page layouts are designed with page-layout applications.

Typography is an important element for design. Many different fonts are available in the graphic design market. “Fonts are the basic building blocks of all text assets.” (Kenly, 2004) Although the terms font and typeface are used interchangeably, typefaces actually refer to families of fonts, which include italics, bolds, and other variants

(Broudy, 2001). Designers who work in groups all need to be able to use and load fonts. When there is more than one user, the best approach is to have the fonts loaded into a server so that all users can access them on their computers (Broudy, 2001).

The inappropriate use and handling of fonts can create more problems than any other aspect of print production. Some printers only require print fonts, while others expect both font formats, which are screen and print fonts (Keenly, 2004).

3.2.1. Font management

“Eventually a font collection gets to the point where it becomes . . . inconvenient to drag fonts in and out of a specific fonts’ folder.” (Broudy, 2001) This problem is overcome by using font management software. The software will load only the fonts needed for any particular job. It will also allow synchronize the fonts from different workstations (Broudy, 2001).

3.2.2. Font management software

The two most commonly used font management software programs are Extensis Suitcase and Adobe ATM Deluxe. Both Suitcase and ATM Deluxe let users create sets of fonts grouped in any way they wish, and enable them to turn them on and off as needed (Broudy, 2001). “Font Reserve and Font Reserve Server offer additional feature for Mac OS users. “[Font Reserve Server] uses a database structure to store fonts, and . . . classify a large type library according to vendor [foundry]. . . . It includes a reference database of

nearly every font produced, and automatically matches [users' fonts] to this database.”
(Broudy, 2001)

4. Common asset management strategies

Some graphic designers choose to implement their own asset management strategies in spite of, or in addition to, a proprietary asset management system. This section will discuss some of the most commonly used systems personally developed by graphic designers.

An effective asset management strategy is important because additional costs will accrue without the use of proper DAM systems. These costs occur from ineffective file transfers, haphazard file organization, etc. In the design process, files are created and re-purposed (Romano, 2001).

4.1. Loosely structured databases

This is a basic organization that graphic designers create by utilizing their operating systems. File folders on Macintosh or Windows operating systems are sufficient for loosely structured databases. The structure consists of folders that contain files which can be sorted by type and modification date/time (Kenly, 2004).

4.2. Naming conventions

The next level is to use a consistent naming convention to help users find a specific asset. Ward (2002) stated that file naming on the database helps to optimize the system. With a naming convention, if the user can identify the type of data that is needed by first name, last name, and address, the system will be able to generate the file requested (Kenly, 2004).

4.3. Image replacement

Image replacement software will automatically generate a low-resolution version of the image as an FPO (For Placement Only) image. Designers can work with these low-resolution versions to increase speed and efficiency. Any changes made on the original files will be reflected on the FPO files. Before the final output, all the low-resolution files are then replaced with the high-resolution images (Xinet, 2004).

4.4. Backup/archiving systems

A backup system will make copies to important files on a regular basis. The backing-up of systems can be done daily or weekly, depending on the user's need. Archiving is done at the end of the project. During archiving, files are cleaned up for future use. For additional usage, files may be copied on CDs, DVDs, or digital tapes (Wolf, 2004).

5. Storage media

The following section will discuss the types of storage media in which graphic designers keep their assets. These various media have their advantages and disadvantages, especially in relation to their longevity. Graphic designers need to be aware of the nature of storage media options to choose the one that fits their workflow best.

Graphic designers are responsible for handling large numbers of files. They need good planning for plenty of storage (Wolf, 2004). To decide what type of storage media to use, designers need to consider the intended application of the image archival system. The choice will depend on how long the images are stored, the retrieval times desired, and the company's budget (Potomac, 1995).

5.1 CD/DVD

CDs are more suitable for the distribution of images than for large data storage. Because the format is standardized, it is the perfect media for sending assets to clients (Phillips Business Information Corporation, 1995).

DVD (Digital Versatile Disc) is another choice of medium. "DVDs can be used to store and play multimedia presentations, video, music, computer data and software" (Anonymous, 1998).

5.2. Tape drives

Tape drives used to be the most cost effective option. They are commonly used for their resilience, large storage capacity and fast writing speed. According to Bahrin (2004), tape drives have life expectancies of 10 to 20 years. They are usually used with automated backup software to help store multiple files on multiple computers (Wolf, 2004).

5.3. Hard drives

Hard drives come in two different options: installed or removable hard drives. Hard drive storage capacities have increased dramatically while their physical size is decreasing. Connectivity speed to the motherboard is increased with Fast SCSI (Small Computer System Interface). Increased rotational speed helps with storage and retrieval (Tim, 1997). Hard drives are made from magnetic plates that spin while writing and reading data. They usually suffer from physical degradation because of their speed. Hard drives have short life expectancies of three to six years (Bahrin, 2004).

Currently, an external hard drive has a capacity of up to 300 GB. External hard drives are connected to the computer using USB or Firewire ports. Some hard drives come with software that can automatically back up the data when they are connected to the system (Wolfe, 2004).

5.4. Servers

When multiple designers are working simultaneously on shared files, a central file server will help them work more efficiently with each other. The server must have enough

storage space to save all files. A file server may also be supported with print servers, where users save their files for printing (Wolf, 2004).

RAID (Redundant Array of Inexpensive Drives) is a good server option because of its security. Servers can use WindowsXP by Microsoft as the operation system (OS), or Linux, which is an open source system. It is important to make sure that the server's OS is compatible with the individual user's system (Howard, 2004).

6. Digital Asset Management

Graphic designers are not the only ones who need to manage digital assets. Many other companies have to do so also. The need for an effective system escalates as the number and size of files increase. Experts in (DAM) have tried to form a standard asset management practice based on available technology.

“Asset management is an integrated system of processes, technology, and tools that enable an organization or an enterprise to manage information elements and assets digitally” (Romano, 2001). It allows users to store and retrieve complex files such as images, audio, video, and text. The system helps users to locate assets within the database and keep track of their use (Romano, 2001).

Some designers may choose to use their own systems, but using a proprietary solution may help to increase efficiency. According to Todd Eckler, vice president of North Plains Systems, “The day of do-it-yourself directory structures based on folders are over because of larger, more complex file types, the need for faster turnaround and

customers that expect on-demand access to their assets” (Core, 2004). The latter half of this literature review will discuss DAM software in relation to graphic design operations.

6.1. How a DAM solution works

A full-fledged DAM system supports all the processes that involve the use of digital content, starting from automated content ingestion, to centralized storage, to a system that allows users to transform, edit, package, and distribute the asset. In a company’s overall management, DAM also supports usage tracking, asset-centric workflow, automated system management, and rights permission. Smaller companies often start with a subset of these functions as a means to search, retrieve and view the assets using thumbnails (Miley, 2004).

Initially, DAM solutions focused on the archiving function, but as users began to realize DAM’s other usages, DAM vendors started explaining its other features. These include permission rights, job and volume management, custom views, search capability, optional check-in/check-out controls, and revision control (Core, 2004).

A DAM solution could also help in media automation, which increases speed and efficiency. Gistics’ report stated that in selling images and multimedia, speed has a competitive advantage. “Reusable digital assets ...eliminate freight and handling expenses.” (Moon, 2004) Gistics refers to this as the automation of media services. This service will enable users to “automate the localization, customization, or personalization” (Moon, 2004) of assets. An example of this is web content aggregation. DAM

implementation may be costly, but the savings generated from using this service will justify the investment.

Media automation eliminates all or most of the labor dedicated to manual media transformation. A digital asset repository will help a graphics server shorten cycle times and reduce labor, materials, and external costs. The use of a DAM system can increase productivity by up to 80%. Some of the areas from which these savings come are shorter cycles in approving, collecting, and updating data (Moon, 2004).

For example, an agency account manager who uses an automated media services system can reduce the time to find ad spots from 60 to 10 minutes, the time to acquire client approvals from 30 to perhaps 10 minutes, and the time to forward to production from 30 to 2 minutes. He or she can also totally eliminate reworking minutes due to error, which usually takes an average of 30 minutes, depending on what exactly has to be reworded (Moon, 2004). “Custom image repurposing is a phenomenal asset because it takes the grunt work out of repurposing imagery and asset duplicating. . . . In a deadline-driven business where every minute counts, automated image repurposing gives . . . a true creative edge.” (Jacobs, 2003)

6.2. Who uses DAM solutions

People who work with an extensive amount of digital assets of different varieties, sizes, and numbers realize the importance of proper asset management. A good asset management system assists with asset retrieval, archival and reuse. It lowers

inconsistencies and increases bottom-line profits. This ability is especially necessary with the growing use of multi-purposing digital assets (Anonymous, 2004).

Proprietary DAM solutions are commonly used by individuals, workgroups, departments, companies and their partners to store, index, search, retrieve, modify and re-purpose digital assets (Miley, 2004). The difference between DAM and other database technology is that in addition to managing the content, DAM manages the value of the content for its user by hosting descriptive meaning and business uses around content (Miley, 2004).

6.3. The future of DAM solutions

Observers expect that the use of DAM will increase in the future. Vendors are expected to incorporate different technology providers to expand content management services, integrate content creation tools, and adhere to emerging standards, such as Adobe's XMP. The DAM market is led in annual revenues by IBM and in market penetration by Canto. Leading IT vendors such as Microsoft and Oracle may acquire or develop their own SQL (Structured Query Language) servers and Oracle-compatible DAM solutions to compete with IBM (Miley, 2004).

7. The basis of DAM technology

As an emerging field, DAM solutions are developing on the basis of metadata, search engine, and database technologies. Metadata helps the system to recognize assets by

keywords attached to each asset. Search engines have the ability to find specific assets based on given information. This information is stored and managed in a database.

7.1. Metadata

Metadata plays an important role in the search for, access to, and integration and management of digital data. It is the data explaining a digital asset, whether stored as multi-media data or in independent repositories (Sheth, 1998). Files are recognized and identified using metadata. “Metadata is all the physical data (contained in software and other media) and knowledge (contained in employees and various media) from inside and outside an organization, including information about the physical data, technical and business processes, rules and constraints of the data, and structures of the data used by a corporation.” (Marco, 2000)

7.1.1. *Types of metadata (Evans, 2002)*

There are three kinds of metadata: technical, production, and marketing information.

- **Technical information** describes the file’s technical attributes, such as: dots per inch (dpi), color-space and application type. This metadata is usually gathered automatically.
- **Production information** links the digital asset to a larger project. This includes job numbers and rights and permission management.

- **Marketing information** describes the product that the asset represents, including the SKU (Stock Keeping Unit), marketing benefits, cost, and general description.

To be functional, metadata has to be automatically attached to the asset and understood by the tool that receives it (PRISM, 2005). An initial investment is needed to make the system work, including hardware, workstations, storage space, etc.

To support the increase in the variation of digital media in the multimedia industry, metadata can now be used to capture content information and application-specific semantics (e.g., multimedia indexes, attribute-based annotations, and intentional descriptions) to allow appropriate access to, and selection and processing of, digital media (Sheth, 1998).

7.1.2. Challenges in metadata

Although the issue of metadata has received plenty of attention, in practice it is still in the impromptu stage. There are many aspects that have not been fully resolved. Digital media has different query paradigms and an exact-match paradigm is no longer suitable.

Furthermore, content-based processing techniques are very hard to analyze (Sheth, 1998).

Metadata can easily get out of hand because people describe images differently. For example, users will get more precise answers using a predetermined set of colors and styles (i.e. red and modern), rather than fire-engine red, brick red, dark red, etc... (Evans, 2002).

7.1.3. *Metadata standardization attempts*

It is important to know that there is currently no standard list of metadata components. Different industries use different metadata specifications. In order to achieve interoperability between systems, standards are being developed in the area of metadata taxonomy, anthologies of metadata attributes, definitions of meta-model registry for mapping purposes, and definitions of generic functionality.

The World Wide Web Consortium developed *XML*, “the Extensible Markup Language, that is designed to improve the functionality of the web by providing more flexible and adaptable information identification.” (Flynn, 2004) *RDF* (Resource Description Framework) is attempting to identify similarities among metadata created by different software (Bray, 2001). *Dublin Core* is working on creating an international metadata standard, which so far includes 15 general descriptions of the data to organize the resources (DCMI, 2004). *PRISM*, a working group of *IDEAlliance*, has developed metadata relating to publication (PRISM, 2005). *DISC* (Digital Image Submission Criteria) group is working on setting a metadata standard to help photographers and publishers determine what metadata should be attached for submission (DISC, 2004). Most of these standards were developed based on *XML* and *ISO* standards.

7.2. Search engine technology

Another important factor in asset management is the designer’s ability to browse through existing digital assets. This is done through the use of search engines, which work by referring to the metadata or ontology of the asset. A keyword base looks for assets by

their metadata descriptions, and an ontology base has the advantage of looking for images based on content (IEEE, 2003). Depending on the search engine, more than just keywords can be used. For example, one can search by date and other criteria with some search engines (Gralla, 1999).

IBM has developed QBIC (Query By Image Content) that allows users to search for images based on color percentage, color layouts, and textures, without using words. Combined with text and keywords, this is a very powerful image-searching tool. QBIC is available as part of the DB2 Image Extender from IBM. An example of a working system in operation can be seen on www.hermitagemuseum.org of Hermitage Digital Museum in Russia (Hermitage Museum, 2004).

The QBIC search looks for images using tools that an artist would use, such as color composition or the layout of a painting. In color composition, a user will select the combination of colors from a defined spectrum. The software will then search the database and sort images that match the defined color spectrum. With a QBIC layout search, the user can arrange geometric shapes of the colors on a virtual canvas before the program searches the database (Hermitage Museum, 2004).

7.2.1. Internet search engines

An example of a well-developed search capability can be seen in Internet search engines. Internet Search engines have three important components:

1. The web crawler, which is used to locate pages,

2. An indexing tool to compile a database of search terms based on files located by the crawler, and
3. A query processor that matches terms entered by a visitor against the database stored on the server. (Whittaker, 2004)

7.2.2 Desktop search engines

Desktop search software has been launched by the major players of internet search engines, namely, Microsoft, Ask Jeeves, Google, and MSN. Microsoft has just acquired a new desktop-search startup, Lookout Software LLC (Hicks, 2001). Ask Jeeves “purchased the assets of Tukaroo Inc., a San Jose, California firm that was developing software for searching the desktop and managing files.” (Hicks, 2004) Google released the ‘Google Desktop Search’ tool “that allows people to scan their computers for information in the same way they use Google to search the web. Yahoo is rumored to have a desktop search engine, LookSmart has a service that envisions file storage and searching, and Lycos UK launched an online drive service for file storage” (Sullivan, 2004).

