

From Piles to Tiles: Designing for Overview and Control in Case Handling Systems

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Abstract

Poor overview and control of workload in electronic case handling systems is a potential health risk factor which affects the users. Case handling systems must therefore be designed to give the users a better overview and maximum control over their workload. In an earlier study, we developed a prototype interface for managing cases, based on the piles metaphor. This paper introduces a second prototype, which is designed to incorporate the findings of an evaluation of the piles metaphor prototype. In this second prototype cases are visualized as "tiles", reflecting the number and complexity of the cases. This paper also describes some the results of the evaluation of the tiles prototype.

Keywords

Case handling, Occupational health, Overview, Control, Information visualization, User interface design, Workflow management, Pile metaphor, Tile, Design process.

INTRODUCTION

Case handling is a common component of administrative work in many organizations, such as insurance companies, banks, social security, and national registration and tax offices. Case handling involves collecting and analysing several pieces of information about a case or a client, making decisions and judgments based on the information and a complex set of rules, and finally documenting and communicating the decision to the client.

Currently the Swedish national tax board (Skatteverket) is moving from paper-based to electronic case handling, and a large proportion of the case handling will be automated in the future. One of the concerns with this change is that the introduction of electronic case handling system may increase the risk of stress-related disorders. Karasek and Theorell (1990) have proposed a model relating stress-related complaints to the three dimensions of psychological demands, control and social support. The combination of high psychological demands (stressors), such as workload and deadlines, and little control over one's own activities and skill usage creates psychological strain, which may in the long run cause stress-related symptoms. Social support, such as informal social activities with colleagues, or supervisory support may act as a buffer to the psychological strain. There are a number of studies (e.g. Painter 2002, Zuboff 1988, Åborg 2001) clearly indicating increases in all the risk factors in the Karasek-Theorell model when administrative case handling work is computerized. Zuboff (1988), for instance, describes various effects of computerization in such a context, including increasing mental pressure and demand for concentration, increasing workload, de-skilling, and decreasing social interaction with colleagues and supervisors as well as a number of physical and mental complaints. Painter (2002) also reports effects on the stress-level and level of control perceived by the case handling officers in a public insurance company after the introduction of an electronic claims handling system.

This paper presents the second study of two successive studies, addressing the issue of how health risk factors in computerized work can be taken into account during the software design process. The main aim of the first study (Boivie, Blomkvist, Persson & Åborg, 2003) was to investigate a range of methods and techniques for analysis, design and evaluation, with a particular focus on the issue of poor overview and control. This study investigated how case-handling administrators at a local office of the Swedish national tax board carried out their tasks. The study comprised of user observations, interviews with questions based on the Karasek-Theorell model (Karasek & Theorell 1990), work models, and design workshops.

As a result of the first study, a prototype interface for a case-handling system was designed based on the piles metaphor. This prototyped aimed to provide the users with better overview and control of their workload. We conducted a user evaluation of this prototype which in turn identified a number of issues that needed to be addressed. This paper introduces a second prototype that attempts to address some of the problems associated with the first prototype, by utilising a new representation in which the cases are visualized as tiles.

The next section discusses various aspects of the design problem and gives a brief description of the first prototype (for further details see Boivie et al., 2003). The paper then describes the second prototype in detail, followed by a discussion of the results of an evaluation of this prototype.

DESIGN PROBLEM – FROM PAPER-BASED TO ELECTRONIC CASE HANDLING

Many physical information cues that are essential to the users in assessing and keeping track of their workload are lost when paper-based case handling is replaced by electronic systems. This makes it more difficult for the case handling officers to keep track of their workload and the work situation. Therefore, the interface of the electronic systems should “recreate” the contextual and physical cues that are used by administrators to estimate and manage their workload in paper-based case handling.

In the first study we identified certain cues that the handling officers used in order to keep track of, and plan their work with paper-based cases. These included sorting the cases into piles, and ordering them within the piles. They also often used the thickness of the piles to quickly assess their workload, as well as estimating the complexity of the cases by quickly leafing through them. Furthermore, completed cases were placed in a separate pile. This is all due to the fact that paper-based documents are tangible and offer rich peripheral information (Sellen & Harper, 2001).

