

# Time2Hide: Spatial Searches and Clutter Alleviation for the Desktop

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## ABSTRACT

The desktop metaphor aimed to create a working environment, which would resemble that of the user's desk. With information abundance this desktop is often cluttered with files and folders. Existing tools partially address the clutter problem and do not support all personal file management requirements. Time2Hide extends the original desktop metaphor by allowing icons that are not used for a long time to gradually fade and merge with the background. This aims to alleviate the problem of icon clutter. Users can also perform spatial searches, defining areas of the desktop they wish to search for icons; can reveal one or more hidden files or can go back in time animating the desktop and its changes. With Time2Hide a user can still use the desktop as a place for storing files and folders, without worrying about the possible clutter and without being afraid that the files might be moved to an unknown location. The new desktop has been implemented and evaluated. To this end, a group of eight users participated in a four-week experimental evaluation. The results of this evaluation reveal that such an enhanced desktop can significantly support users and propose suggestions for further improvements.

## Categories and Subject Descriptors

H5.m. Information interfaces and presentation (e.g., HCI):  
Miscellaneous

## General Terms

Design, Experimentation, Human Factors.

## Keywords

Desktop tool, icon clutter, spatial search, personal information management.

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## 1. INTRODUCTION

The desktop metaphor has now been around for more than a quarter of a century. It first appeared in Xerox Star [6] and it is currently found with small variations in the core of most interaction environments. The desktop metaphor was aiming to create a working environment that would resemble that of the user's desk. Document files would be piled on the desktop as real world documents would be piled on the desk. The user would be able to click on a file and launch the associated application to edit the file. While this was the original notion, users have developed their own interaction routines and methods that take advantage of the desktop metaphor, sometimes in peculiar ways.

Recent studies have investigated the users' habits in regard to the desktop usage and the personal information management routines and several interesting results have been noted [9]. The studies reveal that the desktop is often employed for the following:

*Quick access.* The desktop is the first thing visible to the users when they switch on their computer and, as a result, by many it is used as a means to gain quick access to programs and files.

*Reminding.* Sometimes files are placed on the desktop by the users not only for quick access but also to remind them to process them or to do a particular task [2] [3] [7] [8] [10].

*Temporary Storage.* The desktop is sometimes also used as a temporary storage area. It has been noted as a common practice to first place on the desktop files coming from outside sources and later file them to their proper location [8]. Again, in this case items tend to be forgotten and leading to disarray.

The use of spatial arrangements on the desktop has also been recorded in [8] and [11]. Another issue noted in some of the users is that they seemed to consciously or subconsciously ignore certain files, folders or programs on their desktop [8]. When their attention was brought to this, users said they got used to them and started considering them part of the background and, consequently, ignoring them completely.

Furthermore, as some of the users explained [8], after leaving an icon at a specific position for some time they are reluctant to move it because they are afraid they won't be able to retrieve it. This fact implies the existence of a spatial memory as to the function of specific items in specific positions. Users that have realized its importance sometimes prefer a less tidy desktop and

folder hierarchy to filing away files that they got used to in a specific place and then forgetting where they are.

Clutter seems to be “visually distracting” and “dizzying” for most of the users as noted in [8] and [11] and it is the most common reason why they re-arrange and tidy – up their desktop. However, maintaining their desktop well arranged is a task few users have the luxury of time to perform regularly. As a result, clutter may become a source of distress for them. To this end, we have designed and implemented an enhanced version of a desktop that tackles the problems of clutter and supports spatial and temporal searches.

## 2. PREVIOUS WORK

In [5] the authors introduce a novel desktop metaphor called Lifestreams, which functions as a diary of all the documents a user creates or receives. The user can also store documents to be used in the future such as calendar items, reminders and to-do lists. A basic limitation of that system was the one-dimensional arrangement of documents.

Dourish et al. [4] present a prototype document management system named Presto, which provides rich interaction with documents. The system allows grouping of documents in collections based on their attributes. To interact with document spaces the authors have implemented Vista, a generic browser for Presto document spaces. Vista looks like a traditional PC desktop and it gives a generalized view of the document space, supporting organizational tasks and launching other applications. The browser could be employed as a tool for reducing icon clutter on the desktop, however this could demand extra effort from the user’s end.

In [12] Rekimoto proposed a time centric desktop where the user can travel in time to visit past and future information spaces. The described desktop supports browsing in time, offering a variety of visualization techniques to cater for different user needs.

The latest edition of Mac OS (Mac OS X 10.5 “Leopard”) was made available at the end of October 2007. It includes -among others- a tool called Time Machine [1]. Time machine can be set to archive and keep snapshots of all files on the user’s computer. The tool is mainly a back up utility which apart from storing the files it also allows moving back in time to view changes. To this end, the tool can be used to support personal information management, but it cannot help reduce desktop clutter.

Microsoft Windows XP on the other hand include a tool that aims to help reduce the icon clutter on the desktop. Desktop cleaner can be set to run every 60 days to move unused icons to a pre-determined folder. This approach certainly relieves the desktop clutter problem. On the negative side is that the user cannot customize the time period or the location for storing unused icons. Worse than that, the desktop cleaner by moving icons to another location rearranges the desktop, a feature which studies [8] have noted is not welcomed by most users.