The Google Desktop Search “provides full text search over . . . email, computer files, chats, and . . . web pages viewed.” (Google, 2004) Unlike Google’s Internet search engine, which updates content daily, the Google Desktop Search updates contents continually. The tool indexes the full text of an email within Outlook or Outlook Express, Microsoft Word, Excel and PowerPoint files, AOL Instant Messenger chats, Web pages viewed online in Internet Explorer or any HTML file, and plain text files. Any item listed

will have an 'I cached', which lets users see a copy of the file "without actually opening the file." (Sullivan, 2004) Google Desktop Search also indexes text within a file image in JPEG or GIF formats...(and) file names of ... PDF content. As for images, Google Desktop Search can only search for text in the file name and not in the metadata.

Unfortunately, Google Desktop Search is only available for Windows XP or Windows 2000. There is no news on a Mac version yet (Sullivan, 2004).

7.2.3. User-friendly solutions

Developers of asset management solutions must create systems that consider the users' thought processes. As an example, researchers from the Human-Computer Interaction Lab at the University of Maryland collaborated with Intel Corporation, Microsoft and IBM to develop Photofinder. Its extension, MediaFinder, explores users' mental model by following a semantic model, which gives users flexibility in organizing their personal media data such as images, audio clips, voice mail, videos, web pages and email. These data were traditionally hard to manage because most of the available tools are driven by the storage and distribution model, and not the user's thought process (University of Maryland, 2004).

7.3. Databases

A database is a structured collection of data. For effective usage, a database must be structured in a format that can be manipulated by software. The program will maintain data for creation, update, and retrieval. Important aspects to consider when working with

databases include speed, storage, and stability (Kenly, 2004). The database is searched with the help of metadata using keywords or thumbnails to point users to the location of an image (PRISM, 2001).

7.3.1. Proprietary server and database solutions

There are several different kinds of servers being used as databases: “Oracle, Sybase, DB2, (SQL) and Infomix, Microsoft Access and Microsoft Visual FoxPro to name a few.” (Dewson, 2003) Oracle is the market leader in databases, but SQL is more user-friendly in the area of the query tool, XML, and web technology. SQL server is flexible, because it can be small or large, depending on the number of users (Dewson, 2003).

SQL is an acronym for Standard Query Languages, which is maintained by ANSI (American National Standard Institute). SQL is a powerful query language that was created as a means to communicate with databases. SQL can be used to view, manipulate, and create the data on a database. It can even define the structures that will hold the data, which is reusable from database to database (Thompson, 2002). An SQL server is also used to store and organize digital files used in printing, publishing, communication, production and other workflows. The database links to InDesign, Quark and other software (Evans, 2002).

8. Available DAM solutions

There are readily available DAM applications that users may choose to purchase. These solutions range from individual consumer tools to workgroup, departmental, and enterprise tools. They are also divided into inhouse and hosted solutions by ASP (Active Server Pages) (Miley, 2004).

8.1. Enterprise-scale solutions

Joshua Duhl, research director for Rich Media Software at ICD, helped to divide vendors providing DAM solutions into six categories. The first three pertain to technological type, and the others to market focus. This software is shown in Table 2.

Table 2. Enterprise-scale vendors (Miley, 2004)

Type of business	DAM software options
General: Workgroup/Small Enterprise	Canto, Extensis and InterchangeDigital;
General: Enterprise Scale	Artesia, BrighTech, Documentum (ECM), IBM, MediaBin (Interwoven), North Plain Systems, Webware, and Virage (Autonomy)
Hosted/ASP	eMotion, New Mexico Software, SAVVIS (Wam!Net/Wam!Base), Vio, and Webware
Publishing/Brand Management	Agfa, Engage, Picdar, RR Donnelley (Premedia Technologies), Quark, Wave Corporation (Banta), and Xinet
Broadcast/Media/Entertainment	Artesia, BBC Technology, Blue Order, Dalet, IBM, Konan, North Plains Systems, Proximity, Stellent (Ancept), and Venaca
Animation	NXN Software

8.2. Specialized software/ small-scale solutions

Smaller firms have limited time and money to adapt to new asset management software, so a versatile solution must be affordable and highly adaptable. Some examples of

software that specializes in this niche-consumer market include Canto Cumulus, Extensis Portfolio, and Xinet. Each serves a slightly different purpose in cataloging digital assets. Extensis Portfolio keeps things simple by maintaining its focus on organization, fast and easy search capability, and distribution. Canto's Cumulus is available for single users and workgroups (Core, 2004).

Different software solutions are available for different user needs and preferences. MediaBank is a DAM software catering specifically to the graphic arts industry, specifically smaller graphic arts companies. It has a Quark extension that allows users to track within QuarkXPress. Other important features include the ability to work with InDesign files, JDF integration, and support for Adobe XMP tags. Unlimi-Tech caters to printers that specialize in reprints. Doctera's asset management system does not require clients to install additional software on their systems. Instead, data is fed into an SQL database (Core, 2004). For those who are reluctant to invest capital upfront, Wam!Base from Wam!Net provides a central storage infrastructure through a secure global private network (Core, 2004).

8.2.1 Price ranges

A major deciding factor for smaller graphic design firms in purchasing asset management software is pricing. According to the scale of usage suggested by Romano (2001), there are two kinds of DAM systems based on different price ranges:

Desktop imaging catalog systems

These systems usually sell at a lower price and are designed for personal use with limited needs. They can eliminate duplicates and usually integrate data for print and web needs.

Workgroup systems

Aimed at departments and smaller companies, the price for these systems is higher. They allow users to share a catalog and metadata from a central storage system. The software has security features that can restrict access to a certain user.

A software system is not cheap, but it is usually justified by productivity enhancement, cost savings, and reduction of time to market. Research shows that the payback from DAM can reach up to 15 times its cost, usually as a result of time saved (Kombluth, 2004).

9. Things to consider before implementing new DAM solutions

Before implementing a DAM system, a company must know about its search and retrieval capacity, the delivery side, what a client is publishing to (print or multimedia—CD or DVD), and how well it scales. Joseph Duhl from IDC states that there is no one vendor that has the complete solution. DAM projects should start on specified, department-level projects geared for tangible results such as asset archives, product rollouts, or corporate communications. After seeing tangible results, companies may then expand their DAM applications (Miley, 2004).

DAM solutions range from single-user desktop systems to million-dollar enterprise systems. An organization should consider purpose, future needs, users and rights at the beginning. It is good to start using a simple desktop application with one customer or company in order to realize the amount of work involved in image management (Evans, 2002).

9.1. Initial steps

Companies may need to make an initial investment in infrastructure that requires a more robust server or a faster network. Management needs to decide whether the ingestion phase will require a more distributed or more centralized organization. Outsourcing DAM projects to a hosted DAM provider may be an option to decrease startup time and reduce capital costs, especially for marketing and brand asset management projects. Later, companies can switch to an inhouse solution if needed (Miley, 2004).

9.2. Challenges of DAM

As this new field emerges, DAM challenges come from skilled worker shortage and management expectations.

9.2.1. *Skilled worker shortage*

One of the challenges of DAM comes from the shortage of fluent IT professionals. Vendor-offered solutions are usually limited to the collection of data, not the process.

With the increase of data warehousing sizes, the need to manage and locate data is critical. The number of data users is also increasing (Marco, 2000).

9.2.2. Management expectations

Some problems come from the managerial level, as outlined in Table 3.

Table 3. Management challenges of DAM (Lynn, 2004).

The project scope is too broad	It is important to choose a high-value and well-defined problem to solve at the beginning to ensure management's support.
Poor leadership	There are two kinds of leadership needed to implement a new DAM system. Senior management must provide capital and resources needed for the change, and a project manager is needed to lead the change so the company will not overly rely on the software vendor.
False expectations about benefits	Project managers must be able to solicit expectations from all stakeholders. Senior management looks for financial return, middle management looks for operational improvement, internal users look for greater autonomy, and external customers want better service.
False expectations about the operation of the system	A thorough understanding of what the program actually does before it is implemented is necessary, because an end-user's idea about how the system should work might differ from how it actually does work.
Too much software customization	A company should not customize the DAM software too much because software customization requires additional costs.
Failing to get a balanced view of project requirements	All key players, including IT personnel, management, and creative users, must have the opportunity to voice their needs. IT must not force creative users into a technology straightjacket and management needs to consider platform standards, vendor qualifications, and securities.
Picking the wrong system architecture	Stick to non-proprietary standards and look for scalability of the system.
Forgetting about metadata	Metadata must not be an afterthought—it must be captured from the beginning.
Inadequate user-training and documentation	Software is sometimes not used to its full capacity because users are not aware of its ability. Project managers can help by publishing use policies, tips, and best practices for each type of user. role
Lack of success criteria	Setting clear project goals helps to define success.

10. DAM and Graphic Designers

DAM is special in that it is not just about storing files, but it is also about the ability to search and retrieve files quickly. Many people have to manage a lot of files, and therefore spend a great deal of time searching, retrieving, organizing and sharing files. If this system is improved, it will improve the creative process. DAM will also improve the approval process, because it can tally up all the results (Kornbluth, 2004).

10.1. Designers' limited foundation

Although many graphic designers understand pre-flighting, workflow and file mastering, there are no best practices related to the organization, archival and retrieval of files. According to GATF research, almost 50% of the average creative person's time is spent searching for images (Evans, 2002).

10.2. The importance of asset management for designers

The ability to store and manipulate images is becoming more important as images are increasingly incorporated into electronic documents. These digital images are stored and electronically encoded for future retrieval. Hence, there is a growing need for more sophisticated ways of retrieving and browsing images (University of Maryland, 2004).

The current practice is for graphic designers to store images in an image server, from print to web or CD-ROM, and back to print again. High-resolution images are the

largest consumers of space. Although better IT systems and hard drives have been developed, better management of graphic images is the best solution to the problem (Romano, 2001).

This preliminary research of both graphic design and the DAM industry has given researcher the opportunity to derive a strong relationship between the two by providing information of the industry's current state. The researcher will use these basic understandings gathered from available literature as the basis for the case study.

Chapter 3

Research Questions

In this digital age, almost everybody has to deal with an increasing number of digital assets. Everything is “going digital,” and apparently this trend is not going away. Graphic designers have to manage various digital assets to do their jobs. Currently, there are many available digital asset management solutions on the market, both for big enterprises and small organizations.

Since this is an exploratory study, it will not answer all of the questions relating to graphic designers and their digital asset management. Some basic questions, however, will help to lay the groundwork for future study. Small graphic design operations were chosen both because there are fewer asset management solutions available to them than to bigger enterprises, and because their scale is more manageable.

During their operations, graphic designers have to manage various digital assets such as images, text, sound, layouts and correspondence. On top of this, they have to do their actually design. job, designing! Small graphic design firms have to use their time both to meet project deadlines and manage digital assets. Therefore, this research is based on the following questions:

1. How do small graphic design operations manage their digital assets?
2. What kind of problems do they face in managing their digital assets?

The research conclusion will include a suggested list of points to consider which will require minimal financial commitment from the graphic designers. This model will be created by studying the digital asset management systems of various small graphic design operations through the case study method.

Chapter 4

Methodology

The purpose of this research is to learn the current situation of small graphic design operations' asset management systems. The groups being observed include: freelance designers, small graphic design firms, and inhouse creative divisions of a firm. Designers from these three types of design operations generally face similar limitations in dealing with their digital assets, namely, limited time and financial resources. This study will provide an industry overview of the current situation, while adding to the store of knowledge for further research in the field of digital asset management.

Data collection plan

A secondary research in the form of an extensive literature review was conducted in order to lay the foundation for field research. Graphic designers were interviewed to learn about their asset management workflow. The interview process was guided by a list of open-ended questions, which helped to cover important areas of the study. These open-ended questions gave subjects the opportunity to elaborate their answers based on their personal experience. A copy of the research questions was sent to the participants in advance to give them an opportunity to prepare themselves for the actual interviews. Two

pilot interviews were conducted before researcher finalized the set of questions. The research participants are mainly located in upstate New York.

The main areas covered by the research include file archiving, backup, and searching. Small graphic design firms were chosen because of their relatively manageable size. They also constitute a large portion of the total number of graphic designers in the U.S.

Components of the research design include:

1. An initial loosely-formatted set of research questions to determine what to look for in the study, helped with theoretical issues, and guided the type of evidence to look for (see Appendix A).
2. Subjects of the research study from the population of small graphic design operations:
 - Two small design firms for pilot research (see Appendix B).
 - Twelve field research participants.
3. Linkage of collected data to preliminary research questions.
4. Summary and conclusion based on the research finding.

Data Analysis

Case study is a type of research with lower constraints. Therefore, the validity of the research depends on the “researcher’s clarity of thoughts” (Graziano, 2004). During the analysis stage, the researcher must attend to all the evidence without biases, determine

the most significant aspects of what was presented, and rely on his or her prior knowledge of the topic (Yin, 2003).

The analysis of the interviews is all about looking for patterns, explanations, and models of logic in the answers to the questions posed, and then synthesizing the results across the firms interviewed (Yin, 2003). The evidence is presented “separate from any interpretations, [while] show[ing] adequate concern for exploring alternative interpretations.” (Yin, 2003) The result of the interviews will specifically be observed on firms’ asset management strategies. They were studied for similarities and differences. A matrix of relevant data helped to analyze the study. The matrix mapped directions from the research questions to the set of conclusions.

The results of this study were analyzed according to company background, client relationships, and present digital asset management systems. Moreover, current problems and research subject wish lists were also be analyzed. By proceeding this way, the researcher studies the cause of each problem and offer possible solutions based on better asset management strategies to be used by the participants.

Chapter 5

Data Analysis

In order to determine whether the asset management system of a small graphic design operation needed improvement, the researcher had to first study the firm's current practice of digital asset management. Twelve small graphic design operations were interviewed during the field research. Results were categorized into several segments in an attempt to ascertain the state of the participants' current use of asset management systems. The analysis then highlights problems faced by the participants.