There are numerous studies on the organization of paper-based information. For instance, Case (1991) describes how historians organize their documents physically in four levels of storage: spatial constraints (keeping similar things together or keeping things at close hand), form, topic and treatment or purpose. The physical organization is a powerful aid for retrieving information. In a study of file organization in the desktop metaphor, Barreau and Nardi (1995) identified the need for coping with large numbers of “ephemeral” documents that must be taken care of within an unspecified but fairly short period of time, and therefore have to serve as reminders in addition to containing information. They cannot be buried away somewhere. In our study we identified similar patterns and problems in how the case handling officers sorted their cases into piles and placed these in specific locations on their desks. The users also filed cases that were on hold (awaiting further information) in binders and moved these binders between them according to a pre-defined order. When the required information arrived, the handling officer in charge of case distribution knew “where” the case was.

Pattern recognition is also often used to interpret the physical form of information, such as the location. Nygren, Lind, Johnson and Sandblad (1992) describe how physicians when reading blood test reports, make use of the presence or absence of information, in addition to interpreting the actual values of the tests. This type of pattern recognition is likely to occur in many work situations where standard forms or documents are used. In these situations the structure and contents become very familiar to the workers, and over time they are likely to develop automated pattern recognition. In a case handling context it may be the absence of a signature or a date, or irregularities in the form of the information, which is noticed by the case handling officer. Such “patterns” can be used by the handling officers to estimate the complexity of a case. They can simply browse through the cases quickly and pick up the patterns of information without actually reading the text.

Based on the observation interviews, and the physical cues discussed above, we identified a set of design criteria addressing health risk factors:

- Overview of the number and complexity of cases – the users should be able to quickly estimate the total workload in terms of the number of cases and the complexity of the individual cases.
- Knowing what to do – the users should always have a clear picture of what has to be done and what to do next.
- Work pace – the users should be able to work at their own pace, i.e. the work pace should not be set by the computer.
- Flexibility – the users should be allowed to determine the task order, to sort their cases in any way they like and to work with them in any order. They should be able to choose between sorting and setting priorities manually or automatically. They should also be allowed to work with cases on paper.
- Understanding – the users should understand where the cases come from and where they are at any point in time (i.e. distributed by the system or transferred from a colleague, and status information).
- Social support – the system must allow the users to help one another with the cases.
- Efficiency – the users should be able to work efficiently with the information (i.e. ease-of-use has priority over ease-of-learning).
- Ergonomics – the system must provide access keys, minimum number of screens/windows, choice of input devices, visual ergonomics, etc.

PILES PROTOTYPE

Using the criteria outlined in the previous section we developed a prototype based on the piles metaphor (Boivie et al., 2003). In this prototype, which is shown in Figure 1, piles and individual cases are placed on a workspace, where they can be moved around and arranged spatially. The size of a pile indicates how many cases it contains and thus gives the users a quick overview of the workload. The users can also create any number of piles and name them to reflect their contents. Some piles such as inbox, and pending cases are predefined.

The right-hand side of the screen lists the cases in the selected pile. The main idea with the piles prototype was to make use of the spatial properties of the piles (that they can be placed in specific locations on the workspace) to support the overview and control of the workload. According to Mander, Salomon & Wong (1992), the piles metaphor supports users' organization of information better than hierarchical folders. User studies have demonstrated that people use piles because of their need for a less detailed categorization, and because piles can be rearranged more easily.

An evaluation of the piles prototype (Boivie et al., 2003) indicated that the design solution supported the users' tasks to some extent. However, we also found a number of problems. One finding that surprised us was that the case handling officers did not make use of the spatial properties of the piles, such as their placement on the work area, or comparing their sizes. Contrary to our results, there are many studies which indicate that the use of spatial information is important (Barreau & Nardi 1995, Case 1991, Malone 1983, Zuboff 1988). One reason for this contrast might be that our evaluation was too short and so the users did not have the time to learn to use the spatial properties. Another reason might be that although the spatial location is important, it becomes less so when the "work area" is a relatively small computer screen (17") and there are no real cues in the area where the users' place their documents.

Another problem with the pile metaphor is that the screen real-estate is not used efficiently, and this limits the space used for displaying important information when it is needed. The analysis of our results also showed a major problem in that the pile metaphor was too literal, which promoted ease-of-learning, but had some drawbacks in terms of efficiency and ease-of-use. The pile metaphor relies too much on direct manipulation, and that leads to a somewhat cumbersome interaction style. One important design criteria for the case handling system was that it could be solely operated with the keyboard (as intensive use of the mouse would lead to repetitive strain injuries). Although this was possible, the keyboard interaction became awkward due to the nature of the pile metaphor. Modifications to the design could probably improve the efficiency, but the metaphor in itself would still be a limiting factor.