## 3. DESKTOP DESIGN

We have created Time2Hide desktop which supports users in their personal file management with two major design goals:

1. Free space on the desktop and reduce clutter without rearranging the desktop, and
2. Aid both temporal and spatial searches on the desktop.

These goals were derived from the previously mentioned studies on desktop usage and personal information management. While users dislike clutter they are often afraid to move or archive a file in case they forget its new location. On the other hand users frequently tend to spatially arrange files on their desktop and a tool, which would support spatial searches, could prove to be useful for them.

The metaphor for Time2Hide is based on the finding [8] that users tend to disregard icons they see on a daily basis if they do not use them. To this end, icons in Time2Hide start to gradually fade and hide in the desktop. This leaves the desktop clear from any icons the user has not accessed for some time. However, no icons are deleted or moved to another location. All icons remain on the desktop albeit some hidden.

Time2Hide desktop is a proposal for a new desktop which offers a number of new functions to the users, while resembling the original Windows desktop. Users can customize most aspects of the desktop and its ability to hide icons. Users can:

- Define a global time period in days during which icons will gradually fade. To avoid situations where the user switches on the computer after a long period only to find all the icons missing, days correspond to working time, i.e. time the user is logged in.
- Define the disappearance time for specific icons. The user can also define that the icon will always be visible. All settings made specifically for certain icons override the general settings.
- Define an initial time before the icons start to fade.



Figure 1. Area selection

Once the preconfigured time elapses, icons are hidden and the desktop area is cleared. To restore hidden icons on the desktop the user may select one of the following functions:

- Right-click and drag to select an area on the desktop. While dragging, the cursor changes from arrow to shovel to denote the ‘digging up’ function and a tip appears at the lower, right end of the selection box displaying the number of icons selected, the number of hidden icons and the number of deleted or moved to a different location icons (Figure 1).

Once the mouse button is released a popup menu appears with the option to list all files in the selected area. If the user selects the “List Files” option a new

window appears, listing all files along with information concerning days left before the icon disappears, current status (visible, hidden, or deleted), creation data, last accessed date and deleted date if applicable (Figure 2).

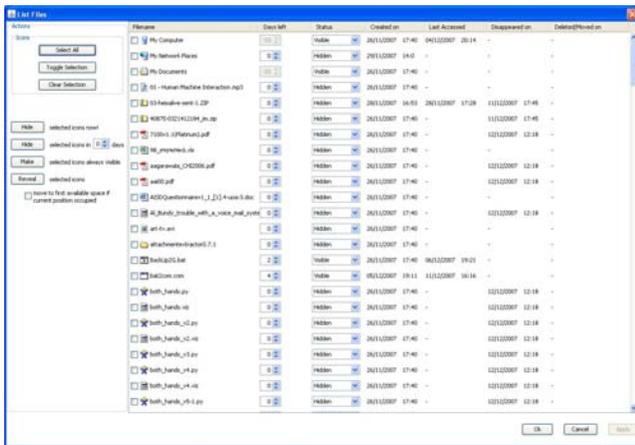


Figure 2. List Files dialog box

Through this window the user can select one or more icons to perform actions such as “hide” or “reveal” immediately, set the selected as “always visible” or change the current number of days before the icons disappears.

- If the user right clicks on any clear area of the desktop the “List Files” option displays all files. Through the popup menu that appears the user can also select to “Search”, “Go Back in Time” and “Customize”.
- If the user does not remember any of the data needed to perform a search she can elect to “Go Back in Time” to reveal a hidden icon. Depending on the customization option the user can either use animation or directly go back to specific dates. When the user finds the file she can right click on it and reveal it.

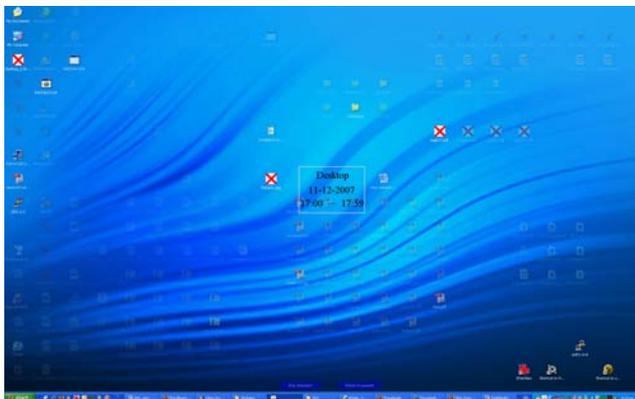


Figure 3. Back in Time animated

Once a hidden icon is revealed it may be the case that a new icon has taken its place. In such a case the two icons are placed on top of each other with a slight displacement. The user can also customize the desktop to initially reveal the icon in its former location and if the space is occupied to animate and move it to the first (starting from the top left corner of the screen) location. The

animation helps the user to notice the change in the icon’s location.

