

# **FilePiles**

## **Using a Piling Metaphor for Digital Document Organization**

**A thesis submitted for candidacy for the degree of Master of Design in Interaction Design**

**The School of Design  
Carnegie Mellon University**

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## Introduction

It's been over 10 years since the Human Interface Group at Apple explored a new UI widget—the pile—as a means of casual organization of information on the digital desktop. Since then, the idea has fallen by the wayside, even though using piles to organize documents instead of hierarchical file systems seems to be an obvious extension of the desktop metaphor and is how many people naturally work. With the recent additions of personal information management applications such as Apple's Exposé to operating systems, it's the right time to revisit this idea. Using new research, I've designed and prototyped a new system for piling digital documents on the desktop, one that tries to emulate the natural use of paper documents on physical desktops. Users have responded positively to prototypes of this new system.

This document outlines the research and development process of this project.

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# Hunt Statement and Hypothesis

Before beginning research, it's always a good idea to put together a hunt statement to test a hypothesis.

## **Hunt Statement**

I am going to look at how people currently organize and use physical and digital documents in order to create a better system for doing so on a desktop computer.

## **Hypothesis**

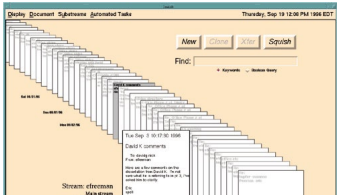
People need a method of organizing and using their digital documents in a way that better mirrors their physical documents: into piles.

RELATED PRODUCTS

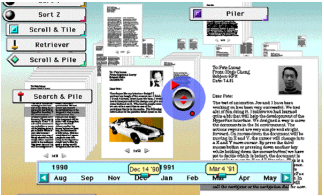
TIME

SPATIAL

3D



Lifestreams  
2000



WorkSpace  
1994



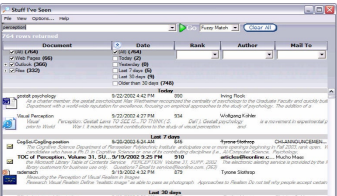
Data Mountain  
1998



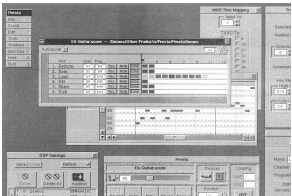
TimeScape  
1999



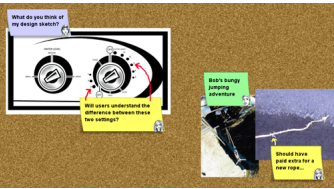
Apple Piles  
1991



Stuff I've Seen  
2003



Presto  
1999



MessyDesk  
2002

2D



# Literature Review

Barreau, D. and Nardi, B. "Finding and Reminding: File Organization from the Desktop"

Bergman, O., Beyth-Marom, R., and Nachmias, R. "The User-Subjective Approach to Personal Information Management Systems"

Boardman, R. "Workspaces That Work: Towards Unified Personal Information Management"

Boardman, R. and Sasse, M.A. " 'Stuff Goes into the Computer and Doesn't Come Out' A Cross-tool Study of Personal Information Management"

Boardman, R., Spence, R., and Sasse, M.A. "Too Many Hierarchies? The Daily Struggle for Control of the Workspace"

Dourish, P., Edwards, W.K., LaMarca, A., and Salisbury, M. "Presto: An Experimental Architecture for Fluid Interactive Document Spaces"

Dumais, S., Cutrell, E., Cadiz, J., Jancke, G., Sarin, R., and Robbins, D. "Stuff I've Seen: A System for Personal Information Retrieval and Re-Use"

Fallman, D. "The BubbleFish: Digital Documents Available On Hand"

Fass, A., Forlizzi, J., and Pauch, R. "MessyDesk and MessyBoard: Two Designs Inspired By the Goal of Improving Human Memory"

Gifford, D. "Semantic File Systems"

Goncalves, D. and Jorge, J. "An Empirical Study of Personal Document Spaces"

Henderson, S. "Personal digital document management"

Henderson, S. "How Do People Organize Their Desktops?"

Mander, R., Salomon, G., and Wong, Y. "A 'Pile' Metaphor for Supporting Casual Organization of Information"

Mark, G. and Gonzalez, V. "Managing Information in Multiple Spheres of Work"

Nardi, B. and Barraeu, D. "Finding and Reminding Revisited: Appropriate Metaphors for File Organization at the Desktop"

Peters, R. "Exploring the Design Space for Personal Information Management Tools"

Quan, D., Bakshi, K., Huynh, D., and Karger, D. "User Interfaces for Supporting Multiple Categorization"

Ravasio, P., Schar, S., and Krueger, H. "The virtual desktop: Selected results of a user study"

Rekimoto, J. "TimeScape: A Time Machine for the Desktop Environment"

Ringel, M., Cutrell, E., Dumais, S., and Horvitz, E. "Milestones in Time: The Value of Landmarks in Retrieving Information from Personal Stores"

Robertson, G., Czerwinski, M., Larson, K., Robbins, D., Thiel, D., and van Dantzich, M. "Data Mountain: Using Spatial Memory for Document Management"

Whittaker, S. and Hirschberg, J. "The character, value, and management of personal paper archives."