The screenshot shows a software interface titled "Visu Work". At the top, there are buttons for "Hämta ärenden", "Stäng inkom", "Ny hög", and "Sök". On the right, there are buttons for "Öppna ärende", "Flytta ärenden till handläggare", and "Utskrift". The main workspace contains several piles of documents, each with a label and a count: "Inkom [Öppen] (29)", "Bekvämlista (3)", "Flytning (7)", "1091 Födelse", "Tillhör samma ärende" (with a list of case numbers: 1105, Hindersprövning, 19970411-5429, Bagge, Runar; 1105, Hindersprövning, 19760305-6449, Erlander, Tova), and "Inkom (3)". On the right side, there is a table with the following columns: "Ärendetyp", "Dnr", "Namn", "PersonNr", "Ankom", "Status", "Urspr.", and "Kommentar".

Ärendetyp	Dnr	Namn	PersonNr	Ankom	Status	Urspr.	Kommentar
Födelse	1216	Hämäläinen, Jarmo	20030228-1415	030401	Nytt	AB	
Flyttnin	1211	Olsson, Marie	19510710-1944	030401	Nytt	AB	
Födelse	1214	Samuelsson, Olga	20030315-1423	030401	Nytt	AB	
Födelse	1213	Samuelsson, Ola	20030315-1415	030401	Nytt	AB	
Flyttnin	1211	Widén, Erik	19501113-1419	030401	Nytt	AB	
Födelse	1066	Lindberg, Go	20030331-6751	030401	Grundre	GÅHS	
Medborga	1212	Hämäläinen, Jarmo	20030228-1415	030401	Nytt	AB	
Födelse	1103	As-saffar, Go	20030331-6751	030401	Nytt	AB	
Födelse	1106	Salmér, Go	20030331-7532	030401	Nytt	GÅHS	
Födelse	1098	Bartholdsson, Fl	20030331-7849	030311	Grundre	GÅHS	
Födelse	1120	Haakinen, Fl	20030331-2468	030401	Nytt	GÅHS	
Födelse	1046	Lindström, Fl	20030331-8844	030401	Grundre	GÅHS	
Födelse	1118	Sonesson, Fl	20030331-7663	030401	Nytt	GÅHS	
Födelse	1077	Alkan, Fl	20030331-6467	030401	Grundre	GÅHS	
Flyttnin	1051	Karlsson, Ingrid	19280404-0083	030401	Inscann	GÅHS	
Flyttnin	1328	Lindström, Mariann	19570819-4640	030401	Grundre	IB	
Medborga	1105	Bagge, Runar	19970411-5429	030401	Grundre	GÅHS	
Medborga	1057	Kiesi, Liisa	19130606-9745	030401	Grundre	GÅHS	
Hindersp	1105	Bagge, Runar	19970411-5429	030401	Grundre	GÅHS	
Medborga	1067	Erkan, Funda	19241203-9662	030401	Grundre	GÅHS	
Födelse	1053	Lindström, Fl	20030331-8546	030401	Inscann	GÅHS	
Medborga	1117	Stohroliten, aF, L	19350715-3127	030401	Nytt	GÅHS	
Hindersp	1105	Erlander, Tova	19760305-6449	030401	Grundre	GÅHS	
Flyttnin	1069	Olsson, Linda	19770908-7645	030401	Inscann	GÅHS	
Flyttnin	1081	Andersson, Anna	19320227-5467	030401	Grundre	GÅHS	
Flyttnin	1124	Eriksson, Maria	19080430-2183	030401	Nytt	GÅHS	
Flyttnin	1113	Svensson, Eva	19441123-3226	030401	Nytt	GÅHS	
Medborga	1108	Hollnick, Klara	20000101-6549	030401	Nytt	GÅHS	
Hindersp	1087	Lundberg, Annelie	19640807-8642	030401	Grundre	GÅHS	

Figure 1: The piles metaphor prototype.

