

The Universal Labeler: Plan the Project and Let Your Information Follow

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The Universal Labeler (UL) supports a single, unified scheme of “labeling” which can be used to organize various kinds of information including electronic documents, email messages and web references. The UL takes a project-centered approach to personal information management (PIM): 1. People often keep information to get things done – to complete projects (“finish a course”, “re-model a house”, etc.). 2. Project-planning involves problem-solving: A person’s conceptualization of a project can often be characterized as a hierarchy of subproject/tasks. 3. Project structure, if made explicit, can aid not only in planning but also in the organization of related information. Projects, subprojects and tasks are represented by “labels” in the UL. Useful properties and behaviors can be associated with these labels – “remind me by” or due dates, for example. The UL is a step towards the integration of information regardless of its form (e-document, paper, web page) and towards the integration of information management with the management of tasks and projects.

Introduction

To live and be active is to have projects. Some projects are professional or work-related; others are personal, family or civic-related (“Re-model the house”, “Organize a volunteer group to keep our city honest”, “Plan a family vacation”). Projects have a lifetime from several days to several years. Projects also have a structure or plan. The structure for some projects is flat – little more than a “to-do” list. The structure for other projects can be quite elaborate. A project may have subprojects which in turn have sub-subprojects.

Sometimes we keep the structure of a project in our heads; at other times, we write it down – on a whiteboard, on paper or even in an electronic document. For example, some of the structure for a project to organize a conference is represented in Figure 1 using the *Outline* view of Microsoft Word (“Word”).

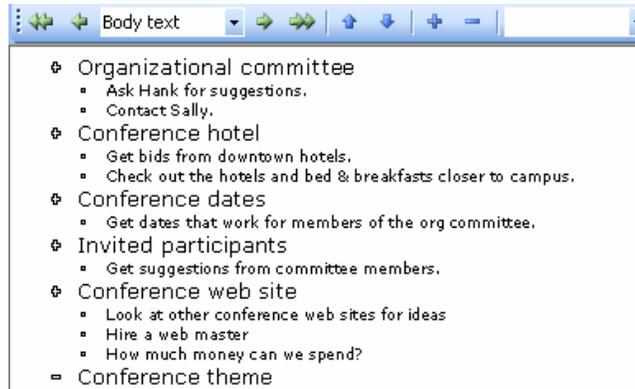


Figure 2. A plan for the organization of a workshop (as represented in the *Outline* view of Word).

Often the structure of a project is partially represented in several different places – in our heads, on pieces of paper, in the to-do lists and the calendar of an application like Microsoft Outlook and so on. The information needed to complete a project is also scattered in different places and in different organizations. For example, information relating to the selection of conference hotel may be in the web references of a “Bookmarks” or “Favorites” collection, in email messages, in various electronic documents and also in paper documents (e.g., brochures from the hotel or notes taken in a meeting).

The fragmentation of information across multiple organizations can create problems at several stages of Personal Information Management or PIM (Bergman, Beyth-Marom, & Nachmias, 2003; Boardman & Sasse, 2004; W. Jones, Bruce, & Dumais, 2003): Where does new information go? (Or is it already “there”?) Where to look for old information? The maintenance of so many folder organizations is daunting. Maintaining consistency between organizations may be nearly impossible. The very assembly or “re-collection” of information across so many organizations can be time-consuming and error-prone.

The Universal Labeler (UL) described in this paper is an attempt to overcome information fragmentation. Its design is driven by two key principles:

1. **A single organization for many types of information.**
2. **Good information management follows from good project management.** The structure of a project – i.e., its decomposition into subprojects at different levels – can provide a useful basis for organizing the information required to complete the project.

Background

The UL is intended to support people in their personal information management or PIM. The UL addresses a major problem of PIM – the problem of *information fragmentation*. The UL’s approach to this problem is to give special attention to *personal projects* as activities with duration (from several days to several years) and a structure, sometimes quite elaborate.

