Planz to Put Our Digital Information in Its Place

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Abstract

Planz provides a single, integrative document-like overlay to a folder hierarchy through the dynamic, on-demand assembly of XML fragments. This overlay provides a context in which to create or reference not only files but also email messages, web pages and informal notes. This paper describes an evaluation of Planz over a period of several days during which participants compared their experiences on two projects – one involving "status quo" methods, a second project involving Planz. Also discussed is an architecture that extends on the front-end to provide additional overlays and on the back-end in support of additional information stores. Work on Planz is guided by a vision of "structural integrity": Many tools, many modes of interaction applied to a common structure for the organization of and access to personal information.

Keywords

Personal information management, PIM, projects

ACM Classification Keywords

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

General Terms

Design, Experimentation, Human Factors

Introduction

Our tools and technologies of Web access and mobile gadgetry work increasingly to remove physical place as a factor of concern in the access to digital information.

But the importance of another sense of place – digital place – persists. Digital place figures prominently, for example, in a person's organization and use of files and folders. Barreau and Nardi [1] identified "location-based finding" as a preferred method of return to files stored on a person's computer. The years since their studies (done in 1993/1994) have seen dramatic improvements in desktop search. But recent studies [2][3][4] indicate that people still prefer to navigate to their files, using search only as a last resort. Considerations of place apply not only to finding files but also to initial keeping where the use of folders is sometimes preferred to a more flexible use of tags [5].

A sense of digital place matters for a number of reasons. Barreau and Nardi noted a reminding value for location-based finding. Related to this is a value of serendipity: along the path to sought-for information, other information of relevance may be encountered that might otherwise be overlooked.

An "orienteering" method of information access also enables a more stepwise progression towards desired information in which the expression of each step is relatively easy and, if a wrong step is taken, corrective backtracking is also easy [16]. There are related notions that recognition is generally easier than recall [13] and that the memory for how to access information is sometimes more "in our movements", so to speak, as procedural knowledge rather than "in our words" as declarative knowledge [2].

In some cases, we can't know whether we have the right information item without the ability to inspect a larger context in which the item occurs [16] – as we do routinely, for example, to locate the "correct" version of a document. In other cases, an item's place within a larger folder structure and its proximity to other items has informational value in its own right [11].

A sense of digital place with respect to a personal filing system is closely related to notions of familiarity, control and organization. As people organize their digital information, this is most likely to be manifest in a personal file system [3][11]. People express a sense of control, ownership and even pride (e.g., [3], p. 585) concerning their files and their organization.

Even so, the organization of files into folders can be a difficult and error-prone activity. The contents of a folder, once the folder is opened, may aid in reminding. But a folder closed is more a door than a window and its contents are easily forgotten [14]. The placement of files into folders can be a difficult act of categorization forced upon a person before there is clear sense of the file's purpose or its relationship to other files [13][14].

These recognized problems with file system use have motivated some researchers to explore "placeless" alternatives involving tags and properties [7] and giving greater emphasis to search [6].

The prototype described in this paper explores an opposing possibility – that many problems of personal file management and, more generally, of personal information management (PIM) can be mitigated by instilling a greater sense of "place" and "placing" for digital information.

The Personal Project Planner (Planz)

