

# *Collecting with **Cabinet**: or how designers organise visual material, researched through an experiential prototype*

Ianus Keller, Froukje Sleswijk Visser, Remko van der Lugt and Pieter Jan Stappers, Faculty of Industrial Design Engineering, Delft University of Technology, Landbergstraat 15, 2628 CE Delft, The Netherlands

**Cabinet** is a tool to support designers in the collecting and organizing of images. It was used in a case study that was conducted by three designers during their normal work practice for a period of 4 weeks. The way they reacted to and reflected on the prototype as well as their collecting behaviour was studied through observation and interviews. In this paper the results of the study are presented and discussed in the light of the growing recognition that computer tools should support creative rather than merely administrative tasks. Crown Copyright © 2008 Published by Elsevier Ltd. All rights reserved.

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In the last decade the computer has become an important and powerful tool for designers, streamlining many aspects of their work. Still, computer tools have been found to have shortcomings in supporting creative tasks (Kolli et al., 1993; Goel, 1995). A provoking quote by Pablo Picasso – “Computers are useless, they only give you answers” – sums up the biggest problem with computers in creative use. Computers are essentially designed as goal-directed problem solving machines with a high emphasis on verbal attributes and are therefore not oriented to support creative design processes, which incorporate explorative, iterative and visual ways of thinking (McKim, 1980).

This limitation of computers manifests itself in how designers use existing visual material for inspiration and reference. The topic ‘collecting’ has been researched in an architectural design setting (Wagner, 2000), but has hardly been explored in the design world. In a contextual inquiry at Dutch design firms, it was found that designers currently keep and maintain two separate collections of visual material: a physical collection of magazines, photos and objects and a set of digital images on their computers, CD-ROMs and the Internet (Keller et al., 2006). These two collections do not come together in the design process – the first is used mainly for inspiration while the second is used for communication with the client.

**Corresponding author:**  
Ianus Keller  
[ianus@forinspirationonly.com](mailto:ianus@forinspirationonly.com)



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Based on the findings from the contextual inquiry, **Cabinet**, a working prototype of a tool that helps designers collect visual material, was developed. The tool bridges the divide between the digital and the physical world. Its key ingredients are its ability to do simplified scanning and completely non-verbal, visual interaction with digital images. This paper reports on an evaluation study in which the prototype was used in three design practices for a period of a month each.

### *1 Cabinet: supporting visual collections*

Four ingredients formed the theoretical base for **Cabinet**: category formation, metaphorical thought, organizing collections, and physical interaction. Creative processes make intensive use of juggling with existing elements. For example, try to create, as a creative exercise, a group of things to take on a trip. The result of this exercise is an ‘ad hoc’ category (Barsalou, 1991). It consists of things taken from closets and possibly from a list, but it also contains things that may not be there and have to be bought or even invented. New ideas often derive from these kind of goal-derived categories. Schön (1963) describes another model explaining the origin of creative solutions by the process of metaphor, in which one concept is mapped on another and new ideas come from making combinations that partially fit. Pasman elaborated on organizing collections of visual material by designers as a creative activity (Pasman, 2003). In his research he found that organising visual material could be instrumental in making new designs that went beyond existing categories. The mechanisms described above rely mostly on cognitive skills, whereas designers find their creativity not only in their minds but also in the physical interaction with their tools (Candy and Edmonds, 1999; Hummels, 2000). In these ingredients one finds a basis for why designers collect and organise visual material as a creative activity and in what way that material is collected.

In a previous research (Keller et al., 2006) we found that designers keep and organise visual material in their workplace as a means to stimulate their creativity. Figure 1 illustrates the six findings that came out of this study. The main theme of these findings relates back to the designer keeping two collections, a physical and a digital collection, each with different goals, uses and values.

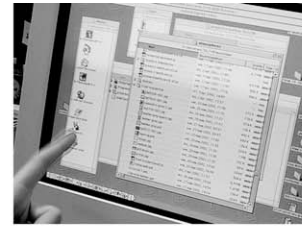
The first author used the six findings as design criteria to develop a prototype tool, shown in Figure 2. **Cabinet** is a table-sized workbench, displaying a visual collection projected on its surface (Figure 2, left). Physical visual material placed on the table can be entered into a collection easily. When its single button is pressed, **Cabinet** takes a photograph and projects a digital copy on the surface over the original (Figure 2, top right sequence). The user can move and organise the collection on its surface with large gestures and through compositions and stacks (Figure 2, lower right sequence). The tool is more like a physical cabinet than a typical software application: its inter-



*Finding 1: Collecting is an ongoing activity. The clippings in this collection are gathered over time and collections are browsed rather than approached with a factual query.*



*Finding 2: Designers keep two collections of visual materials which never meet- a digital and a physical. The separation is exemplified by the stacks of magazines lying on the scanner but never scanned in.*



