

Joshua Evinin  
June 10, 2003  
Cogsci 102c: Project Report

## Toward Better Photo Organization Software: The Design of Picture This 1.0

### ***Introduction***

There are many ways to organize photos. Analog methods include scrapbooks, albums, photo flip wheels, and wall collages. Many of these methods are mimicked in the digital realm, but the most common form of digital photograph organization is through software built purely for the practice of organization. This software often arranges photos into folders and shows thumbnails, which are a smaller version of the picture (about the size of one's thumbnail), of the pictures in a folder. There are many variations of this type of software, but their intent is the same: to help with organization. As our group found, however, this help became a hindrance in many cases.

At the outset of this project, our group was excited at the prospect of studying the use of a table that is controlled with gestures. We thought it best to study a practice rather than the gesture table itself, so we chose the field of photograph organization. We wanted to study the practices of people who organize and use analog and digital photos. The hopeful end goal of these studies was to employ the gesture table as a medium to bridge the gap between digital and analog photo organization. However, due to time and data constraints, we limited our work to the study of digital photo organization in any computer setting. This means that our prototype software includes the features that most users would utilize, but testing did not take place so that the User Interface is finalized. Data pointed us toward an intuitive, viable design which we believe suits our users well.

The entire project was guided by Contextual Design, a book titled after a process that is meant to guide software and other product designers through design practice which is driven by user data. The authors write of this process, “[Contextual Design] supports finding out how people work, so the optimal redesign of work practice can be discovered...[and] it leads the team through the process of discovering design implications for redesigning work practice...” (Beyer & Holtzblatt, Contextual Design, p. 21). The key to Contextual Design is the gathering and use of data in iterated segments, such that all parts of a project focus on the user, not the attitudes or opinions of designers. The first step of the process is Contextual Inquiry, which will be discussed later in this paper, but consists of a basic, though specialized, interview process. Following this is the work modeling stage in which interview information is represented in many ways in order to understand the user's entire work practice. Next is the consolidation stage where user data is generalized across the entire user population. Consolidated models and an affinity diagram are made to represent the work practice of all users of a piece of software. After this is the work redesign process, in which the gathered user data is used to redesign the users' work practice. Once the redesign process is completed, a User Environment Design is built. This is basically a floor plan of the system. “The User Environment Design shows each part of the system, how it supports the user's work, exactly what function is available in that part, and how it connects with other parts of the system, without tying this structure to any particular UI” (B&H, CD, p. 24). After the completion of the UED process, users are interviewed with paper prototypes in order to test the system. Finally, after all prototype interview data is taken into account and the prototype is finalized, the system can be implemented into actual work practice.

## ***Methods***

At the outset, our group studied a wide user base. Only after our interview process had yielded strong initial data would we narrow our interviews to a smaller subset of photo users. We also hoped that our data would point us toward the most interesting user community. Among the initial groups we studied were recreational digital photograph users, analog photo scrapbook makers, and professional photographers. The intent of these interviews was to gather basic information about the practices of the users. In-depth information was looked into later in the interview process, these interviews were to be more topical. In the process, we outlined the practices of users and asked about their various motivations, but made sure not to dig too deep into the details.

An adapted Contextual Inquiry interview process was used in the first stage of interviews. In order to gain a better understanding of the user, Contextual Inquiry demands that the interviewer, “go where the customer works, observe the customer as he or she works, and talk to the customer about the work” (B&H, CD, p. 41). The contextual interview is composed of four parts: the conventional interview, transition, contextual interview proper, and wrap-up. In the conventional interview the interviewer and user get to know each other as people. The interviewer explains what this interview is for and asks general questions of the interviewee. In the transition the interviewer explains the rules of the contextual interview explicitly. The contextual interview proper is where the user does his work task and the interviewer observes and asks questions. Copious notes must be kept as a record of everything that takes place. At the end of the interview is the wrap-up, where the interviewer summarizes everything that took place in the interview.

Contextual Design recommends that the relationship between interviewer and user follow the master/apprentice model. In this model, the user is the master craftsperson who knows all about his work practice. The interviewer must enter the situation with the mindset that he knows nothing of the user’s practice, but wants to learn. For our project, this was a difficult relationship to build. Since the photograph organization work practice is recreational, users generally are not able to do it on command. Thus, when users were asked to “act normally” they would often get confused and not know what we as interviewers wanted to see. Thus, the users were asked to carry out particular tasks. This was very effective and caused confusion to subside. The tasks varied depending on the focus of the interview. In the beginning of the project the tasks were more general, as it was important to get a feel for everything a user does when organizing photos. Later the users were asked to carry out particular practices that are witnessed in many users, so specific processes could be studied in depth.