REDESIGN OF THE PROTOTYPE

As mentioned earlier, there are a number of problems with the piles prototype that need to be addressed. Due to these problems, we decided that rather than modifying the piles prototype, we would redesign the prototype from scratch, by generating and evaluating new possible design concepts. We used the design criteria and knowledge gained from our initial user study, as well as the findings from the evaluation of the piles prototypes as the basis for our new design. In particular we wanted to focus on providing support for easy and quick estimation of the total workload in terms of the number of cases and the complexity of the individual cases. This included representing the number, type and status of the cases, the complexity and priority of each individual case, and the relationships between the cases. Improved flexibility and efficiency in performing tasks, as well as providing mechanisms for social support were other important criteria for our second design.

In addition to the above design criteria we conducted a survey of information visualization literature, including the bifocal lens (Spence 2001, Spence & Apperley 1982), perspective wall, XY-distorted views (Spence 2001), table lens (Rao & Card 1994) and tree-maps (Johnson & Shneiderman 1991) to inform the design of the new prototype.

The design process initially focused on brain-storming activities in order to generate new possible solutions. From these ideas, we selected two different design concepts that we developed further using paper and pen. Both concepts visualized cases as rectangles containing textual information, e.g. the citizen's name and social security number, and the date of arrival for the case. The case symbol was referred to as a "tile". The tiles were arranged in columns, each column holding cases of a certain type. In both designs, the colour of the tile reflected the case type.

The name "tile" is just a label for the case symbol and none of the design concepts were based on a literal "tiles"-metaphor. Instead, the first design was partly based on the bifocal display concept (Spence 2001, Spence & Apperley 1982). Here, the basic idea is to integrate an overview level with a detailed view at the point of interest. The detail view is moveable and functions like a bifocal lens. The peripheral items are smaller, but the user is still aware of them, thus supporting the user's overview. In this design, the tiles are arranged by arrival date, so that the oldest cases are placed on top of each column. A sketch of the bifocal display design is shown to the left in Figure 2.