*Finding 3: Computer tools do not support visual tasks such as making collages. The files in this screenshot are images gathered for collages. The display only shows the filenames and some very small thumbnails.*



*Finding 4: Designers organise their workplace to promote serendipitous encounters with earlier work. The yellow sticky notes are kept in the magazine even when they are not used afterwards.*



*Finding 5: Most new ideas come from breaking the rhythm. In computer tools time is an underestimated design parameter: an exception is the anti-RSI software, which interrupts but does not manage to lure the designers away from their monitors.*



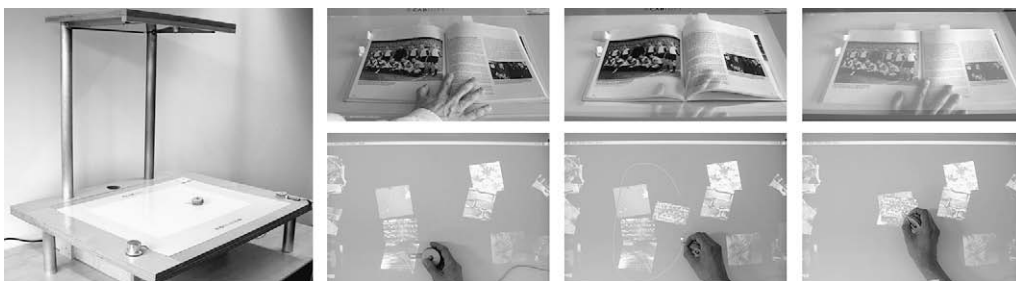
*Finding 6: Designers use visual material socially to support awareness and the exchange of knowledge with their colleagues. Images on computer displays do not allow for this fluent sharing.*

*Figure 1 The six findings from the contextual inquiry*

face is minimal, it is always on and ready to be used, and it provides a continuous presence of the collection in the working environment. When **Cabinet** is left alone for several minutes, it starts displaying random images from its collection.

**Cabinet** combines the act of working on physical collections with new media. It addresses the six criteria as follows:

- (1) Active collecting is supported by **Cabinet's** 'always on' availability and the possibility of adding material without the need to prompt for structure.



*Figure 2 Cabinet prototype with the scanning process in the top row and the interaction with thumbnails in the bottom row*

- (2) Merging of the physical/digital collections is supported by smooth scanning and physical interaction. In this way the digital and physical collections of the designer can be unified.
- (3) Visual interaction is supported by eliminating verbal clues in the interface and by allowing the collection to be organized purely visually and spatially.
- (4) Serendipitous encounters are supported by the continuous and dynamic display of different images from the collection.
- (5) Breaking the rhythm for inspiration is supported because **Cabinet** is a different physical object than the regular workspace thus luring the designers away from their desks.
- (6) The social use of visual material is supported by continuously presenting images in the workplace and by inviting collaborative interaction at the **Cabinet** table.

## 2 *Field evaluation*

The development of **Cabinet** was characterised by early prototyping, in situ testing and constant exposure to prototypes in the ID-StudioLab. The prototype was intended both as a proof of concept for new tools and as an instrument for research in the field. The aim of the case study was to see how designers, when confronted with a tool that implemented the above six principles, would work with their visual collections during real-world design projects. In this study the prototype itself was evaluated and used as a means to gain further insight into how designers in practice organise their collections.

Because this study is not only interested in the use of a tool but also in understanding the designers' interactions with their collections of pictures, this study was approached as a practice-based multiple case study (Yin, 1984). A design tool "...reveals itself to us fully only in use... Without analysing it in its setting we are bound to overemphasise other aspects of the artifact that may not be crucial in the use setting. Thus, as many authors have argued, a tool is what it is used for." (Bannon and Bodker, 1991). Designers need to become accustomed to a tool in order to get a sense of its impact and use in daily practice. Therefore, it was essential to deploy the tool for a substantial period of time. **Cabinet** was deployed in various design studios to explore congruencies and differences in its use between different design settings. A list of expectations, developed in the design of the tool, was used as a structuring device and starting point to interpret the rich variety of data, both qualitative and quantitative, that was gathered from the cases.

### 2.1 *Participants*

The participants in the study were three designers at three different design companies in the Netherlands. The designers were selected by their companies on the basis of their experience with finding and using imagery in the design process. Each participant brought with them their own way of working. The first participant was Roy Gilsing at WAACS, a design agency in Rotterdam

with seven employees working on product, packaging and interior design. The second participant was Renate Frotscher at Fabrique, a design agency in Delft with over 50 employees working on graphic, industrial and new media design. The third participant was Renée Schuffelers of Smool, a design agency with three employees working on concept, product and furniture design.

## 2.2 Procedure

The procedure for the case study research is illustrated in Figure 3.