The Personal Project Planner, "Planz" for short, provides document-like overlays to a personal file system with additional support for the organization of other forms of information including email messages, web references and informal notes.[1] Support for place and placing is at two levels:
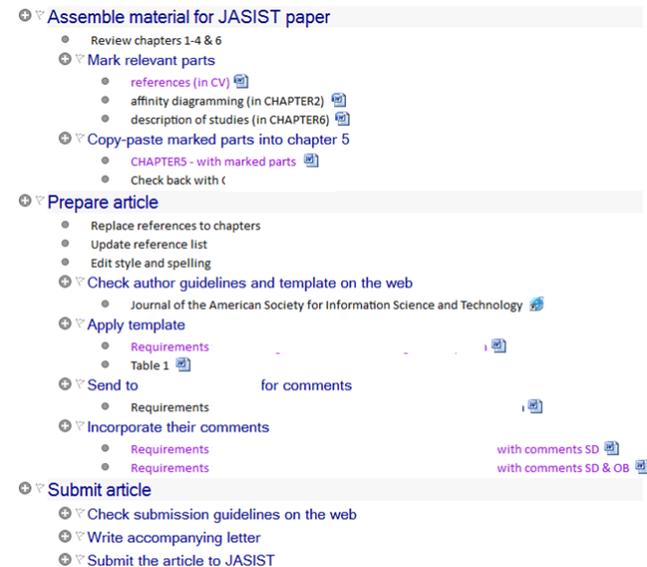
On the front-end, a document
Planz displays a document in either a *draft* or *outline* view (see figure 1). This document can be edited to show all of a person's projects and tasks in a single, scrollable view. Headings often represent high-level projects ("Plan family vacation for summer"); subheadings then represent component tasks ("Make plane reservations").

This document also provides the basis for an organization of project- and task-relevant information via two basic operations:

➢ *"Drag & link"* to existing documents, email messages and web pages from the "outside-in". Simply select the item, drag and drop to a location within the Planz document. The item stays where it is (as a file, email message or web page) but a link pointing to this item is created within the Planz document. Or, select text as a summary or "hook" to the item. Drop the text into the Planz document plan to place a copy of the text in a new note with a link back to the item.

➢ *In-context create.* Send email messages and create new documents from the "inside-out". These items are created as they would be normally (in separate windows managed by supporting applications such as the word processor or email application). However, the Planner places a link to the document created or the email message sent near the insertion point within the Planz document.

In other respects, Planz has the affordances of a basic word processor: 1. Type directly to create or modify notes and headings. 2. Move headings and notes up or down as one might move blocks of text in an electronic document. 3. Expand and collapse headings to reveal or hide content. 4. Promote notes to be headings; demote headings to be notes.

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[1] The version of Planz (7.2) described here is a desktop application based on .NET 3.0. Planz works under Microsoft Windows and integrates with Microsoft Outlook, Microsoft Word, and other Microsoft Office applications. However, the Planz approach readily extends to other operating systems and other applications.

On the back-end, the file system
Headings and subheadings correspond to file system folders and subfolders. Links within Planz correspond either to local files within these folders or to shortcuts which, in turn, can point to files, web pages or email messages. The mapping from headings and links to folders and files/shortcuts is one-to-one.

In short, Planz works with and as an alternative to the file manager. Users can create, modify or delete folders and files through operations initiated within Planz. In the other direction, a process of synchronization works to insure the document views of Planz are current with respect changes to the file system made outside Planz.

The document overlay of Planz has made the realization of additional features straightforward:

➤ *In-place expansion*. Link to any accessible folder from within a Planz document; expand to see this folder's contents in-place.
➤ *Folder-focused views*. By default, Planz presents a document that is anchored at a "Projects" folder.[2] However, for any folder selected in the file manager, Planz can also be invoked as a right-click option to present a document anchored at this folder instead.
➤ *Save As HTML*. The document presented in a Planz window can be saved as an HTML file to be viewed in a Web browser or edited in a word processor. Structure as well as content is preserved.[3]
➤ *Export Structure*. The structure of a Planz document can also be exported for re-use either as

a project template or for immediate use in another project.[4]

Motivations and a meeting in the middle
Why a document overlay? Why the file system? Why not instead, for example, support the freedom to place in two dimensions similar to Microsoft OneNote or, even, in three dimensions? On the back-end, why not a more flexible, advanced system of storage?

Both the document overlay and the file system followed from considerations of familiarity (place) and control (placing). As noted in the introduction, people are most likely to invest first and feel the greatest sense of ownership in their personal file system [3][11]. When people do give digital expression to project tasks and to-dos, this often takes the form of lists created in a word processing application [9]. And certainly the basic ability to use a word processor is widespread. But clearly other choices could have been reasonably made on both the front-end and the back-end.