Only two out of twelve interviews are included in this chapter. The former represents those firms with a high utilization of asset management (Subject V). The latter represents firms that use less constraining asset management systems (Subject VIII). The other ten interview summaries are included in Appendix C.

1. Interview summaries

1.1. Subject V: Three-person business—two designers and a project manager

Anonymous (personal communication, January 20, 2005)

Company profile

This design company has been in the graphic design industry for the past four years. The firm currently has two designers and one project manager, each of whom has access to

the digital asset system. The company hires freelancers as needed. The freelancers do not have direct access to the firm's digital asset system, but instead receive digital assets by CD.

Asset management system

In order to manage their digital assets, the designers use a combination of two types of proprietary software, and a naming convention that suits their workflow. They use Extensis Portfolio, not only because it is affordable (about \$300) but also because it comes with an easy update option. The other software is Studio Zzar, which the firm uses to track the amount of time spent on a project and to create naming systems.

The firm works regularly with three freelance photographers. When their photographs are received, the designers organize them using Extensis Portfolio. This is similar to sorting through a collection of photographs. The photographer's name and the date appear at the top level of the folder's hierarchy. Information about the subject or location of the photograph follows.

System improvement

The lead designer understands the advantage of using metadata. As a photographer himself, he uses technical metadata in the form of Exif data obtained from digital photography. This helps him determine the best conditions for capturing images, including ISO, exposure, speed, etc. Descriptive metadata are also occasionally input when organizing digital images in Extensis Portfolio.

Ideally, the designer wishes to have an actual image library, like the Getty Image library, and software that can search for images according to image contents, which include color composition. Currently he searches for source files by going through Extensis Portfolio's database of images. This software allows designers to search for images visually and by using keywords based on the directory structure of the image. To search for previous projects, he relies on the client's prefix and job number.

Digital asset workflow

For naming conventions, live and archived files are both listed by client, followed by project descriptions. The firm has a six-digit naming scheme which starts with a client's prefix. Each client gets a three-digit number, with new clients assigned to the next number in the system. Each job also has a three-digit number.

To prevent multiple designers from working simultaneously on the same part of a project, each designer is given his or her own designated set of numbers when naming files. The files are named with D (design) and M (mechanical) followed by the designer's assigned number. For example, one designer starts from 1000 when naming the files, while another starts from 5000, and so on. This system allows users to determine who has worked on a particular part of a project. This designation informs the designer which file went to the printer (M) and which files are working files (D).

Versioning is also considered in the naming convention. The firm believes that keeping all of the different versions of a file in progress may save them from having to recreate files, especially when clients decide that they like an earlier version of the draft.

Files are saved in a “non-destructive and evolutionary [location] for that reason” (Anonymous, 2005).

<u>x x x -</u>	<u>x x x</u>	.	files
client prefix	job number		D1000
			D1001

Figure 2. Design firm V's file naming convention

Once a job is finished, it is considered an archived job. These jobs are transferred to DVDs. A single DVD may consist of one large project or a compilation of many smaller ones. To store digital assets, the firm uses server space. These assets are then automatically backed up to another drive in the network on a daily basis.

Challenges

One of the biggest challenges with the firm's asset management system is its volume of files. Because of this, the size of storage media in the network has had to grow exponentially. The firm currently has one tera-byte of storage space in the network, and doubles its amount of storage space every year.

Another obstacle is the cost of involving human resources and software to specifically manage digital assets. At the time of the interview, the firm had just hired a project manager. One of the project manager's responsibilities is to help manage digital assets. In the past, both designers had to spend time managing digital assets. Although this process was not viewed as troublesome, “It is another thing to manage and put into a schedule, and it adds to the time [by] increase[ing] the number of man-hours required to do a particular project.” (Anonymous, 2005) There is no specific billing item to cover

asset management costs, since they are included in the price of the design. Eventually, the head designer of the firm hopes to have the resources to hire an asset manager whose specific duty would be to control digital assets and enter descriptive metadata during image input.

There have been occasions when a portion of a project's digital assets were no longer retrievable because of data corruption. The firm tries to maintain the quality of its storage media, but occasionally the media fail during the backup process. When this happens, the firm has to suffer the financial loss of having to recreate the file. In the past, however, the designer was able to contact his printer to retrieve digital assets. Most of the printers that the firm works with require native files during submission.

Unless a design project involves a heavy amount of asset management as a contingency for completion, the firm does not feel that it should charge clients for DAM services. Some projects that could charge for DAM services might be building an Internet bookseller interface, creating an image library for digital printing companies, or designing an image library for an auto manufacturer.

The firm has considered purging some of its digital assets. However, it decided to keep them because the cost for storage media has fallen to the point where it is no longer an issue. Furthermore, the designer feels a greater need to keep physical files on hand, so he'll just buy some more storage cabinets.

Backups and archiving

The firm keeps sufficient copies of backups and has a versatile workflow. Additionally, the firm has maintained regularly scheduled check-ups by outside technical support every quarter. Regarding the time-tracking software, the firm serves as a beta testing site, so the software provider constantly monitors its technical aspects.

The designer feels that there are too few educational resources in asset management for graphic designers. He mentioned that this area is often thought of as an unimportant part of the curriculum. In reality, however, the opposite is true. Graphic designers must realize that asset management is an integral part of their profession.

1.2. Subject VIII: One-woman design firm

Anonymous (personal communication, January 21, 2005)

Company profile

This one-woman design firm has been in operation since 1996, but the designer has worked professionally since 1989. She constantly works with three freelance photographers and two writers. She also uses some stock photography for her projects.

During the design process, the designer often has to connect clients with other freelance designers. These freelance designers then work directly with the client, and she only charges for her services as an art director. She does not directly hire the freelancers; the client does. This designer does, however, hire programmers to help with the technical aspects of her design process.

Asset management system

At first, due to the small number of files that she had to manage, the designer did not consider using an asset management system. She later learned from experience that backing up and searching assets are an integral part of a graphic design operation. When one client asked her for a brochure project that she had designed five years earlier, she was able to find the files, but realized that had she had a more efficient system, it would have taken her less time to search for them. One of her hard drives was once fried due to static electricity caused by her plastic mouse. Now she makes sure that she has a backup of everything.

For web design projects, in addition to images, other digital assets to consider include royalty-free sounds and texts. This designer considers text as “almost even more important than images, because images usually need updating” (Anonymous, 2005). Text used on subsequent projects may require only a word change here and there, as is the case with a lot of the annual campaign materials which she handles. The designer works on an average of seven projects a month, mostly small projects, and about three to four large projects a year.

This designer does not currently have a server, but she has three different hard drive stations for her design operation. They are Mac systems and are all connected to each other. As storage media, she uses CDs and hard drives. She also stores extra copies of assets in jump drives. She has a certain spot on her hard drive where she keeps all her archives. When a project is more than ten years old, it is erased from the hard drive and is

available only on discs. CDs are labeled clearly with a list of the images they include and are stored in an archive center.

System improvement

Currently, this designer is in the process of starting another design company. In her next company she expects to start correctly by having a consistent naming system and not just using her own brand of naming. She desires a system that can be understood not only by her, but also by other designers. She wants to set a central server space for designers to access at any time. She hopes that after restructuring her assets she will be able to search them by client name and date of project.

Initially, the designer was reluctant to purchase asset management software because of the cost. Small design firms have to carefully consider making additional investments in software. They usually wait until they really need it. This designer feels that since she has so many folders, it would take her a considerable amount of time to reorganize them. However, she “wants to start the right way and make the time and spend the money to make sure it is done properly.” She knows that a good asset management system will help her be more efficient. After discovering that the price of an asset management system is reasonable, she wants to integrate one into her workflow.

The designer adds that she feels a versatile asset management system is necessary because somebody must take care of all the digital assets being created. She has heard that the George Eastman House in Rochester is losing 60% of its films a year because the equipment to access film is not readily available. Recent improvements in technology

make it easy to create digital assets, but designers need to make sure that they can still access those assets stored in older media. IBM, for example, has done a good job of conveying the message that it provides services for smaller businesses. In the realm of digital asset management, the same should be done.

Digital asset workflow

This designer requests that images from her freelance photographers be transferred to her on CDs, so that both the photographer and the designer have a copy of the asset. She needs to keep track of everything since she works together with freelancers on many jobs at once.

In her workflow, she gives printers native files on CDs, including TIFF and EPS formats for images, original and outlined text, and PDF formats. The designer wants to make sure that she provides the printers with everything they could possibly need. She thinks that it is much easier to create all these necessary files at the beginning than to recreate them later on. She mentions in her contract that she will give her clients all the native design files when a project is completed. Clients also retain ownership of all the images that they purchased for their particular project. They can then choose to work with her or another designer at a later time.

When the designer needs to search for a particular file, she scrolls through her master list in InDesign. This system works for her because she “work[s] with all this stuff all the time, [and] know[s] right where [the file] is.” However, she admits she would not expect other people to work with her system. As a single operator of the design firm, she

feels she is too busy now to “just sit and manage files.” She plans to adjust her current asset management system as soon as she has some extra time.

Backups and archiving

The designer backs up all her projects manually at least every two months, and also constantly backs up files on CDs while working. In the past 16 years, she has lost her files twice by accidentally trashing them while she was “cleaning house.” She immediately went to the printer to check whether the printer had kept her files, and the printer had not. She then had to recreate the files. The designer thinks that this is not too bad given the length of time she has been working as a designer, but feels that she may save herself time, and her client money, if she does not have to recreate files in the future.

Lists of all her files are kept on a master document that was created in Adobe InDesign. This document lists all the folders, the files in each folder, and descriptions of each image. She thought that assigning metadata to these assets would be fantastic, but she does not see an urgent need to do that now because she feels her labeling system works adequately. It allows her to know which discs store the specific assets that she needs. When working with freelancers, she keeps a copy on a disc and gives them all the digital assets.

2. Tables and comparisons

The latter part of this chapter will summarize the relationships between subject firms in the form of tables. This method allows the researcher to make a closer observation of the key points between these firms' asset management systems.

2.1. Demographics

Table 4 on the next page shows that the small graphic design firm research subjects are single freelancers, graphic design firms, or in-house divisions of larger organizations.

Ninety-two percent of the firms are operated by two people or less. There is no relationship between the size of a graphic design firm and the length of time that it has been in business. Ninety-two percent of the research subjects use the help of outside photographers, writers, programmers, and/or designers. The number of projects that the firms work on per month varies between three projects per designer to 25 projects per designer. There is no trend in the type of projects that small graphic design firms work on. Most of them work with both web and print projects.

Table 4. Participants' demographics

	Type	# of Designers	Years in business	Uses Freelancers	Projects / month	Type of projects
I	Graduate student/freelance designer	1	3	Yes (Ph, P)	3 to 4	Web and print
II	Instructor/freelance designer	1	5	Yes	3	Web and print
III	Two-person design business	2	20	Yes	20	Web and print
IV	Lead designer with many freelancers	1	3	Yes (D)	n/a	Mostly web
V	Three-person business — two designers, one project manager	2	4	Yes (Ph)	n/a	Web and print
VI	Veteran designer who currently teaches	1	17	Yes (Ph, W)	5 to 8	Mostly print
VII	An inhouse design department	2	4	Yes	20 to 25	Publications
VIII	One-woman operation	1	8	Yes (Ph, W)	8	Web and print
IX	Two-person, 29-year-old firm	2	29	Yes (D)	20	Web and print
X	One-man operation	1	3	No	3 to 5	Web and print
XI	An inhouse design division in a hospital	2	3	Yes	50	Mostly print
XII	Somewhat larger firm with six full-time designers	6	25	Yes (Ph, W)	30	Mostly print

Ph: Photographer P: Programmer
W: Writer D: Designer

2.2. Project naming and backup systems

Table 5 shows that small graphic design firms work mostly on smaller projects. The size of the projects was subjectively determined by each graphic design research subject.

Most of them use some form of naming convention, which could include versioning and a master list as a guide. The naming convention is usually based on the client's and project's names. Some firms use the naming convention only to name the folders, while others use it to name each individual file. Eighty-three percent of the subjects have a backup system. Some backup systems are automated, while others are maintained manually. The types of backup media vary between CDs, external hard drives, tape drives, and central servers.

Table 5. Project naming and backup systems

	Project size			Naming convention	Backup system	Backup media
	Large	Medium	Small			
I	25%	0%	75%	Yes (V, G)	Yes (weekly)	CDs
II	0%	10%	90%	Yes (V)	Yes	Ext. hard drive, CDs
III	13%	20%	67%	Yes	No*	Automatic
IV	n/a	n/a	n/a	Yes (V, G)	Yes (Auto)	Central server
V	n/a	n/a	n/a	Yes (V)	Yes (Auto)	Central server
VI	0%	40%	60%	Yes	Yes	Local hard drive
VII	50%	0%	50%	No (No G)	Yes (Not Sch.)	Ext. hard drive, CDs
VIII	12%	0%	88%	n/a	Yes	CDs, jump drives
IX	5%	20%	75%	Yes	Yes (Auto)	Tape drive
X	0%	25%	75%	Yes	No	No
XI	0%	0%	100%	No	Yes (Auto)	Central server
XII	20%	50%	30%	Folder only	Yes	Tape (2 days only)

Ext.: External

Auto: Automatic

V: Versioning

Sch: Scheduled

G: Guidelines for other users are used

*: Backup is only done on finished projects, and ongoing projects are only stored locally.

2.3. Archival systems and proprietary software

Unlike backup that serves for immediate data retrieval, an archive relates to longer data storage. Most archiving processes are done manually. Some firms' archives are built from their backups, while others use an entirely separate archival system. Forty-two percent of the subjects use CDs as part of their archival system, and 25% use DVDs. The rest use a mixture of hard drives, tape drives and central servers for archiving media. Forty-two percent of the participants use proprietary software as part of their asset management system.

Table 6. Archival systems and proprietary software

	Archival system	Archive Media	Proprietary software
I	Yes	CDs, hard drive (zipped)	No
II	Yes	External hard drive and CDs	No
III	Yes	Central server	Snap w/ server.
IV	Yes	DVDs	Retrospect
V	Yes	DVDs	Portfolio, Studio Zzar
VI	Yes (infrequent)	ZIP discs, CDs	No
VII	Yes	CDs and external hard drive	No (tried Cumulus)
VIII	Yes (bimonthly)	Designated hard drive spot	No
IX	Yes (not reg.)	Tape drives	Retrospect
X	Yes (infrequent)	Hard drive or CDs	No
XI	Yes	CDs	No
XII	Yes	DVD	No

Reg: regularly

2.4. Folder nesting

Table 7 shows how participants organize their files in their asset management systems. In the chart,

‘>’ indicates that a lower-level folder in the hierarchy comes next,

‘,’ indicates folders on the same hierarchy, and

‘;’ indicates that a higher-level folder in the hierarchy comes next.