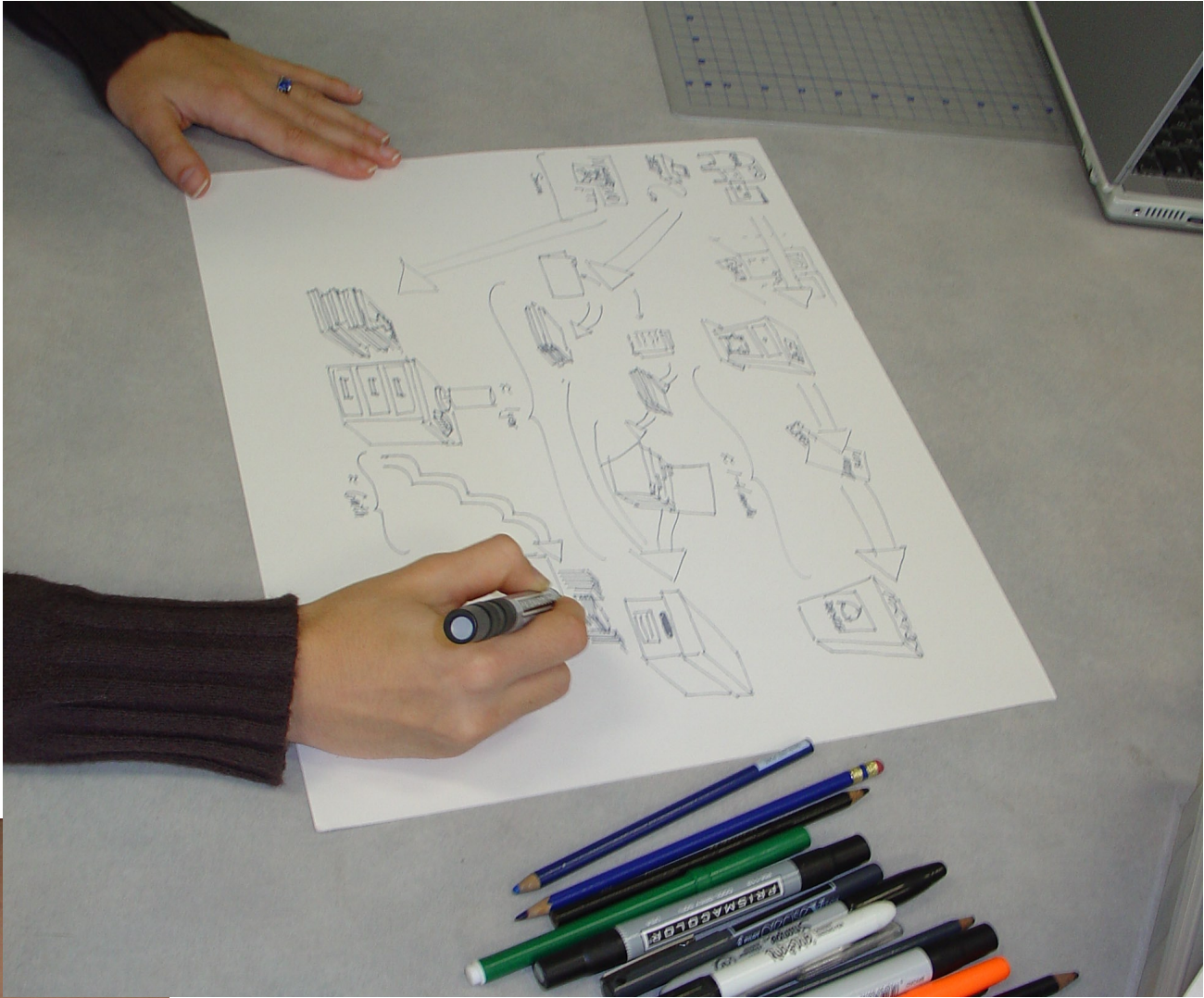
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## Draw Your Experience

I did several participatory research sessions to dig up more information about how people pile and file physical documents and about how they feel about them. I used an IDEO technique called Draw Your Experience, where the subjects draw things in a subject area. I gave them the topic “The Life Cycle of Your Paper” and 30 minutes to draw. Then they had to explain their drawing to the group.