More central to the Planz approach and its research significance, are choices made at a middle level. Planz realizes its document overlay through a dynamic, "on-demand" assembly of many small XML fragments.

Each XML fragment defines a "Plan" – the basic unit of organization within Planz. A Plan is an ordered list of notes followed by an ordered list of headings. Plans are in one-to-one association with folders. The XML fragment defining a Plan is stored as an ordinary text file within the associated folder. The actual display of a Plan follows a process of synchronization between a

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[2] "Projects" is created on installation of Planz as a sibling folder of "Documents" (or for Windows XP users, "My Projects").

[3] In Microsoft Word, for example, headings are given a "style" of Heading 1, 2, 3… according to heading level within Planz.

[4] The export of structure copies the folder structure of a Planz document but not the content within these folders.

Plan's XML fragment and the "reality" of the associated folder's actual contents. In cases of conflict, the file system always wins.

Planz generates a window's document as follows:

1. Retrieve the XML fragment for the window's anchor folder and synchronize its information with actual folder contents as provided through file system calls. This produces a top-level Plan.
2. Do the same, in turn, for the folder associated with each heading in this Plan that was shown expanded when the Plan was last displayed.

The provision for XML fragments, and their rapid assembly in support of coherent, integrative views, forms the basis for a middleware layer. It is possible to support additional views – a "mind map"[5], for example, or a workflow – through a modest addition of attributes to the XML fragment (e.g., x- and y-offsets needed to position folders as nodes in a mind map). The architecture of Planz then provides the basis for the exploration of a number of different views and modes of information management. This possibility is further discussed in the concluding section.

Comparisons to related efforts
Planz draws inspiration from Kaptelinin's work on an UMEA prototype [12]. UMEA is a system for creating "project-related pools consisting of documents, folders, URLs, and contacts" (p. 353).

Planz also uses the project as a basis for organizing various forms of information. In UMEA, a project is represented by what is essentially a tag. A tag can be

⁵ http://en.wikipedia.org/wiki/Mind_map.

used both to retrieve project-related resources and to set a current context. But users must then remember to change this tag later should the context change.

Users of Planz, by contrast, develop a project place through an internal structure of headings, subheadings and notes. This structure and its state of expansion offer an informal view of a project's status: what's done and what needs to be done. Links within this structure can be clicked for rapid access to project-related documents, emails and web pages. Current position within this structure (e.g., as set by the insertion point) establishes context. Newly created documents and newly sent email are "tagged" by links placed near the current position. As users move to a different project or to a different area within the current project, this change of position implicitly changes context.

Place, context and support for a visible interrelating of information resources are also explored in two more recent efforts, Giornata [20] and WikiFolders [19]. Giornata follows in a succession of tools for window management (e.g., [15]) extending back to the Rooms system [8]. Users of Giornata create and switch between virtual desktops – each tailored for a different activity. When a new desktop is activated, a new set of windows are opened. A desktop also provides access to files and folders created from or linked into the desktop.

By contrast, window management is not a primary design goal of Planz and there is no notion of a (discontinuous) jump between one constellation of open windows and another. By default, Planz presents all of a user's projects in what amounts to a single document. Users can scroll, navigate, expand, collapse

and rearrange projects according to their current activity. Users can also type directly to add a thought or to annotate an association to an information item (including email messages). A click on an icon brings an associated item (document, email, web page) into its own window for viewing. The user can click again later for rapid return to this open window.

Planz supports a reality in which: 1. Boundaries between projects (activities) are not always clear. 2. People may effectively need to see and work on several projects at the same time.

Like Planz, WikiFolders works as an overlay to and enhancement of the user's current organization of files and folders. WikiFolders works as an extension to the Macintosh Finder. Planz works as a stand-alone application. Users enter a separate Wiki-like authoring pane to edit a folder's appearance in WikiFolders. In Planz, editing is direct – although the range of options for formatting and display is considerably more limited. The most significant difference is in the scope of the overlay and its enhancements. In WikiFolders, the overlay is within a folder. Planz, by contrast, supports an overlay that crosses folder boundaries.