Personal Information Management

PIM is attracting increasing attention as an area of study. In the ideal world, we have the right information at the right time, in the right place, in the right form, and of sufficient completeness and quality to perform the task at hand. Tools and technologies help so that we spend less time with burdensome and error prone activities of information management (such as filing) and more time making creative, intelligent use of the information at hand in order to get things done. In one sense, this is about sending information to yourself — information that you may need later on. We might liken it to throwing a ball into the future, and having it fall into our hands again later at just the right time and place.

The payoffs for advances in PIM are large and varied:

- For each of us as individuals, better PIM means a better use of our precious resources (time, money, energy, attention) and, ultimately, a better quality to our lives.
- Within organizations, better PIM means better employee productivity and better team work in the near-term. Longer-term, PIM is key to the management and leverage of employee expertise.

Advances in PIM may also translate into:

- Improvements in education programs related to information literacy. Progress in PIM is made not only with new tools and technologies but also with new teachable techniques of information management.
- Better support for our aging workforce and population in order to increase the chances that our “mental lifespan” matches our physical lifespan.

The payoffs for better PIM may be especially large in targeted domains such as intelligence analysis or medical informatics. Better PIM may help doctors and nurses to balance a large and varied caseload. Potentially of greater importance may be PIM support for individuals undergoing long-term or sustained treatments for chronic or acute health conditions.

The Problem of Information Fragmentation

A wide range of tools and technologies are now available for the management of personal information. (For recent reviews see (Blandford & Green, 2001; Etzel & Thomas, 1996; Rosenberg, 1999)). But this diversity has become part of the problem leading to *information fragmentation*. A person may maintain several separate, roughly comparable but inevitably inconsistent, organizational schemes for electronic documents, paper documents, email messages and web references. The number of organizational schemes may increase if a person has different email accounts, uses separate computers for home and work, uses a PDA or a smart phone or uses any of a bewildering number of special-purpose PIM tools. New tools often introduce still more schemes of organization. (See, for example, the recently released Microsoft OneNote application (Microsoft, 2003))

A report on PIM (W. Jones & Maier, 2003) from the 2003 Information and Data Management (IDM) workshop identifies information fragmentation as one of the major challenges that must be met if the above-listed benefits of better PIM are to be realized. Moreover, the study of PIM itself is often fragmented according to applications in ways that parallel the fragmentation of personal information itself. Many excellent studies focus uses of and possible improvements to email (Balter, 2000; V. Bellotti, Ducheneaut, Howard, Neuwirth, & Smith, 2002; V. Bellotti, Ducheneaut, Howard, & Smith, 2003; V. Bellotti & Smith, 2000; Ducheneaut & Bellotti, 2001; Gwizdka, 2000, 2002a, 2002b; Mackay, 1988; Whittaker & Sidner, 1996; Wilson, 2002). Other studies focus on the use of the Web or specific web facilities such as bookmarks or history information (Abrams, Baecker, & Chignell, 1998; Byrne, John, Wehrle, & Crow, 1999; Catledge & Pitkow, 1995; Tauscher & Greenberg, 1997a, 1997b). A wide range of studies have looked at the organization and retrieval of documents in paper and electronic form (Carroll, 1982; Case, 1986; Malone, 1983; Whittaker & Hirschberg, 2001).

But the study of PIM across information forms is still in its infancy. The results of initial studies suggest that there is overlap – similar or same folder names, for example – between the organizations for different information forms (Boardman, Sasse, & Spence, 2002).

