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# Improving Re-Finding upon Work Resumption

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## ABSTRACT
This paper presents an approach to reducing user efforts when re-orienting to interrupted work. We present a time-centric Journal view of the user's information-work activities, which allows going back to 'task states' for activity resumption. We further compute an activity-induced correlation function to reflect information coherence, as experienced on the user's side when 'using information items together'. We thereby investigate the expressiveness of easy to understand correlation indicators, such as temporal proximity, window switching, and clipboard use. The work most closely related to ours is [2],[4].

## Categories and Subject Descriptors
H.5.2 [**User Interfaces**]

## TASK SWITCHING & INTERRUPTIONS
One of the everyday experiences of information workers is that task work must be interrupted and later resumed. This particularly applies to *complex tasks* such as authoring an overview report or preparing a presentation. The corresponding *activities* can only seldom be completed within an uninterrupted period of work and hence often extend over several days: "Complex, 'returned-to' tasks comprise a significant portion of an information worker's week, but reacquiring such tasks is considered difficult by users." [3]. The basic prototypical case of *task switching* is a user interrupting her primary task for a secondary one and later resuming the primary task.

One of the most often reported effects of information workers being interrupted in their work, is them losing track of their position in the work process. An interruption necessitates a user to leave her immersion in task work and to redirect her focus of attention to the interruption source. Especially, in the case of *unanticipated* and more or less *abrupt interruptions* ([1],[3]: 20%), this can cause *forgetting information*, which had just before been under conscious control. Forgotten information can mean (at least temporarily) not remembering a) *what* to continue, b) *'where'* to continue. Both phenomena possibly necessitate redundant activities and hence additional 'cost'.

## RESUMING WORK
As compared to generally orienting oneself about what to do next, the case of resuming one of several active tasks requires an information worker to remember what she did and what thereof is still unfinished – together matching (a). Having decided, which task to take up, she then needs to *re-find* the hooks, i.e. information items for continuing to work – matching (b).

These items serve as *reminders* as well as *connection points* for the to-be continued activities. As the information relevant for processing complex tasks are commonly distributed over multiple information items, the activities to advance a task often entail juggling with several items at once, i.e. during an *activity phase*. Consequently, there might be multiple items relevant for resuming work. Accordingly, we speak of *connection sets*, where each information item might have a specific reminder function.

One approach for determining connection sets, is re-finding those information items, which have been the object/s of a user's activities by the time when the interruption occurred (*activity-phase specific approach*).

## REFLACTION JOURNAL
The ReflAction Journal (RJ) *visualization* is based on computer-observable fractions of information work. In fig.1, the doing pane shows *item-related user activities (uA)*, which mirror that a user's activities leave traces on those items. Accordingly, an *activity object* is composed of an information item (defining its name), and the traces related to the item, where the latter are sets of {focus, edit/view, visibility} intervals, representing, if so, interrupted item-related user activities.

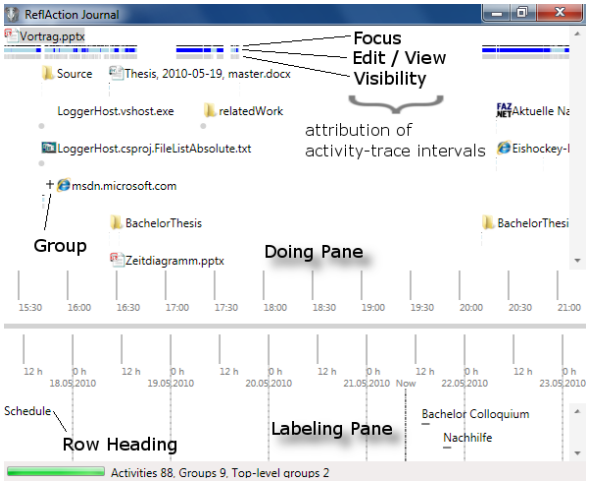


**Figure 1. ReflAction Journal: The 'doing-pane' view is rather zoomed in, while the 'labeling pane' [5] provides overview.**

Overall, the RJ provides a representation "from which the user can *determine what she had been working on* (…) which was



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shown to strongly support resumption" [7]. The RJ *user interface* allows continuous scrolling and *zooming*, where zooming primarily affects the resolution of the x-axis. The information items shown can be accessed, if available.