The root level is usually divided based on client, project name, or job number. At the lower level, folders are usually divided into paperwork, layouts, images and fonts. Some participants may choose to divide the layout folder into rough draft and presentable layout.

Table 7. Folder nesting

	Folder nesting
I	Client> project> contract, working files, support, images, layout, e-mail correspondence, approvals, billing, contract
II	Client>project>project section>version
III	Regular clients; Miscellaneous clients
IV	Client>project>development files, action script files, payment
V	N/A
VI	Client> project
VII	Project’s name> correspondent, planning, budgeting, print quotes, and production files; Production file> layout, text, image
VIII	N/A
IX	N/A
X	N/A
XI	Client>project; Miscellaneous>projects
XII	Client’s name and project> print, estimate, schedule, miscellaneous ; Print>layouts, images, fonts

2.5. Archival storage systems

Table 10 shows the variety of storage systems that firms use to physically store their archives. Some firms simply organize their archives on shelves, in envelopes or on CDs. Other firms make multiple copies of these physical items to store in separate locations.

Table 8. Archival storage systems

	Archival storage systems
I	Shelf and storage
II	External hard drive
III	Envelopes and central server
IV	CD sleeves, 2 copies, in different locations
V	CDs are stored in cabinets
VI	N/A
VII	Envelopes with backup CDs
VIII	CDs are stored in cabinets, labeled with stickers
IX	One copy of CD is stored locally, one in a remote storage location
X	N/A
XI	Shelf of CDs (only for original image archive)
XII	CDs are stored in three locations: locally, a safe, and a remote location

2.6. Other issues:

The following two tables in this sections summarize other issues faced by participants in managing their digital assets.

Table 9 shows that the number of reprint and update requests for projects varies from firm to firm. Some firms receive a low number of requests while others receive a high number. Only one participant uses metadata in its asset management system. Others are either not aware of this function or think that metadata will not help their systems. Forty-two percent of the subjects use outside IT consultants to help them with asset management. The IT consultants are either called on a timely basis for scheduled maintenance or only when there is something wrong with the system. When firm uses CD as their main distribution media, they tend to use the same CD in their backup or archival system.

Table 9. Reprints, metadata, IT consultants, and asset distribution media

	Reprint/ update	Metadata	IT Consultant	Asset distribution media
I	Average	No	No	FTP, CDs
II	Low	No	No	FTP, Instant Messenger
III	High (web)	No	No	CDs, FTP
IV	N/a	No	No	CDs, FTP (3 rd party)
V	N/a	Yes (T)	Yes, scheduled	CDs
VI	Low	No	Yes	Internet, CDs
VII	Low	No	No	CDs
VIII	N/a	No	No	Jump drives, CDs
IX	High	No	Yes, scheduled	CDs, FTP
X	Low	No	No	FTP
XI	High	No	Yes	Email, CDs
XII	N/a	No	Yes	FTP, CDs

T: Technical

Note: The rate of reprints requested given here has been calculated according to each participant's personal interpretation of what high, average, or low would mean.

Table 10 shows that all participants rely on their self-created systems to search for old projects, usually using the search function provided by their computer's operating system. These systems are most often searchable by client, project, date, or job number. Only one out of twelve participants uses a master list, which was created in InDesign. Five out of twelve maintain ownership of their projects and one has a more lenient ownership policy. Four of them use a central repository system to store digital assets.

Table 10. Search parameters or processes, asset ownership, and central asset repository

	Search	Ownership	Central asset repository
I	Client, project, date	Yes	No
II	Name of project	Yes	Yes
III	Client, job number	Yes	No
IV	Client/project	n/a	No
V	Client's prefix and job number	n/a	Yes
VI	Mac OS	Yes	No
VII	Mac OS	Yes	No
VIII	Master list (in InDesign)	No	n/a
IX	Job number, client, project	n/a	No
X	Client, project	No	No
XI	Client, project	n/a	Yes
XII	Job number, client (master list)	n/a	Yes

2.7. Asset management problems

Table 11 outlines the asset management problems currently faced by the participants in this research. The variations in these problems may be caused by differences in the projects they designed, the length of time that the design firms have been in operation, their previous knowledge of DAM, and what they've learned from past mistakes.

Table 11. Asset management problems faced by participants

	Asset management problems
I	No system lists the exact location of storage. Uncertainty about which version of the design was chosen by the client.
II	Backups over redundancy.
III	No automatic backup for ongoing projects.
IV	Inconsistent labeling, inconsistent script library. DVDs are not labeled with the files inside. Asset management software requires too much CPU cycle.
V	No employee is designated to tag new assets. Large volume of files. Required storage space is increasing exponentially.
VI	Discs are not clearly labeled. Software incompatibility.
VII	File naming conventions are not universal.
VIII	Inefficient asset management system.
IX	Too much time is required to manually archive assets and delete unnecessary files. Files may be stored in the wrong alphabetical order.
X	Not following through with improving the asset management system.
XI	Time constraints cause designers to rush.
XII	Designers procrastinate when creating archives and backup files are difficult to retrieve.

2.8. Exemplary asset management solutions

Table 12 shows some solutions which participants chose to incorporate as part of their asset management systems. Some interesting solutions include outsourcing programming to India and leasing computer equipment.

Table 12. Asset management solutions

	Asset management solutions
I	<ul style="list-style-type: none">• Outsource programming requirements to India.• Files are separated into working files for rough drafts with low res. images, and layout files for presentable layouts.• FTP site will indicate whether a file is currently checked out.• Multiple archives, stored in two locations.
II	<ul style="list-style-type: none">• N/A
III	<ul style="list-style-type: none">• Lease computer equipment every three years.• Asset management software is counterproductive.
IV	<ul style="list-style-type: none">• Researching available proprietary software solutions.
V	<ul style="list-style-type: none">• Extensis Portfolio to store all images.• Clients have a 3-digit designation, jobs have another 3-digit designation.
VI	<ul style="list-style-type: none">• Use online third-party vendor to buy images.
VII	<ul style="list-style-type: none">• Image replacement.
VIII	<ul style="list-style-type: none">• Master list is kept in InDesign.• Give every possible file format to the printer, including EPS and TIFF.• File maker assigns job number.
IX	<ul style="list-style-type: none">• Prefers to invest in upgrading software and hardware rather than in an asset management system.
X	<ul style="list-style-type: none">• Back up system is done for all designers and archive is done by individual designers.
XI	<ul style="list-style-type: none">• Internal IT division is in charge of the asset management system.
XII	<ul style="list-style-type: none">• One designer multitasks to help with the firm's asset management system.

2.9. Future plans to improve asset management systems

Table 13 on the next page shows the subjects' future plans to help improve their asset management systems. Each firm is at a different stage in its asset management

implementation. Some simply wish that their asset management took less time, and others want to purchase automated archiving systems.

Table 13. Future plans

	Future plans
I	External hard drive, DAM software
II	Second external hard drive
III	Back up current projects
IV	Flash action scripts' catalog and ways to determine a file's level of relevance
V	Actual image library and the ability to search for images by image content
VI	Software and hardware compatibility
VII	Centralized server
VIII	Naming conventions
IX	Wishes that archiving would take less time
X	Automatic backup system
XI	Contact sheet on each CD archive
XII	Automated archiving system

The research covers graphic design firms which are located in upstate New York. Similar research involving participants from other areas may give different results. All thirteen tables show that each participant has some kind of asset management system which involves backup, archiving and searching systems. Some firms have solutions that are more developed than others.

Chapter 6

Summary and Conclusion

Most research participants in this study are committed to managing their digital assets, including archiving and creating backups of their files. Some even use an automatic backup system. The more apparent issue, however, is the naming convention and searchability of these assets. Designers tend to keep everything in their archives “just in case,” so the amount of required storage media easily escalates. Files are usually available, but many times designers cannot readily find them. Most participants acknowledged that when they need to access their archived files, the files are rarely corrupted or inaccessible. However, the search process may be quite laborious.

Digital assets were divided into two types:

- those that are directly related to creative products, such as images, sounds, photography, scripts, layouts and fonts, and
- those that serve more of an office managerial role, such as billings, time sheets and correspondence.

This research focuses on the former type of digital asset.

1. How small graphic design firms manage their assets

A digital asset management (DAM) system is an integral part of the design operation and designers need to maintain a system that works for them. The need for a good asset management system increases as the number of projects being worked on increases. Design firms that work on a large number of projects must implement a system from the beginning, and those that work with fewer projects can use a simpler approach.

There is usually more than one person involved in a design project, since it may require any or all of the following, in addition to the designer: photographers, writers, printers, and the client. A DAM system is more critical when several people are working on a same project at the same time. There are two immediate predicaments that a designer must consider with a multiple-person workflow:

- Everyone who is involved must understand the asset management system's conventions, mainly naming and nesting.
- Different people may be working on a part of the project that others are also working on.

The system must be designed in such a way as to prevent these two issues from causing inefficiency.

Some graphic design firms choose to minimize the need to go back to old files by specifying in their contracts that they will not keep any projects older than a certain period of time, and giving all elements of the finished project to the client. However, this option may not be the right choice for small graphic design firms.

A high number of research subjects expressed that they face asset management issues in their day-to-day operations. Some feel that their asset management system is sufficient, and others wish that someone else had done it for them. Most of them see it as a chore that they have to do.

2. Problem faced by participants in managing their digital assets

The interviews showed that many of the research participants are experiencing similar problems in their asset management systems. At the basic level, problems in asset management strategy are caused by budget, time, and personnel limitations. Designers must wear many hats—they have to manage digital assets and the office environment in addition to doing creative work. Additional problems come from:

- a lack of information in software pricing and capability,
- low standardization in asset management software,
- the tendency of designers to keep everything, creating far too many unorganized archives,
- too much reliance on memory instead of a master list of assets, and
- metadata attached to the assets which are only useful if designers can remember the keywords.

Unless a DAM system has been in place from the beginning, the amount of time required to implement new system can be viewed as counterproductive. In this case, designers will be unsure whether the benefits of implementing a new system will outweigh the initial investment of time and money. Files kept in one central server are more manageable.

However, it is more financially feasible to save files on CDs or DVDs than on hard drives.

3. Things to consider when creating an asset management strategy

Designers may choose to take advantage of proprietary DAM software, build their own systems, or use a combination of both methods. Small graphic design firms tend to purchase proprietary software systems as a last resort, since the purchase of new software requires a considerable investment in time and money. They usually try instead to operate as long as possible without such systems.

On the other hand, a self-built digital asset management strategy will provide designers with a system that fits their workflow, and will not typically require much financial commitment. Figure 1 lists some key points to help designers in creating an asset management strategy.

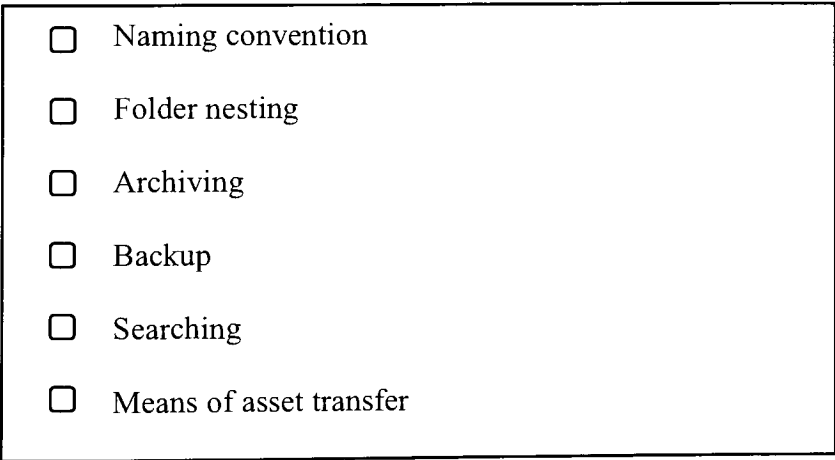
- 
- ☐ Naming convention
 - ☐ Folder nesting
 - ☐ Archiving
 - ☐ Backup
 - ☐ Searching
 - ☐ Means of asset transfer

Figure 1. Checklist of things to consider in asset management system creation

3.1. Naming convention

The most important aspect of asset management, and the easiest to control, is file naming. Many designers create a stable system by assigning job numbers for each client and project. If the project will be worked on using both PC and Mac platforms, designers will have to make sure that the naming is compatible with both systems. It is critical for designers to maintain consistency in their naming structures.

3.2. Folder nesting

Before starting a project, it is recommended that designers put all the assets required for a project inside the project folder within the client's folder. In the project folder, assets are organized into about five categories (see Table 14).

Table 14. Typical digital assets in a project folder

Layout assets	Include any files that are shown to the client (page or web design layout). This folder may also include PDF files both for print or preview.
Image assets	Include all the photographs and illustrations needed for the project. This folder may be broken down further into low-resolution and high-resolution images.
Font/script assets	Include any typefaces or scripts used in the project.
Working files	Include rough drafts, which would be cleaned up before archiving.
Correspondence	Includes billing/time sheets and e-mail correspondence with the client, photographer, and other freelancers.
Other files as needed	

3.3. Archiving

Designers must maintain consistency when archiving their old projects. They can choose to organize their archive by year or by client. The media used to store each asset must be compatible with the software or hardware required to open it in the future.

3.4. Backup

Backup and archiving can be the same thing, with backups serving a short-term purpose and archiving serving a long-term purpose. Designers usually use the best media that they can afford to store their backups. Longevity of the media is an issue. However, it is important to consider the asset management system as a whole when considering the choice of storage media, because a DAM system is not a stand-alone system.

3.5. Searching

Users must make sure that their archives are searchable. The more time they invest at the beginning to create the archive, the less time it will take them to search for their assets.

3.6. Means of asset transfer:

Designers communicate assets with printers, photographers, programmers and other designers using FTP, email, or discs. The various media come with features and limitations that will influence the DAM strategy. For example, CDs from photographers may serve as backups of the image assets. A remote FTP site allows a user to find out whether a project is currently being worked on, in which case the user can choose to wait

before making further adjustments. Having a printer maintain some assets may be a better option than recreating lost or corrupted files.