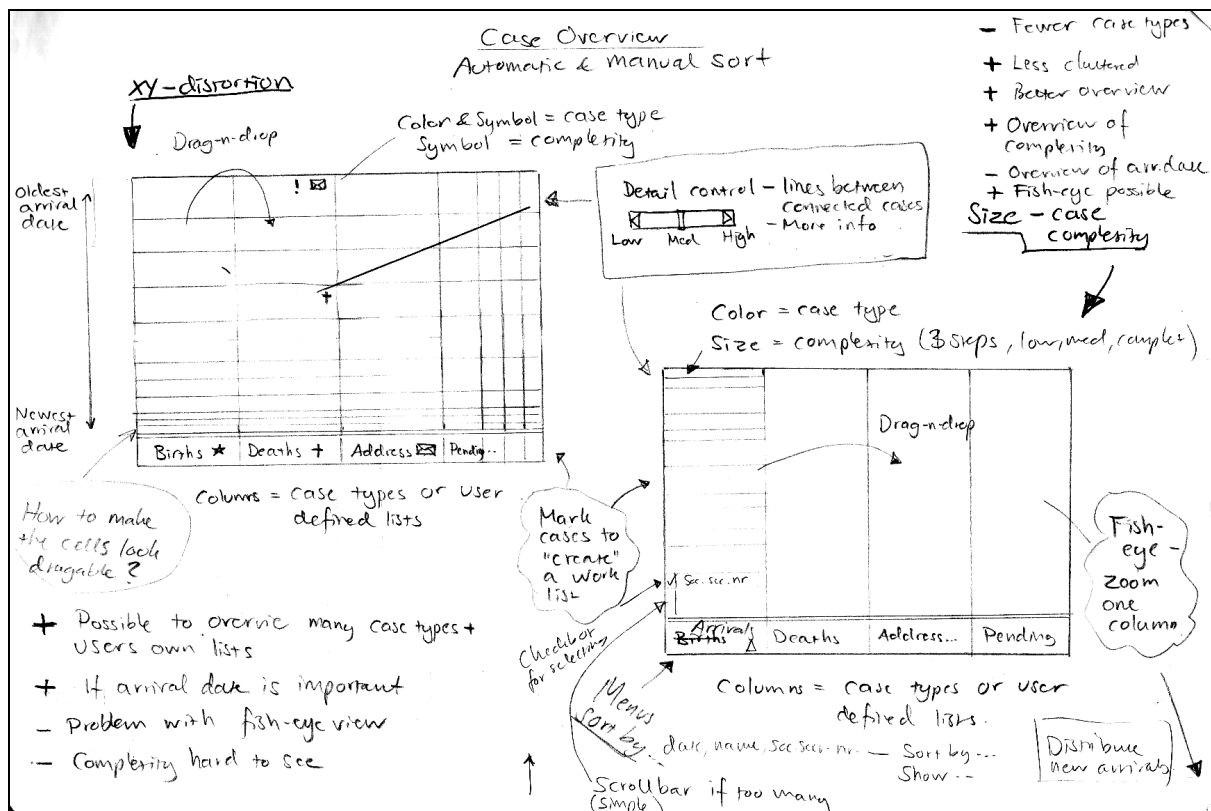


Figure 2: Two different designs based on tiles arranged in a tabular view. In the left sketch, the tiles are shown in bifocal display, and arranged by arrival date. In the right sketch, the size of a tile reflects the case's complexity.

The second design was similar to the first one but without the functions of a bifocal lens, and is shown in the right-hand side of Figure 2. Besides the bifocal lens, the main difference between the two designs was that in the second design the size of a tile reflected the complexity of the case – a larger tile size indicated a more complex case.

Both of the designs were elaborated further to allow a better comparison of their features. Based on a final comparison, however, we decided to choose the second design as the basis for the development of our next prototype. The main reason for this choice was that the second design would allow the case handling officers to estimate the complexity of individual cases, and this was clearly an important factor in better estimating their workload. This design was developed into an interactive prototype and evaluated with the users.

THE TILES PROTOTYPE

A prototype interface for a case handling system was developed using the second design described above. Figure 3 shows this prototype. The cases, visualized as “tiles”, are arranged in a tabular workspace. Each column, called a “tray”, contains a number of related cases. Trays hold cases of a particular type (e.g. births or marriage cases), or cases that have some form of status defined by the user (e.g. pending case, requiring further information). New cases are by default displayed in the “new cases tray”. The user can move these cases to other trays manually, or ask the system to do it automatically. Each tray can be sorted and arranged by the user. The users can select and prioritize the cases with which they will work, thus creating their own task list.