Six users were interviewed in the first iteration. The intent of having a small number of interviews at the early stage of the project was to yield information about multiple user communities without committing too much time or effort to those which ultimately would not be studied. These initial interviews covered users from three distinct fields: analog photo scrapbook makers, newspaper photograph editing, and digital photo users. Because these users came from varied communities, there was little similarity between the interviews. Also, these interviews were each covered by two group members so that a single group member was not responsible for an entire interview. This ensured that no pertinent questions would go unasked. In depth information about the users in this iteration and the following two can be found in the User Notes pages, located in section 2 of the group binder.

The two interviews with users who made scrapbooks yielded information about what exactly happens when a scrapbook is constructed. We hoped to learn much about gesture through our scrapbook interviews; however the focus quickly changed as it is very difficult to attain data on this topic. Instead, the users were asked to build, or emulate the building of, a page of the scrapbook. Many questions about the basic intents and motivations behind making photo scrapbooks were asked. These users also divulged instructional information about how exactly they choose pictures and lay them out. These interviews showed that there is much structure and regularity in the process of building a scrapbook, as well as a lot of individual creativity.

One of the interviews was with a newspaper editor. The goal of this interview was to find out how a professional organization uses and organizes pictures. The user was asked to go through a few processes that are everyday practices for digital photo users, such as searching for, organizing, and using photos for some sort of project (in this case to be used in conjunction with a newspaper article). Because the newspaper's organizational structure was severely lacking, the interview was somewhat disheveled. In an interview that we expected would be abound with data, we turned out rather disappointed.

Half of the initial interviews were with recreational digital photo users. The users in this field showed a wide range of practices and many different uses of digital photos. During the interviews, these users were asked to organize newly uploaded photos and use their photos as they normally would. Normal use of photos included project events such as building web pages, editing photos for personal use, and using photos to complete school assignments. Of course, the users were queried with many intermediate questions as their processes progressed.

Following the initial round of interviews, data was consolidated through the construction of conceptual models. The practices of each of the six users were broken down into the types of models discussed in Contextual Design. The data gathered through the use of these models is explained in more depth in the results section of this paper.

With the initial goal of narrowing the user community down using data accrued in the first iteration of interviews, we decided to change our focus of attention from photo organization on a gesture table. Instead, we decided to base the rest of the design process on the uses people have for digital photos in projects (such as web site design or class projects), creation of digital albums for personal use, and storing digital photos simply for documentation purposes. In order to learn more about these processes, we decided to begin further interviewing with special emphasis on how users search for, categorize, and edit photos in their collections. We believed that it is these processes which would shed most light on the kind of design we wished to do. The fact that we already had much data from our first round of interviews on the photo organization processes helped our decision greatly. Later interviews were able delve deeper into the processes because we better knew what to look for.

The initial data also caused us to change our overall group plans. After studying what we learned in the first round through interviews and modeling, we decided to revise our overall group goals. The data we focused on did not tell us much about how users incorporate gesture into their use of photo organization, so we decided to leave the interface of the gesture table. This interface was too confining for the data we had gathered, and there was not enough time to focus sufficient effort on this topic. Instead, we decided to focus on designing a basis for photo organization on any computer interface. The major goal of our group became the design of efficient organizational, retrieval, and use schemes for digital pictures. Our hope is that our

software bends to user constraints rather than users having to bend to the software's organizational constraints.

For the second iteration of interviews, the spotlight was on recreational digital photo users. Ten users were interviewed in this round, and because the user community was more focused, these interviews dove much deeper into user practice. Each interview was completed by one member of our group, rather than the 2 assigned to each interview in the first round. The data that was received eventually became redundant, as was predicted in Contextual Design. Again, following the Contextual Inquiry method the users were asked to perform activities that are natural in their environment such as searching through their collection for particular photos, saving, organizing, printing, and doing peripheral activities (e-mailing, editing, posting to websites, etc.) with their photos. The users were also asked many in-depth questions pertaining to these different actions as they performed them. Asking an interviewee to search for a particular photo on his computer was an especially informational technique. Doing this allowed the interviewer to see exactly how the organization of photos affects search speed and ease. Interviewing users from a single community greatly helped focus attention to specific issues in digital photo organization. Also, because we knew more exactly what to focus on, data tended to "jump out" at us, and guided the interviews much deeper into user practice.

After the second round of interviews, the new data was summarized by the interviewer to the group. Models were not made for each interview, however, the new data aided in the construction of consolidated models, which attempt to show different representations of the work of the user community on the whole. Using these models and the detailed user notes taken at the interviews, an affinity diagram was produced from the bottom-up. This means that specific examples of work processes were taken from the user notes. Similar processes were grouped together, and titled accordingly. Also, groups of processes that were similar were grouped together. The process of building an affinity diagram from the bottom-up promised that top level categorization would come straight from user data. It also allowed us to discount data that only showed up in one or few interviews, so that attention was paid where it was due.