An asset management strategy is an evolutionary process. For designers, it is usually a matter of trial and error, because nobody gets it right the first time. Systems are improved gradually to overcome problems along the way. It is possible to design a system that designers can follow as long as it is frequently adjusted to specific needs and workflow. Additionally, Designers must realize that storage media suitable for transferring assets is not necessarily also acceptable for backup or archival purposes.

4. Improving current asset management strategies

Without purchasing new asset management software, designers can improve their asset management systems by doing some simple things, such as:

- Keeping multiple versions of files depending on space allowance,
- Indicating which version is the final version, in order to know which one actually goes to production,
- Keeping files in the central server to improve searchability and manageability,
- Staying consistent with the archiving and naming conventions,
- Setting automatic backups or committing to a manual backup schedule,
- Working off the central server, and
- Keeping files that are not presentable to clients in a separate folder. (In the end it would be easier for the designer to delete this type of folder before archiving the project.)

5. Software solutions

Some designers choose to use proprietary software to help manage their assets. A few software solutions geared for smaller scale usage include CantoCumulus and ExtensisPortfolio. At the server level, some designers use Retrospect. In addition to storing and previewing their digital assets, an asset management software solution should help designers with the following tasks:

- File naming and creating a semantic asset management system,
- Adjusting the system based on the user's level of comfort in involvement,
- Setting levels of priority based on the relevance of each asset, and
- Dealing with office managerial assets.

6. Implications of a weak asset management system

A DAM system is an integral part of the graphic design process. The more time users invest in organizing their files from the beginning, the less trouble they will have later on. Asset management is often seen as a chore, and most people do not enjoy doing it, but it has to be done. Maintaining a good system will help increase the bottom line by improving efficiency. Most of the research subjects understand the importance of DAM strategies and are willing to invest time researching available solutions.

In addition to increasing the bottom line through increased efficiency, a good asset management system can give a designer a competitive benefit. Different design projects spring from an increase in digital technology. Projects like designing Internet vendors' websites require good asset management strategies as a contingency for

working on them at all. To be able to complete a project of this kind successfully, a designer must have a well-maintained asset management system.

Chapter 7

Suggestion for further study

This research has opened the door for further study in the field. After conducting the interviews and forming the case studies, it became apparent that some areas require more investigation. Future research on the supporting factors that cause some graphic design firms to have a better DAM system than others. Namely file size, length of company's operation, etc... The types of issues that occur with font management and how associated problems can be solved could also be studied. Lastly, one could study how proprietary software solutions help solve designers' DAM problems.

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Appendix A. Questionnaire

DEMOGRAPHIC

1. How long has your company been working in the graphic design field?
2. How many designers work for your company?
 - Do you ever use freelance help?
 - If so, how many freelancers have access to digital assets?
 - Do interns have the same level of access to digital assets as regular employees?
3. Who is responsible for managing your digital assets?

ASSET MANAGEMENT

4. What do you know about asset management system/software?
 - Do you know about or use metadata?
 - Do you know about querying by image content and do you use this?
5. What would your firm consider to be digital assets?
6. How do you backup and/or archive your files?
 - What kind of storage system does your company use?
 - Do you have an automatic backup system for current projects?
 - Do you have one for archived projects?
7. How do you search for old projects in your archive?
8. How do you organize your files?
 - Do you use outside vendors?
 - How about outside tech support?
 - Do you use proprietary software?
 - What kind of media do you use for backup or archiving?
9. Do your designers follow a list of steps to save or name a file?
 - What is your file naming convention?
 - How do you nest your folders?
10. How do you communicate digital assets
 - between designers?
 - with clients?
 - with printers?
11. Do you ever encounter problems with your file archival system?
 - What kind of problems?
 - What causes the problems? What are the issues?

PROJECTS

12. On average, how many projects/jobs do you working on monthly?
 - What percentage are:
 - large?
 - small?
 - medium-sized?
13. Do you often get reprint requests?
 - Do you often get new projects that require access to previous projects?
14. Do multiple designers work together on the same project?
 - If so, how do you prevent overwriting?
15. Have you ever lost a file that needed to be reprinted? What did you do?
16. Have you ever lost a file?
 - How did you rebuild it?
 - Who was responsible for the fee cause by the loss?

WISH LIST

17. What would you like to change about your current file management system?
18. Are you willing to invest time to observe existing asset management systems, including both the software and technology that they use?
19. Are you aware that a good file archiving system can improve your bottom line by improving your efficiency?

INTERACTIONS WITH PRINT VENDORS

20. What type of file do you give to the printer?
 - What media do you use?
21. Does the printer maintain your assets?
 - Have you ever asked a print vendor to retrieve a 'burnt' file?

THE CLIENT RELATIONSHIP

22. What is the format of the files that you give to your clients?
 - What media do you use?
 - Do you give just printables or workable files?
23. How much access do your clients have to their digital assets in your firm?

Appendix B

Preliminary interviews with two small graphic design firms

Graphic Design Firm One

Anonymous (personal communication, August 15, 2004)

This graphic design firm is five years old. The founder comes from a background in computer engineering. At the time of the interview, there were two undergrad interns working for the company. Three people have access to the central file system.

One of the problems is that most of the hired designers are not familiar with the file organization system. Another immediate problem that needs to be acknowledged is font recognition. Clients often request a reproduction based on certain existing fonts. With the massive number of fonts available, it is sometimes hard to know the name of specialized fonts a customer wants to use. The types of projects this firm produces include packaging, brochures, invitations, and other collateral graphic work.

There are always requests for reprints. The rate of returning clients varies. Higher-demand clients return every two years or so, and medium-sized clients return monthly, while smaller-sized clients can return as frequently as once a week. The firm recognizes the need for client awareness of file organization. Files are given to clients in a digital format with a preliminary explanation of the naming system of the file. However, the firm often has to re-explain the system to a client, which takes extra time.

The manager gives verbal guidance to the employees on how to manage their files, but every week or so he rechecks his file organization to make sure that everything is in place. There is a plan to put together a written directive on the file organization

system so that there will be a special step-by-step guide on how to organize the files. There is no regular schedule for doing backup, but files must be backed up at least every three months. The manager sees the necessity for investing a period of time for file management to ensure easy access to the files at a later stage.

Active files are kept in the central hardware. All the designers can access these files using the LAN system. Finished files are kept in CD format. The backup from the hard drive is also done on CDs. The number of assets on a CD depends on the quality of the CD. The firm makes one copy when using higher quality CDs and two for lower quality CDs. Backup CDs are numbered. Finding backup files requires two steps. First a search is done on the Excel spread sheet. Then the physical CD is located on the shelf. Retrievable assets are maintained forever, as long as the company exists.

File management is done using an Excel spreadsheet and file searching is done through the search-inquiry function within Excel. The firm finds this method to be sufficient and is not aware of any DAM software. A record of every design file is saved in Excel, with columns describing client name, project name, date, and name of file. Initially, files are zipped, but this process was found to be too time-consuming.

The manager of this firm would want DAM software to be able to look up a file based on subject, meaning a short description of the file itself. The manager thinks that the “file info” option in Photoshop is rather extensive, and he does not see the need for it. To search for a file based on image content is, he feels, too hardware-intensive.

If any file is lost and needs rebuilding, the firm will take full responsibility. Even though it can offset this cost to the client, the firm does not often do that. An outside IT

vendor is called in for hardware problems. There are no specialized IT personnel in the company, because the manager himself has a background in computer engineering.

Given its limited software technology, this firm has an efficient file organization system. Digital assets are managed using non-specialized software such as Excel. The manager is consistent in managing the digital assets, and each designer has access to the central computer.

Graphic Design Firm Two

Anonymous (personal communication, August 16, 2004)

This company works in both the graphic arts field and in interior design. It has been in operation for 3.5 years. The owner acts as the concept originator, art director, and marketing director. As the primary designer, he is the only one who has full access to the files. There are two other designers working in the firm.

There is an obvious problem in file archiving. In the early months, files were organized properly. But by the time the firm was six months old, the number of files had increased, and problems with archiving them began to crop up. At the beginning there was no awareness of the need to be vigilant about file organization; now, the firm is slowly facing this problem.

There are not many repeat orders. The majority of clients order print jobs in high numbers and keep an inventory to maintain a low printing cost. Old file retrieval only occurs when clients ask for a design similar to a previous job.

For security reasons, other designers have very limited access to the workable files. Because of previous incidents, the owner limits access to the files to himself. There are two file archiving systems. Active projects are organized based on subject and client, and “source projects” are organized based on kind of project. This gives easy access to samples based on client requests. A new client is approached by showing samples from source files, and an existing client is approached with the client’s own sets of files.

File organization relies heavily on the memory of the primary designer. The art director claims to remember what is inside each CD, but there is therefore a heavy reliance on the art director’s memory. The filing system is handwritten and files are searched manually. Recently, one designer was told to start organizing files on the CDs and writing an index. The naming convention is based on the client’s name. The naming system is verbally communicated to other designers.

Files are saved manually on CDs. Active files are also kept on CD, and printouts and proofs are kept as hardcopy. There is only one copy of all the files, and there is no realization for the need of a backup system. The quality of the CDs is viewed as sufficiently stable. The firm feels that it is still possible to keep hard copies of all its projects. Certain illustration work is done using clip-art. More specialized artwork is done with special illustrations.

The future plan is to divide the files into passive and active categories. The firm is also considering using an outside database consultant to host manage the digital assets. This system is viewed as safer because it will be more secure and confidential, and employees will not have direct access to the files.

There is an awareness of metadata technology, but the manager doesn't feel the need for it yet. The company is currently looking for a new designer, not a specific IT person. The next step is to move to tape drives but the company is still busy with other matters. Currently, if a file is lost, the firm relies on the printing plates for that job to be provided by the printer, or perhaps the films that the printer had used.

This interview with Graphic Design Firm Two had less structure. There was less knowledge about DAM. The individual interviewed was more interested in marketing and design than asset management. A valuable lesson was learned about the need to focus the survey study to get more salient data.

Neither of these preliminary firms sees the need for special IT personnel. Designers are viewed as capable of handling basic file organization. However, they should have training and discipline upfront because the realization of the need for good DAM practices tends to come later, when there is problem, and then it is too late.

Appendix C

Interview summary of ten research participants

Subject I: Graduate student/freelance designer

Subject II: Instructor/freelance designer

Subject III: Two-person design business

Subject IV: Lead designer with many freelancers

Subject VI: Veteran designer who currently teaches

Subject VII: An in-house design department

Subject IX: Two-person, 29-year-old firm

Subject X: One-man operation

Subject XI: An in-house design division in a hospital

Subject XII: Somewhat larger firm with six full-time designers

Subject I: Graduate student/freelance designer

Anonymous (personal communication, February 11, 2005)

This designer currently has two professions: she is a freelance designer and a graduate student at the same time. The designer has to divide her time between school and work. She only works with three or four projects a month—one big project and three small ones, or two medium projects and two small ones. She does 70% of her projects on her own, and the other 30% are in collaboration with other people. She typically works with one photographer and two programmers. One of the programmers is a student and the

other one is an IT vendor. She communicates with the IT vendor through a consultant in the U.S., but the job is done in India.

The designer built her own digital asset management system through knowledge gained from her previous experience working at other firms. She has learned about proprietary digital asset management software and the use of metadata through her studies. The designer understands the benefits of this technology and tries to implement them in her workflow, but she is reluctant to make a financial investment in DAM software because she does not think that she needs it with her current workload. She was surprised to learn that Adobe Photoshop itself supports the use of metadata. The designer realizes that inputting metadata at the beginning may take some time, but there will be benefits in the long run.

The designer is in charge of asset management, even though more than one person works on a project. Files from photographers or programmers are named according to her specification. Digital assets are organized by project in each client's folder. The project folder consists of the contract, working files, support, images and layout. E-mail correspondence, approvals, billing and contracts are stored in the contract folder. Working file folders hold all the rough drafts and low-resolution images. Files sent by clients are kept in a support folder. High-resolution images are organized in an image folder. Designed layouts, which are presented to the clients, are stored in a layout folder. The designer keeps all versions of her designs so that she can always come back to them.

Two years ago, the designer invested in a third-party FTP site. She uses the site to transfer files with programmers and photographers as needed. She allowed one of her

clients to download files from this FTP site only once. This was done because the file was too large to be transferred by e-mail, and giving the client files on a CD was inconvenient at that time. Usually clients do not have access to the FTP site. The designer realizes another benefit of her FTP server — she can store files there while working remotely. However, she is not currently using this function.

When the designer requires a special photograph for her project, she will contact the photographer by e-mail. At the same time, she will use dummy images on her design. She informs the photographer of the deadline to make sure that she receives the images two weeks in advance. When working with the programmer, she has to wait until she receives approval for her layout before informing that person about the programming components needed for the project. The programmer then works on the programming components while the designer manages the layout and content of the design. During this process, both parties simultaneously work off the FTP server. The server indicates if a file is checked out by either one of them. The other person can wait until the file is updated before working on it; therefore, the programmer is always working with the most current version of the file.

The designer receives files from photographers on CDs and she receives files from the programmer on her FTP site. For previewing images to the client, the designer uses file browser options from Photoshop and prints them for the client. She gives files to the printer according to the printer's specifications, such as whether the printer needs native files or only PDFs. She chooses the print vendor on 90% of her project, and clients choose their own printer on the other 10%. She does not know whether the printer keeps

her assets once her files are printed. Clients receive PDF formats so that they can do their own reprints—they never receive original/native files of the projects. The designer maintains ownership of her design by specifying on her contract that all modification to her work must be done with her permission.

Naming convention is done based on client, project and then version number. For example: client_project_1, client_project_2, and so on. There are no assigned job numbers. Images from the photographer must also follow her naming convention. They are named object_1, object_2, and so on. She informs the photographer at the beginning of each project how she would like the images named. Occasionally she uses a digital asset for a different project if the client does not approve the previous draft using that asset. Even though she sees the need for a master list of her assets, she does not have it.

Backup is done at least once a week. If a project takes one month to complete, backup will be done four times. When a project is completed, the designer cleans the 'working files' folder by deleting unnecessary items such as low-resolution images, and then creates the archive. Some content in the working file will be kept for her own future reference. She realized the need to maintain old files after clients began requesting that she reprint previous projects.