In the authors' Keeping Found Things Found (KFTF) studies (H. Bruce, Jones, W. and Dumais, S, 2004; H. Bruce, Jones, W., and Dumais, S., 2004; W. Jones, Bruce, & Dumais, 2001; W. Jones et al., 2003; W. Jones, Dumais, & Bruce, 2002) participants often expressed frustration that they needed to maintain so many different organizational schemes in parallel. Several participants indicated that they had largely abandoned their organizations of Favorites or Bookmarks as “one organization too many”. Two participants reported that they had largely abandoned their use of Microsoft OneNote for similar reasons. Both participants enthusiastically embraced OneNote initially for its note-taking features. However, notes taken in OneNote cannot easily participate in existing organizations (e.g., for e-documents, email or bookmarks/favorites). Instead, OneNote comes with its own tabbed organizational support. After their initial enthusiasm waned, these participants were faced with the need to maintain “yet another organization” of information in parallel with existing organizations for e-documents, email messages, bookmarks/favorites and paper.

Four participants indicated that they went to great lengths to consolidate organizations. One person printed everything of importance to paper to be organized in an elaborate paper-based filing system. A second person saved email and web references as or into electronic files to be organized in a computer-based filing system. A third participant embedded web references and e-documents into self-addressed email messages which were then organized into an elaborate email folder hierarchy. Working with his assistant, a fourth participant created a schema for the organization of all his work-related information. This schema was then applied to several different information collections: 1.) the files on his office desktop computer. 2.) his email messages. 3.) the paper documents in his filing cabinets 4.) and the work-related files – paper and electronic – maintained by his assistant.

In one KFTF study, participants were often observed to create elaborate folder hierarchies for specific projects (W. Jones, Phuwanartnurak, A. J., Gill, R & Bruce, H., 2005). Hierarchies were used not only to organize project-related files but also to express a kind of problem decomposition for the project. Subfolders often represented tasks or even whole subprojects in their own right. The project-related folder hierarchy then served as a simple

project plan with several associated benefits. Participants could “see” their information as summarized by the hierarchy and could be reminded of tasks to be completed.

Participants in the KFTF studies were generally good at getting back to a desired information item (e.g., e-document, email message or web page) *if* they remembered to look (H. Bruce, Jones, W. and Dumais, S., 2004; H. Bruce, Jones, W., and Dumais, S., 2004; W. Jones et al., 2003). However, participants complained that they often forgot to look for an information item until the period of its usefulness had passed. The limited data available, therefore, suggests that problems of information fragmentation are serious and likely to be encountered at several different stages of PIM.

Comparisons with Related work

The UL's single-organization (for many forms of information) is in the spirit of other efforts to provide unifying schemes for the representation and organization of personal information. These efforts include LifeStreams (Fertig, Freeman, & Gelernter, 1996), PRESTO/Placeless Documents (Dourish et al., 2000; Dourish, Edwards, LaMarca, & Salisbury, 1999), Haystack (Quan, Huynh, & Karger, 2003) and UMEA (Kaptelinin, 2003). At a general level, the UL takes an approach that supports the creation of organizations of personal information, as external representations, that more closely reflect a person's internal representations for this information (e.g. Barreau, 1995; Bergman et al., 2003; Engelbart, 1961, 1963; W. Jones, 1986a, 1986b, 1988; Kwasnik, 1989; Lansdale, 1988, 1991; Lansdale & Edmonds, 1992 and, of course, Bush, 1945).

Similar to UMEA, the UL supports the notion of a “project” as one means to bring together various types of information items – electronic documents, email-messages, web references – into a single unifying organization. UL work is also related to efforts to support task management (V. Bellotti, Dalal, B. Good, N. Flynn, P. Bobrow, D. G. & Ducheneaut, 2004; Czerwinski, 2004)). A “task” in these efforts is generally opaque with respect to any internal structure and often represents an action of relatively short duration (“return Mel's phone call”, “drop of the car for servicing”, etc.). The “project” as supported in UMEA also lacks an explicit internal structure. By contrast, a project in the UL can be given an explicit, hierarchical structure – it can contain any number of “sub-projects” and base-level tasks. This structure can then be used to organize the information needed to complete the project and its components.