A prototype of the photo organization software was built through the use of the affinity diagram. In our interviews, users utilized many different pieces of software when using their digital photos. Because user interviews did not focus on any one specific User Interface, our prototype software was built simply to include the features that we found important, without focus on building a UI. Knowing all these facts, we began the visioning process by highlighting the recurring themes of the Affinity Diagram, and making a list of software features that would support users' work. This list was our version of the User Environment Design written about in Contextual Design. Once the UED was completed, features were added one by one to a paper prototype. Again, the paper prototype was simply designed as a place to implement all features, and the UI itself was the focus. At the same time, we wanted to design a piece of software that looked good and was intuitive, such that a first time user could easily learn how to use all parts of the program.

After designing the paper prototype, we interviewed another seven users with the prototype. Many of these users had been interviewed in the second iteration of interviews, thus we were able to test our prototype with the exact users who composed our data. In a few cases, however, new users were interviewed so that we could make sure the prototype dealt with data that was not just from the second round interviews. The content of these interviews was similar to previous contextual interviews, but now users interacted with the paper prototype instead of their own software. Interviewees were asked how certain features would be used, and if they

liked particular parts of the program. Also, users were asked to reenact sequences they would do on their own software on the paper prototype. At the end of each interview, the users were asked if anything should be added to the software, or if there were unneeded features.

Finally, our group discussed each prototype interview, and redesigned the prototype so that it fit our latest group of users' needs. This left us with a final prototype which fulfilled our users' standards as a good tool for digital photo organization.

### ***Results***

The initial models that were formed after the interview process completed showed our information in a new light. Because of the models, each team member was able to understand the interviews done by other people. This is important, especially in the consolidation phase when recognition of all data is needed. Also, putting together models was a way to tease out data that could not be seen at first. Because we built multiple models for each user in the initial interview process, we were able to find trends that went unchanged across different types of users. Our modeling for the second round of interviews was different. For this we created consolidated models from the start, and then created an affinity diagram. The results and trends from the models in these two iterations are illustrated below. All models can be viewed in section 3 of the group binder.

Our cultural models were probably the most informative of all of our first round models. These helped us recognize what each of our users actually used their photos for. A regularity we found among users is that they often use one piece of software as an organizational tool, and separate pieces of software for editing photos, web site design, and other practices. The users were constrained by each of these pieces of software, and the technologies behind them. For example, two of our initial interviewees (U1 and U5), web site designers, were constrained in many ways because they wished to place his digital photos on the internet. Because of this they have to be sure that photos are not too large in file size and actual size. If a picture is too large in file size, then it takes very long to download when a person is trying to look at the picture on a different computer. If the actual size of the photo is too large, then the person will not be able to see the entire picture on their screen. Our interviewees had to account for these constraints by editing their photos. This is one example among many others that was made evident through the use of cultural models.

We decided that flow models would not be of importance in our project. When a person interacts with photo organization software, it is generally just the user interacting with the computer. The flow model deals with interpersonal interactions, of which we witnessed none in our initial photo organization interviews. Although there are other people in the photos, we found that this was not an integral part of the actual organization process. Interaction with other people in the photos would be more important in the actual photo taking process, rather than the process that we were studying.

Our group also decided not to complete isolated artifact models as we believed that these models were already present in our physical models. The physical models at first displayed the physical surroundings in the user's environment. We learned, however, that this method works best when a user is in the when the user is working with analog photos. When a user utilizes a computer, it is often more important to understand the physical structure of objects on the screen than the physical environment that the user is in. Thus, our physical models included screen shots in each computer program and information about physical transitions on the screen. This

revealed much information about how users utilized features within their organizational software and how this applied to the use of other software.

The final type of model that we used was the sequence model. These models were very important because they drew out the sequences of the many practices that our users exhibited. We made sequence models for the photo upload, organization, and edit procedures, among many other procedures. An important detail that we noticed was that there was often a break in sequence between the use of separate software programs. We also looked at how users browse through their photos and the picture retrieval process. An important trend that was found during sequence modeling was the shoebox phenomenon. In the sequence models of all users we found that new pictures are added first to an unorganized pile, or “shoebox.” This strategy was found across users in both the digital and analog photo organization domains. Once the shoebox strategy was found to be so widespread, we studied it further in order to apply this regularity to our software.

Almost everyone we interviewed had some sort of photo “shoebox” in which they stored many pictures that were yet to be organized. Some had plans of one day organizing these shoebox photos, but many did not. Those who did organize their photographs beyond the shoebox generally chose a single categorization method. The chronological order was a popular strategy, as was separation by event. In fact, our data suggests that these are the two main forms of organization of photos. Those who arranged chronologically generally let the computer do all the organizational footwork, by simply inputting a setting that allowed the pictures to be organized by when they are uploaded. By organizing by upload date, the pictures stay in chronological order. Users who organize their photos by event tended to put more time into their organization. This method is similar to the chronological method in that the pictures remain in a time based order, however, this method requires that the user move pictures into more confining, better organized spaces.

