

“I Thought You Would Show Me How to Do It” - Studying and Supporting PIM Strategy Changes

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ABSTRACT

This article presents an unexplored perspective in personal information management (PIM): PIM strategy changes. In the first part of the paper, we introduce a naturalistic study we conducted in order to explore how people manage their information and how their strategies evolve. We propose a model for characterizing PIM strategy changes based on their cause, scope and action. Further, we present collateral user problems and needs found during the study. The second part of the paper presents WotanEye, a software tool making use of information visualization techniques for reflecting the usage, hidden structure and patterns of personal information, towards alternative ways of managing PI and reflecting on one’s own PIM strategies.

1. INTRODUCTION

Personal information management (PIM) is a domain in constant evolution. New devices allow us to carry and access our PI everywhere. The democratization of high capacity storages and progresses in compression algorithms make it easier to collect and manage multimedia PI. The cheapness of storage also discourages any “spring cleaning” of our PI collections. To quote Jones in [18], we prefer buying a new mansion with plenty of rooms for piling up our personal information instead of cleaning our current home and throwing away our old stuff. Moreover, as portable devices’ capacity increases, it seems we could in a near future be proud owners of a device comparable to Rincewind’s *Luggage* in Pratchett’s *Discworld* [23]: a multi-legged trunk with almost infinite storage for items of every kind and that follows us everywhere every time, for better or worse.

Not only does information pile up, but our needs evolve as well. As a consequence, we often have no other choice than to change the way we manage information, even if constantly changing our PIM habits has drawbacks. When we change our job for instance, we generally have to implement new strategies to adapt to the new context. We usually cannot stick once and for all to one strategy of PIM because the

context constantly evolves. Instead, we sporadically adapt our strategy to fit with the new technical possibilities we have or simply because our current strategy has been pushed to the limit and does not respond any more to our needs.

The article is constituted of two somewhat disjoint parts, reflecting two different approaches: the first one is user-centered while the second is technology-driven. While the first part aims at understanding people practices and needs, the second part presents the current development of a prototype we implemented to support PIM through natural means. The first part of the article presents the results of a naturalistic study aiming at studying PIM practices and motivations to analyse and improve it. How do people analyse their PIM strategies? What motivates their changes? Are they interested in analysing their own practices and in learning better ones? And if yes, what is to be done to support them? The second part presents WotanEye, a tool we implemented with the hypothesis that people will better manage their information if manipulating meaningful and natural means such as social, temporal and thematic facets. Further, in connection with the first part, we argue that this tool could help people in adapting their PIM strategies when needed.

2. RELATED WORK

Barreau [5] and Nardi [4] pioneered the studies about digital PIM behaviours. They identified the role of the software and hardware tools in the files management practices of computer users and gave a preview of their PIM habits. One year later, Whittaker dived into people’s emerging email habits [27] and proposed three categories of email management strategies: *no-filers*, *frequent filers* and *spring-cleaners*, the former category being further extended by Balter [2] into *folderless cleaner* and *folderless spring-cleaner*. Abrams [1] did a similar work for bookmarks management strategies. Barreau [3] defines five filing strategies that can be applied to whatever type of information (emails, files, bookmarks, etc.). However, despite the elegance of categorizations, it has been noted that people often fail to adhere strictly to one single category of PIM strategy.

More recently, Boardman [8] summarized recent research on PIM practices, with a particular focus on integration challenges. He notably emphasizes the facts that (1) users generally prefer to browse than to search through their personal information and (2) the personal email archive has a potential for being integrated with the personal files, as similarities are strong between personal files and filed emails, a conclusion also defended by Whittaker, Bellotti and Gwiz-

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dka [26].

Many other researchers conducted studies directed towards the design of particular PIM tools or aiming at evaluating their suitability to user's needs [6, 9, 10, 13]. The different approaches they followed are thoroughly presented in [19].