For *re-finding an interrupted activity phase*, represented by a collection of activity objects in the RJ, the following 'index notions' can be employed for orienteering [6]: 1) *Absolute* time, 2) (name of) any information item involved in the activity phase just before interruption, 3) items at which activity was directed *before* or *after* the interruption. Additionally, 4) the *attributions* of the trace intervals facilitate 'queries' like "I remember having looked at those pictures I want to re-access now, just before answering (and therefore viewing) this Email I have at hand now." These re-finding means improve today's common user experience that computers do not well support the *"leaving the task (state) as it is"* strategy [1], as they are not hampered by closed windows.

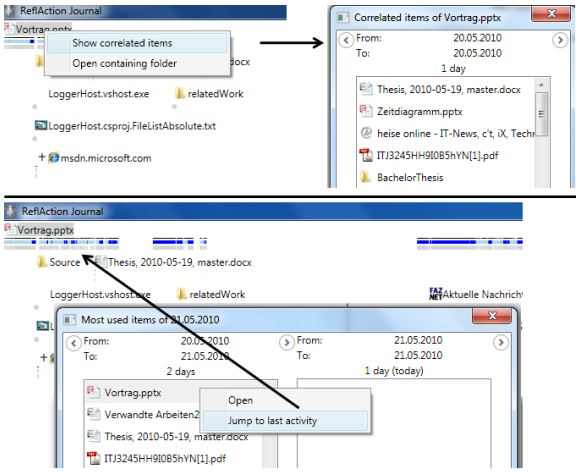


**Figure 2. Employing *ReflAction Correlated* to view items which have been 'used together' across activity phases & *ReflAction Most-Used* to jump to an activity (phase).**

## CORRELATED & MOST-USED ITEMS

Consider that a few days have passed since a user had extensively used some important information sources $S_i$ of a presentation (or any other) document. Even though she meanwhile proceeded with editing the presentation, she still *perceives the $S_i$ as related to her presentation document a*. Therefore, we provide a *uA-related* function, which is used to determine correlated items within a time frame (*across activity phases*). Its user interface (fig.2) is an early prototype and doesn't allow convenient control over time scoping yet.

The intuition behind this function is that information items 'used together' implicitly gain *activity-induced* coherence. Let uA-related(*a*, *b*) denote the function mapping (*a*, *b*) to the correlation strength of *b* to *a*. The construction of this function is illustrated in fig.3. It is called for all b's within the provided time frame. So, uA-related(*a*) for 'today' yields the list of items presented in fig.2.

So far, we only tested uA-related(*a*) for time frames of a few days and the results are comprehensible. All variables of this function are still subject to experimentation.

The *most-used list* also shown in fig.2 provides the main working documents to a user. It is computed from the aggregated lengths of activity intervals per item and time frame, where, in general, editing has more weight than viewing.

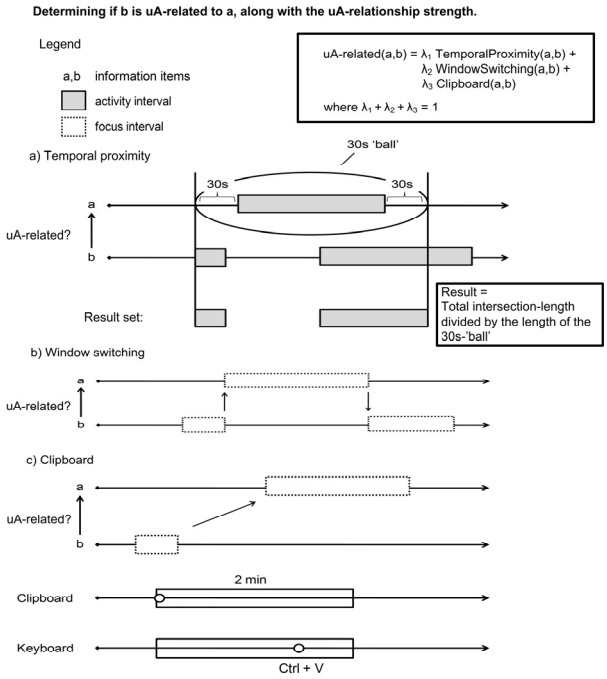


**Figure 3. Construction of the *uA-related(a, b)* function from activity-oriented indicators; 'window switching' and 'clipboard use' implement a counting of the corresponding events.**

## CONCLUSIONS & FUTURE WORK

Our activity representation fed by the ContextDrive [5] system can be considered *personal metadata*, which allows approximating user-experienced coherence also among items of non-text information types. While our current main task is experimenting with the here presented indicators and tuning their weights, we will also work on including non-text information types, which are currently under-represented. This will allow us to better evaluate and compare our work to other means representing relationships among information items, such as semantic technologies.

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