### 2.2.1 Instruction session

**Cabinet** was delivered to each office with an instructional DVD containing a 7-min movie that explained all its functionalities and features. In this way, all three participants received the same instruction. In each studio, **Cabinet** was strategically placed in a location where social interaction or interaction with visual material could possibly take place (e.g., see Figure 4). The participant was then assisted in performing a few actions, such as adding a new picture, and giving it a place in the collection. A 50-image collection provided by the participant had been pre-installed, allowing a fluent start. A diary with instructions was also provided to record observations and possible questions. The participant was instructed to start up **Cabinet** every morning and keep it active and available throughout the working day.

### 2.2.2 Maintenance visits

Each Wednesday (circles in timeline in Figure 3) a researcher (the first author) would come by for a short maintenance visit, to backup the log files and collections. The maintenance visit also served as a chance for the participants to ask questions or report problems to the researcher and as a reminder on the study's progress.

### 2.2.3 Design session

In the third week, the participants were asked to present, using **Cabinet**, one active project in which he or she had used it. The participants were then asked to perform some tasks on **Cabinet** to elicit use. For example they were asked to show on **Cabinet** in which direction the project was heading and to summarise the project with three images.

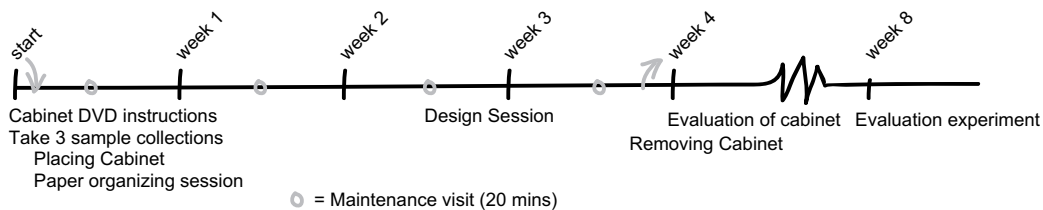


Figure 3 Timeline of the procedure



Figure 4 Placement of **Cabinet** in the design studios: at WAACS (left) on a desk near a workplace and the entrance to the studio, at Fabrique (middle) near the entrance and water cooler on a separate table and at Smool (right) next to the printer

### 2.2.4 Evaluation interview

After 4 weeks **Cabinet** was taken away. Shortly thereafter, another researcher interviewed the participant in order to evaluate **Cabinet** and reflect on the participant's behaviour considering visual material in the design process after using it. In the evaluation the participants were asked to describe what **Cabinet** is, how they used it, what their collection on **Cabinet** looked like, and how it influenced their collecting and design behaviour. This interview was conducted by a different researcher (the second author) for two reasons: to avoid bias leading to socially acceptable answers (e.g., Nielsen, 1994) and the researcher could pretend not to know of the prototype's background thereby inviting the participant to give a fresh view and a critically different perspective on the developed prototype (Gaver et al., 2004). During the interview the participants were also asked to bring in a colleague from their studio who was interviewed regarding his or her understanding and observations of the prototype.

### 2.3 Expectations

Table 1 lists the different expectations grouped by the criteria by which **Cabinet** was developed. Table 1 also lists three categories of data gathering, and their appropriate form for each expectation.

## 3 Analysis, results, and discussion

The entire procedure resulted in several sources of data, which have been analysed and matched using the above expectations as starting points. The **Cabinet** prototype had produced log files of all interactions over the 4-week period. The log files were visualised (Figure 5). The three collections the participants had created over the period were also studied for similarities and possible surprises or confirmations.

The richest source of data was the transcript of the evaluation interviews combined with observation notes. Excerpts from the transcribed

**Table 1** Expectations of phenomena expressing the six design criteria and the ways in which we gather the data in the study (CL = computer log, DS = design session, EI = evaluative interview)

Criteria	Expectation	Data collection
1. Active collecting	<i>Greater use/value of physical images</i> Short bursts in intervals during the day Physical collection will grow <i>Will become more aware of collecting</i>	CL, EI CL, EI EI EI
2. Merger of physical/digital collection	Physical and digital images used on equal footing The collection will be less rigidly structured <i>The line between physical and digital collection will blur</i>	CL, EI CL, EI CL, EI
3. Visual interaction	<i>Participants can easily interact with a purely visual interface</i> <i>Story emerges from pictures and composition</i> <i>Composition is used for meaning-giving, classification, finding back</i>	DS, EI DS, EI CL, DS, EI
4. Serendipitous encounters	<i>Participants will inadvertently find more images</i> <i>Screensavers and 'always on' will be appreciated</i> Serendipitous encounters in search session	CL, EI CL, EI CL, DS
5. Breaking the rhythm	Breaking the rhythm for inspiration Creativity in motor skills Ad hoc categories, fitting in	CL, EI DS, EI DS, EI
6. Social use	Table will invite joint use Colleagues will learn about <b>Cabinet</b> and its contents <i>Interaction with two people is fluent</i>	DS, EI EI DS, EI