Most (if not all) studies highlight the difficulties users have to face in order to organize and retrieve information items. Lansdale describes the psychological challenges associated with PIM [20] and brings out two key issues for organizing and re-finding personal information: (1) categorizing items is a cognitively hard task, and (2) people remember contextual cues to personal items that could complement retrieval procedures. It seems that PIM-tools developers have started to address these issues only recently.

Finally, this short state-of-the-art of PIM behaviours studies would not be complete without mentioning a most recent and interesting study conducted by Barreau [3]. She involved participants that already took part to her first study 10 years before and ask them the same questions about their PIM behaviour. Her conclusion is that, even if technological means or job responsibilities of the participants have evolved, some of their PIM behaviours have remained very similar across the years. Barreau's focus in this study is on tracking behaviours that remain the same across the years, given "improvements in technology and expansion of the electronic information environment". Our focus is complementary to Barreau's. Instead of looking at conservative behaviours, we examine fine-grained PIM strategy changes occurring in a shorter time-scale, trying to identify the reason and context that make the change occur. In our understanding, Barreau's *behaviour* characterizes the way people behave in doing PIM with much hindsight, neglecting the specific details of which PIM software is used or which kind of information is managed. To describe it in a broader outline, we have the feeling that what Barreau calls PIM behaviour somewhat stems from individual personality traits which do not evolve much over time. In our work, we propose to use the term of *strategy* to characterize the way people manage their PI for a specific task and context (software, role, etc.). These fine-grained strategies are thus more subject to change than Barreau's *behaviours*.

3. PRESENTATION OF THE STUDY

Naturalistic studies are considered a complementary approach to quantitative studies in PIM, because they can provide a more holistic and contextual understanding of the actual practices and needs of people. Their final goal is to apprehend how they make sense of their personal information and the management strategies related to it [22]. Naturalistic studies rely on fieldwork and contextual observations, which leads to the formulation of hypothesis and knowledge modelling. As computer scientists, we of course have a lesser experience of the fieldwork than the experience a trained ethnographer would have. However, we are domain experts for digital PIM, which has the advantage of providing another insight into the matter [16]. The present section explains our goals, the context of the study and provides a discussion of its results.

3.1 Goals

Our initial goal was to get an overview of the strategies people employ to manage their personal information in the context of their work. We planned to cover more precisely

the areas of task and calendar management as well as email and files management, but remained opened to other opportunities for PIM that we could have not envisioned, according to an holistic approach. During the fieldwork, we consolidated our understanding of PIM strategies. Among the many promising questions that arose, one caught our attention: do people analyse their own PIM practices and are they motivated to improve it? This is a topic not yet well covered in the literature and we saw our fieldwork as an opportunity to gain insight into it. We therefore reframed our goals in order to elicit the means people employ to analyse their own PIM strategies and the motivations behind their strategy changes.

3.2 Context

Twelve participants (coded P1 to P12) were recruited by convenience among the circle of friends and acquaintances of the authors, as it is often the case with naturalistic studies. Moreover, as this study deals with personal matters, we believe this also helps the participants to know and trust the interviewer in order to feel comfortable while discussing their PIM strategies. The participants were aged 26 to 49 (average 36), 7 of them were female, 5 male. Half of the participants had a computer science background, whereas the other half came from diverse fields like psychology, letters or commercial. Their professions range from full-time university professor to secretary, including research assistants and high-school teachers. Most of them have used a computer at work for more than 10 years, only two of them use one for less than 5 years.

The time and resources at disposal for the fieldwork were limited. In particular, we could not perform long-term observations of user behaviour, but would focus on a snapshot of their practice, combined with a semi-structured interview. We decided not to use recording devices that would be intrusive for the participants and require much time to transcribe and analyse. Instead, we used a notebook for taking live notes during the interviews. The raw field notes were taken on the right page while left pages were left empty. They would be used later to identify possible themes, add comments, notes and sketches as a first effort of synthesis, as advised in [15]. While note taking, the interviewer took care to write down not only what the participant was saying, but also relevant details he could notice, or what the participant was actually doing while talking.