Twenty to thirty percent of the content of her files are purged before archiving. She tries to keep as many files as she can, because she never knows when she will need them. She then zips the files and archives a copy onto a CD. A copy is kept in her local hard drive, and depending on how important the file is, she may make two copies of the

CD to store in different locations. If the CD stores a long-term client's asset, it is labeled with the client's name and the duration of the project.

She knows about the longevity issues with storage media, but says she has never had a problem with her archives. She has never had any corrupted files. One company she worked for did specify in their contract that they keep client files for only two years. She thinks this may help reduce asset management issues, but as a freelancer, she cannot afford to do that to her clients.

To search for old files, the designer uses the client and project name. For project revisions, clients typically provide her with the range of time during which the project was done. This helps her to find the files. She thinks that her search system is sufficient, yet she would like to improve it. Sometimes it takes longer than she wants to find certain files. The designer finds it easier to search for the assets of her regular clients than for her infrequent ones. The ease of search is based on her familiarity with each client. She does not have a system that helps her to remember where exactly she keeps the files.

Sometimes, the designer is not sure which file version the client previously picked. In this instance, she will send them one version, and if the client questions the version being sent, then concludes that the other version must be the right one. The designer is working on a PC system because she was able to purchase a higher capacity computer for less than the price of a MAC system. She compensates for the lack of color quality by referring to spot color swatches during her work.

To keep track of all her billing and client information, she uses Microsoft Infopath. The designer uses an automated e-mail vendor system to manage her

correspondence. She wants to invest in an external hard drive as part of her asset management system. She has also considered purchasing an asset management solution if the number of files she works with increases. In the future, the designer hopes to build her own design firm.

Subject II: Instructor/freelance designer

Anonymous (personal communication, January 31, 2005)

This designer works as both a freelancer and a graphic media instructor at a university. His freelance design firm has been in operation for the past five years. There used to be another designer with him, but now he works alone. Occasionally the designer collaborates with other freelancers when he needs assistance with programming and other skills that he does not have. He does not currently work with a large number of projects. On average, the designer works on two to three projects a month. Ninety-percent of his projects are small scale.

The designer created his own asset management system based on his personal experience. He feels that his system is sufficient for his workload. Sometimes, he entertains the idea of purchasing proprietary asset management software, but thinks that the number of assets with which he works would not justify it. During his workflow, he keeps all the different versions of a project as he makes revisions. The folders are arranged by the client's name, followed by the project's name and section, then version numbers. Once a project is finalized, he changes the version number to "final." This designation helps if he needs to return to his files in the future. It is not sufficient to just

go by the highest number, because the latest revision is not always the one that the client picked. To communicate with other freelancers/ programmers, the designer uses FTP and IM (Instant Messenger).

In his daily operation, the designer works mainly on his laptop and uses an Ipad to transfer files between one location and another. At the beginning of every project, he gathers all the necessary files under a folder labeled “stuff,” located inside the designated project’s folder. This folder includes any assets needed for the project, such as logos, images, photographs, etc. Projects do not usually share assets, and there is no master folder of available source assets. The one exception is his personal photography collection folder, where he stores all photographs that he has taken, which he may use for his projects. As long as the firm has been operating, the designer has never thrown out any assets, and all assets are arranged chronologically.

Two years ago the designer purchased a 180GB external hard drive for his backup system. He transferred all his previous files from CDs to the external drive. The hard drive is more versatile because all his archived files are now stored in one location. He does not have to flip through different CDs if he needs to access previous projects; he only needs to do a search function on the hard drive. The designer backs up his projects to the external hard drive on a daily basis. However, he still makes additional back ups on CDs in case the hard drive fails. When a project is finished, it is erased from the local drive, and a CD archive is created. The CDs serve as “backup of the backup” (Anonymous, 2005) because the external hard drive could fail. He has never had to access files in his CD archive since purchasing the hard drive.

The designer has almost filled up his current external hard drive. In fact, he just cleaned up 45GB, a substantial amount of space, of unnecessary files from the hard drive. When backing up files, he copies the entire folder, and as a result, there is often more than just one folder for any specific project. Eventually, the designer has to go back and delete some of this redundancy to save storage space. However, he would much rather have more than the necessary number of copies saved in his hard drive than not be able to retrieve files. Problems also occur when files are not saved in the right folder.

Clients sometimes ask the designer to revise an old project. In this instance, he would have to access old files from the archive. The designer would do this by a search based on the name of the project. Updates are trickier for website design because he has to save files using exactly the same name in order for them to work. (Files for the web are name-specific.) Before starting a major revision on a web project, the designer copies everything from the current website so that he can refer to it in case of a mistake.

The designer gives both native and PDF files to the printers. He has a couple of printers with whom he always works. The designer never finds himself asking print providers for assets that he has given to them since most of his projects are a one-shot deal and any reprint request would always require at least some revision. On the other hand, clients can only access the printed version of a project or any files uploaded to the web.

This firm's asset management system is pretty universal. The designer has never had any problems communicating with printers, programmers and other freelancers; they understand his file-naming convention. He realizes that his system is only as good as the

user, and therefore he feels the need to continuously monitor his asset management system. The designer is committed to putting in the time to manage his files and he finds that this is not difficult. To improve his system, he has to “keep going through and filtering out the version that [he] may never need [because] there gets to be a ton of files.” (Anonymous, 2005) He thinks that the price of an external hard drive as storage media is reasonable, and plans to purchase a second hard drive for archiving his backups.

The designer thinks that the use of metadata for assets is probably more useful for a publications type of firm than for his. He is anticipating the coming of OS “Tiger” from Macintosh because this new operating system will have the capacity to search for any words located within the asset itself, not just the tags.

Subject III: Two-person design business

Anonymous (personal communication, January 26 2005)

This firm has been in the graphic design business for the past 20 years. At the beginning, the designers were not even using desktop computers to work on their projects. There are two designers currently working at the firm. Previously, during busier seasons, they hired freelancers as needed to work at the office. However, the firm no longer has freelancer stations. In any given month, the firm usually works on 10–15 small projects, 2–3 medium ones, and 1–2 big ones.

In this small graphic design firm, both designers must wear a lot of hats. Although they are both formally trained as designers, they split the jobs in such a manner that one

of the designers spends most of her time managing the daily correspondence, project management, and art directing, while the other focuses more on designing projects.

When a client calls for a job, one designer takes the job down and adds it to the list of current projects. She will then start a project sheet and attach it to an envelope, where copies of every proof and other related correspondences are kept. The project sheet helps the designers track how much time has been used on each project. At the designer's local station, regular clients have their assigned folder and new and sporadic clients are organized inside a miscellaneous client folder. One of the designers is responsible for each project. Multiple designers may be involved in the same project, but they never work on it simultaneously. In this instance, one designer serves as the art director, while the other one executes the project. Sometimes a project must be transferred to the other designer because the first designer is not able to continue working on the project due to other commitments.

As mentioned previously, clients are divided into two categories: regular and miscellaneous. The miscellaneous folder holds new clients or clients who do not do much business with the company. Each client and project has a designated number. A truncated description of the project then follows the designated number. To differentiate the numbering systems between regular and miscellaneous clients, miscellaneous client numbers end with M, for example 100M, 201M and so on. Files are generally listed by the way they are arranged on the server. The designer keeps a master list of all current jobs that are running. The list was originally handwritten, but six months ago it was transferred to an InDesign file. Currently, this master list is stored locally on one

machine. When one designer needs this list, he or she must either ask the other for it or access that computer.

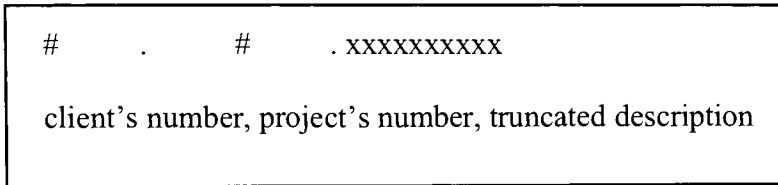


Figure 3. Design firm III's file-naming convention

There are two separate storage locations in the firm's asset management system. Current jobs are only saved in the local drive. After a project is completed and billed, it is moved from the local space to the server. The server functions as storage space only. Both server folders and local project folders can be accessed at each designer's station. Designers retrieve older files from the server space when needed. Most of the time, however, one designer feels that there is no need to keep different versions of a project. Every time he works on a project, he rewrites old files with the revisions.

The firm did not have a perfect system from its inception, but it has learned from its mistakes. One early project involved a technical literature catalog. In order to be able to do this project, the designers had to create a system that could track all the various updates with different timeframes. Their asset management has evolved from handwriting projects on calendars to their current system. Their system is not fail-proof, but is only as good as the user's input. It serves them well as long as rules are set from the beginning, and both designers follow these rules during file saving and renaming.

The firm leases most of its equipment for a three-year period. Since purchasing a server four years ago, the designers have been relying on that system for their automatic

backup. They were previously saving files on zip discs and local hard drives. The server consists of five separate hard drives totaling 300GB. Old project files are saved in triple redundancy; all five hard drives would have to be broken at once for the designer to lose any asset stored there. The only time the firm has any backup other than what is in the server is when the printer sends CDs with a file after minor modifications, before a project goes to print.

Current files are not stored in the server because most projects do not last very long. At the present time, the designers have to manually copy current files to the server for backup if it is deemed necessary. The designer does this when he sees that the file he is working on is behaving strangely or when he wants to make a major change to a current project and needs to have an extra copy just in case. The designers keep all their previous projects in the server; they never feel the need to purge files because they have not filled up the server yet. Since they maintain a long-standing relationship with most of their clients, the designers never know when they will be required to access these files.

When he needs to search for old projects, the designer relies on identifying his assets based on the client and job numbers because that information is always intact. His abbreviation of the project (the truncated description of the project) is less reliable for searching because it is difficult for him to remember the exact abbreviation that was created.

He has been exposed to the basics of metadata and image content, and understands how this can help some people. Nevertheless, he does not deem it necessary to use this technology for his present workflow. He also thinks that although available

asset management software has some nice features at an affordable price, it is almost counter-productive for a designer to learn to manage asset management software.

Files are transferred to clients and printers using CDs or FTP, depending on which option is required. Most printers prefer to receive native files. This has benefited the firm in the past because there were occasions when the designer was able to obtain a copy of his digital asset from the printer after somehow losing a file. The firm very rarely gives native files back to its clients. Usually clients will request a copy of the design in PDF to post on their websites. The firm tries to maintain ownership of its designs within reason. Clients will also get back any original asset that they have provided, such as photographs.

When a project is corrupted, the designer has to recreate it from scratch. However, this has happened very rarely with this firm and has never caused any major problem. In this instance, the firm would have to absorb the cost as a part of doing business. Problems also occur when procedures are not followed correctly, such as when files are not saved in the right location or are not renamed correctly. Sometimes a project is created with one type of software, and for whatever reason, is switched to some new software. The new software does not always translate the file correctly.

But generally, the designer thinks that his system has been working well for the firm. The only way he wishes to improve his asset management system is by creating a more reliable workflow to constantly back up current projects.

Subject IV: Lead designer with many freelancers

Anonymous (personal communication, February 1, 2005)

This firm has been operating for the past three years. There is one designer who acts as the lead designer and manages the operation of the firm. As the lead designer, he collaborates with 15 freelancers to provide the design services. The types of design projects that the company produces vary, but they are mostly web design. The firm uses both PC and Mac systems.

This firm uses a combination of local and remote file servers. The local file server uses Retrospect software, and the remote file server is provided by a third party. The local server can store up to 100GB, but it also has 400GB of backup space to keep redundant copies. The remote server can be used by the designers to transfer assets using the FTP site. However, since it is only 500MB, it is used mainly for uploading and downloading smaller files. When the size of the file is too large, the file is transferred using CDs.

The local server is set to back up daily at 2 a.m. in a four-day cycle—Monday through Thursday. Anything stored after that is backed up by the system during the following week. When a project is finished, it is moved from the remote server to the local server. The local server is cleared quarterly, and the files are archived to DVDs. Sometimes files from a local drive are archived directly. When this happens, the disc is labeled with the designated name of the computer and the date of the archive.

While working on a project, designers are encouraged to work off the server, unless the file size is too large. When they work in their own local drives, they have to

transfer the file to the local server at the end of the day so it can be backed up. The lead designer provides guidance to the freelancers regarding file naming conventions and folder hierarchy.

The naming conventions help prevent multiple designers from working on the same part of a project. The file names include major and minor version numbers and the initials of the specific designer as shown on diagram 2. To store the files the designer uses nesting, which goes up to eight levels deep. The nesting is done in a logical structure to help designers when they are looking for specific projects or files. The hierarchy of the folders is the same on every project. The folders start with client name > project name > separate folders for client folders, development files, action script files, payment, etc. This structure developed over the years. An example of this nesting is client name > project > section of project > file name.

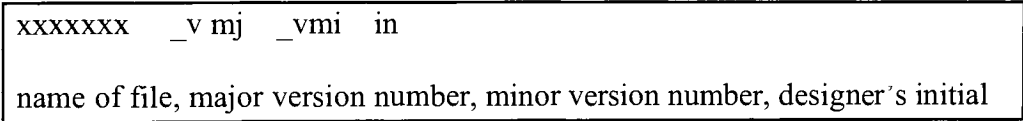


Figure 4. Design firm IV's file naming convention

When the work on a project overlaps, the lead designer has to consolidate the multiple files generated. He does this by opening both files at the same time and simply copying and pasting images from both layouts, which is labor-intensive.

The lead designer is the only one responsible for managing and archiving the digital assets. Archived CDs or DVDs are physically kept in CD wallets. There are two copies for each archive. The system could use some improvement because some of the CDs and DVDs are labeled with the list of files inside and others are not. Files are

archived inconsistently by projects, clients, or date as the root folder, depending on the lead designer's mood at the time. There is no master list containing all of the archived CDs or DVDs and files. Occasionally, the designer will make a partial list using Microsoft Word, but other times he does not. The local file server uses software which allows indexing for archiving. However, the designer is skeptical of this software's function. He maintains that the act of manual archiving is not distracting to his creative process because he likes the balance of using both his left and right brains.