A regularity that we noticed of all users was something our group termed “OCD,” or Original Copy Disorder. This is not actually a disorder, rather a pattern that showed that users of digital photos always keep an original copy of each picture. A user always renamed a photo before or after editing it, so that the original copy remains unchanged. For those who we interviewed who did not use digital photos, color copies, or double prints were always used, leaving one unused original photo to be kept. This scheme allows users a sense of security in that if they ever edit a photo in a way that it cannot be repaired, there is always a backup. Thus, users can edit their photos however they want. This also allows users to make multiple manipulations on the same photo, as long as they resave the photo under new names each time. Some of our users had special naming schemes designed especially for this case. For example, one of our interviewees (U6) exported photos under the name “original.jpg.” After editing that picture she would resave it as “original\_edit1.jpg,” where “edit1” is a brief explanation of how the picture has been edited. If the photo is again edited, a new edit term can be appended, so the file will be saved as “original\_edit1\_edit2.jpg.” Another of our users (U8), who maintained a website, had a scheme in which her thumbnail sized pictures would start with a capital letter, and normal sized pictures started with a lowercase letter. In both cases the name of the file would be made up of the same word, simply with a different first letter size.

Another source of much data that came between the first and second rounds of interviewing was from studies done by others in the field of photo use and organization. In an article titled “Time as Essence for Photo Browsing Through Personal Digital Libraries,” a group reported the results of retrieval tasks in newly created photo organization systems. One of these

new software programs, “Calendar Browser,” utilizes the photo taken date, which is embedded in photo metadata, in order to sort the pictures. Time periods which have more pictures consequently have more pictures displayed. This software takes advantage of the “burst” patterns of camera users. “People tend to take a lot of pictures in bursts. For example, lots of pictures may be taken at a birthday party, but few...may be taken until another significant event takes place” (Graham, Garcia-Molina, Paepcke, Winograd, Page 3). This idea is applied heavily to our design, and is used in conjunction with Pile research. “...We found that users like to group items spatially and often prefer to deal with information by creating physical piles of paper, rather than immediately categorizing into specific folders...Therefore, we propose that incorporating ‘piles’ within a graphical user interface could provide a number of interesting possibilities” (Mander, Salomon, Wong, P. 1). These piles also save room on the spatially constrained desktop, and make it easy to automatically sort photos by ‘burst.’ These tools, discovered by other researchers, are utilized in our design because we felt there is not sense in completely reinventing our software. This data helped spur our design, and though we added to it, it is the basis for much of our work.

Following the second iteration of interviews, an Affinity Diagram (see section 5 of the group binder) was built and used to find similarities in the work processes of all interviewed users. The users’ work practices when organizing digital images fell into five categories. Users had distinct practices for uploading photos to the computer, placing the photos into categories, retrieving, editing, and using photos. Data that is supported by the User Notes is followed by the users which follow the noted pattern. Other data is substantiated, but is not found in the user notes section of our binder.

Uploading photos is the process any digital photo user must go through in order to get the photos onto the computer. Though there are various methods for achieving this, all interviewees went through the process of selecting which particular photos to download from the camera, and then visually scanned the thumbnails of photos which were most recently uploaded. Often, the user took a closer look at photos which are especially meaningful. Though this is a simple process, it is still interesting to note that there was not much variability between informants.

When categorizing uploaded photos, users’ needs fell into three groups: folder structure, folder organization thresholds, and chronological ordering. Folder structure was generally first dictated by how the computer was set to organize pictures, and then could be changed by users according to preference. For example, many users (U7, U8, U10, U11, U13, and U14) organized their photos inside an overarching “my pictures” folder. All photos were organized inside this folder. Further organization was done by theme or event. Users had many different schemes for this including organization by events, objects, people, and “feel” of the picture (U8, U9, U11, U15). Other users simply let the computer do the organization (U7, U10, U13, U14). Most often the default computer organization setting was to categorize photos by upload date. One users who followed this sort of organization did so because organizing by event or theme is, “too time consuming to organize, not worth the effort” (Section 2, User Notes, U7, line 16), or “because [it is] too tedious” (Section 2, User Notes, U13, line 6).

When photos are organized by themes or events, there are subtle regularities in how users grouped pictures. The most obvious form of organization was that of major events. Each time a user took pictures at some sort of large, meaningful event, such as a birthday party or basketball tournament, a new folder was to be created. Special events and meaningful photos are categorized into their own places. Also, some users did not like these event folders to have too few or too many pictures in them. If a folder did not have very many pictures, the photos would

be placed in another folder, and the folder itself would be deleted. In an opposite manner, when a folder reached a maximum threshold, the folder would be subdivided by date or event (U11). The reason folder sizes are kept small is because people like to view the photos in folders as thumbnails. If there are too many pictures in a folder pictures are difficult to view because they become too small. Finally, some folders are left unorganized. People who organize their photos by events tend to have a folder where they keep pictures which are yet to be organized (U5, U9, U11, U14, and U15).