The interviews took place at each participant's workplace, behind the computer they usually work on. The interviews lasted 1-1.5 hour on average, depending on the time the participant could invest. The interviewer used a "backpocket guide" to help him frame the interview. But, as it is the rule with naturalistic studies, open discussion was encouraged in order for the interviewer to discover unsuspected areas of interest. The backpocket guide was inspired from Barreau's questions set [3] and included specific directions towards the understanding of strategy changes:

- What do you do on a typical work day?
- What information do you have and use in your personal workspace?
- How do you organize information in your personal workspace?
- How do you typically go about finding information when you need it?
- What features do you wish were available for organizing

and retrieving information from your workspace that you do not already have?

- What are the main problems you have encountered managing your personal information?
- How have your organizing and retrieving strategies evolved over time?
- What motivates you to change a strategy?

The raw notes were then reworked by the interviewer in order to build an organized collection and interpretation of the participants' responses. These were published internally [14]. In the following we present selected results and discuss them.

3.3 Results

All 12 participants were able to talk about their PIM strategies and to explain at least one PIM strategy change. Moreover, some participants were able to say that the strategy they disclosed orally was ideal, and that exceptions happen in practice. Exceptions can be due to "lack of time" (P5) or "laziness" (P1) for example. Others tried to formulate a strategy, but evidences show that it was inconsistent with their actual practice. Indeed, the interview time was an opportunity for the participants to reflect on their PIM practices, which they had seldom done before. Some also became aware of strategy flaws or forgotten items that needed to be handled (P1-P3-P9-P10). Moreover, after the interview, one participant (P4) wanted to give precisions on her strategies and notify the interviewer that she noticed something new in her practice. This seems to emphasize the fact that the interview time made her think about her strategy and analyse it more precisely.

However, strategy changes are not always conscious and seem to "happen almost naturally" (P3). After people have explained us their strategy, we could sometimes notice evidences that they used another strategy in the past. For example, P1 explained that she manages her tasks with her calendar. While browsing through her emails, we noticed a folder called *Todo*. She could explain she planned to use it for managing tasks related to emails but forgot it in the end. Similar situations happened with other participants (P3-P10). Therefore, it seems that some people do not have a good mental model of their PI as a whole, and that they happen to forget portions of their PI collections and related strategies.

Other interesting results of the study shows that concurrent management strategies can coexist. In particular, archived items often adhere to a classifying scheme which is not used any more. For example, P12 mail archive contains past emails classified in directories. However, his current management strategy is that of a folderless cleaner in Balter's taxonomy [2].

We propose in the following paragraph a model for characterizing PIM strategy changes. Then, we classify the strategy changes that we observed during our study according to this model.

3.3.1 Model of strategy changes

From our empirical observations of PIM strategy changes, we attempt to formulate a simple model for characterizing changes. In this model, a PIM strategy change consist in a general *scope*, a *cause* and an *action*:

Scope The scope of a strategy change is either *specific* to a PIM tool or *longitudinal*, across tools but related

to one meaningful activity. For example, using more folders to classify emails is a strategy change specific to the email client. Centralizing the task management that was scattered across many tools to a single one is a decision taken from a longitudinal scope.

Cause The cause of a strategy change is either *external* or *intentional*. External causes involve conformance to organizational requirements, for example rules to use collaboratively a filesystem or calendar. Intentional causes involve the user wanting to make its management better without external constraints, for example because she happens to have trouble re-finding emails or she takes too much time putting files into folders.

Action The action may be a decision to *simplify*, or *complete* the existing strategy. Depending on the scope, simplify and complete take different meanings. In a tool-specific scope, simplify means using *less categorization* (e.g. less folders, less labels, etc.), while complete means using *more categorization*. In a longitudinal scope, simplify maps to *centralize* (e.g. use one single tool for managing all tasks) and complete to *fragment* (e.g. keep copies of email attachments both in the mail archive and the filesystem). Note that we consider a change of strategy towards deletion of items a simplifying action, since its a kind of simplification or centralization (towards the trash). As well, a strategy which is abandoned altogether is considered being simplified to the extreme.