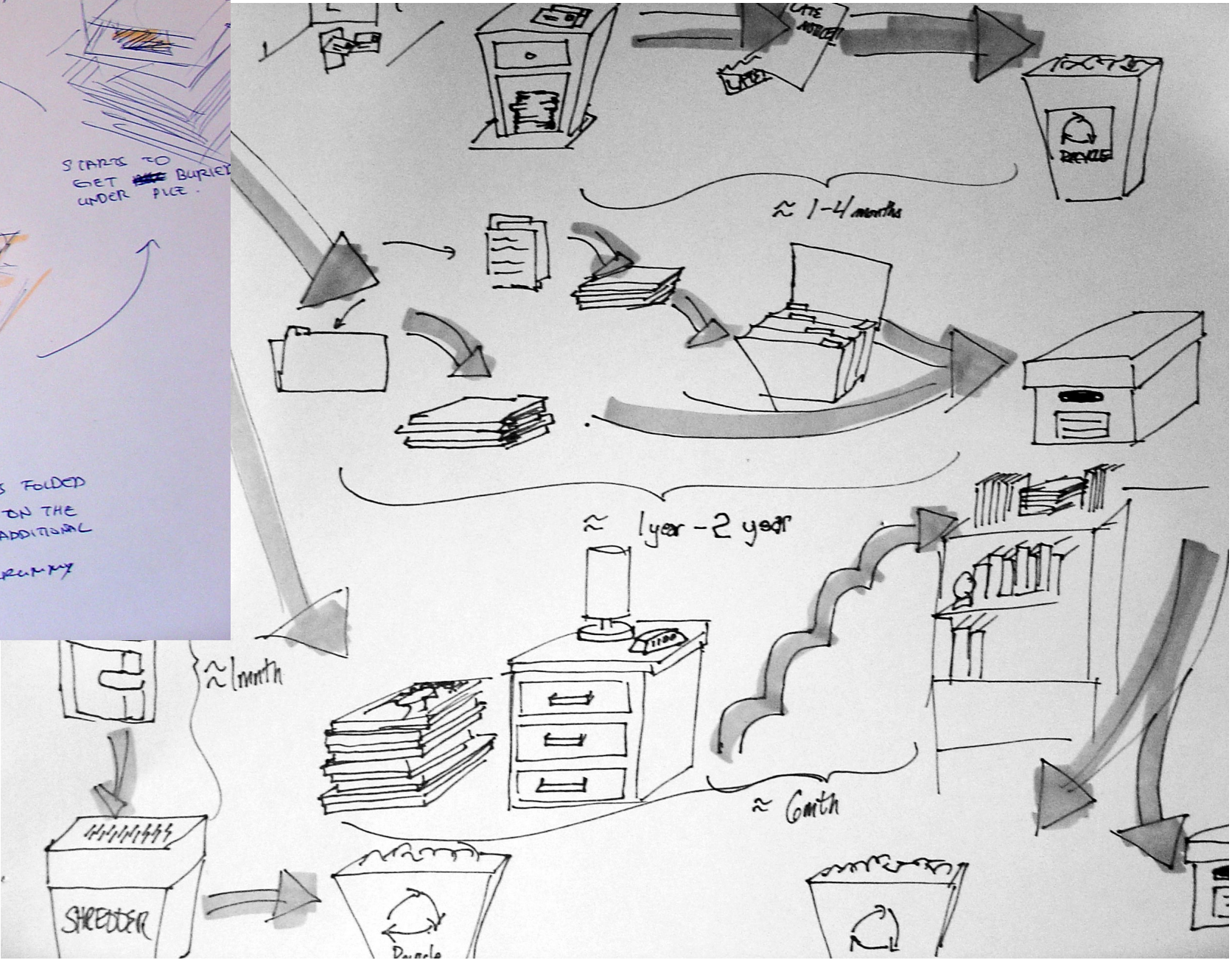
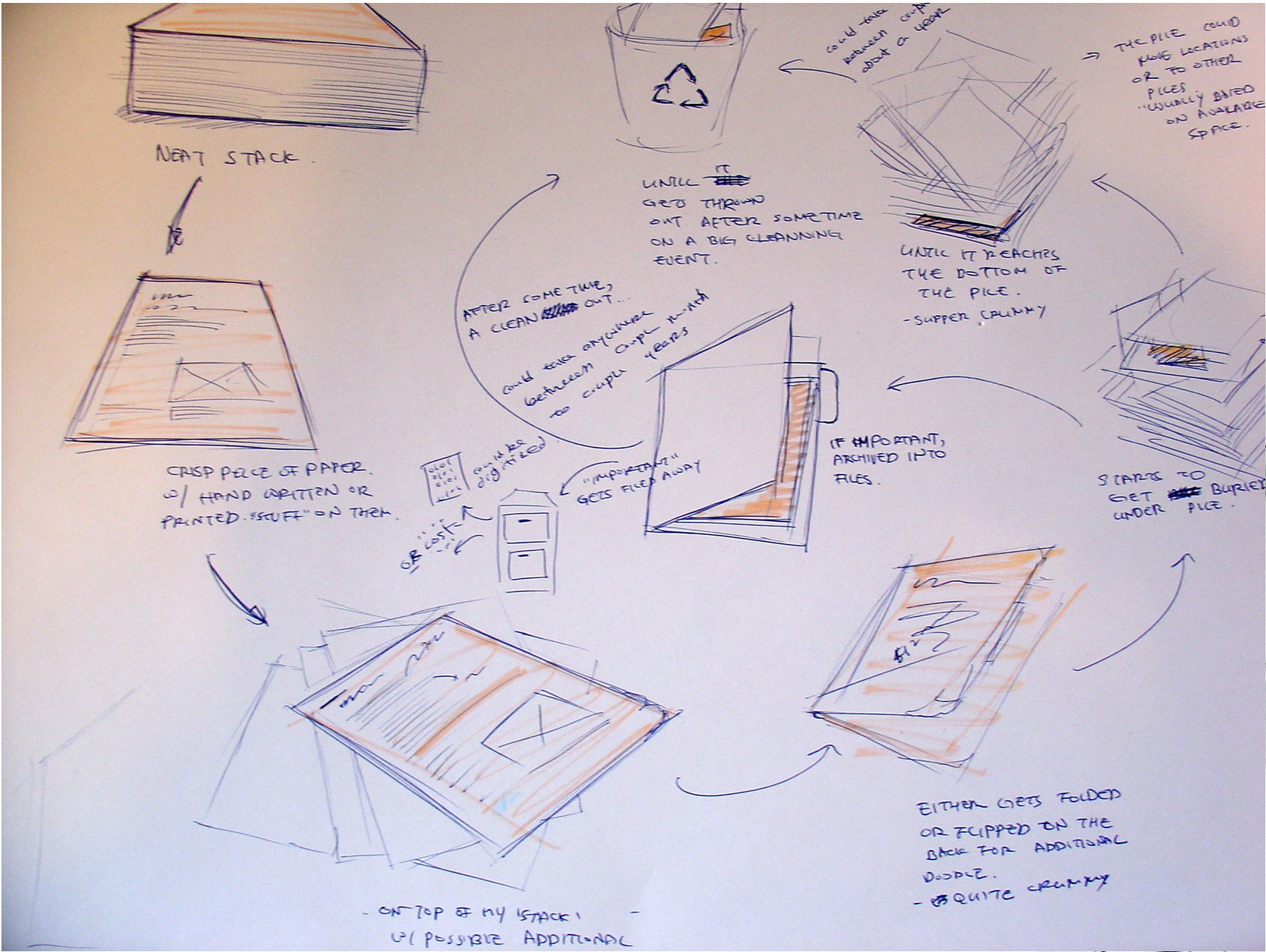
# DRAW YOUR EXPERIENCE SESSIONS