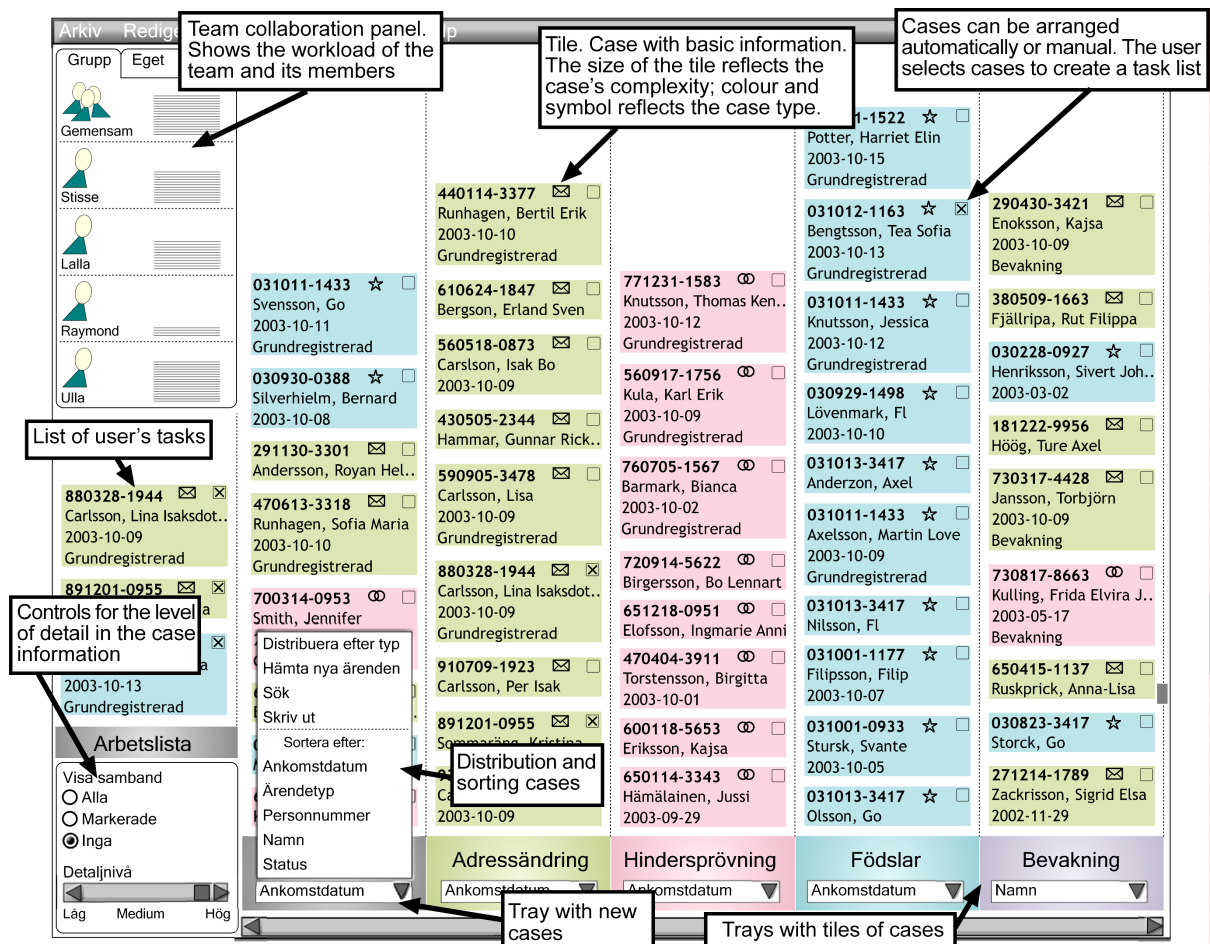


Figure 3: The main screen of the final design. It shows the overview of cases in the user's workspace.

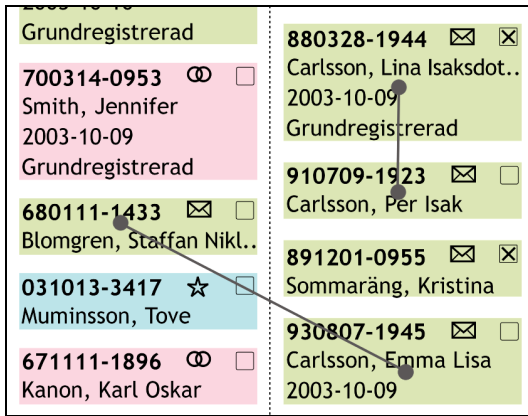


Figure 4: Tiles are used in the design to represent cases. The lines show connected cases.

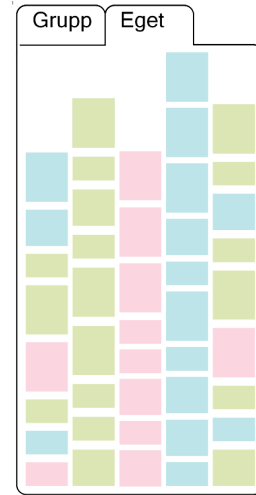


Figure 5: The minimized view of the user's workload.

The collection of the tiles in the workspace gives the users an overview of the cases assigned to them. Tiles are characterized by a number of visual attributes (Figure 4), some of which are listed in Table 1.

Tile attribute	Meaning
Size	Complexity of the case
Colour	Type of the case
Symbol	Type of the case
Text	Basic info: citizen's name and social security number, arrival date of the case, status (new, pending etc.)
Lines between cases	Connection between cases (i.e. family members).
Check-box symbol <input checked="" type="checkbox"/>	Selection. Marked if case is selected for user's task list.
Order	User selects order of cases according to predefined sort order, e.g. arrival date, name.

Table 1: Main visual characteristics of tiles.

The left part of the main screen shown in Figure 3 contains the user's task list, controls for the level of details, and buttons for showing/hiding possible connections between cases. The team panel which is placed in the top left-hand corner, shows the other handling officers in the team, and their workload. When the users need support from the other team members, they can use the functionality provided in this panel for instance to discuss a complicated case or transfer cases.

The tiles design aims to provide the users with an overview of their workload, and functions for managing their workflow. The idea is that when the users have prioritized their work and created their task list, they start to work with the cases in other applications. The workspace is then replaced by the user interface of the other application, but the user's task list and minimized view of the total workload is still displayed (Figure 5). The team panel is also available. The users can switch back to the workspace when needed. The user interface can be operated by a keyboard or by a pointing device.