Table 1 details a selected sample of strategy changes that were discussed with participants during interviews. Some changes were mentioned by participants directly, others were asked by the interviewer when he noticed something unexpected according to a strategy disclosed by the participant. Of course stronger empirical evidences (e.g. alternate studies) would be necessary to validate our model attempt.

3.3.2 Motivation behind PIM strategy changes

People adapt their strategies. But the concrete reasons that make them change their strategies are many. For example, they may have discovered a new PIM tool that they want to give a try (P8). They have had a hard time re-asking for emails they had deleted and do not want to experience that situation again (P2). Their strategy for tasks management failed as they forgot appointments and tasks (P3-P8). They feel overwhelmed by tasks, because they use the same calendar for private and professional tasks (P10). They face collaboration problems for task management (P9). They have new job responsibilities (P8). They must respond to organizational requirements (P4-P6-P11-P12). They have learnt a new feature in a PIM program that they never used before (P6). They find that some features are missing in their current strategy (P12). They cannot cope any more with fragmentation (P9). Or they simply want to try a new idea inspired by a colleague's practice (P8).

Moreover, several people admitted being not satisfied with their strategy and consider it a makeshift solution, waiting for a better way of managing their information (see section 3.3.3). Thus, they invoke reasons for not changing their strategy. Some participants explained that changing would take too much time: "I prefer losing some time searching for a document than classifying everything perfectly" (P5).

Table 1: Types of some observed strategy changes

Property	Scope		Cause		Action	
	Specific	Longitudinal	External	Intentional	Simplify	Complete
<i>Strategy change</i>						
Stop filing emails into folders	×			×	×	
Stop deleting all emails, keep them in the inbox	×			×		×
Use naming conventions for files	×			×		×
Abandon the use of todo folder and do task management through emails		×		×	×	
Keep several copies of documents in different places (including attachments)		×	×			×
Stop using a folder for “source” documents	×			×	×	
Use a common filing strategy for documents on a collaborative platform	×		×			×
Stop tagging items in del.icio.us	×			×	×	
Add folders and subfolders in a systematic way for all projects		×		×		×
Use a single tool for task management		×		×	×	
Centralize collaborative tasks management		×	×		×	
Use two calendars for private and professional matters	×			×		×
Use less folders		×		×	×	
Centralize all tasks management in a specific tool		×		×	×	
Use a common calendar	×		×		×	

Other people also invoked a lack of education for justifying their strategy. For example, P10 feels overloaded by email, but she does not use any mail client, because “no one ever told [her] how to use them”. The standard email web interface she uses is poor, slow and does not provide search tools. Thus it takes her much time and energy to manage emails. When asked to describe the strategies she was using for managing her personal information in her workspace, P6 expressed her disappointment: “I thought you were going to show me how to do it!”. She further described herself as an “old-school secretary”, educated to the use of real papers and binders and with a very basic knowledge of computer-supported information management tools, which somewhat frustrates her. Other participants also asked the interviewer for advice in their PIM or complained that they never have received lessons or hints for doing PIM.

3.3.3 Unsatisfied needs and user problems in PIM

During our naturalistic study on PIM strategies, some side problems were raised by participants. They often contribute to the decision of changing their strategy.

- *Classification*: One participant clearly expressed that keeping things organised takes too much time (P5). On the other hand, several people said that they are afraid of losing things which encourages them to classify information or even duplicate it (P4-P5). On a related note, one participant said that even if time-consuming, he considers classification calming and reassuring (P11).
- *Information fragmentation*: At least two participants (P5-P10) complained about the fragmented nature of their personal information, either because it stands on various materials (disks, servers, USB sticks, etc.) or because it is distributed over various applications (emails, calendar, documents, etc.).
- *Collaborative PIM*: Although shared information is not

personal, various participants considered that it enters in the personal information sphere since information is sometimes shared among small groups of people. Various people said that they have problems to find things in collaborative setting (P4-P5-P6-P8-P9). Strangely, even when they consider that they have messy shared directories, they admit they do not have the will to change their organization because they cannot take decisions about shared data on their own (P4-P6).