If the animation option is chosen the user can also set the animation granularity: days, hours or minutes. By right-clicking on a clear area of the desktop and selecting the “Go Back in Time” option a square appears in the middle of the screen displaying the date the snapshot of the screen corresponds to. If the user has chosen hours or minutes as the animation granularity, apart from the date the box also displays the exact time period (e.g. 17:00-17:59) (Figure 3).

As illustrated in the figure, icons that have been deleted or moved in the meantime, are shown with a special icon (red X) to denote they are unavailable. By rotating the wheel on the mouse the user can go back or forth in time. The user can also choose to move to a particular date directly from a calendar and be presented with a snapshot of that day’s desktop.

#### 4. IMPLEMENTATION

Time2Hide desktop has been implemented in Java to enhance portability and it employs MySQL database to keep a log of every change on the desktop. The current version of the system emulates Microsoft Windows XP desktop, but future versions will be able to emulate Mac OS X style of desktop. The system runs as full screen application covering the existing windows desktop.

When it executes for the first time Time2Hide reads the user’s desktop folder and populates the emulated desktop with all the icons (files, shortcuts and folders) it finds. After that Time2Hide keeps a log of all changes that happen on the emulated desktop and at the same time monitors the user’s desktop folder. This is necessary because some applications (such as web browsers) tend to save downloaded files on the desktop and this action has to be reflected on the emulated desktop as well.

#### 5. EVALUATION

Time2Hide was evaluated over a four weeks’ period. To this end, eight users (four females and four males) were selected with more than three years experience with computers. All of them used their desktop in their everyday interaction either for quick access to files, for reminding purposes or for temporary storage. To monitor users’ interaction with Time2Hide desktop a questionnaire was compiled consisting of four major parts: user’s profile, current desktop status, user’s view of hiding icons functionality and user’s view of spatial searches. The questionnaire contained forty-nine questions in total, most of which were closed Likert scale questions and the rest open questions. User’s profile was completed once, while the other three parts were being completed at the end of each week. This scheme provided a better view over time of the subject’s interaction and opinion regarding the desktop under evaluation.

##### 5.1 Summary of Evaluation Results

The application was successful in its first aim to alleviate icon clutter on the desktop. Even from the first week some users noted a difference while the majority of users felt that the icon clutter was reduced after four weeks of usage. But icon fading proved to be a stress factor for some users. Three of the users admitted that there was at least one point in time they were afraid they would lose information/icons residing on their desktop. However, after four weeks of everyday use all felt very confident they could find hidden, except for one user who felt moderately confident.

During the same period all of the users uncovered at least one icon, while five out of the eight deliberately hid icons on the desktop. Of the eight users during the evaluation period two never performed a search or list files action on a specific sub-area of the desktop. The response of the rest at this type of search function was positive on its usefulness and very positive its ease of use.

All but one user performed at least once a “Go back in Time” action using the option for animation. The users’ feedback was overall very positive on the usefulness of the function with negative comments on ease of use stemming from the absence of an alternative to the wheel mouse method. This problem was apparent with laptop users who had to revert to an external mouse instead of the touchpad.

Nevertheless, the overall reaction to Time2Hide desktop was very positive as already stated. Users found the desktop overall easy to use and not at all frustrating.

While there was not a direct question on rating the usefulness of each functionality, users’ response on listing the most negative and the most positive aspects of the new desktop indicates that the majority of the users expressed a strong positive opinion on the hiding functionality failing to express any comments (negative or positive) on the search functionality. However, this could also be attributed to the fact that users did not use the search function very often.

## 6. FUTURE WORK

A number of enhancements is foreseen for future versions: The first is to allow the user to move to the future and make changes to future snapshots of the desktop. This will offer the possibility of using the desktop as a reminder.

The method for traveling back and forth in time will also change. Based on the users’ comments a slider will be added allowing the user to change the desktop in a user-defined time frame.

Another enhancement will be a function for naming user-defined areas on the desktop. This will help users to better organize their desktop. The user will be able to define an area and set rules for the icons on that area. For example, the user will be able to define areas for certain types of documents and to automatically arrange the icons on different clusters on the desktop.

Apart from these enhancements we would like to try different metaphors for icon hiding. For example, instead of the icon becoming more transparent as time passes it could shrink to a small size without fully disappearing. This may help users that feel anxious when icons hide from their view.

## 7. CONCLUSIONS

In this paper we have presented Time2Hide desktop, which aims to enhance the common desktop with new functionality. Results from the user evaluation are encouraging. While we do not claim that all users will welcome such a desktop we feel that Time2Hide offers new capabilities that can assist a large percentage of users in their everyday interaction.

We also feel that once we address the issues found, we should continue the evaluation on a longer term and with a larger user sample as there exist some questions that have to be clarified. The main question is what will happen after a few months of usage when there will be a great amount of icons hidden in the desktop.

So far, two users reported that once some icons were on the verge

of becoming invisible they started to clean up, deleting unwanted icons and putting the rest in folders. On the other hand two other users started almost immediately to hide icons they “*did not know what to do with them*” with a mental note to manage them later. Yet, the rest of the users did not do anything, they just left the icons disappear. We hope that a long-term evaluation will reveal how will users interact with Time2Hide and if it affects the way they perform tasks.

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