Evaluation of Planz

An earlier evaluation was reported for a version of Planz (the Personal Project Planner) in which essential features were only partially implemented and participants were guided through a hands-on demonstration of those portions of the prototype that did work [10]. Participant response was generally positive. As one participant noted, *"…all I do all day long is go back and forth … between programs. …<the prototype> will save me a lot of time." (p. 684).*

Since this reported evaluation, and as guided by several more interim evaluations, the prototype has greatly matured and is now used on a daily basis by members of the KFTF team.[6] The evaluation described in this article, therefore, involves a version of Planz (7.2) that, though still far from a finished product, can be used over an extended period of time towards completion of an actual project of importance to participants in their own lives.

A note about methodology. There is generally considerable demand characteristic associated with any prototype evaluation and especially in relation to questions focused only on the prototype itself (e.g., "How useful is this prototype on a scale of 1 to 5?"). Tohidi et al. [17] observed that "when presented with a single design, users give significantly higher ratings and were more reluctant to criticize" (p. 1243). An ideal might be to give participants a choice between several different prototypes each presented on "equal terms".

However, in a longitudinal evaluation, such an approach makes unrealistic demands both on project resources and participant patience. Fortunately, one alternative is always available and provides a basis for some critical comparison: the status quo. In the current evaluation, participants selected two personal projects of roughly comparable complexity and stage of completion. These projects were randomly assigned to be "Project A" ("Work on this project as you would normally, using your current set of tools") and "Project B" ("Use Planz as much as possible towards completion of this project."). Interim questions and a final questionnaire

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[6] Planz is available as a free download from http://kftf.ischool.washington.edu/planner_index.htm.

then engaged participants in a critical comparison of their experiences on Project A vs. Project B.

Participants
Eight people (five M, three F) participated in the evaluation. Three people were recruited through personal contact with KFTF research team members. Five people responded to an invitation sent out through a University of Washington technical transfer alias. Participants were screened to ensure that they shared the following: 1. Permission to install Planz on at least one computer running Windows XP, Vista or 7, used on a daily basis. 2. Participants made regular use of Microsoft Office 2007 applications on this computer including using Microsoft Outlook as a primary email client. Participants were offered reimbursement at the rate of $15 per hour for the time required to complete interviews and questionnaires and to learn the basics of using Planz (between four and five hours over the course of five to twelve days).[7]

Procedure
Steps of the procedure were as follows:

1. During an initial interview, lasting from 40 to 90 minutes, participants first listed projects they were currently working on and were comfortable discussing. From this initial list, two projects were selected by mutual agreement to be roughly comparable with respect to scope and current state. By a coin flip (literally), one of these projects was designated as "Project A"; the other as "Project B". Participants were instructed to continue working on Project A as they would normally, using their existing set of tools. Participants were instructed to use Planz as much as possible in the completion of Project B.

2. Either during the initial interview (if time could be scheduled) or in a short follow-on session, participants were guided in their installation of Planz and were given a brief (20 to 30 minute) lesson in the use of Planz as this specifically related to the completion of Project B.

3. At the conclusion of the evaluation, participants completed a questionnaire sent via email. Responses were then reviewed during a short (roughly 30 minute) concluding interview.

All evaluations took place in July and August of 2009. The period of evaluation for a participant ranged from five to twelve days depending upon participant availability for a concluding interview and to insure that the period involved at least five working days. With the exception of two participants, all initial interviews were conducted via Skype or over the phone. Concluding interviews were conducted in person for four of the participants.

Results
A centerpiece of the concluding questionnaire is a set of questions asking participants to compare their experiences between Project A (the status quo) and Project B (using Planz). Participants answered each question with "A", "B", "?" (if unsure) or "A!" or "B!" if emphatically certain. Questions and responses are represented in Table 1.