Apart from that, people explicitly mentioned the following needs.

- *Browsing facets and information linking*: Various people use facets implicitly to organize and refine information. For example, P2, P4 and P5 classify some documents and emails in directories having the name of people from their social network. Others classify and/or access documents or emails by temporal indexes (P1-P3-P4-P8). Concerning the social facet, some told us that they would like to have their communication items (emails, chats) automatically clustered by people and further to have their broader PI automatically linked to the people concerned. Still, related to information linking, several persons expressed the need for tools to help them organize specific types of information. For instance a system administrator (P7) said she would like to be able to keep track of software and hardware problems-solutions pairs. Another expressed his need to link scientific articles (colleague of the authors, not included in the presented study).
- *Ubiquity versus fragmentation*: Although several people expressed their problems with the fragmented nature of information, on different disks or applications, as discussed in the previous section, they reversely expressed their desire to have information available and accessible from everywhere, for instance to have access

to appointments online or to have information available on the field (in a mobile task) (P3-P5-P9-P12).

- *Usage history*: This aspect is not only related to the temporal facet but also to the patterns of usage. For instance, P2 said that he would like to see the usage frequency and other attributes of folders without having to open them, which could be also used as a browsing facet. P5 explicitly said that he would appreciate to have the operating system taking care of the versioning of documents in order to be able to jump back to a previous version, without having to manually use a naming convention. Finally, some people said they would like to have the history of the tasks they performed, to observe how they invested time on specific tasks or projects (P2-P11, indeed P11 does it by hand at the time of the interview).
- *Education and support*: Various people (P6-P10) said that they would like to be more educated on the way to use the existing tools and would like to have support.

3.4 Conclusions

Although people say they do not like doing PIM for itself, because it is a painful and time-consuming task, the study presented above actually shows that people adapt their strategies to punctual changes in their activities or work contexts. They do it as a mean to an end: improve their efficiency and well-being at work. They change strategies for multiple specific reasons: a bad organization hindering to refind information, the discovery of a new technology (a search engine, a more complete or task specific tool, etc.), an excessive amount of documents making classification too time-consuming, the abandon of a useless or ineffective strategy, etc. Strategy changes are grounded, have a scope and require an action.

This study also suggests that what people say about their PI and strategies often differs from the reality of their data and practice. Finally, surprisingly, although people participating to our naturalistic study have spent one or two hours of their working day with us, they have all appreciated spending time to share and analyse their strategies, which counter balances the fact that they do not like doing PIM, as they say.

We present in the following section a software tool making use of information retrieval and information visualization techniques to provide a faceted view on personal information. This tool has been mainly designed to support personal information browsing and searching. Its design was based on a study we performed [7] focusing on how people remember what they have done in the past, where documents are located in their personal information and how they prepare further events. The result of this study motivated the usage of facets (social, temporal and thematic) as natural cues to information. Although the tool has not been designed primarily for this purpose, we believe it could also help to support PIM self analysis and strategy changes.

4. WOTANEYE: PIM AND REFLECTING PI USAGE

The naturalistic study presented above has confirmed the need for people to feel in control of their personal information and their difficulties to match their desire with the way they use and manage personal information in daily life situations. In particular, the study elicited the need for having a tool which reflect personal information usage and for highlighting usage patterns towards strategy evaluation. Further, in another survey we performed on the usage of PIM tools at work [7], it appeared that contextual cues are crucial for re-finding and forming a mental model of personal information, as Lansdale stated [20]. Three facets of personal information stood out from the survey: the temporal facet (when did the information item appear/was modified), the social facet (who is related to this information item), and thematic facet (what is the information item about).

Three observations from the above studies motivate in particular the potential usefulness of our tool: (1) people would like to organize and access PI using natural facets; (2) people would like to keep track of their PI usage history; (3) education and support is requested for PIM.