In summary, the tile concept has a number of advantages compared to the pile metaphor:

- Overview – more information is available and the screen real-estate is more efficiently used.
- Overview – it is easier to compare the number of cases, their complexity and dates.
- Control – it is easier to select, sort and manipulate cases.

Evaluation of the tiles prototype

The final design described in previous section was developed into an interactive prototype using Macromedia Flash™. Due to the limited interactive capabilities of the prototype it was not possible to allow the users to simulate their real tasks in full. Therefore we used a different evaluation method to the one used for evaluating the previous piles prototype (Boivie et al., 2003).

The purpose of this evaluation was to assess the tiles prototype against our initial design criteria. However, due to the limitations of the prototype, some of the criteria could not be evaluated at this stage since the users could not fully interact with the prototype to simulate their work. Therefore, the evaluation mainly focused on the following criteria:

- Overview of the workload – The user should be able to prioritize his/hers work from available information.
- Flexibility – the users should be allowed to determine the task order, to sort their cases in any way they like and to work with them in any order.

Listed below are some other aspects that also were evaluated, but only partially.

- Efficiency – the users should be able to work efficiently with the information (i.e. ease-of-use has priority over ease-of-learning).
- Social support – the system must allow the users to help one another with the cases.
- Understanding – the users should understand from where the cases come and where they are at any point in time (i.e. distributed by the system or transferred from a colleague, and status information).

Finally, the following criteria were not evaluated at all:

- Interaction style and ergonomics – the system must provide access keys, minimum number of screens/windows, choice of input devices, visual ergonomics, etc.
- Knowing what to do – the users should always have a clear picture of what has to be done and what to do next.
- Work pace – the users should be able to work at their own pace, i.e. the work pace should not be set by the computer.

The evaluation was conducted as an informal review together with a group of three users using the interactive prototype displayed on a big screen. The users were case handling officers at a national registration office, different to the one in our previous study. The session took about two and a half hours and was performed by two of the researchers involved in the project who have expertise in usability and organizational psychology. One of the researchers led the evaluation by walking through scenarios in the prototype with the group of users. The scenarios covered, for instance, *getting all their cases*, *getting an overview of their work and prioritizing their cases*. 15 scenarios were evaluated in total, each involving one or more tasks. For each scenario we had a list of user behaviour that we wanted to observe, and a set of related questions we wanted to discuss with them (for example: *Did you find it easy/difficult to estimate the number of cases for each case type?*). The questions aimed at evaluating the design criteria discussed above. The scenarios were followed by a more open-ended discussion. After the session, we analysed the answers to our questions as well as our observations of the users' behaviour.

The results of the evaluation indicated that the users found it possible to get a quick overview of the number of cases and their type. The solution for arranging and sorting cases in order to prioritize and create a task list also met the design criteria. Furthermore, the team panel helped the users get support from their colleagues.

The users found it possible to get an overview of the complexity of the cases indicated by their tile sizes. However, in the opinion of the users, the concept of complexity is too subtle and hard to define, and therefore defining case complexity automatically will not be very useful in their real-work setting. Although there are some generally applicable rules of thumb which can be used to estimate the complexity of a case (e.g. marriage between people with different nationalities is often complex), it is often necessary to look at a case before its complexity can be estimated. The case handlers, however, use the case type as the primary selection criteria in prioritizing the cases, with cases regarding deaths and births having the highest priority.

Coding the case type using colours and symbols also helped the users in getting an effective overview of their workload. Furthermore, sorting the cases into different trays by their type reinforced this overview. One user mentioned that she would like to have a list view of the cases to complement the tiles views. Another user pointed out that newly arrived cases should automatically be sorted according to their type. Some users also

requested more visual information about the number of high priority cases. For instance, they wanted to have a counter displaying the number of death and birth cases.

The visual attributes and the textual information of the tiles were generally considered to be adequate and helpful by the users. However, they also wanted to be able to display notes from the records of a case without having to open it. The connection lines between related cases were considered useful, but in practice there would be related cases that are handled by different case handling officers.