When searching for archived files, the designer relies on what he has written on the CDs or DVDs, on their labels, and on their different colors. Since it is easier to search for files on the local server, they are kept on the server until there is no more space left. During the searching process, he is certain that he has all the necessary files, but is often unsure of their exact location. Unfortunately, the system sometimes requires that the designer remember what he wrote on the backup CDs and DVDs . He admits that the system has its flaws, but says it has never cost him a great loss. He says that, based on his experience, his system is actually better than that of some of his clients.

The firm works mostly on web works projects. It tries to get its clients to do their own update using XML scripting. For a larger redo of a website, the designer has to go back to a previous project and copy the skeleton of the website and other files to be reused. To search for projects, the lead designer goes first to the server for more recent works, then to the CD wallets where older files are archived. If there are multiple discs on one project, he will have to read each disc in order to determine which one is the most

recent. Since the searching process relies heavily on memory, it is difficult when multiple discs are needed.

The designer feels that his main difficulties come from the inconsistent file naming on the CDs and DVDs. As a one-man operation, it is difficult for him to devote time to adapting to the structure of available asset management software. The time required to tag files could easily accumulate during the month. Furthermore, a tag that would make sense one day may not make sense the next.

As a web designer, he often uses Macromedia Flash's action scripts. The time that he spends searching or rewriting previously-written action scripts could be better spent improving his existing ones. The problem is that he does not have a complete database of all these scripts. He is improving his system gradually by building a helper code folder.

Another issue is e-mail as a digital asset. The designer feels that he spends too much time managing his e-mails. He tries to solve this by replicating the structure of his file folders in his e-mail folders.

Previously, he spent time experimenting with asset management software but he found that the software he tried was using too much CPU cycle during indexing or cataloging. His computer was not powerful enough to handle this extra task, and he did not have the necessary time to adjust the software capability properly. Therefore, he chose to keep using his own system until he finds a suitable software solution. These initial obstacles have not discouraged him from researching other available asset management software solutions. He is confident that the proper solutions will come up, and he is keeping his eyes open for them.

During his search, this designer noticed that Dublincore seems to have caught on in web software. This development allows for very detailed tagging and it has been included in Macromedia Flash as an RSS (really simple syndication) format. This data includes simple tagging, such as author, date, etc. He emphasizes that “asset management is a hot topic and Google is one of the major players in this field. It sells specialized hardware, which allows indexing at lightning speed.” (Anonymous, 2005)

The designer thinks that in order for asset management software to work well, it has to be able to adapt to different users. Some users are more patient than others. The level of control that users would like to have in their organization also varies. The software and human component need to meet halfway. It is impossible to have software so powerful that it can immediately determine what digital asset the user is looking for. A more versatile system should allow images to be searchable by content. Another advantageous feature would be the ability to determine the level of relevance of each asset. In the immediate future, he wishes for software that allows local indexing and archiving without taking too much CPU cycle. A standardized naming and archiving format included in a database would also help to narrow down the search.

This designer is convinced that good file management can increase efficiency. It could also allow his firm to provide additional billable service for managing clients’ assets. Although the firm’s system is not perfect, it is improved periodically. Since he is working mostly by himself, it would be difficult to implement immediate changes.

Subject VI: Veteran designer who currently teaches

Anonymous (personal communication, February 7, 2005)

This designer has worked in the design field for the past 17 years. Ever since she started teaching, she has not done much design work. Currently, she spends 80% of her time working as a design instructor, and 20% working at her design studio. To do her projects, she collaborates with other freelancers, including a photographer, a web designer/developer, and a writer. These individuals are members of a virtual team that can be put together as needed. Although the members of the design team may vary, it usually consists of the same individuals. The lead person on the project is not always the designer. Whoever receives the order from the client will eventually hire the other individuals as subcontractors. Clients may also choose to hire the team as a group or individually.

On average, the designer works on five to eight projects in a month—mostly small to medium scale. A medium-sized project may include a logo, a letterhead, an envelope, a business card, and a website design. Although she is not involved with many projects, she still finds it challenging to work at the studio after a period of teaching. However, once the project is spread out, it becomes more manageable. Another type of project that the designer often works on is catalog design. In general, catalog projects require a larger file source, but none of her catalog projects do. To transfer files within the group, the designer primarily uses the Internet. She only uses CDs when the size of the file is too large for Internet submission.

The designer has kept all of her digital assets since the day she started working as a designer. Some of these assets are still stored in older media. Yet when she needs access to an asset, she is able to find it because she has kept the reader. The majority of her digital assets are stored on Zip discs, but she is trying to transfer them onto CDs. Although the designer is aware of the longevity issue with her media of choice, she thinks that it is not practical for her to be overly concerned about this. When she is doing her clean up, she may consider purging any assets older than five years.

At first, the designer had the habit of labeling each disc with an alphabetical file list. Some discs are labeled with the index of files inside. However, that is not a part of her archiving process at the present time, so the more recent discs are not labeled with as much detail. Projects are backed up onto another location in the computer every 20 to 30 minutes. There is no timely schedule for archiving to CDs. Archiving is done only when she finds the extra time. The need to work on other projects sometimes interferes with her asset management process.

Even though the designer maintains a list of regular clients, she never works on projects that require constant updating. She feels that it is her privilege as a freelance designer to work on a variety of projects.

Occasionally she has to access her old files, not for reprints but for essential parts of project updates. When she needs access to older files, her system only helps her to narrow her archives down to several discs because not all of them are specifically labeled with the file content. Often she must read the content of the disc with the computer to find what she needs. Although this process takes more time, the designer does not feel the

need to purchase proprietary asset management software to help with her digital asset management. She feels that the Mac OS has decent search capabilities, as long as the user knows what to look for. Problems occur when the designer cannot open a specific file because of software incompatibility.

Her asset management system has generally remained constant, with minor adjustments here and there. Both in her computer and in her external archives, files are organized with the client's name as the top hierarchy. Client folders are separated further into different projects. All files related to any particular project are kept in these folders. This order is mimicked in her disc archives. Discs are organized based on the client, and then the individual project. She makes an effort to package her files in ways that the printer can understand, so the files are named with some reference to the client and project type. Files are also labeled with the date and version number. The designer keeps all versions of the files because clients may prefer a previous layout over the final one.

She does not make an effort to use a naming convention recognizable by PC platforms because some of the symbols recognizable by MACs, such as dots and slashes, are not recognizable by PCs. This especially becomes an issue because not everyone involved in the project works on a MAC platform. There is no main folder where she stores all her digital image assets. However, when she needs a specific image, she either searches for it online from a third party image vendor, or uses a collection of stock images that she has purchased.

She feels that her projects do not have enough complexity to require the use of proprietary asset management software. When she saw an ad for a software solution, she

thought that the product was directed toward larger design studios or those that use online viewing as part of their workflow. Moreover, she does not bring in enough income with her studio work since she has to devote most of her time to teaching. The designer is only familiar with metadata as a part of the Internet search engine program. She feels that dealing with metadata is the job of a programmer and she is not interested in becoming one.

A growing number of printers that she works with require PDF submissions instead of native files. In addition, the designer will send a mockup of the design to them. The printers do not have any copies of the native file. When the need for a reprint occurs, the designer will first ask the printer for the particular file. However, printers rarely keep any of her work in their databases.

The designer never gives digital files to her clients—with one exception. That particular project was a small one and the designer still kept her own copy. It is important to her to retain ownership of her design, even though it was done for a client.

The designer feels that her system is working fine so far. She only wishes that she had the financial resources to make all her hardware and software compatible between her school and studio workstations. For the past ten years, she has used an outside consultant to install software updates because she feels there are too many variables in the process. She would rather have a technician install the software than calling one later to fix the problem. If money were not an issue, she would like a third party to manage her digital assets. She feels that it takes too much time to make sure that archives are saved and labeled, and it is not a process that she likes to do. This designer assumes that most

graphic designers are more skillful at “using their creative side of the brain in order to generate and move ideas to a final product.” (Anonymous, 2005) File organization and money matters are not their particular areas of expertise.

Subject VII: An in-house design department

Anonymous (personal communication, January 26, 2005)

This design operation serves as the in-house creative service division to a publisher at an educational institute. The publisher has been in operation since 2001. The two designers occasionally hire interns or collaborate with freelance designers, both local and out-of-state. For photographs, the head designer works with other departments within the institute. Since this publisher is part of an educational institution, the in-house designers are not focused on making a profit. The publisher is the only client they have, except on rare occasions when their services are needed by other departments within the educational institute.

When working with other freelance designers, they create the original ideas and the head designer later finalizes the design and re-links the high-resolution images before sending it to press. Photographers deliver digital photographs on CDs, but can also send the designers physical images, such as slides. When this happens, the assistant designer will have to scan those images herself. Most of the files involved are too large to be sent over the Internet. so the designers rely on CDs to transfer digital assets between photographers, freelance designers, and printers.

Not all of the freelance designers they work with have high-speed Internet access. In these cases, the designers only give these freelancers low-resolution images, and those images are then replaced with high-resolution images before the project is printed. This is done to help freelance designers work more efficiently without having to deal with large files. The other reason for using low-resolution images is that since the head designer has to struggle to get permission for the reproduction of some images, she wants to maintain control of the use of these high-resolution assets.

The in-house design team works on an average of 20 to 25 different projects including some publications, in any given month. About half of these are large projects such as books, and the rest are small ones. On their hard drive, assets are organized by project name in the root folder. The folder hierarchy is then divided into correspondent, planning, budgeting, print quotes, and production file folders. The production file folder contains layout, text source and image files. Backup CDs are organized inside an envelope with all the necessary physical sources and other correspondence. The designer tried to use Canto Cumulus at one point, but she was not satisfied with the software capability so she stopped using it.

The naming conventions that these designers use have been inconsistent. This discrepancy presents a potential problem as more people become involved with a particular project, and more projects need to be worked on simultaneously. Before a project has a final title, the naming system could be based on either a project's subject, title, author, or editor. Additional problems persist because, after receiving design projects from freelancers, the designer keeps the name that the freelancer gave it, unless

she does a major revision on the design. This is an issue because there is no naming convention between the designer and freelancer. Furthermore, there is no existing record of all these different file-naming aliases. However, since both designers work side by side they can rely on each other when one of them does not understand the naming convention.

To search for existing assets, the head designer must know which project the asset was used for and when the project was created. If she cannot remember, then she will have to flip through a collection of the physical assets of any given year to find a particular project.

Most of the projects that the designers are working on are book publications. One of the problems that plagues publication projects is software compatibility. Many of the older files were created using QuarkXPress, while later projects were mostly created in InDesign. In the beginning, the head designer had to reconcile all the font and naming convention issues between QuarkXPress and InDesign. Eventually, the decision was made to use strictly InDesign, both because the department has not upgraded to the new version of QuarkXPress and because most of the printers she works with do not support QuarkXPress files.

Frequently, multiple designers work on the same project because the designers often collaborate with freelancers. In this instance, the head designer will take low-quality previews of the images and send them to the freelance designer to pick from. Then the designer will have the chosen images photographically reproduced.

The workflow goes one way, from the freelancers to the designer. The freelancer never gets files back from the designer. The designer makes the final adjustments before submitting the project for print. The freelancers can either make changes on proofs that the designer gives to them, or revise parts of the project for resubmission. Thus, freelancers will never have a copy of the print-ready files. In her workflow, the designer also keeps all file versions sent by the freelancer and dates them to indicate the most current one.

The publisher has never received a high number of reprint requests. For the past four years, the designers have only had to handle five reprints. In every instance, they didn't request that the printer print directly from the digital files that they had originally been given. Instead, the head designer resubmitted the files in PDF format on CDs.

There is no scheduled backup in this operation, but a full backup is done at least once every quarter. Whenever there is a sufficient amount of work, both designers copy their files from their local desktop to the 180GB external hard drive and the CD archive. The external hard drive was purchased six months ago. Previously they backed up their files to each other's computers. In case something happened to one of the designer's files, she could then access the other designer's computer or the backup CDs. Currently there are four different copies of any asset: one copy in each desktop computer, one in the external hard drive, and one on the CD. The designers can keep a copy of every file on the hard drive because it has not yet reached capacity. Their backup goes back to the start of the publishing operation.

The head designer realizes that their system is too informal. She did not set up a better system in the beginning because there are only two designers working in the division and they are not working on very many projects. She started to see a problem with their asset management system as their project workload increased. Formerly, among all total projects, the designers had to work with only two to three publications a year, but this year they have 14. This problem could easily escalate as the operation hires more designers to work on an increasing number of projects.

In her workflow, the head designer sometimes loses track of certain assets due to the inconsistent file naming system. She sometimes knows that a file exists, but she cannot find it. On one occasion, the designer received a reprint request for a project that had been created by the educational institute even before the publishing aspect of her department started. The publisher inherited some, but not all, assets related to that particular project. The designer had to re-compile the digital assets from an older storage media that was no longer part of their system. Fortunately, she still had access to the media and could retrieve most of the images. However, she had to re-shoot some of the photographs and recreate the layout file.

The head designer wishes to have a more organized system in the upcoming year. Although asset reorganization is not in the in-house division's immediate plan, she can see it as an important project for the future. At the very least, she thinks that she should use better naming conventions in her files. The designers currently use Mac OS search features, which are quite helpful with finding digital assets. Nevertheless, the head designer would like to have asset management software that allows her to search for

assets both by file names and groups of file types. She also sees the need for a centralized storage system because they will eventually run out of storage space. Although she did not have a good first impression of CantoCumulus, she is still willing to consider its updates, along with other available asset management software.

Subject IX: Two-person, 29-year-old firm

Anonymous (personal communication, February 2, 2005)

This firm has worked in the design field for 29 years. There are two designers on staff, but the firm also uses freelancers for design and photography. The company is currently working on 20 projects this month. These projects can be divided into 5% large, 20% medium, and 75% small. The two designers lead the firm's design projects with the help of two other freelance designers. The firm uses the MAC system for design work, and PC systems for accounting and testing purposes, when files are transferred to other PC users. The firm hires an outside IT consultant to maintain the computers' technical aspects and to build their asset management system.

Jobs are named based on job number, client, and then project name. FilemakerPro assigns the job number. Any new project will be given the next number available on the system. Freelancers are given a naming guide in the form of a Quark file in order to ensure their naming conventions are synchronized with the design firm's. All files are stored inside a working folder within the project folder, except for final files, which go out to the printer. Files sent to the printer are labeled "final" or identified by a cursive "f" given by the preflight software.