The tool we developed, called WotanEye, exploits those facets. This section first presents its general architecture and details the way we extract the data that helps us provide a faceted view of information. The section finally presents WotanEye's user interface and use cases.

4.1 Facets Analysis

WotanEye provides a faceted view of personal information. More precisely, temporal, social and thematic facets of information have been chosen because they reflect the way people naturally remember information. In order to build those facets, we need to extract metadata from raw information items.

Basic temporal metadata is easy to obtain for calendar entries (obviously), local files (the operating system stores creation, last modification and last access timestamps) and emails (sent date). Social and thematic metadata can be obtained more easily from emails than from other types of personal information and various studies tend to prove that email constitutes a representative subset of personal information [9]. Moreover, as indexing the whole personal information is a technically-solved problem, we leverage an existing indexing engine, like other researchers in the field do [11, 25]. In our case, we leverage the existing database maintained by Windows Desktop Search (WDS) [21] to keep track of information items. It can be accessed easily through an API using SQL-like queries. However, there is no mean to access the database structure directly; therefore it is not possible to read the detailed textual features extracted by WDS (inverted file along with $tf \cdot idf$ values¹, etc.). This is the reason why, in order to compensate this lack, we perform statistical analysis on textual content and addresses of emails to gather relevant features.

Firstly, temporal metadata can be obtained easily using operating system facilities for all kinds of personal information. In concrete terms, we retrieve the date of text files (last edition date), calendar entries and emails using Win-

¹In text retrieval, $tf \cdot idf$ is a measure of terms' importance in documents. The better a term characterizes a document, the higher its $tf \cdot idf$ value is. See [24].

dows Desktop Search (WDS) queries constrained on time intervals only (i.e. without querying on a particular keyword).

Secondly, in order to automatically extract the social network of a person, we use all the email addresses that can be found in her email archive. We define a closeness measure between two contact's addresses that is proportional to the number of times these addresses appear together in the headers of emails, yet depends on the number of recipients of these common emails. Indeed if Georges and Nick belong to the same group of people and know each other well, there are chances that they often appear together on emails envelopes, including envelopes with few other recipients. Though, if Georges and Jack systematically appear together on envelopes along with many other recipients, chances are that they do not know each other well but are both members of some mailing-list. Our closeness measure takes these observations into account. Using the closeness measure between all pairs of contacts, we then build a social network graph, the edges of which are weighted by this measure. This social network is user-centered as it reflects the view the user has on her contacts. Using the *prefuse* [17] toolkit and its facilities for displaying graphs, we visualized this social network using a modified spring-embedder.

Thirdly, in order to build a map of an individual's interests, we analyse the textual features of her emails. On one hand, the most salient themes in her emails express her main interests. On the second hand, discriminant words that appear in emails may help to relate those emails to other information items (documents, meetings, etc.). To extract the textual features of emails, we use the GATE toolkit [12] to remove stop words and perform stemming. Then we build an inverted file using *tf-idf* values and compute textual similarities between emails using a cosine similarity measure on *tf-idf* values, in order to be able to group similar emails. Thus the similarity between two emails is proportional to the number of words that appear in both, and strongly depends on the discriminancy of each word (a rare word, e.g. "Capadoce", has more weight than a very common word, e.g. "meeting"). To group the emails by themes and preview the themes, we perform a hierarchical clustering based on their cosine similarity. The result of the clustering is somewhat average and unsatisfactory. Notably it often happens that a significant amount of emails from the same person are clustered together even if they do not treat the same topic. This can be attributed to several reasons: (1) emails signatures of this person may contain high-*tf-idf* words ; (2) the person may use regularly a particular vocabulary or slang words ; (3) copies of forwarded or replied-to emails also belong to the body of the new email, even of the new mail is about a new topic (common practice). In order to make the quality of themes extraction better, we plan on applying several methods. First, we could detect forwarded or replied-to parts of an email and lower the *tf-idf* score of their content. Second, and more important, we could balance the *tf-idf* scoring by taking into account all emails from a particular sender and filtering out highest-*tf-idf* words if they do not appear anywhere else in the corpus. This could notably lower the bias introduced by the signature and a too specific vocabulary.