Chronological ordering also played a large role in users' organization. Users often said that the default setting on their computer was to organize photos by the date they were uploaded (U13). The date uploaded characteristic, however, was of secondary importance. Most users felt a photo's date taken characteristic was a better organizational unit. Surprisingly, most photo organization software does not allow a user to organize at all by date taken, and often users find difficulty in even finding the date on which a picture was taken. In some of our interviews it took users three to eleven clicks in order to navigate to a screen which tells when the picture was taken. Users often also wanted to organize their events in chronological order, a difficult task since named folders generally align themselves in alphabetical order (U7).

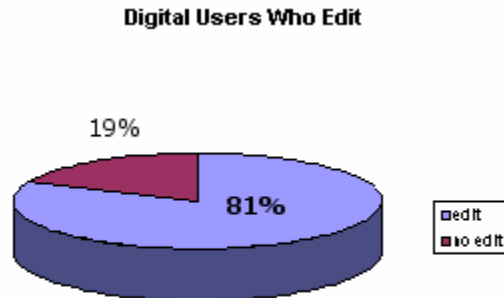
Users showed much regularity in the photo retrieval process. When asked to search for a particular photo, users fell into two distinct search styles. In the first, and less popular, style users (U8) looked at who was in each photo and were able to navigate through their photos by who was in the picture and what they were doing. This style was generally used only when searching for a picture of a person, rather than of an overall event. This style is not very robust; however a few users preferred it over the search by date or event method, which was seen more often. The search by date or event method was utilized by most informants (U7, U8, U13, and U14) because their photos were stored in chronological order. The date provided a filter for the user, so they only had to know a general time period in which the photo they searched for took place. However, because of the default setup of modern organizational software, which dictates that photos are aligned by upload date, users often got lost in their search (U7, U8). Some users wait a few days, or even weeks, after an event to upload their pictures (U14). In this case, the upload date does not correspond closely to the photo-taken date. This breakdown can be a huge hindrance to users who often go through photo search tasks.

Through the search tasks, we also learned many about many constraints created by current computer software built for photo organization. Users in almost all cases preferred thumbnail sized photos to normal sized, when doing photo organization (U1, U5, U6, U7, U15). Using thumbnail photos, users are able to see many of their pictures on the screen, and the manner in which they are organized. Users found it extremely difficult to search for pictures that were not represented as thumbnails, because the default naming scheme is generally a photo identification number created by the camera itself. This number only has chronological meaning and says nothing about what is actually in the picture. Most users do not name individual pictures. According to U10, this is because, "it takes too much effort" (Section 2, User Notes, User 10, line 3). A few of our users named their photos for various reasons (U8, U9, U13, U15). This process was generally long and tedious, because they had to iterate the naming process many times before they were finished. An advancement that many users liked was the "representative photo" superimposed on folders. This is a new feature in Windows XP. As a default setting, the first four photos in a folder are represented on the folder's icon. This helped users search for photos in many cases, but in some cases did not. Users would have liked to be



able to choose the representative photos, because the first four may not say much about what else is in the folder.

Almost all of our users applied some sort of editing features to some of their photos. This statistic can be seen in the following graph:



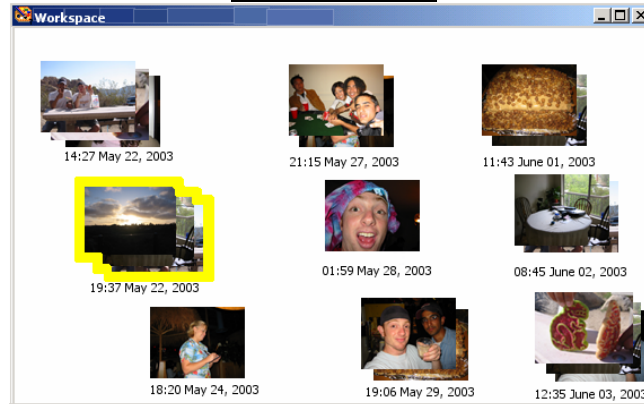
The simplest form of editing that was witnessed was completed in organizational software, and was only for very basic editing, such as rotating a picture (U8). Since the main purpose of organizational software is not to edit photos, these pieces of software were often lacking in editing options. For more advanced users, editing was done in some sort of proprietary software made for the purpose of editing. Users took advantages of features such as crop, resize, save for web, and many more (U1, U5, U6, U9, U15). An advanced user, U6, even created artwork using photo editing software. Data suggested that photo organization and editing were completely separate sequences, despite the fact that they have so much in common. This is a breakdown that hinders many users. Another matter that was important to users was how edited pictures were saved. Because of OCD, which was previously discussed, almost all users saved pictures under a new name after editing them. An exception to this was when interviewees only performed basic editing on a photo, such as rotation. In this case the photo would not be renamed because the new picture is the desired original.