# DRAW YOUR EXPERIENCE SAMPLES





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## Research Models

Based on my Draw Your Experience sessions, interviews, observations, and survey, I created two research models: Anatomy of a Pile and the Lifecycle of Documents.

# RESEARCH MODEL : ANATOMY OF A PILE

Piles are collections of documents related by type, theme, time, or any combinations of those.

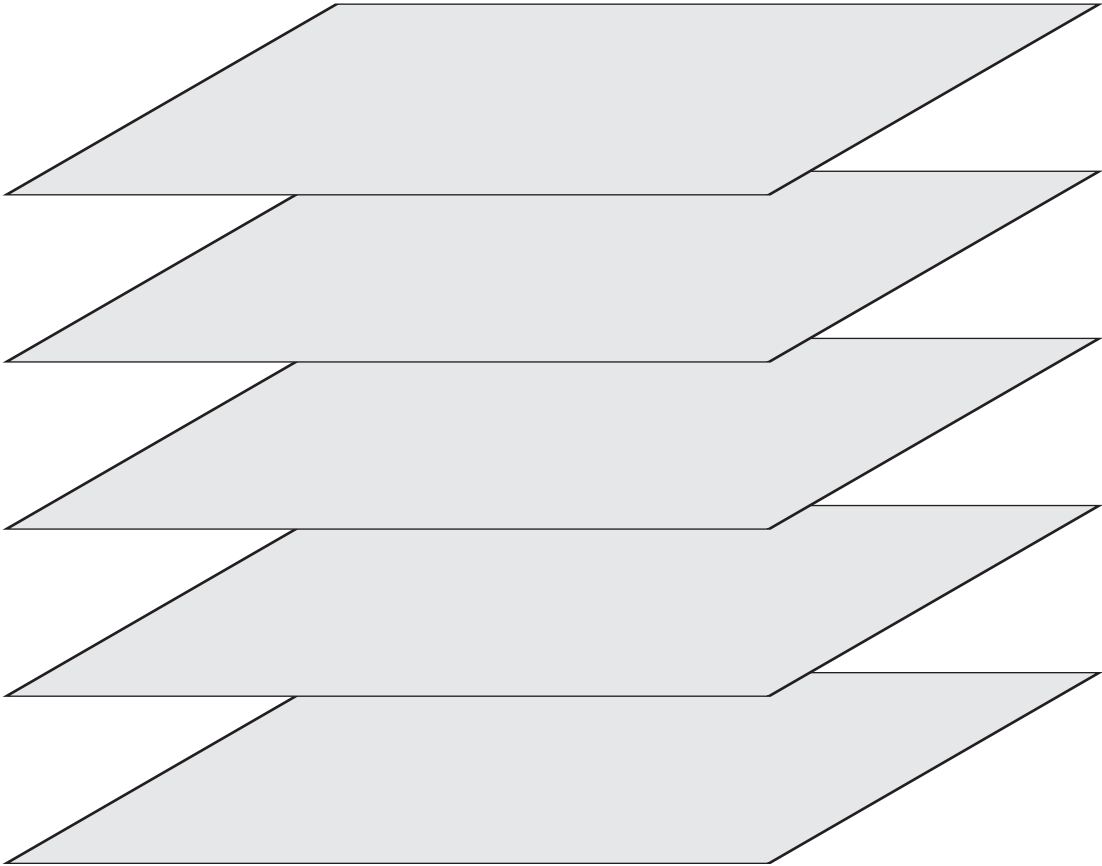
Documents in piles are sometimes annotated by post-it notes or writing directly on the document.

The more important a document is, the longer it takes to travel from the top of the pile to the bottom.

Items at the top of the pile are either important, referenced often, or new. Documents here remind users of tasks they need to accomplish. Documents in view.

Items in the middle of the pile are referenced less often and are decreasing in importance. Documents hidden but easily found.