The scope of efforts on the UL is modest. There is, for example, no attempt to manage the storage of information items in the UL. The labels of the UL are folder-like and their organization is essentially hierarchical but with the support of additional properties. The hierarchy is violated only at the level of information items which can have any number of labels. But, a label has only a single containing or parent label.

In the evaluation described in this paper, the UL was a stand-alone application. However, this was done simply to speed the development of a prototype for the sake of evaluation and iterative design. A design goal for the UL is that it eventually disappears altogether as a separate application and instead is visible to the user only via extensions to existing applications – for example, as additional views in a file manager.

The most important feature of the current UL prototype is its support for a *Project Planner*[™] module and for the creation of “project plans”. The Planner module is currently hosted by Word. Figure 3 provides one example of a project plan as rendered in the Outline view of Word.

The UL's support for the Planner view is an attempt to support (and test) a guiding principle of the UL: *Good information management follows from good project management*. Give people a way to think about and structure a project; use this same structure to organize the information needed to complete the project.

A Scenario of Use

Jill is embarking upon a major project to organize a conference. She begins by creating a project plan using the UL's Planner module (see **Figure 4**). The Planner view is supported via a Word “plug-in”.

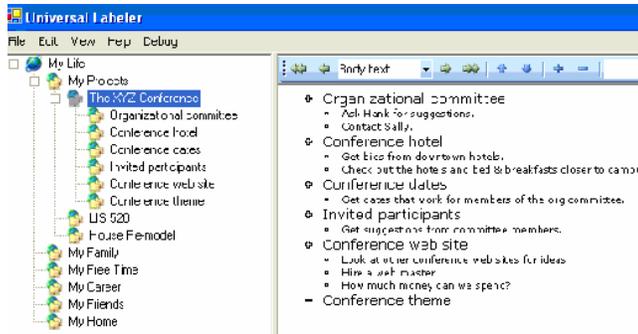


Figure 4. Jill's initial project plan for a conference

Jill uses Word as her primary word processor and is able to use her word processing skills in the construction of a plan for the conference. She types in her thoughts free-hand and makes edits as needed. She likes working in the Outline view where she can easily create an outline of headings and subheadings to reflect her thoughts. However, Jill can also switch to a more “document-like” *Print Layout* view just as she can when she uses Word as a stand-alone application. Other features follow as well. For example, Jill can make a paper printout of her plan.

However, by typing in her thoughts in the Planner, Jill has done more than just create a document – she has created a structure for the organization of project-related information. Headings in the planner document correspond to labels in the UL. Relevant email messages, electronic documents and web references can be associated with these labels through the actions of a simple drag & drop. Jill can do this using the same methods that she has already learned to use for managing her files.

Figure 5 illustrates the use of the UL to organize several types of information. Jill decides to work on establishing conference dates. She initiates the send of an email message (subject: “Please give me your conference dates!”) from within the project plan, with the insertion point under the “Conference dates” heading. A pointer to this email message is created automatically.

Just as Jill fears, most people ignore her request to fill in the web form she pointed them to. Instead, they have simply commented on their availability in the body of the email response. As Jill receives these responses, she simply drags & drops excerpts from messages to reside under the “Conference dates” heading in her project plan for the conference. As she does so, a link is automatically created back to the original email messages. Similarly, Jill is able to drag & drop excerpts from web pages and various e-documents. In each case, a link is created automatically.

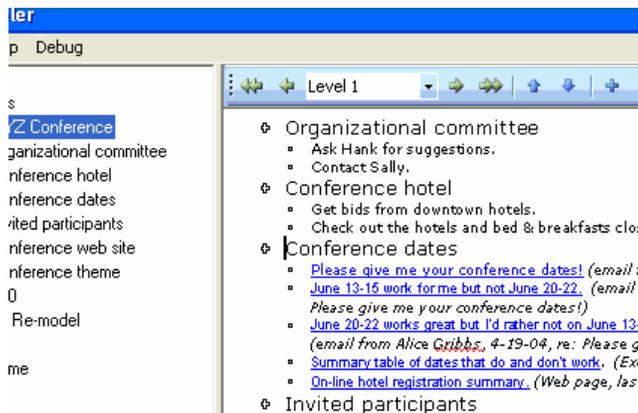


Figure 5. The organization of information follows naturally from an elaboration of the project plan.