Finally, we found that users had various uses for their photos. Some use pictures in a leisurely way, such as U14 who uses pictures simply to, “remember the good times” (Section 2, User Notes, U14, line 1), while others do more advanced projects. Many users utilized digital photos in the creation of websites. This involves much work with photos, such as editing, saving as thumbnails, saving with smaller file sizes, and more. Users also created CDs of their photos, sometimes for the security of having their photos in multiple places, other times to distribute photos to other people. One user was in the process of creating an analog scrapbook using digital pictures (U8). For this she printed photos, and then treated them as normal analog pictures. Also, as mentioned previously, one of our users who was an art student created beautiful artwork using her digital photos (U6). This is just a sampling of all the uses of digital photos, but in any case, our users manipulated and used photos for various reasons. This means that organizational software, where digital photos initially enter the computer, should have more support for what people do with photos.

## *Design Changes*

From the data arranged in the affinity diagram, we were able to piece together a list of features that the photo organization software we were to build should include. The combination of all of these features culminates in the design of our software, Picture This version 1.0. The key to all of the features is that they are simple, and come straight from the data. In many cases, users recommended design ideas. Some of their ideas are included in our list, and others come from data that was not as explicit. In any case, these tools were designed to be efficient and intuitive, so that a first time or advanced user could take advantage of our software.

### *The Workspace*



**The Workspace-** A very important piece of our software is called the “workspace.” We found that most programs do not have an area to arrange files and photos freely before saving to a directory structure. However, our scrapbook interviews (U2, U3) showed that users like to test the appearance and structure before anything is finalized. The workspace is easily accessible, files can be manipulated in any manner, and having all new pictures in a single organizational frame reduces toggling. Our workspace also accommodates our users by giving them a visual trigger that they need to organize their photos. U5 first uploaded his pictures into a folder named “random,” then organized these photos when the folder became full. Having the visual workspace cue, he would be able to tell when his pictures are becoming too disorganized.

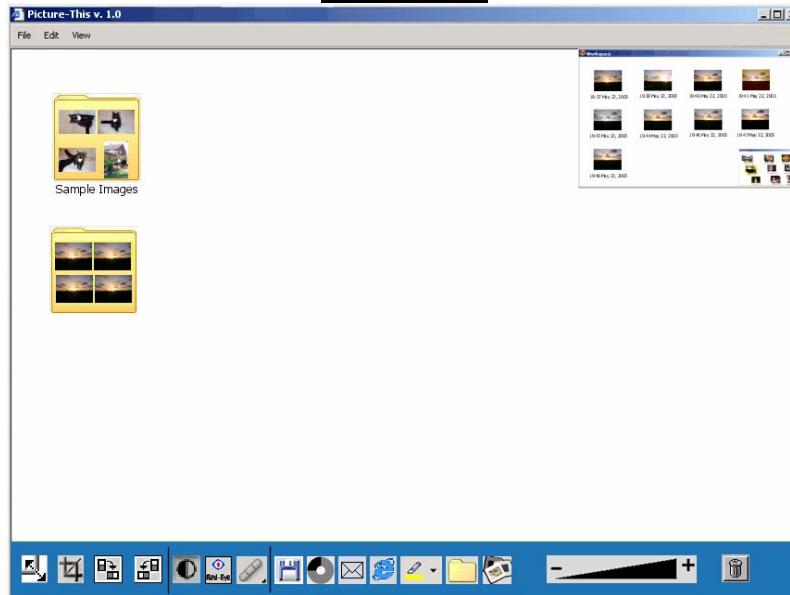
**Piles-** In our workspace, we utilize a piling system so that photos are automatically sorted. Pictures that are taken within close time proximity are generally related. Thus, our software takes advantage of “time taken” metadata information and groups photos that were taken close temporal range. The goal of this feature is to automatically group photos by event, so that those who choose to organize by event have less overall work. Because this pile structure exists on the workspace, piles can be easily changed before they are saved to the desktop. Piles also save space on the workspace so that more events can be present. Users liked the idea of representative photos, so this idea is applied to our organization scheme (U2, U11). Finally, if a user has a large number of pictures, this is a cue that this pile will probably need its own folder on the program’s actual desktop.

**Mouse-Over Info** - On the workspace, when the mouse cursor is left on top of a pile, a small popup window is displayed that tells the date the pictures were taken, how many pictures are in the pile, and the time range of the pictures (time of first and last picture). Because the workspace is a small area, there are spatial constraints so this information cannot be present at all times. This feature was added so that users do not have to open the pile to find out this

information. Also, since users are often interested in the time and date the picture was taken (not uploaded), this information is readily available.