As an indication, the expectations that were successfully found in the results have been shown in Italics.

evaluation interviews were cut independently grouped by three researchers into 18 themes related the list of expectations (see Table 1). An independent facilitator (third author) moderated this session and led the discussions between the three researchers. The analysis resulted in 112 separate quotes categorised over the six main themes of the expectations. These quotes were evenly distributed over each theme, with at least 12 quotes to each theme. In addition there was video observation material on interaction with **Cabinet** in *design sessions* (DS in Table 1). The videos were analysed independently, with special attention to the expectations of Table 1.

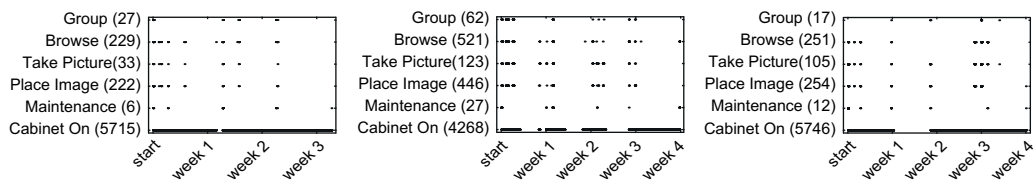


Figure 5 Log file visualisations. From left to right: WAACS, Fabrique and Smool

### 3.1 General observations

All participants actively used the **Cabinet** over the entire 4-week period (Figure 5), and could work readily with the size and style of the prototype. This is remarkable because **Cabinet's** interaction style, with its large interaction area and minimal, tangible interface is very unlike the digital tools currently used in practice.

In their evaluation the participants reported a total of 19 suggestions, requests or remarks on flaws. These focused mainly on details in interaction or appearance, but not on the overall concept of a collecting tool or the interaction style as a whole. This suggests that the participants accepted **Cabinet** as a natural tool in their workplace.

When asked for their descriptions of **Cabinet** all the participants volunteered a variety of interpretations of the tool's meaning to them. They talked about the *contents* of **Cabinet** – “it is a kind of collection of images”, “a photo thing”, “like working with photos”. Next to that they would describe its *goals* – “storing visual information ... and organizing”, “an organizing thing”, “an ACDSee folder”, “an image management tool”. Two of the participants stressed the *collaborative* aspects of **Cabinet** – “a meeting tool” and “a brainstorm tool”. Finally none of the participants described *the technical components* of **Cabinet**, but they did describe what you could do with it as a whole – “a desktop to scan images”, “scanning in 3D objects”.

In their use of **Cabinet** one exciting new pattern emerged outside of the research scope. All three participants spontaneously used **Cabinet** not only to put in existing visual material from their collections but also to add their digital or physical sketches of design solutions. These images were not just added for archiving or presentations, but also as part of their creative processes. Two of the participants mapped their own ideas and concepts next to, or even in the compositions of source material for comparison or analysis. This presents an exciting opportunity for improving on the current use of visual material in the design process.

### 3.2 Observations at the three agencies

The three participants had three distinctive ways of using **Cabinet**. This had consequences on their use patterns, their collections and their evaluations. The differences and description of the cases themselves are presented first, followed by an analysis of the results based on the different criteria and expectations.

#### 3.2.1 Roy Gilsing, industrial designer at WAACS

Roy used **Cabinet** to organise handmade sketches of a web cam design and translate them into computer renderings (Figure 6). These renderings were to be used on the company web site.



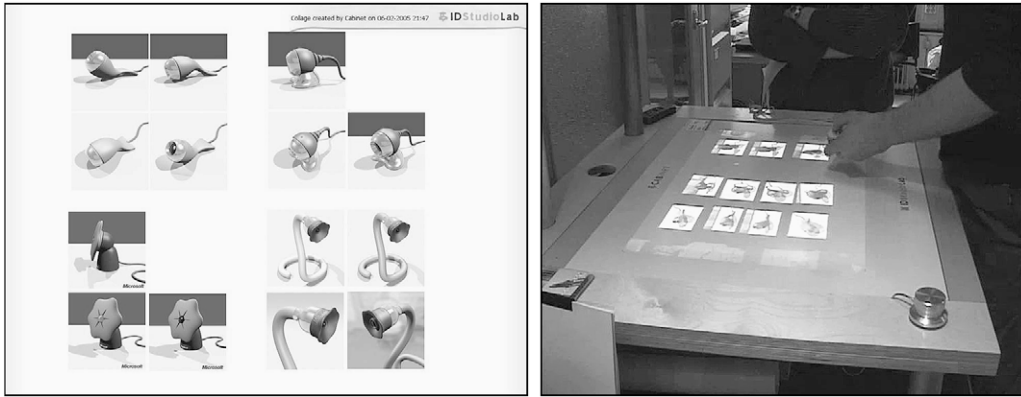


Figure 6 **Cabinet** export of a composition of web cam renderings at WAACS (left) and a still from the Design Session in which Roy presents the process of making these renderings (right)

Roy was fluent and confident with the interaction and used **Cabinet** a couple of times for presentation to visitors and colleagues. In his compositions he made a distinction between sketches and renderings. The renderings were organised very neatly in straight grids (Figure 6).