4.2 Interface

As we said above, WotanEye provides a view of personal information based on facets. Our current prototype makes

use of two facets already, the temporal and social facet. The thematic facet is still under development. Fig. 1 shows WotanEye main interface window. On the left part of the figure, information items are plotted according to their temporal facet in a calendar-like view. The view represents a full month, where each line shows a week from Monday to Sunday. The week line is divided into four horizontal axis which are used to display from top to bottom the user's appointments (squares), documents (circles), and emails (triangles pointing up are outgoing emails whereas triangles pointing down are incoming emails). A traditional search box is available on top of this temporal view. On the right part of the window lay two other views. On the top right, lays the document-list view. It lists the currently highlighted documents along with further details like the document's name, its author and timestamp. On the bottom right is the social facet view of information, in the form of a social network. People are displayed and clustered by communities. Selecting a group of users in the social network highlights pertaining document in the temporal view. Similarly, selecting documents in the temporal facet view highlights relevant contacts.

4.3 Use cases

WotanEye can be used for a large number of tasks such as finding information items, tasks management, document and email management, giving high/low priority to tasks, browsing information through personal facets, etc. In the following we illustrate the use of WotanEye with two scenarios of interest, the second one being especially relevant to the main topic of this paper.

4.3.1 Meeting preparation

According to our survey on the use of PIM tools at work and related to meeting [7], meeting preparation appears as one of the most important tasks for which people need support. When preparing a meeting, participants need to read related emails, documents, and other past meetings information, but often these information are not linked on their computer and they have to spend a couple of minutes to find them all individually. WotanEye aims at supporting meeting preparation by highlighting all the documents related to a selected event, email or document, as illustrated in fig. 1.

4.3.2 Strategy monitoring

In the study presented in section 3, we observed that people are not always fully aware of the strategy they follow to manage their emails, documents and other information. Some people do not use any folders in their mailboxes, others classify their documents and emails by projects, or by people, other even use temporal folders, etc. It also seems that what people say about their practices does not always match their real practices. Further, we observed that people do adapt their strategies. Not only do we expect WotanEye to support people in better managing their information, but also to help reflect what they are doing, how information items are related to one another using personal facets, and how they can improve their strategy.

For instance, through its temporal view, WotanEye enables to observe how we interact with our personal information in time. From the emails we receive and produce, the document authored or stored, the meetings we have, and their relationship with people, it is possible to observe pro-