Items at the bottom of the pile are seldom referenced and are ready to be filed or thrown away. Documents hidden and more difficult to find.



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## **Design Implications from the Research Models**

Items on the top of piles should be visible.

As files get accessed less frequently, they should drift deeper into the pile.

Piles should be easy to file when done.

Users need to be able to browse through the piles to find things not at the top.

Pile visualization should reflect the amount of items in the pile.

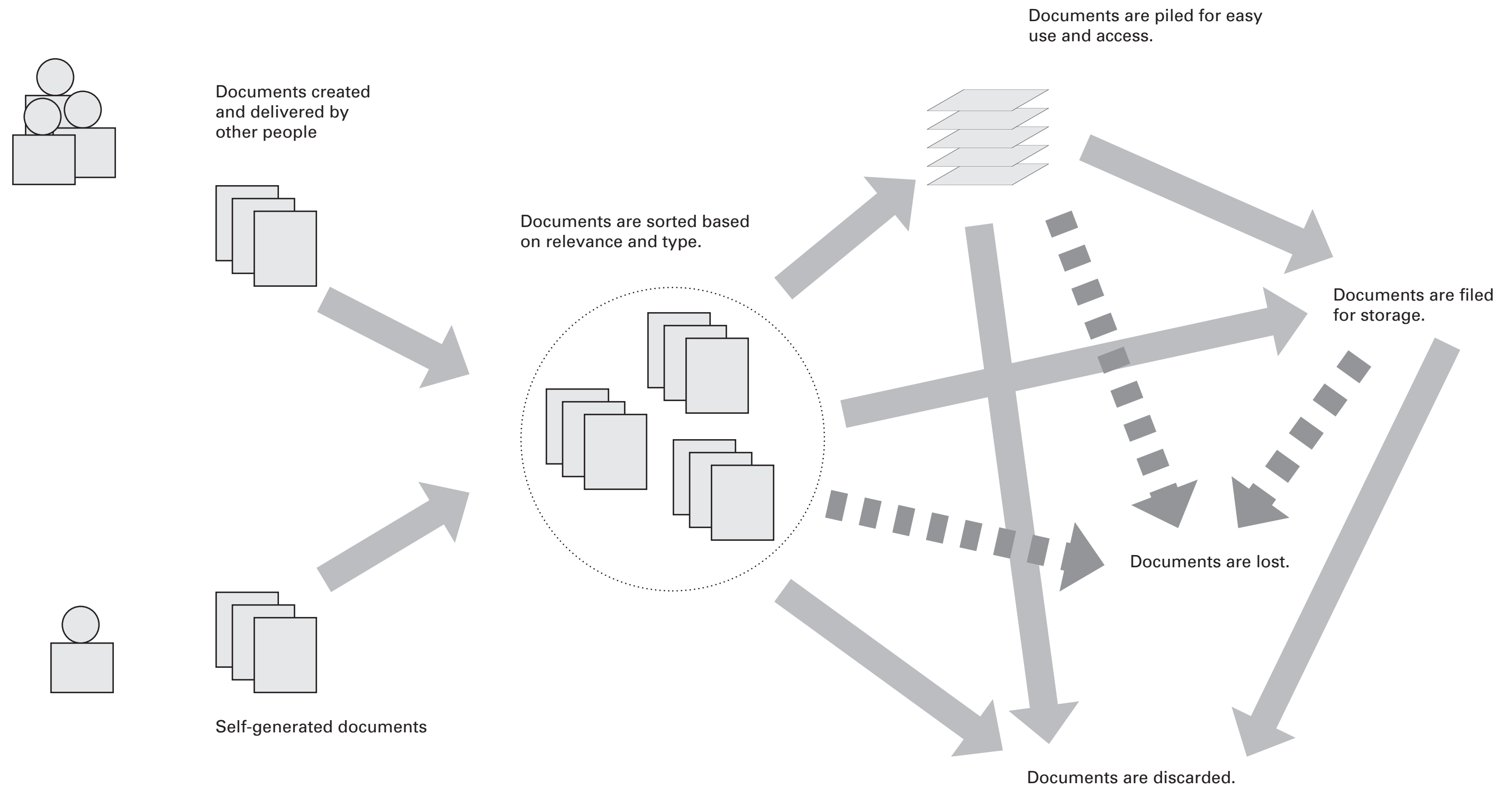
Pile visualization should reflect the last time accessed.

It should be easy to re-sort the pile (to move files back to the top or down to the bottom).

It should be easy to discard things from the pile.

It should be easy to pile things as they are received or created.

# RESEARCH MODEL : DOCUMENT LIFE CYCLE



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# Personae

I distilled my users down to three personae, based on their document usage, computer expertise, and physical piling.