Roy added mostly digital material to **Cabinet** (Figure 7). He added 18 physical images, evenly distributed over 4 weeks. The 123 digital images were added in three bursts of activity. Roy started out enthusiastically and open, but was troubled when his standard way of making straight, aligned compositions turned out difficult to achieve in **Cabinet**. For this reason he became sceptical about some of the features of **Cabinet**.

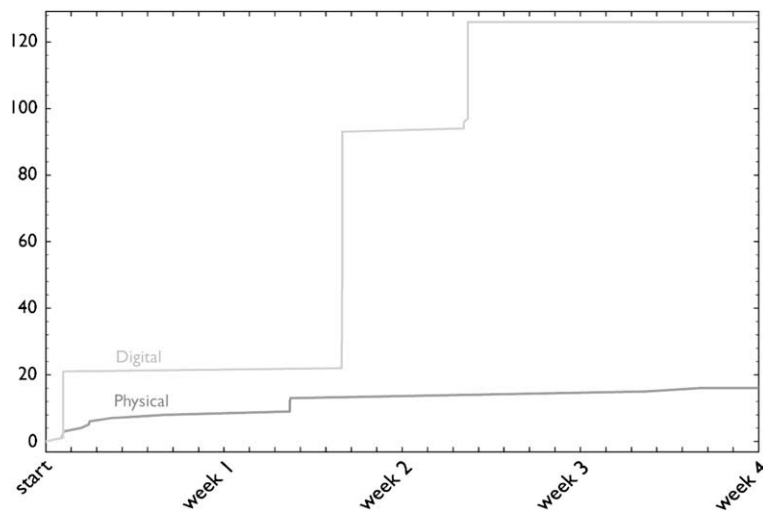


Figure 7 The amount of physical and digital images added in the **Cabinet** at WAACS over time

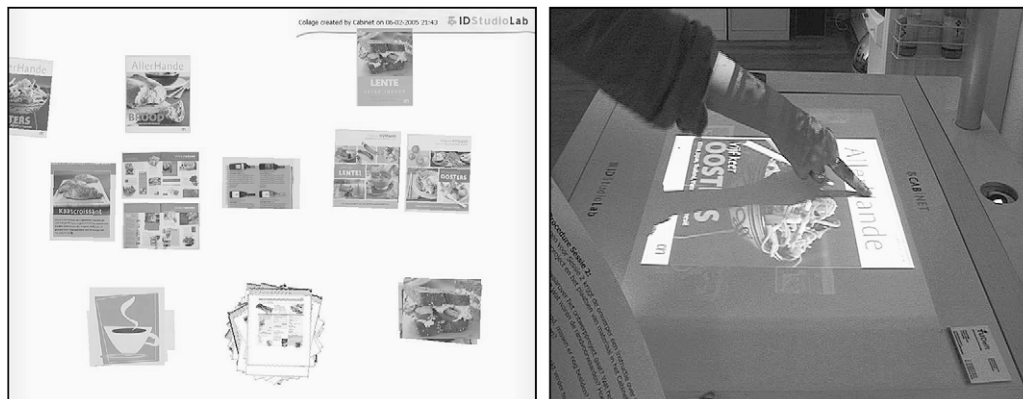


Figure 8 **Cabinet** export of Renate's analysis of a magazine (left) and a still from the design session in which Renate points at elements she can use for her solutions (right)

In the evaluation interview, Roy described **Cabinet** as an “image management application”. In all his suggestions for **Cabinet** he emphasised the possibilities of presenting images to clients, and shared use of **Cabinet** in brainstorming.

### 3.2.2 Renate Frotscher, multimedia designer at Fabrique

Of the three participants Renate was the most intensive user of **Cabinet**. In two projects she used **Cabinet** to analyse graphic designs. The project she presented during the design session dealt with the translation of the style of a company magazine onto their web site. She scanned different spreads of the magazines, and analysed them regarding layout, use of photography and illustrations (Figure 8).

In the beginning, she invited her colleagues to use **Cabinet**, but found they messed up her collection. After these disturbances she only used **Cabinet** for herself, not for presenting to clients, colleagues or managers.