These links can be seen and used in other views of the UL which are analogous to views of a file manager such as Microsoft Windows Explorer. Figure 6 depicts an *Icon* view. Links, regardless of how they are viewed, can be clicked on to return to a source document, email message or web page.

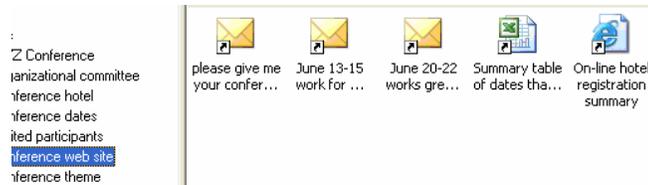


Figure 6. A standard *Icon* view of items initially linked via drag & drops into the Planner view.

The planning document, which Jill might have created anyway, is now much more than a document. Its structure is turned “inside out” to organize various items of information that would otherwise lie scattered across many different information collections. The same structure is used in many ways. This situation is in stark contrast to the situation we commonly see today where people are forced to repeat representations of the same logical structure again and again, imperfectly and inconsistently, in order to organize email, e-documents, web references, notes, excerpts and their own thoughts.

A key feature of the Planner is that it allows Jill to establish an ordering between various components of her project. Jill simply moves the associated heading and its contents, just as she is accustomed to doing in her word processor. In our fieldwork observations, people are often observed to “trick the system” into preserving an ordering of folders and associated information through the use of leading characters such (“aa”, “zz”, “1”, “-”, etc.).

An Evaluation

Sufficient progress has been made in the development of the UL and its Planner module to conduct an initial evaluation. The UL of this evaluation has several important limitations:

1. The “drag & link” of excerpts into the Planner is not yet supported. A “copy & link” is supported instead.
2. Changes made in the Planner appear in “standard” views of the UL such as *Icon* and *List*. However, the converse is not yet true.
3. A *Details* view is not yet supported.

Nevertheless, the Planner could be used by participants to write down and structure their thoughts concerning a project and to make some information connections via a “copy & link”. And participants could view their work in the file-manager *Icon* and *List* views.

Participants and Procedure

Ten people (five women, five men) participated in this initial evaluation. All were affiliated with the University of Washington (three professors, two graduate students, three undergraduate students, two staff members). All participants used Microsoft Windows and Microsoft Office applications (including Word) on their primary computer.

Participants each completed a one-hour session. For professors and staff members, evaluations took place in their workplace. For students, evaluations took place at the same desktop computer in our research lab.

The evaluation consisted of: 1. A 15-minute introductory period in which essential features of the UL were demonstrated and participants selected a project they were currently working on. 2. A 20-minute period of Planner use to construct a plan for the selected project. Participants were encouraged to copy & paste relevant information from web pages and also from Word documents (when accessible). 3. A 10-minute period in which participants were asked to switch to a “file manager” view (*List* or *Icons*) and to attempt a retrieval of an item (web page or Word document) that they had previously linked using a “copy & paste” in the Planner. 4. A final 15-minute period in which participants were asked to describe what they liked and disliked about the UL and to rate the likelihood that they would use a “finished product” version of the UL.

Results

Participants rated the likelihood that they would make daily use of a “finished product” UL on a seven-point scale where 7 is “definitely”, 4 is “don’t know” and 1 is “definitely not”.

Table 1. Participants rated the likelihood that they would use the UL on a daily basis.

