

The User-Subjective Approach: A New Direction for PIM Systems Design

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ABSTRACT

This paper reports on the user-subjective approach – a novel design approach that was developed specifically for PIM systems. PIM systems are unique in that the person who stores the information and decides on its organization is the same as the person who later retrieves it. The user-subjective approach takes advantage of this unique feature and suggests that PIM systems should make systematic use of *subjective, user-dependent* attributes. This paper (a) describes the approach and states its design principles; (b) presents general evidence in support of the approach, (c) demonstrates how user-subjective principles can be implemented in PIM systems design with the *ChittyChatty* prototype and the *GrayArea* design scheme, and (d) examines the “search everything” approach and explains the relation between the two approaches. Future work will evaluate our seven user-subjective design schemes.

Author Keywords

Personal information management, user-subjective.

ACM Classification Keywords

H.5.2 User Interfaces.

THE USER-SUBJECTIVE APPROACH

Many PIM-related studies report on users' problems and dissatisfaction with the classification and retrieval processes of their personal information. Problems are not restricted to a specific PIM system and are reported for digital files [1], emails [15] and Web favorites [9]. Boardman, Spence and Sasse [6], who studied PIM across and within these systems reported that “We were often surprised at the vehemence expressed regarding PIM-related problems” (p. 618). It seems that many users blame themselves for being disorganized [2], though part of the problem can be ascribed to faults in PIM design.

PIM system designers may be partly to blame for users' dissatisfaction and complaints about their information management, as they fail to recognize the unique requirements of such systems. In contrast to other information management systems, which serve many different users, each PIM system serves only one person. In other systems, information is stored and organized by information professionals (e.g., librarians, Web site developers) for many and diverse users who retrieve information according to their needs. To cater to the needs of different users and facilitate information retrieval, information professionals use general and objective attributes of the information for its organization. PIM systems are unique in that the person who stores the information and decides on its organization is the same as the one who later retrieves it. The user-subjective approach [4, 5] takes advantage of this unique feature and suggests that PIM systems should make use of subjective, user-dependent attributes. PIM systems should capture these subjective attributes when the user interacts with the information item (either automatically or by using direct manipulation design) in order to help the user retrieve that item later on.¹

Attributes of an information item are variables which describe it, and in doing so, add value to it [14]. We differentiate between objective and subjective attributes. Objective attributes are attributes that are user-independent, in the sense that an external observer can infer these attributes directly from the information item, without observing the user's actions. Such objective attributes are the item's format, size and date. In contrast, subjective attributes are user-dependent and cannot be inferred directly from the information item. Instead, they might be derived from the user-information interaction. The user-subjective approach identifies three subjective attributes – the *project* to which the item belongs, its *importance* to the user, and the *context* in which the item is used.

¹ The paper focuses on personal computers design however the user-subjective approach is applicable to all PIM systems, including mobile phones and PDAs. We will be happy to discuss with other members of the workshop how the approach can be applied on mobile devices.

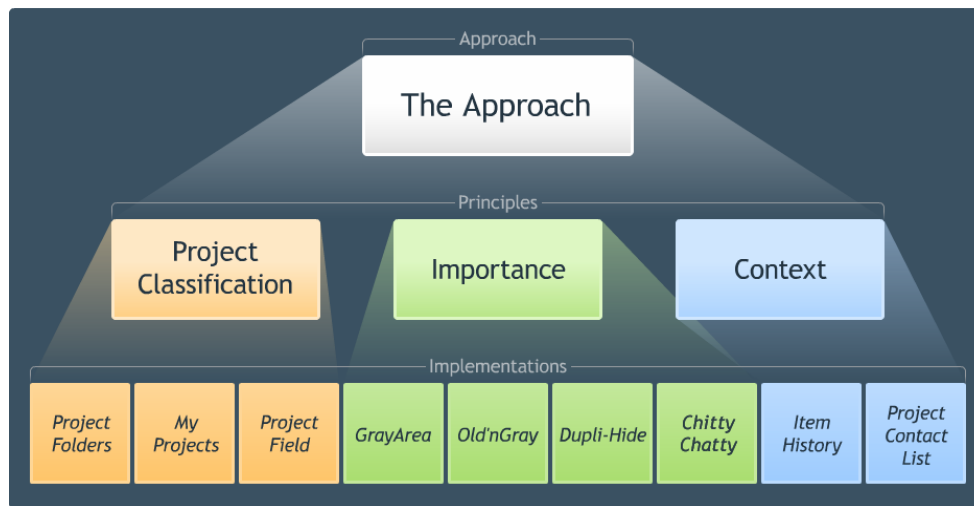


Figure 1: An overall view diagram of the user-subjective approach taken from www.user-subjective.org