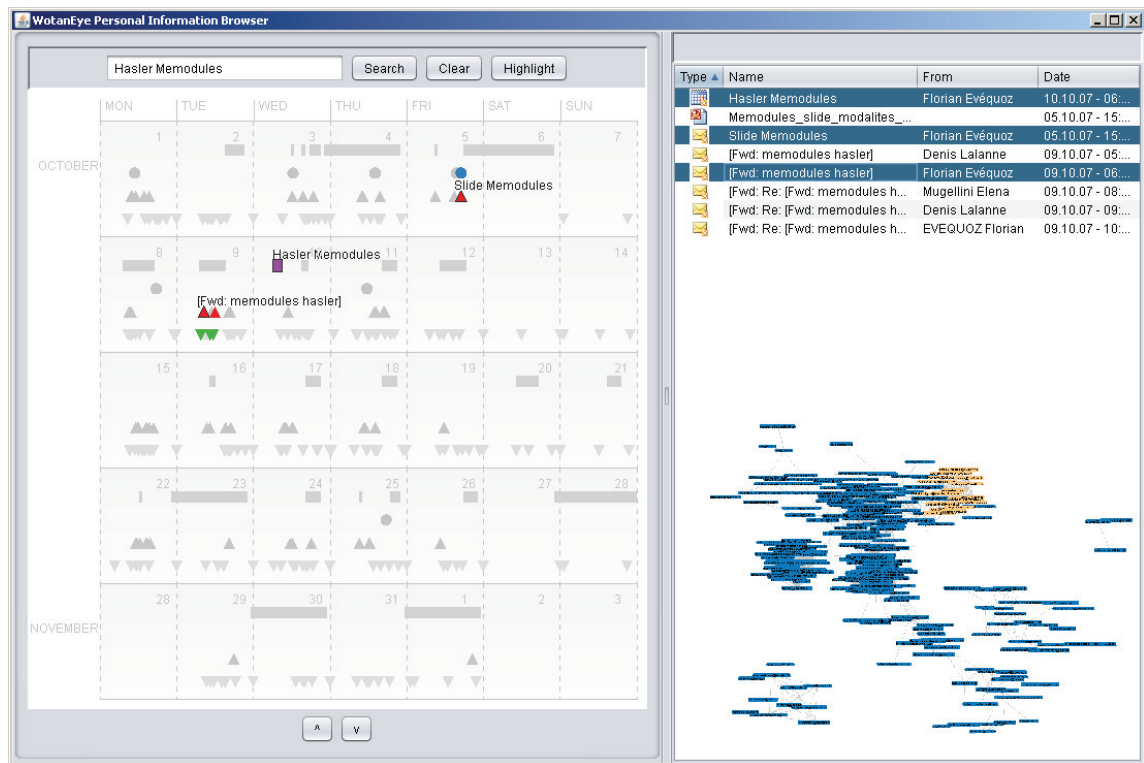


Figure 1: *WotanEye* browser window. The user selected an appointment “Hasler Memodules” (name of a project he is involved in) in the temporal view (left). Similar and corresponding items are highlighted in this view and listed on the top right. The social network view (bottom right) highlights relevant contacts.

ductive periods, repetitive patterns, and the proportion of time we allocate to a specific project, topic or related to specific contacts from our social network.

Currently, *WotanEye* relies on visualization to reflect PIM usage. It reflects the past activities but does not explicitly suggest better PIM strategies. We do not know at the time of writing if there are better strategies than others, depending on the number and type of documents or activities managed at a time, or on the role of people, etc. *WotanEye* could be improved to suggest strategies improvements or to give practical advices. However the exact nature of those hypothetical advices remains to be studied.

Furthermore, at the time of writing, no user evaluation of our tool has been performed. We plan to evaluate it with the same population we used for our naturalistic study, and observe if our tool has any impact on the way they manage their information and analyse their practices. The evaluation will take the form of a diary study in which we’ll ask people to use *WotanEye* 5 minutes everyday, during a period of 2 weeks, and write down the things they learnt. The exact form of the diary study is still to be set, though.

5. CONCLUSION

As Barreau stated recently, “people manage their work in unique and creative ways” [3]. We found this assertion particularly true while performing our naturalistic study on PIM. Each participant seemed to have developed a different way to organize their information, in some way expressing not only their personality but also their role and function.

Despite this great variety, we found some common patterns related to changes of PIM strategies. Each change has a cause: external, or intentional. Each change has a scope: tool specific or longitudinal (cross-tools). And finally, each change implies an action over the strategy: either to make it more simple, or to enrich it.

What we found particularly singular in our study is that people are not aware of their strategies or often not applying it as they would like. Various people even asked us to help them better organize or train them to do better. But what is the best way, since each way seems suited to a particular person, job or tasks? This is a challenging question yet unanswered.

Being not able to provide to each individual the best way for them to manage their personal information, we thought useful to develop a tool that could help them observe the way they use their personal information, and also making use of contextual browsing facets such as their social network or a temporal view. We present our prototype, *WotanEye*, aiming at bridging the gap between our mental map of personal information and the way it is accessible on our computer.

Future works are twofold: (1) work on the implementation to have a fully operational prototype of *WotanEye* to browse documents through temporal and social facets; (2) run a qualitative user evaluation of *WotanEye* to assess whether it helps people better manage and understand their personal information space or not.

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