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[7] Four participants declined any compensation with comments such as "this was fun" or "I participated out of curiosity".

Table 1. Responses by participant (columns) to questions comparing the status quo (A) with Planz (B).

Participant	P1	P2	P3	P4	P5	P6	P7	P8
I knew how to keep and organize new <insert> better for Project…								
Q1. docs.	B!	A	A	A	?	A	B!	B
Q2. emails	A	A	A!	B	A	A	A	A
Q3. web refs	B!	A	B	A	B	B	A	B
I knew how find (re-access) existing <insert> better for Project…								
Q4. docs.	B!	A	A	B	A	A	B!	B
Q5. emails	A	A	A!	A	A	B	A	A
Q6. web refs	B!	A	B	A	B	B	A	B
I had a better sense of <insert> for Project…								
Q7. overall status & progress	B	?	B	B	B	B	B!!	B
Q8. priority & next steps	B	?	B	A	?	B	B!	A

A simple non-parametric binomial test of significance was applied to responses scored as -1 for "A" or "A!", 1 for "B" or "B!", and with "?" responses discarded. In a two-tailed test, responses to Q7 are significantly in favor of Project B ($p < .02$). On the other hand, responses to Q2 and Q5 (for the two questions involving email) approach significance for Project A ($p = .07$). No other responses approach significance.

One participant offered that "these comparisons aren't really fair since I've been using my current tools – especially OneNote – for years now but I've only been using Planz for about a week". Even so, responses are balanced overall with neither the status quo (Project A) nor Planz (Project B) a clear winner.

Planz is a clear winner with respect to what can be called the "visibility" factor underlying Question 7. At the same time responses to the related "what to do next" question (Question 8), though slightly favoring Planz, are more mixed. In the concluding interview, participants selecting a "?" or "A" response offered that they already had some means of task management in place, such as the use of tasks in Microsoft Outlook.

Keeping and finding responses for documents and web pages were mixed, favoring neither A nor B. However, the comparable questions for email clearly favored A (the status quo). Based upon participant comments and also reflections of KFTF team members on their own use of Planz, email management appears to be very much its own activity for which users naturally gravitate to the familiar constellation of features in their email application.

Discussion and Next Steps

Results of the evaluation are encouraging. Participants were able to use Planz over a period of several days to manage project-related information. Participant-supplied screenshots such as that of figure 1 tell a story of projects made much more visible with Planz.

Plans are underway (using Planz of course) for a much longer evaluation in which participants will be encouraged to use Planz across all of their projects over a period of several weeks. This evaluation will use a new version of Planz developed under .NET 3.5 and using Windows Presentation Foundation (WPF).

Integration of email remains a major challenge. A more general challenge is to support a fast "note this" [18] operation from outside Planz to capture random

thoughts or to annotate information items (e.g., email, web pages) for later action within a Planz project context. The basics of such a facility will be available in the new version of Planz.

Moving beyond this near-term release, efforts are underway on an elaboration of a middleware layer that generalizes from the current Planz architecture in two key directions:

1. A formal schema that might support an extensible, tool-independent use of XML fragments in support of many different views and modes of information management.
2. An ability to associate XML fragments not only to file folders but also to files, web pages, email messages and, more generally, to any item with a valid uniform resource identifier (URI).[8]

These steps are towards a vision of what might be called a "structural integrity" of personal information. Currently, use of a new tool and its features generally means that existing organizations of information must either be abandoned or duplicated. Even when new tools support a faithful import of existing structures, there is rarely an instance where a new tool completely subsumes existing tools and their use of existing structures. The result is that information fragmentation, a pervasive problem of PIM [9], is made worse.

But what if there were a basis for new tools to work directly with a person's existing structures? Some tools might be Web-based; others might be based on the conventional desktop. Some tools might be used as part of larger group collaborations; other tools – a

journaling tool for example – might focus on regions accessed only by the individual. Many tools, many modes of interaction applied to a common structure. This is a vision that puts not only our information but also our tools in their proper place.

Acknowledgements

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