Rating	1	2	3	4	5	6	7
Count:		1		1	1	5	2

Participants who gave the two lowest ratings were also the only two participants to rate themselves as generally “bottom-up” in their approach to project planning and to PIM. For example, they resisted the imposition of structure and preferred to have all their information “flat” in a single folder. Conversely, the two “7” ratings came from participants who rated themselves as decidedly “top-down”. Each began first by thinking about the project’s overall structure. One participant reported sometimes copying the folder structure for a related project as a starting point.

Overall, participants liked the Planner and its support for the free-style entry and structuring of their thoughts concerning their project. Three participants specifically liked the fact that they could use their existing expertise in Word and that word-processing features “came for free”. Five participants explicitly said that they liked the automated linking of the copy & paste. Conversely, two participants thought the automated linking might be confusing. One participant voiced two concerns that are likely to apply to many people: 1. While viewing an information item (e.g., document, web page, email message) she wanted to be able to use a “Label With” analog of “Save As” so that the item could be labeled without switching to the UL. 2. This participant doubted that she would be willing to abandon her already elaborate file folder structure for the labeling structure of the UL and she would not want to maintain “yet another organization” (in addition to her file folders). This last point is especially important and reinforces the goal of eventually integrating the UL into the system’s file manager and into other applications.

The Current Prototype

The evaluation described above is part of an ongoing cycle that has been applied repeatedly on the KFTF project: Fieldwork (sometimes with supporting surveys), then modeling and analysis, then selective prototyping and evaluation, and then back again to fieldwork – focused especially on problems identified in the previous evaluation.

Driven by results of the evaluation described in this paper, we have made good progress with what we call an “un-application” version of the UL. All support of the current UL prototype is achieved through extensions to and integrations with existing applications. We focus on Microsoft Windows and Microsoft applications (the Microsoft Windows Explorer, Microsoft Outlook and Microsoft Word, in particular) because “that’s where the users are”. However, there is nothing in UL’s approach that would prevent its implementation across platforms and other applications as well.

Key features of the current prototype are:

- **Label With...** to support fast, easy, in-context creation of shortcuts not only to e-documents and other files but also to email messages and web pages.
- **Task management...** to enable users to set reminders and due dates in their electronic calendar (MS Outlook).
- The introduction of a special “**My Life**” folder and a child “**My Projects**” folder.

The intent of these features is to encourage users to begin using their hierarchy of folders for e-documents and other files as something much more general: A system of classification or “labels” that can be used to organize not only e-documents but also other forms of electronic information including email messages and web pages. Folders as labels can represent not just holding bins for files but also a structure of projects, sub-projects and tasks that need to be completed.

We chose to work with and extend the file folder hierarchy (vs., for example, an email folder hierarchy) because for most people this is the hierarchy they make most extensive and elaborate use of currently (Boardman & Sasse, 2004). In the current UL prototype, people can use their existing folders or they can begin building a new Personal Unifying Taxonomy or “PUT” (W. Jones, 2004) through elaborations of the special “My Life” and its child “My Projects” folder.

Label With

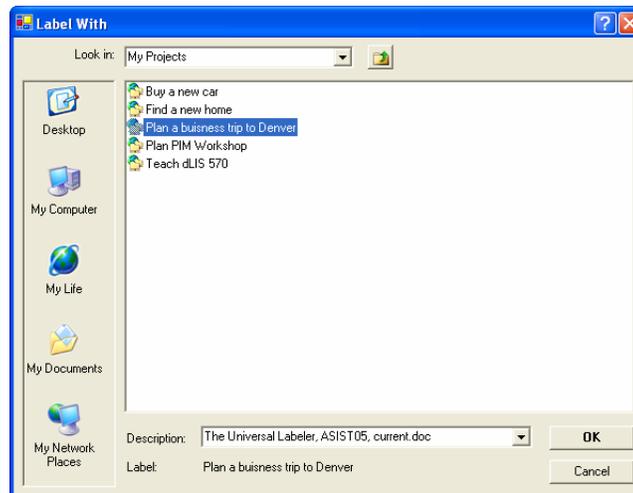


Figure 7. *Label With* supports the fast, in-context creation of shortcuts to e-documents, email messages and web pages.