**Default Time Stamp** - Cameras often upload photos with a preset photo identification number. Though this number may be meaningful to the computer and camera, a string of numbers often seems irrelevant to a normal user. Thus, the default save name for any new picture coming into the workspace is the time and date it was taken. For example, a picture could be named “10:43 May 22, 2003.” Though this name may not be as plausible as far as computer filename structure rules go, there could easily be a background ID used by the computer to sort these files. As long as the visible name for the file is compatible with users, this naming scheme will be successful.

### ***The Desktop***



The desktop is the main screen of our software program. This is where all folders containing photos are stored and displayed. The layout is easy to understand. File folders are to line the background area. These folders are named as the user pleases. In the upper right corner of the screen is a small version of the workspace. When the user puts his mouse inside the workspace it expands to its full size. This feature exists so that the workspace does not get in the way of the desktop, but can easily be accessed. On the bottom of the screen is the toolbar, which contains many features that do not exist in previous photo organization programs.

**Representative Cover Photo**- Pictures are displayed on the outside of a folder. This follows the scheme already present in Windows XP. Sometimes the pictures that are displayed by default are not good examples of other pictures in the folder. In order to deal with this our software includes the ability to change the representative photos. Representational photos help users recall the pictures in the folder better than a folder name, which is far less descriptive.

**Autonaming**- The autonaming feature was created so that all files are named with titles that are relevant to the user. When a pile is dragged from the workspace to the desktop, a new folder is created. The name of this folder corresponds with the date the pictures inside were taken. All pictures inside the folder are also named accordingly. For example, if the pictures were taken on January 3, 2003, the folder name would be “January\_3\_2003.” Pictures inside the file would be named “January\_3\_2003\_#,” where the number symbol stands for the

chronological number of each photo (the first picture is 1, second is 2, etc.). If two or more piles occur on the same date, when dragged to the desktop its name is appended with a number. So, a second pile from January 3, 2003 would be named “January\_3\_2003\_2.” If the user chooses to name folders by event, this can be done easily. He only has to right-click on the folder and then chooses the rename option. Once the folder is renamed, another option screen pops up to ask if they would like to name all photos inside that folder to match the new folder name. The user can accept or refuse this automatic option.

**Save Edit Scheme**- This feature is based on the OCD (Original Copy Disorder) data, which was found to be applicable to all photo users. When a user attempts to save after editing a picture using our software’s features, the name of the photo will be appended with “\_edit”. This protects a user from copying over the original photo, thus automatically applying rules of OCD. Also, in case the user does want to copy over the original photo, the word “edit” will automatically be highlighted so that it can be erased quickly. The underscore stays in place so that a more descriptive name can be appended, since many users followed this scheme. We liked the fact that this automatic feature is visible to the user at all times, so they can stop the process if they want. Adobe Photoshop has a feature much like this one, which we did not learn about until the end of the project. The Photoshop version of this feature, however, does not have the automatic highlighting, so if a user wants to copy over a picture, it is more difficult to change the name.

### *The Customizable Toolbar*



An astonishing trend our users elicited was that every informant we interviewed did *something* with their photos other than simply organizing them. Most of these users, however, did not do anything so advanced that they would need another full piece of software to complete their tasks. Thus, we included the customizable toolbar into our organizational software. The toolbar is customizable because features from other pieces of software, such as Adobe Photoshop (used in editing) or Microsoft Frontpage (used to create websites), could be implemented through additional buttons on the toolbar. We made this bar customizable after data from prototype interviews showed that each user would want different features on the toolbar, thus options on the toolbar can be added or removed. The toolbar is always in the same place on the screen, and is never covered. This means photos can be appended when the user is in desktop or workspace mode. Again, the toolbar’s default setting contains the general functions our users would need. These default features are (from left to right): resize, crop, rotate right, rotate left, change contrast, red-eye fix, heal (found in Photoshop, fixes blemishes and other unwanted items), save, burn to CD, place in “to e-mail” folder, save/edit for web, highlight photo, Autofolder option, slide show, zoom bar, and delete photo. Important features we implemented are discussed below.

**Burn to CD**- This feature was designed to aid OCD. Often users wanted to save originals, and an easy way to do this is to burn them onto a CD. Also, some users already planned on burning their photos to a CD, but had to open an entirely new program in order to do this. Placing a burn to CD feature in our software would speed up this process. Pictures are dragged from the Workspace or Desktop onto the Burn to CD icon, the program then stores copies of all the pictures that have been dragged. When this folder reaches a certain size threshold (CD 97% full, for example) the user sees a pop-up asking if he is ready to burn the CD

now. If the user clicks on the Burn to CD icon, he will see a pop-up that tells how full the CD is, and is asked if the CD is ready to be burnt. This feature makes burning photos to a CD much more accessible, and offers an alternative for users with Original Copy Disorder.