To systematically use subjective attributes the user-subjective approach suggests three design principles, each of which takes into account one of the subjective attributes mentioned above. These principles are currently only sporadically implemented in PIM systems design:

The subjective project classification principle – The subjective project classification principle suggests that design should allow all information items related to the same project to be classified under the same category regardless of their technological format. Although project-based classification has been encouraged in experimental systems [e.g., 10, 13], current PIM system design discourages such classification. At present, it encourages users to classify their information items within their format-related hierarchy: documents are stored in one folder hierarchy (e.g. in My Documents), emails in a separate mailbox hierarchy, and favorite Web sites in yet another browser-related hierarchy. Thus, information items related to the same project but based on different formats (documents, emails or Web favorites), are retrieved from different collections stored in separate locations (hierarchies), causing "the project fragmentation problem" [3]. One implementation of this principle is the *single hierarchy solution* - in which all project-related information items are stored in the same folder regardless of their format [3].

The subjective importance principle - suggests that the importance of information should determine its degree of visual salience and accessibility: Highly important information items should be highly visible and accessible, as they are likely to be retrieved; information items of lower importance should be visually demoted so as not to distract the user. This will be explained in detail in the "example design schemes" section.

The subjective context principle - suggests that information should be retrieved and viewed by the user in the same context in which it was previously invoked, in order to

bridge the time gap between these two events. The term context has been used extensively in the literature and may have different meanings [7, 8]. The user-subjective approach refers to four context attributes of an information item – external, internal, temporal and social. The *external context* of an information item refers to the other items that the user dealt with while interacting with a specific information item; *internal context* relates to the user's thoughts while interacting with the information item; *temporal context* pertains to the state in which the user left the information item when s/he last interacted with it, and to his or her working plans regarding that information; and *social context* refers to other persons relating to the information item, such as other people who collaborate with the user regarding that information item.

Figure 1 is an overall view diagram of the approach, its design principles and their implementations.

We now present evidence for the approach, followed by an example implementation of the importance principle.

EVIDENCE IN SUPPORT OF THE APPROACH

Evidence for the user subjective approach can be found in [5]. In that study we explored the use of subjective attributes in current PIM systems, and how it relates to current systems design. Participants were 84 personal computer users. Tools included a questionnaire ($N=84$), a semi-structured interview that was transcribed and analyzed ($N=20$), and with screen captures taken from this sub-sample. Overall, the results indicate that participants tend to talk about their personal information management in terms of subjective rather than objective attributes and use these subjective attributes when the system allows them to. However, when the PIM system design does not allow them to use these subjective attributes, they either refrain from using them (e.g. participants rarely store emails and Web favorites together with documents relating to the same project) or develop workarounds that exploit subjective attributes (e.g. by using various ways of archiving

documents of low subjective importance to remove these from their current visual focus). Thus current PIM systems do not provide first class support for subjective attributes, and it is recommended that they should be designed to allow for broader and more systematic use of subjective attributes.

EXAMPLE DESIGN SCHEMES

In this section we will demonstrate the user-subjective approach by presenting two design schemes both related to the subjective importance principle. The first design *ChittyChatty*, observes the information which the user interacts with, infers that they are of high subjective importance and automatically allows easy access to them for future retrieval. The second *GrayArea* allows the users to visually demote distracting information of low subjective importance by using direct manipulation.