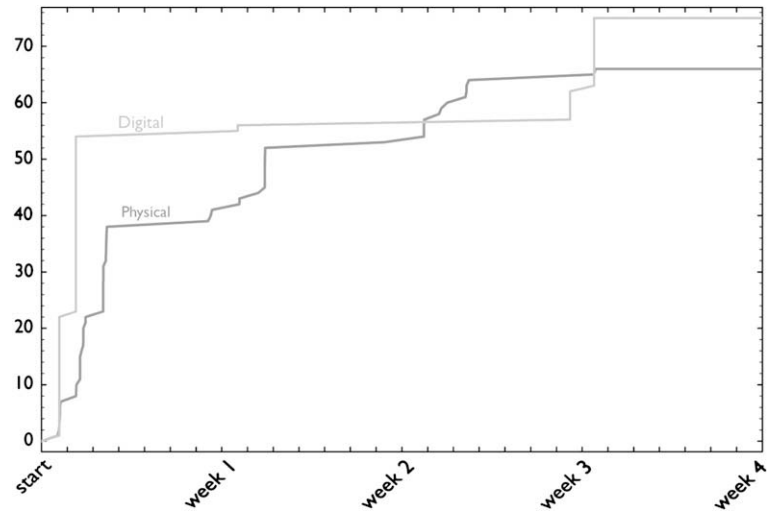
Renate added both physical and digital material in equal proportions and tempo (Figure 9). She added 66 physical and 75 digital images. She used **Cabinet** several times, at irregular intervals over short and long periods. At the end, she was enthusiastic about **Cabinet** and its value for supporting creative design.

In the evaluation interview Renate likened **Cabinet** to “an ACDSee folder” (a popular digital asset management application). In her further remarks on **Cabinet** she stressed the importance of maintaining overview and using **Cabinet** for analysing images.

### 3.2.3 Renée schuffels, industrial designer at Smool

Renée used **Cabinet** to organise her own sketches in relation to source material or reference designs from magazines. By cutting out her sketches, and

Figure 9 The amount of physical and digital images added in the **Cabinet** at Fabrique over time



composing and organizing them with collage material she looked for new patterns and directions in her own solutions (Figure 10).

After making the stacks and compositions, she labelled each stack by scanning handwritten notes with **Cabinet** and placing them below the stacks. Renée presented the result of this exercise to both the researcher and to her colleagues in a collaborative design session.

Renée used **Cabinet** merely for adding physical images (89 physical images as opposed to 16 digital images). Almost all the physical images were added in two lengthy sessions at the end of the period (Figure 11). At first she was quite hesitant to start using **Cabinet**, which was possibly caused by the prototype breaking down once in the instruction session. In the final weeks of the period she gradually used **Cabinet** more and more intensively.

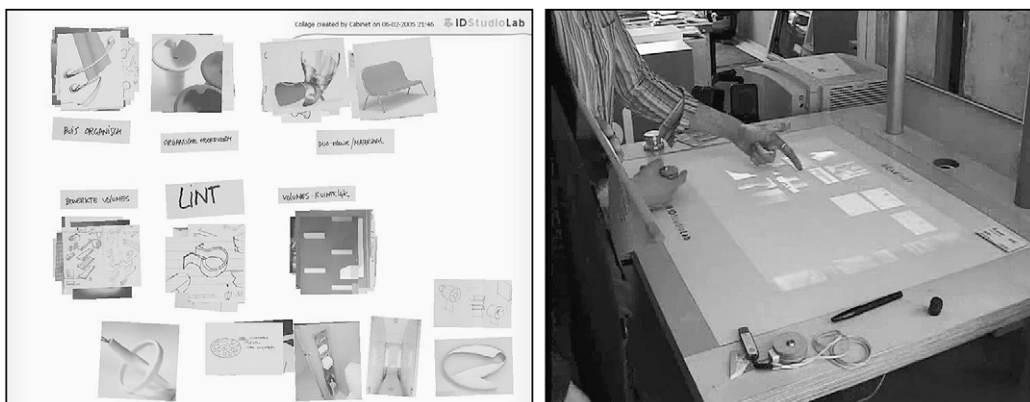
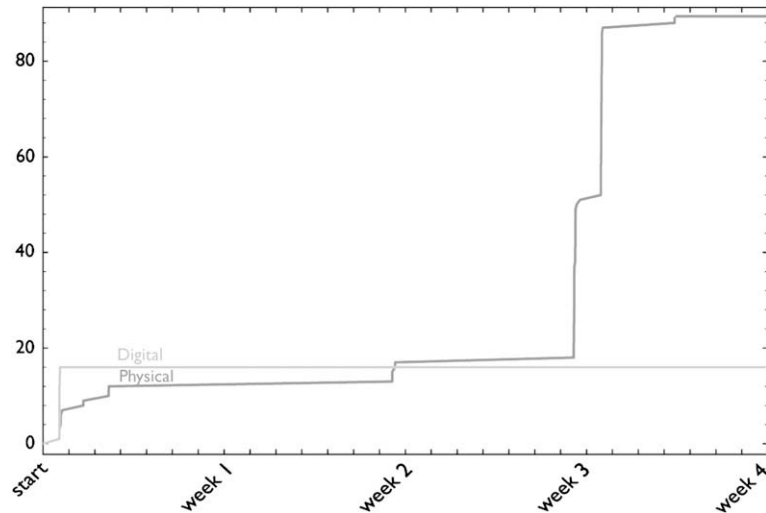