One designer primarily manages the firm's digital assets. She is responsible for this task in addition to her design work. About five years ago the company switched to Retrospect software. The designer realizes that all assets from that point on exist in the Retrospect system. However, she is not sure whether the Retrospect-based archive goes further back to before the system was installed. This designer did not work at the company when it changed to the Retrospect system, and so she doesn't know whether there was any difficulty during the switching process. The designer does not see the importance of ascribing metadata to her asset management system.

During the archiving process, she must pick and choose the files to keep, since not everything is archived. When multiple designers work on the same project, freelancers work in-house to prevent redundancy during the design process. When the freelancers choose to work away from the office, they must bring a copy of their finished sections to the main office.

Files are only available on each designer's local drive. There is no centralized server. Backup is done by the system automatically every night on tape drives by Retrospect software. When a project is in progress, there are two copies of the file available, one on the tape drive and the other on the local computer. Once the project is completed, it is deleted from the computer and archived to two copies in tape drives. One copy is stored locally and the other is kept in storage. The tape drive archives are organized in which the project was done. Although there is an additional copy of each project in the storage, the designer has never had to use these extra copies.

There is no archiving schedule—the designer archives finished projects when she has extra time or when the local computer is running out of space. Before files are archived, the software will make sure that each folder is numbered according to the firm's system. Freelancers are responsible for making their own backups within their own systems. Once a project is completed, a freelancer will give the finished project to the firm on a CD. As of this date, the tape drives have been a reliable storage media; they have never failed the company's asset management system.

Searching for files is relatively simple because Retrospect software has cataloging features. The designer will search for a particular file based on job number. Once the job number is specified, it is relatively easy to locate the asset. The system does not allow a file to be searchable by itself. The designer must remember the specific project for which the asset was used. For example, if she needs to find an image, she must remember which client the picture belongs to, then look under that corresponding job folder. Currently, the designer does not see the importance of searching for assets by description.

Assets from both photographers and freelance designers are given to the firm on CDs. On the output side, files are transferred to clients and printers using CDs or an FTP site. Printers usually receive files in native form. They only get a PDF file if they request it. When the design firm is too busy to make any final changes, files will be revised by the printers, and they usually do not charge for this additional service. Some files are given directly to clients so that they can then print the projects themselves. Most of the time, however, the firm is responsible for turning in the file to the printer. In this case, the client will receive the final format of the design.

Ever since the firm implemented Retrospect as part of its system, it has never had any major issues with its digital asset management. The firm never loses files. Sometimes the need to recreate files occurs if a particular file was created in an older software version. In this case, the designer must recreate the file using the current software. On rare occasions, problems occur because a project folder was stored out of alphabetical order. Once the designer figures out the mistake, she can easily correct it.

The designer wishes for a system that will help her spend less time archiving. She feels that the less time she spends on the process, the better. The current system only automates the backup system and not the archiving process. During archiving, the designer must go through each project folder and clean out unnecessary files. She feels that this process cannot be automated because someone has to manually decide which files to keep and which to delete. The designer must also make sure that she deletes all the archived files from the local computer. The IT technician only builds the asset management system; he or she does not help with the archiving process itself. The firm relies on its outside IT consultant to give advice on necessary software purchases.

Subject X: One-man operation

Anonymous (personal communication, February 18, 2005)

This firm in the design field has been open for three years. The designer is the only one working in the company, and he never uses any freelance help. The designer uses a MAC system to do his projects. In any given month, the firm works on between three to five projects, of which 75% are small and 25% are medium-sized.

The designer keeps his design jobs in his local hard drive. Most of his work does not require the use of large Photoshop files, so his files are relatively small. Based on his experience, he does not feel that attaching metadata to his assets would enhance the quality of his asset management system. He never uses the metadata input option from Photoshop, and only recently became aware of this option. The designer keeps all of his assets in the hard drive as long as there is space. Once the hard drive is filled, he transfers some of the assets onto CDs to free up space. Digital assets are only stored in either the hard drive or on CDs, not both. The designer works under the assumption that his digital assets will always be retrievable.

He assigns a folder for each client at the root level of his hard drive. Within each folder, projects are then organized by job numbers. Each client is assigned a two-letter acronym, which is followed by a three digit job number. For example, project folders from the Disney Channel will be referred to as DC001, DC002, and so on.

During its three years of operation, the firm has only made minor changes to its asset management system. The designer upgraded his system by adding an extra hard drive. Now he is working from two hard drives simultaneously. Once the local hard drives fill up, the designer will go through his digital assets and transfer some of them to CDs. He does not do the archiving process on a regular basis.

The designer rarely encounters the need to access old projects. However, when this happens, he utilizes the search function available through the OS. He does not use specialized software to search his digital assets. The designer feels that searching for files based on relevant job numbers is sufficient in his workflow. This is the case because he

does not have many projects per client. Instead, he has lots of clients, each with only a few projects. With his existing system, once he knows who the client is, he can easily find the particular asset.

The designer maintains a regular relationship with one particular printer. He sends one- and two-color projects to this printer, and only shops around for other, more demanding print jobs. Once a project is finished, he either sends the file directly to the printer or gives the file to the client. His printer usually prefers a PDF format. Two-thirds of his clients also prefer PDF formats and the rest prefer native files. The designer is not concerned with his clients' capability to modify the design because he does not put ownership rights in his contract. He knows that his printer keeps his assets on the printing company's database. However, the designer is not aware of the duration because he has never requested any reprints from his printer. The designer has an FTP site, and he uses it for transferring files to his clients or printers.

The designer is aware of the reliability issues with storage media, especially in relation to longevity. He has noticed that he does not have access to a few of his older files. Nevertheless, he did not have to recreate any of these particular assets because he was only trying to use them for his own portfolio and not for a client. He has considered improving his asset management system because many of his colleagues have found themselves in trouble because of corrupt files. However, since the designer has never experienced trouble himself, improving asset management is not a priority. Whenever he hears of an issue, he considers possible solutions, but he has never followed through on them.

This designer admits that he keeps postponing improving his asset management system, not because of time constraints, but because of his laziness. There are also financial limitations: he would much rather spend his money upgrading his computer or design software than investing it on a better asset management system. The designer does not see the urgency to improve his asset management system in his workflow. He feels that a better asset management system would be more important if there were more than one designer working at the firm.

In spite of all this, the designer is still considering putting money into asset management software. He wishes that he could invest in an automatic system to back up his digital files nightly. Nevertheless, he does not feel that a better asset management system will help increase the firm's bottom line because he does not do enough business. The designer counts himself lucky because he has never gotten in trouble for not having a proper asset management system. He finds it ironic that he recommends that other firms improve their asset management system, yet he does not do it for his own firm.

Subject XI: An in-house design division in a hospital

Anonymous (personal communication, February 12, 2005)

This graphic design division operates as a part of the marketing department in a hospital. The in-house design division has operated for the past three years. There are two designers working there, and occasionally they collaborate with local freelance designers when they are overloaded with work. Additionally, the department hires two freelance photographers to obtain images. Currently one of the designers is working on a web

design project, and for this work she is collaborating with an outside web vendor. The division's main projects involve promotional materials for physicians or groups in the hospital.

Both designers work on PC systems. They upload and download files from the central server designated solely for the design division. Files in the server are backed up automatically by the system created by the IT department. The designers do not keep files in local drives. When one of the designers cannot show up for work, the other can continue to work from her own computer because all the files are kept in the server. They recently upgraded to a larger server, and some of the older files have not been transferred to this new server. If they need these older files, the designers have to access the older server. Between the two of them, they work on up to 50 projects per month. Both designers usually receive up to five project requests to divide between them in any given day. The projects are usually small- to medium-scale—one-page EPS files created in Adobe Illustrator. However, since there are so many projects, the designers can never spend a lot of time on any one project.

The lead designer feels the need to keep naming and folder nesting consistent because she often has to refer back to older files. For ads that run monthly, she has to retrieve old files and update them. The designers rarely keep different versions of the project. Once they are set on a design, they will revise over the current file. Then when people request an older version of the project, the designers can easily recreate the older version.

The root folders are separated not by clients but by divisions or physicians in the hospital. Each folder is divided into a variety of projects: newspaper ad, flyer, billboard, etc. Files are separated further into layout and image folders. When sending projects to the printer, the designers always include original TIFF files from this folder. A separate miscellaneous folder keeps all sporadic projects, which are organized by project types. Additionally, the designers keep a separate image folder to store assets, which are used for multiple projects. Problems arise when the designers carelessly download digital images into the wrong folder because of rushing.

Generally, the lead designer does not have to do additional work to create backups because the system is fully maintained by the IT department. On occasion, she will keep extra copies on Zip discs because she needs to work from home. The department keeps an archive of CDs from the photographer. An additional person from the marketing department helps the designers to organize this archive. The CDs are categorized into different projects which the photos were taken for. They are labeled with the particular image chosen for the project.

Not all of the images on the photographers' CDs are transferred to the central server because of space limitation; only the images actually used for the projects are copied to the server. To look for other images, the designer has to read each disc using Adobe Photoshop. The system has worked adequately so far because they can narrow down the CDs by particular project. However, the lead designer wishes to improve the system by including a contact sheet on each CD to show its images. Currently, the

designer does not see the need to use proprietary software to locate old files. She can simply browse through her folder and locate the older version of the project.

The department uses both in-house and outside print vendors. The hospital owns both black-and-white and color printers which the designer uses for short runs or projects with time constraints. She usually uses a PDF workflow with the outside print vendors. For less updated print vendors, the designer sends native EPS files. Files are transferred through email because the hospital has a very good Internet system. Larger files are transferred using CDs. Images are also sent in their original formats as well, in case printers need them for production.

When ordering prints for promotional material, she orders more copies than needed because physicians usually request additional copies later. For reprints, the designer never requests that printers print directly from the files that they already have, because there are usually a few minor but important changes to the file such as date and other information.

Although both designers have to work with a high number of projects, the system is efficient because they only have to focus on designing and not on managing projects. There are other people involved in the design projects to help the designers. The lead designer feels her system is sufficient now—she does not foresee the need for drastic changes in it. The only area she feels the department could improve is its folder nesting consistency.

Subject XII: Somewhat larger firm with six full-time designers

Anonymous (personal communication, February 2, 2005)

This design firm has been operating for 25 years. There are currently six full-time designers, one writer and one account director. The firm works on an average of 30 projects per month. In any given month, each designer is responsible for up to six different projects. On average, 20% of the projects would be classified as large, 50% medium, and 30% small. Occasionally, the firm will hire freelance programmers, photographers, or writers as needed. To help with technical aspects, the firm maintains a close relationship with an outside tech consultant.

All design stations are connected through a network. Each designer has several partitions in the operating system. Partitions designated for active files are automatically backed up every night. Therefore, the designers must work in an active-file partition for the projects to be automatically backed up. When projects are switched between designers, one designer can transfer files to the other designer's drop box through the network. The firm uses outside tech support to fix or upgrade its computer system.

The firm uses email to transfer assets with printers or clients as much as possible. CDs are used only when the file size is too big to be transferred by email. There is a high amount of CD trafficking in the firm's operation because the firm works more on larger files than small ones. Files are usually sent to the printer in native format. However, 15% of the firm's projects are printed digitally, and for these projects, files are sent in high-resolution PDF. In the past, the firm used a client's FTP site to transfer finished projects. A third-party FTP provider was also used to transfer assets, but now freelancers can

directly upload projects to the firm's website. For web design projects, the firm will hire an outside programmer. In this case, the designer works as much as possible on the layout, and then sends a prototype or shallow version of the project to the programmer.

Naming conventions are kept only on the folder hierarchy and not on individual files. The folder is named by a five-digit job number, the client's name, and the project name. Although the nesting generally stays the same, each designer names files according to his or her own preference. Each main folder is divided into print, estimate, schedule and miscellaneous. The print folder stores the layouts, images and fonts folders. The designers keep different versions of the projects because clients may request them for different purposes, either to maintain the look or to save money.

The backup and archiving system was developed as a collaboration between the outside tech support and one of the designers. This particular designer has a unique job: he acts both as a designer and as the firm's internal tech support. In the past, he was responsible for archiving all the projects. However, this was taking too much time from his design duties. Now each designer is responsible for creating his or her own archives. When an active file partition begins to fill up, the designer then archives the projects. Although all these archives are stored in one central location, the archiving time frame lacks consistency because each designer creates his or her own archive only when there is time available. The tech /designer further explains that most designers procrastinate fulfilling their archiving duties, because the last thing they want to do during down time is to go through their system to create archives.

Files are archived into three different discs, which are stored at different locations. One disc is stored locally, one is in a safe, and the director keeps the last copy. The firm switched from using CDs to DVDs as backup media because project sizes are increasing. Some designers choose to clean folders prior to archiving, while others do not. Discs are labeled by the next number on the master list. Once projects are archived, the disc's label and content are listed on a searchable Quark master document.

The automatic backup only goes back two days. After two days the tape is rewritten with the next back up cycle. The firm's writer also oversees the backup system. At this time, the backup system is not versatile because when a designer needs to retrieve files from the tape, the tech/designer must spend a lot of time doing so. Additionally, files are often not backed up because designers sometimes must work outside the active-file partitions. Those files are not backed up.

The firm receives a high number of reprint and revision requests. Therefore, designers frequently need to access old files by browsing through the master list, which is maintained by the tech/designer. The list is searchable by job number or client name. Once the file is located, the list will show the disc that stores the project. Unfortunately, since designers do not archive on a regular basis, old projects may be stored on one designer's local hard drive instead of on the central archive system. However, the designers have reported that they've never had a problem finding files, and thus have never had to completely redo a project. If all attempts to retrieve an old project fail, the firm may resort to revising an existing similar file or request a copy of the files from the

printer. Some printers provide this service for free, while others charge, depending on the design firm's relationship with the printer.

The tech/designer thinks that the firm's asset management problem is a result of the archiving process being too cumbersome. Archiving takes the designer up to a couple of hours a day. She wishes that the archive system could be as automatic as the backup system. The firm's asset management system is only as good as its least diligent user. In order for the system to work properly, each designer must follow procedures perfectly. Retrieving backup files from tapes takes too much time because there are no detailed instructions for the user. If the system needs to be upgraded in the future, the director will be reluctant to invest in a new system unless the designers manage to justify the need.