ChittyChatty

ChittyChatty is a system that is intended to help users remember information from conversations that they have heard previously, e.g. to recall important information from a meeting. It allows users to make speech recordings and to annotate these using digital handwritten notes. Fig 2 illustrates the *ChittyChatty* interface. Users follow their normal practice of taking handwritten notes about what they consider to be important in the meeting, but each pen stroke is temporally co-indexed with the underlying recorded speech. This allows the notes to be used to access the conversation; when users want to re-access recorded speech, they click on a specific note, and the system begins to replay the speech that was being recorded at the moment that note was taken. In this way the notes serve as a visual analogue to the underlying speech, allowing straightforward, precise access to what the user thought was important in the original speech.

We have tested *ChittyChatty* with 25 users, comparing it to a Dictaphone – which also offers a complete speech record of what was said - but does not have the users' annotations of interest [12]. We found that although both are equally accurate, there was much greater use of *ChittyChatty*, because it was much more efficient. Also users were much more positive about *ChittyChatty* in a follow-up survey.



Figure 2: ChittyChatty Interface

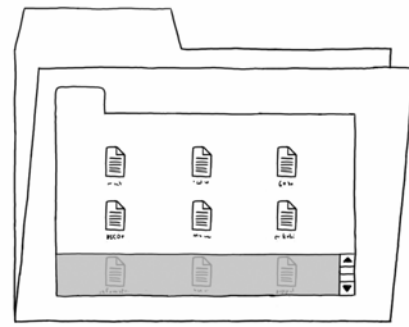


Figure 3: *GrayArea* design scheme

GrayArea

Jones [11] claimed that the decision whether “to keep or not to keep” information for future usage is prone to two types of costly mistakes: Information not kept or deleted may be unavailable later when it is needed, however, if unimportant information items are kept, they compete for the user’s attention. Furthermore, the decision whether to keep or delete information takes the user’s time and cognitive resources. To avoid these problems, the subjective importance principle offers an intermediate option between the “keep” and “delete” ones - the visual demoting option. It has the advantage of the “delete” option (less competition for visual attention) as well as the advantage of the “keep” option (access to information item in case it is unexpectedly needed in the future). It also reduces the time and energy it takes to decide what to do with the item in question. Evidence for demoting is provided by a recent study (currently being reviewed) in which 59 of 70 participants preferred one of three demoting designs they saw, compared to the support offered in current operating systems.

One of these demoting designs is called *GrayArea*. *GrayArea* is an additional folder feature that allows the users to drag information items of low importance to a designated location at the bottom of a folder (see figure 2). Information items in that area are presented in a smaller font, they are concealed by the area’s gray background, and are presented in a small space (if information items exceed the gray area, a scroll bar is used). Items within the *GrayArea* may also be compressed in order to free disc space. In addition, when using a search query the demoted information items will appear in gray at the end of the query list, allowing the user to ignore them.

ALTERNATIVE APPROACHES TO PIM DESIGN

One potential reason for the slow uptake of the user-subjective approach has been the view that PIM problems will be addressed entirely by search. This ‘search everything’ approach asserts that improved search engines lead to a preference of search over navigation and will eventually eliminate the need for filing. In a recent project examining 761 PIM users (currently under review) we tested the effect of using 5 different search engines on

retrieval preferences, using varied research designs. The same questionnaire was used in four different studies. Our results show little evidence supporting the ‘search everything’ claims. First, regardless of search engine, there was a strong navigation preference: on average, users estimated that they used navigation for 56-69% of file retrieval events and searched for only 4-20% of events. Second, the effect of improved search engines on search usage was limited and inconsistent. Third, search was used mainly as a last resort when users could not remember file location. Finally there was no evidence that using advanced search engines led people to change their filing habits to become less reliant on hierarchical file organization.

The user-subjective approach does not attempt to replace the hierarchical method, only to improve it. It doesn’t oppose search, and makes use of this option (as demonstrated in the *GrayArea* example), however, it also doesn’t rely on it. Instead, the approach proposes an alternative direction for PIM systems design.

CONCLUSIONS

The user-subjective approach proposes a novel alternative direction to PIM systems design. Its principles, developed uniquely for PIM systems, suggest how these systems can make systematic use of subjective attributes. This paper provided some evidence for the approach, explained the principles and their demonstrated one of them with the *ChittyChatty* prototype and the *GrayArea* design scheme. More systematic evidence supporting the approach and six other schemes can be found in [5]. Future work will evaluate these designs, and continue to develop the approach.

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