Figure 10 **Cabinet** export of Renée's combined use of existing material with sketches labelled with words (left) and a still from the design session in which Renée points at source material next to her sketches (right)

Figure 11 The amount of physical and digital images added in the **Cabinet** at Smool over time



In the evaluation interview Renée described **Cabinet** as an organizational tool, with the power to mix sketches and reference material. She also described it as a tool to discuss designs. In her final remarks, she was very positive about the possibilities of scanning 3D objects.

### 3.3 Discussion of the six criteria

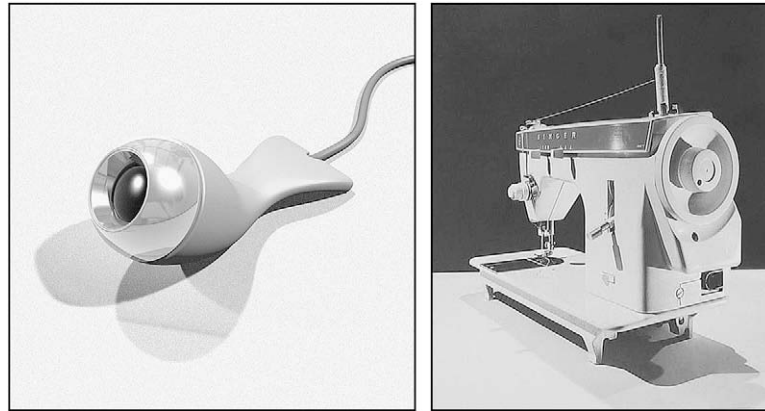
In this section we discuss the findings, following the structure of the design criteria and expectations.

#### 3.3.1 Active collecting

From the log files it was seen that the participants used **Cabinet** 3–4 times a week in small, short bursts. The participants’s own estimation during the evaluation interview was close to this as well. They did not really say that the role of their collections or visual material changed after using **Cabinet**. Roy did, however, refer to the role of visual material – “*I now realise that I am working with visual material daily ... but I knew that in some way already*”.

The unconscious quality of organising is illustrated by Renate who talked about images that ended up in **Cabinet** as part of her design solutions instead of her actively putting them into the **Cabinet**. Though **Cabinet** aimed to make the implicit aspects of collecting explicit, the collecting behaviour was still mostly an unconscious stream. For example, Roy was asked to tell if he used other visual material for inspiration in the design process. He could give no examples, saying that the project was not really creative, just an engineering or computer task. When the researcher, during the evaluation interview, pointed at a specific image of a sewing machine in his collection on **Cabinet** (Figure 12) Roy explained – “*O, that ... I kept it because I like the lighting effect in this photo resulting in double shadows. It is very dramatic. I used it in my renderings of the web cams as well ...*”.

Figure 12 A rendering from the collection of Roy (left) with reference material found in his collection (right)



### 3.3.2 Merger of the two worlds

All the collections on **Cabinet** contained images from both the physical world and the digital sources, where Roy's collection had an emphasis on digital images and Renate's collection was mostly physical. With Renate, the merger was most balanced and in her evaluation Renate talked about one project in which she "was able to use the complete span of **Cabinet**". In another project she described a similar merger – "I designed a leaflet, printed it out, made photos of the leaflet [with **Cabinet**] in different stages of folding, and used those pictures in the CD-ROM".

The links between virtual and physical were apparent in the evaluation interviews. Two of the participants said they missed a "waste basket" which should be "bigger" (Renée) or should be "like a physical waste basket" (Renate), although they were actually referring to the waste basket in the desktop metaphor.

Roy's compositions in **Cabinet** showed a distinction between computer and handmade material. He also did this without a real conscious choice. When asked to explain, he said: "A computer rendering is more exact, so maybe that's



Figure 13 **Cabinet** at Fabrique with a physical pink sticky note (left), in closeup we can read "start here" on the physical sticky note and "that means here!" on the digital sticky note (right)

*why I might have preferred them neatly organised ... These sketches are, well more messy, so I found it OK to put them like this”.*

One anecdote of Renate powerfully illustrates the merger of physical and digital. On the company intranet she had invited her colleagues to come by and try out **Cabinet**. After 1 week her colleagues had messed up her collection so badly that she couldn't use it anymore. She solved this problem by making a special stack in her collection that her colleagues could use (Figure 13) and marked it with a physical sticky note on **Cabinet**. The physical and digital sticky notes were stuck on top of each other creating a seamless integration of both physical and digital information.