The evaluation showed that the part of the design that aims to improve team work and social support was overall useful. The evaluation nevertheless raised some questions. For instance, the users did not like the idea of showing their workload in the team panel to their colleagues or supervisor. They felt that watching each other might lead to more stress. Displaying the total workload of the team, on the other hand, was considered acceptable. Another concern was that the users could not see the individual cases in the team inbox or in their colleagues' trays. This is necessary when a case handling officer must take over cases from a team member for some reason, for instance, when someone is absent due to illness.

DISCUSSION

The evaluation of the prototype indicated that the tiles design concept supported the users' work and fulfilled the design criteria to some extent. We also identified a number of areas for improvement, which are discussed below. Most of these problems can be resolved by making minor modifications to our basic design concept. However, to further validate the results we need to conduct further evaluations in real work context with more users.

One of the goals of the tiles design was to visualize the complexity of cases, as this was a problem with the earlier design based on the pile metaphor, and an important factor in determining the workload. However, the last evaluation revealed that this attribute is very complex and hard to define for the users. The users base their perception of the complexity on the contents of the case, rather than on some pre-defined criteria. This indicates that the "leafing-through" of a case to assess its complexity is not easy to recreate on the screen – the complexity is unique for each case and difficult to capture by means of general rules.

Instead, these users applied other strategies to get an overview of their workload and to set priorities. The main strategy is to sort the cases by type. The arrival date had little to do with the priority, contrary to our expectations. The tiles design supports sorting the cases by type, and should use the case type as the primary sorting order.

The evaluation of the prototype revealed that the users did not use the same strategy as the users in our previous study. The users in the two studies worked in different local offices and the work practices differed between them. It may also be so that we judged our initial findings as more significant than they actually were. Nonetheless, further studies with more users from different local offices are needed to clarify these issues. Complexity might still be very important, and future research should consider developing methods and tools that make it possible for the users to estimate the complexity more easily. Above all, the design must support different strategies for sorting and setting priorities.

Another problem with the current design is the visualization of related cases. In the current prototype, related cases are visualized by lines that are easy to spot when they are diagonal, but not when they are horizontal or vertical. The viewing of these lines could be enhanced by making them slightly diagonal or curved. A more difficult problem is that related cases may "belong" to different case handling officers. The best solution would probably be to send all related cases to the same officer. When this is not possible, we could still visualize these relations as all cases are in the system, for example with an outline marking, or with a connection line that "ends" in a sticky note containing information regarding the whereabouts of the related case.

To get an overview of a large amount of cases is potentially a problem. In our current design, we can only display a limited number of cases on the screen at the same time. For a large number of ongoing cases, the user has to scroll the tray vertically (each tray can be scrolled separately). The same situation occurs horizontally if the user works with many different case types and wants to have a separate tray for each type. Alternative solutions are to provide trays that can be folded and unfolded horizontally or use the bifocal display concept (described above). We could also use a zoomable user interface. When the workspace is zoomed out, all the cases can be displayed but without any detailed information (resembling the minimized view in Figure 5). However, we need to conduct further studies to find out more about how the users work with large numbers of cases, and how many cases they work with on an average day.

CONCLUSIONS AND FUTURE WORK

This paper gave a brief overview of a previous study which we conducted to better understand how case handlers at a branch of the Swedish national tax and registry office estimate their workload in a paper-based case handling situation. The aim of this study was to design a prototype that would support overview and control over one's workload, in order to address stress related complaints often associated with the introduction of computerized case handling systems. Based on the findings of this study a prototype system was developed using the piles metaphor. An evaluation of this prototype identified several problems with the piles metaphor.

The knowledge gained from the previous study and the evaluation of the piles prototype, as well as a review of the literature on information visualization was used to design and evaluate a new prototype based on tiles. Although this prototype has shown some advantages over the piles prototype for being more effective in allowing the users to get an overview of their workload and organising their tasks, there are still some issues which need to be addressed. Our goal is to further develop the tiles prototype by incorporating the user feedback from our current evaluation, and re-evaluate the next version of the prototype in a real work context with more users.

However, our experience has so far demonstrated that providing overview and control for case handling work is a complex problem where there may not be a single straightforward solution. As the problem concerns work context and occupational health issues, it is also difficult to fully evaluate long-term effects of different designs. Nevertheless, we are convinced that a design process which considers occupational health issues is an effective way of designing solutions that address the workload overview and control problems associated with computer-supported case handling work.

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