# Ann

## primary persona

### computer usage

computer **Dell PC Laptop**  
 operating system **Windows XP Home**  
 expertise **Intermediate**  
 comfort **Comfortable**  
 time **40 hours/week**  
 programs **Email, Word, Powerpoint, IE**

### paper usage

desktop **Messy**  
 filing time **Every Six Months**  
 piles **One Big Pile**  
 types **Printouts, Mail, Post-Its, Receipts**

### document usage

types **Word Files, Email**  
 desktop **Folders, Few Loose Items**  
 filing time **As Created**  
 piling **Folders as Piles**

*"I make an Important  
 Papers Stack. The stack  
 is a nightmare, but I  
 know what's in it and  
 where to find it."*

## demographics

age **34**  
 occupation **Journalist**  
 location **Pittsburgh**  
 marital status **Divorced**  
 children **Two**  
 income **\$42,000**  
 education **College Graduate**  
 hobbies **Yoga, Hiking, Reading**





# Ralph

## secondary **persona**

### **computer** usage

computer **Mac G4 Powerbook**

operating system **OSX**

expertise **Expert**

comfort **Very Comfortable**

time **50 hours/week**

programs **Email, Illustrator, InDesign**

### **paper** usage

desktop **Semi-Messy**

filing time **Every Three Months**

piles **Piles for Different Projects**

types **Printouts, Memos**

### **document** usage

types **Image Files, Word Files, Email**

desktop **Many Loose Items**

filing time **Every Few Weeks**

piling **Desktop as One Big Pile**

*“The desktop becomes  
an important papers  
file while I’m working  
on something, then  
afterwards I clean it up.”*

## **demographics**

age **42**

occupation **Creative Director**

location **San Francisco**

marital status **Married**

children **Two**

income **\$110,000**

education **College Graduate**

hobbies **Surfing, Rare Record Collector**





## demographics

age **26**

occupation **Graduate Student**

location **Cambridge, MA**

marital status **Single**

children **None**

income **\$26,000**

education **College Graduate**

hobbies **Gaming, Skiing, Pinball**

## Andy

### tertiary **persona**

### computer usage

computer **Mac G5 Tower**

operating system **OSX**

expertise **Super User**

comfort **Very Comfortable**

time **80 hours/week**

programs **Email, IM, iTunes, Word**

### paper usage

desktop **Neat**

filing time **Daily**

piles **Piles for Different Projects**

types **Printouts, Articles**

### document usage

types **Image Files, Word Files, Email, IM**

desktop **Messy**

filing time **Every Few Weeks**

piling **Each Desktop is Its Own Pile**


***"I have multiple desktops. Each one is its own pile."***


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## **Scenarios of Use and Task Analysis**

Once I had my personae, I ran them through scenarios of use, then distilled those scenarios down to an actionable task list that the system would have to support.

# SCENARIOS AND TASK ANALYSIS

	SCENARIO ONE	SCENARIO TWO	SCENARIO THREE	SCENARIO FOUR
<div><p><b>Ann</b> primary persona</p></div>	<p>Ann creates a Word document.</p> <p>She saves the document.</p> <p>Under the File menu, she chooses Add to Pile and then the name of the pile.</p> <p>The document becomes part of the pile.</p>	<p>Ann sees her document on the top of a desktop pile.</p> <p>She double-clicks the document and the document opens in the appropriate program.</p>	<p>There is a file somewhere in one of her desktop piles that Ann wants to see.</p> <p>She selects the pile then uses the roller on her mouse to flip through the documents.</p> <p>When she sees the file she wants, she double-clicks it to open it.</p>	<p>Done with a project, Ann wants to file the associated pile.</p> <p>She selects the pile, then drags it to a folder.</p> <p>Inside a folder, the pile breaks up into its component parts.</p>

<div><p><b>Ralph</b> secondary persona</p></div>	<p>Ralph has a number of documents on his desktop he wants to make into a pile.</p> <p>He selects them.</p> <p>He chooses Make a Pile from the Finder menu.</p> <p>The documents become a pile.</p> <p>He names the pile.</p>	<p>Ralph wants to see all the documents in a pile.</p> <p>He selects a pile and hovers his cursor over it.</p> <p>The pile expands to show all the documents in it.</p>	<p>Ralph wants to remove a document from a pile because it is no longer relevant.</p> <p>He finds the document in the pile and selects it.</p> <p>He drags it out of the pile.</p>	
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<div><p><b>Andy</b> tertiary persona</p></div>	<p>Andy gets a email about a research project he’s working on. He wants to add that to the project’s pile.</p> <p>From his email client, Andy drags the email onto the pile, creating an alias of the email on the pile.</p>	<p>Andy has an email message on the top of his pile, but he doesn’t want it on top, just in the middle somewhere.</p>		
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## TASK ANALYSIS

- Make a pile
- Add an item to the pile
- Remove an item from the pile
- Move a pile
- File a pile
- Search a pile
- Browse a pile
- See all documents in a pile
- Open the top document of a pile
- Return documents to the pile
- Break up a pile
- Name a pile
- Combine piles
- Move an item higher in a pile
- Move an item lower in a pile
- Filter pile by file type

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# Mood Board

To get the feel of the system (as opposed to the functionality), I made a mood board.