Label With is a special variation of the standard *Save As* dialog and a reference to it is placed immediately below “*Save As*” on the *File* menu. However, *Label With* has some key differences:

- It is used to select a folder as a “label” for an opened information item (e-document, email message or web page).
- Clicking “OK” initiates the creation of an ordinary shortcut in the selected folder that points to the information item in view.

Label With is, as one participant noted, a kind of “super shortcut maker”. Shortcuts can point not only to e-documents and other files but also to email messages and web pages. Equally important, *Label With* enables the in-context creation of shortcuts. While an information item is open, the user can quickly select any number of labels according to different anticipated uses of the item. Without *Label With*, the creation of a shortcut is cumbersome and distracting: Users must leave the opened document, use the file manager to find where the document is listed as a file, copy, navigate to the folder where a shortcut is desired, and then *Paste Shortcut*.

Label With supports an integration of different forms of information: the file folder hierarchy is now a general system of classification that can be used not only for “files” (e-documents) but also for email messages and web pages. One organization for many forms of information. *Task management* represents a further integration of information and task management.

Task management

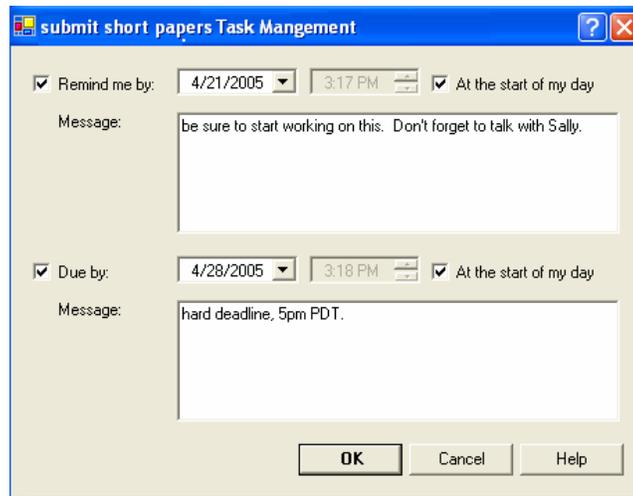


Figure 8. Use *Task management* to set "Remind me by:" and "Due by:" appointments in the calendar.

Task management can be accessed from the context menu for any selected folder. Users can set both a "Remind me by" property and a "Due by" property. Properties are represented as special appointments in the Microsoft Outlook calendar (see Figure 9).



Figure 9. A "Due by" appointment in the calendar.

With *Task management* folders can now be used to represent tasks (projects, activities, etc.) with associated dates. Information needed to complete the task, regardless of its form, can be "labeled" with the folder for easy access. Information management and task/project management are two sides to the same coin. Certainly, it may make sense eventually to support other task-relevant properties as well (for example, "Percent completed", "Priority", or "Total time spent so far").

Next Steps

An evaluation of *Label With* and *Task Management* is underway. Our programming effort is currently focused on a version of the Planner that works as a plug-in to the file manager (currently, Microsoft Windows Explorer). Farther down the road, we would like to complete work on a "Drag & Link" that automatically links from excerpt to source in the way that the copy & paste currently does.

We are also exploring the potential of downloadable Organizers" for various activities such as "Buy a house" or "Get a (better) job". Organizers are a modifiable "canned plan" that people can use as a starting point. Labels/headings of an organizer can help people to approach a project and to remind them of important aspects to the project. Links in an organizer can point to useful reference information.

As measured in person-months of programming, our investment in *Label With* and *Task Management* is quite modest – perhaps 2 person-months so far. But these simple enhancements may "breath new life" into a user's file folder hierarchy so that the same organization has many uses – to integrate different forms of information and to integrate information and task management. The *Planner* may take us one step further in integration – towards a situation in which personal information is naturally organized and managed as an outgrowth of a person's efforts to plan a project.

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