**Place in “E-Mail To” Folder**- This feature is similar to the Burn to CD option, but is for a different purpose. When a photo is dragged to this button, a copy of the picture is sent to a folder that is reserved for e-mailing. We created this because many users e-mail their photos, but dislike searching through their files to see which picture they want to send. If all the pictures they want to mail are in a specialized folder, their search time is greatly reduced.

**Autofolder Option**- This is an on/off toggle for the Autofolder feature. If Autofolder is turned on, when a pile from the Workspace is dragged to the Desktop, a new folder is created with all pictures from the pile. If Autofolder is off, the pile is placed on the Desktop, but a new folder is not created. The Autofolder feature helps people who like to separate their photos by event. If it is on, the user can drag a pile to the Desktop and rename the file with the event’s name. This makes the process of separating by event or theme much simpler than in prior software implementations. Also, since the Workspace separates piles by date, it is easy to create folders corresponding to days in which events happened, rather than the date the pictures were uploaded.

**Save/Edit for Web** – This is a feature which already exists in Adobe Photoshop, and is an example of a customizable button. The customizable feature makes features of other programs accessible without having to export photos to another program. Many users disliked this because they had to rename and export photos in order to edit them. All of our users who built websites used some sort of tool to edit their pictures so that they could be uploaded to the internet. The internet places many constraints on photos. Their file sizes must be small so that they do not take long to transfer, and the pictures cannot be too large or they will not fit on the screen. Website designers must deal with these constraints, and this button helps by changing these settings so they are done automatically.

Other features are also important, but have appeared in other software, so need less explanation. Of course, our software contains a “Send To...” option, like most other Windows based software. The user can click this option and send a photo to a disk, place on the hard drive, or to another proprietary program. The “Highlight” option allows users to choose groups of pictures and highlight them in certain colors. This feature presently exists in Microsoft Word 2002. This highlighting would allow users to see and drag photos from different piles into a single folder, or pile of its own.

Most of the features described here did not change after the prototype interview process. The only changes were slight, and since new features were added throughout the prototype interview process nothing distinctly new came from prototype interviews.

### ***Conclusion***

In summary, Contextual Design proved to be a strong tool in the study of how users organize and use digital photos. Using this step by step process, features of software were designed based directly on data acquired from the actual users. No design feature is unsubstantiated, and the software is a viable, intuitive software solution to the digital photo organization currently used by today’s users.

If more time were allotted to complete this project, I believe that much more could be accomplished. There were many areas that our process did not study due to lack of time, but

could change our software completely. Among these areas are the field of Metadata, User Interface design, and application to a Gesture Table.

The field of Metadata is currently expanding at a very fast rate. The goal of Metadata is to store information inside a file that is visible to a computer, but not to the user (unless viewed through a program). Digital cameras currently store information inside pictures using the EXIF Metadata Standard ([www.exif.org](http://www.exif.org)). Current information stored in photos includes shutter speed, aperture settings, contrast, and much more about the special settings of the camera. However, there is much more that could be stored in a picture file, such as where the picture was taken, who is in the picture, and any other comments a user wishes to make. These pieces of information could lead to better search abilities and categorization. Also of interest is the Dublin Core Metadata Initiative (<http://dublincore.org/>), which seeks to store metadata of the same structure inside all digital media. In this method, a photo would have the same metadata categories as a video clip or written document. Though the EXIF Standard and Dublin Core Initiative are separate entities, a photo organizational software could be built to take both projects into account as this technology becomes more advanced.

Probably the easiest next step to take with this project would be to further develop the User Interface. Since this was not explicitly tested at all with users, it would be possible to create a piece of software that not only had all the features users wanted, but these features could also be laid out in a manner that takes user needs into consideration. Also, this UI study could be applied to a Gesture Table. Since a Gesture Table has the ability to bridge the gap between analog and digital photo use, much could be gleaned from this study.

There is much more work to be done in the study of digital photo organization and use. As this field continues to expand, many more problems will be solved, and perhaps some will even be created. Software like Picture This 1.0 is needed to supplement the trends of normal digital photo users. As the study of digital media becomes more advanced, many ramifications can change this type of software. However, as witnessed in this study, the most important idea is that software should be built to complement the users habits, rather than the user following software constraints.

*Works Cited*

Beyer, H. and Holtzblatt, K. Contextual Design. Academic Press, 1998.

Graham, A., Garcia-Molina, H., Paepcke, A., and Winograd, T. "Time as Essence for Photo Browsing Through Personal Digital Libraries." In JCDL 2002 Proceedings, 2002.

Mander, R., Salomon, G., and Wong, Yin Yin. "A 'Pile' Metaphor for Supporting Causal Organization of Information." In Proceedings of CHI, 1992 (May 3-7, 1992) ACM, 1992. pp 627-634.