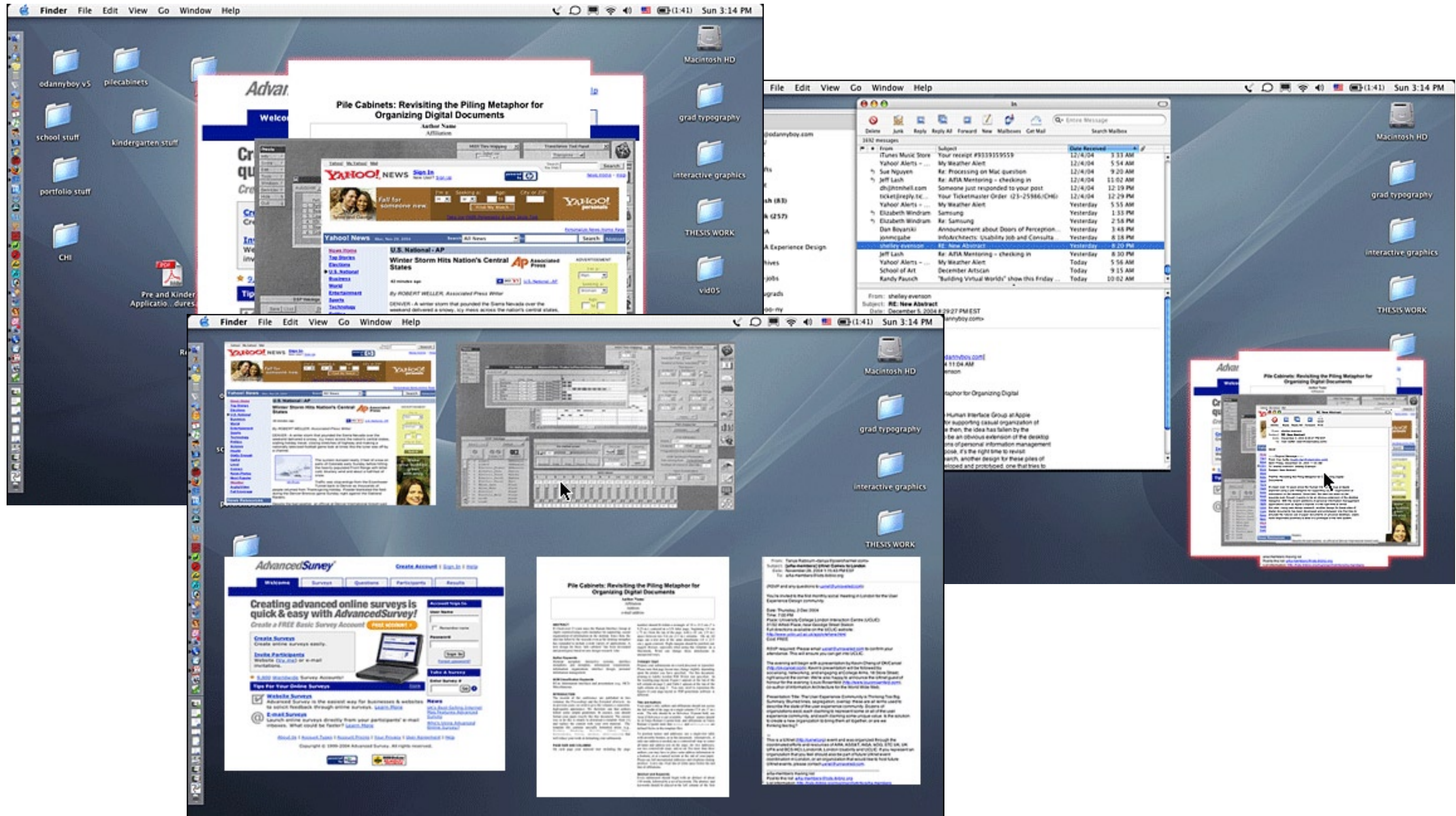
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## **“Paper” Prototype**

After a brainstorming period, I created a crude (intentionally so) prototype, made of HTML, non-interactive animated images, and text to demonstrate the features, aesthetics, and functionality of FilePiles. I posted this prototype on the web and proceeded to test it and get feedback on it.

While this prototype (and the final one) have the appearance of Mac OS X 10.3, FilePiles was conceived platform-neutral and could potentially be implemented on Windows or Unix.

# SCREEN CAPTURES FROM THE "PAPER" PROTOTYPE



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## **Interactive Prototype**

For nearly three months (March–May 2005), I worked with a developer, Dave Rowett, in the creation of an interactive prototype. The prototype, built in Flash, went through two rounds of testing and refinement before time and monetary restrictions put an end to the project.

The details of the final prototype will be described in the following pages, alongside screenshots of the prototype.



### Filing a Pile

Piles can be dragged into folders for more permanent storage. Once in a folder, they can remain piles, or else be unpiled to unpack their contents.

### Folders and Piling

Folders, too, can be piled.

### Adding Documents to a Pile

Once a pile is formed, documents on the desktop can be simply dragged onto it to be added. Icons will turn into images (screenshots) of the document. Documents can also be saved to a pile using the “Save” commands of programs. Some types of documents like email can be dragged directly from their programs into a pile.

### Browsing and Sorting a Pile

Using the up and down arrows or the scrollwheel on a mouse will thumb through the documents in a pile. Double-clicking on the pile itself (not a document in the pile) will scatter the pile (see the section on scattering). Additionally, using the right-click (PC) or control-click (Mac) menu, piles can be sorted by file type, date files were created, or by date added to the pile.

### Deleting and Unpiling Piles

Piles (and their associated files) can be deleted by either dragging the pile to the trash or else clicking on Delete Pile in the right-click (PC)/control-click (Mac) menu. A pile can be broken up into its individual files again using the right-click/control-click menu item Unpile Files.

### Creating a Pile

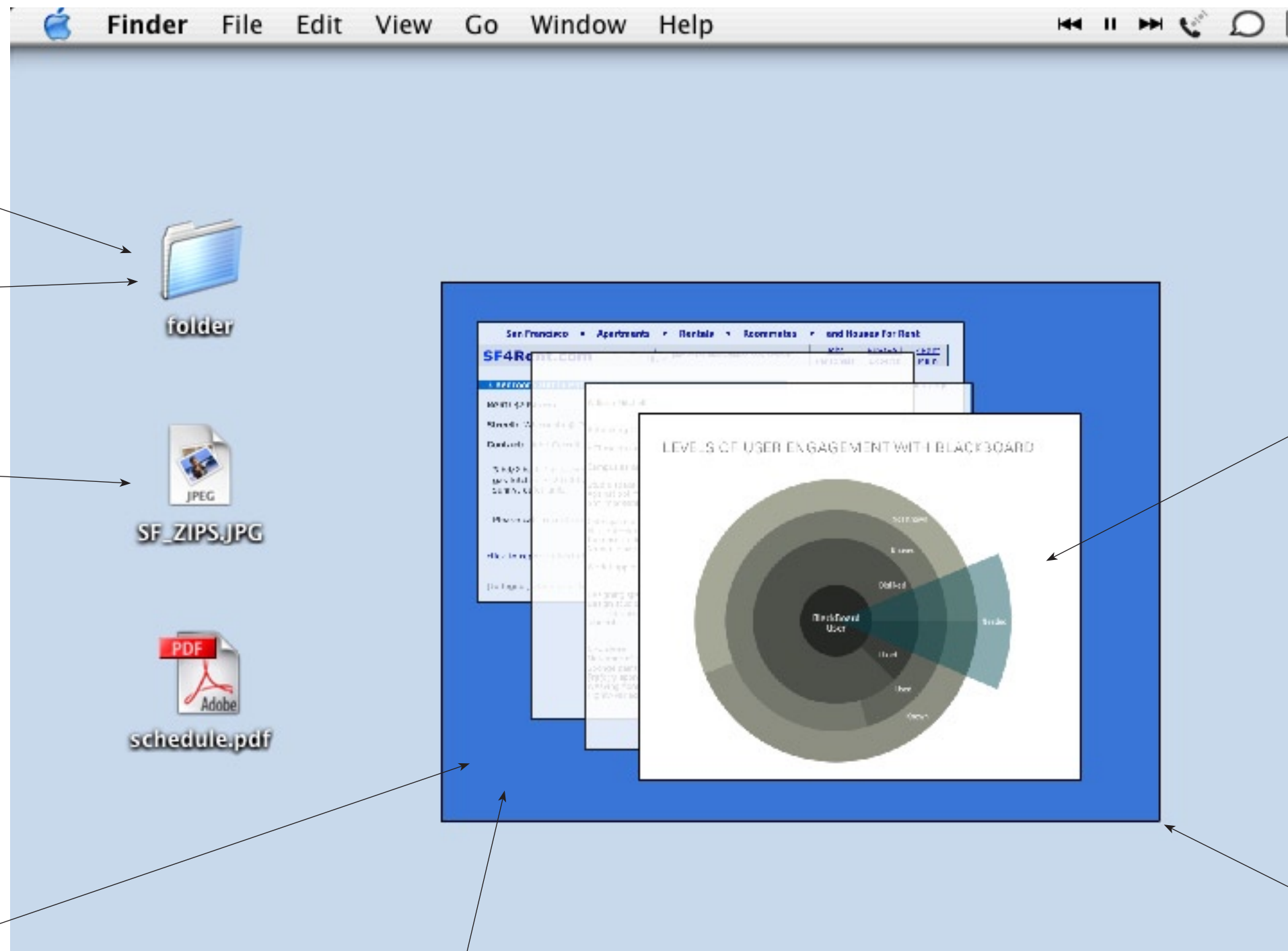
Piles can be created in two ways. The simplest way is to simply drag one file onto another until both files are selected. Releasing the dragged file will create a pile. The second way to create a pile is to create one while doing a “Save as...” command, creating a pile to save the file to instead of a folder or the desktop.

### Using Piled Documents

The document at the top of the pile is considered active. A double-click on it will launch the program associated with that file. Pressing the delete key will move that document to the trash. The document underneath will now be on top and can be opened. Hovering the cursor over a piled file will bring up a “tool tip” of the file name. Clicking on a document in the pile will bring that document to the top of the pile. Documents can be dragged off the pile and back onto the desktop.

### Moving and Scaling a Pile

Piles can be moved via drag and drop like other desktop items. Grabbing the bottom right corner of a pile will scale it (and the images of the documents inside) larger or smaller.





### Scatter Mode

A pile can go into scatter mode either by using the Scatter Pile item in the right-click/control-click menu or by simply double-clicking on the edge of pile. In scatter mode, all the files in a pile are scaled and placed around the screen so that they can all be seen at once, with the top of the pile being in the upper left corner of the screen and the bottom of the pile in the lower right. Rolling over a file will reveal its file name in a “tool tip” manner. Files can be dragged to new positions while in scatter mode, moving them either lower or higher in the pile. The other files will automatically adjust to the dragging and dropping. Clicking on any file will reform the pile on the desktop with that file on the top of the pile. Clicking on the blue edge of the pile will reform the pile on the desktop with whatever file is in the top left on top of the pile.