The integration between digital and physical images had gone further than just seeing both types of images in one tool. For all the participants the line had blurred in their perception of and interaction with their collections.

### 3.3.3 Visual interaction

**Cabinet** offers a completely visual interaction, with no verbal menus or labels in the interface. None of the participants, during or after the period, reported real problems with the lack of verbal input and complete visual interaction. Two of the participants appreciated having an overview and not being required to enter labels. When asked for suggestions, two of the participants did mention adding verbal input as an added feature, but it was never regarded as a requirement.

The popular notion that designers have strong visual memories was supported by the participants' ability to draw out the complete structure of their collections from memory.

In the design sessions the participants interacted with **Cabinet** fluently, allowing them to talk about the images in their collection without being distracted by verbal elements. Mistakes, such as accidentally enlarging the wrong image or opening the wrong stack, did not break the flow of conversations held over **Cabinet**. During the design sessions two of the participants showed improvised uses of **Cabinet**, and explained their design process with the material visible on **Cabinet**. Roy really prepared a presentation of his design process on **Cabinet** especially for the design session. When asked for the future direction of his project, Roy had to make a change to his composition to make his point. Immediately afterwards he altered his composition to make it more logical and supportive of his presentation. The purely visual interaction of the prototype was regarded as positive but was also most criticised in its details, showing the importance that the participants gave to the interaction style.

In the evaluation, the designers talked about missing the ability to scale or align images and the annoyance of new images appearing as rotating in the centre, suddenly disturbing the composition of their images.

### 3.3.4 Serendipitous encounters

All the participants described serendipitous activities that were seen as positive but not of direct use. For example, when asked whether she would miss her collection on **Cabinet**, Renate played down the importance of the images in **Cabinet** by saying that *“These pictures in **Cabinet** are still in project folders and my personal collection are things I am surrounded with, things I want to have available at hand in case I want to use them, or that I occasionally run into. So they are in the back of my head and I don’t really need them”*.

The fact that **Cabinet** showed images randomly when left alone was described by two of the participants as *“pleasurable, aesthetically pleasing”* (Roy) and *“a fun way to bring out new thoughts”* (Renée).

### 3.3.5 Inspiration by breaking the workflow and using motor skills

The log files show many short uses by Renate. In the evaluation interview Renate reported using **Cabinet** *“when my anti-RSI software would force me to stop”* so that she could *“mess around with images ... making larger gestures”*.

In the design sessions we observed that the participants would use both hands and large gestures, even without actually pointing at the images with the input device. Two participants even pointed at empty spaces in the composition to suggest new idea directions.

### 3.3.6 Social use

The work colleagues of the participants that were brought in during the evaluation interview (see Section 3.4) provided some surprises. Considering that **Cabinet** had been showing images during the last 4 weeks in that design office we expected all colleagues to recall at least one image they would have seen while passing by. To our surprise none of the colleagues were able to recall a single image; they all mentioned something that they thought they saw, but they were all wrong. Still, these colleagues readily gave a description of **Cabinet’s** functionality and purpose, which were similar to the definitions given by the participant that actively used **Cabinet**.

The participants themselves often described **Cabinet** as a collaborative tool, such as *“a brainstorming tool”*, *“a table to present images to colleagues”*. Though all the participants mentioned collaborative use as a positive feature, only Renée actually reported using it to share her work with colleagues. The fragility of social interaction is found in the anecdote described in Figure 13, where Renate had to tell her colleagues not to mess up her collection. After putting up the sticky note on **Cabinet** no colleague ever dared to touch her **Cabinet** again.

### 3.4 *Evaluation of the prototype's interface*

The participants provided 19 suggestions and features that could improve the interaction with **Cabinet**. These varied from improvements in efficiency, “*allowing two crops to be made from one scan*”, to changes in physical appearance, “*making it a more elegant device*”. The most valuable suggestions were directed at the interaction with the collection itself, allowing for “*temporary compositions*”, “*clearing the centre from incoming new images*”, and “*being able to label groups*”.

### 3.5 *General discussion*

**Cabinet** was set out in practice as both an evaluation of the prototype and an intervention to gain knowledge on designers' behaviour.

The overall result of the evaluation was that the prototype was able to attract the designers into using a new tool and adapting it to their working practice. The findings were categorised into six categories, which determined the expectations of the research. Three out of these six findings (active collecting, merger of physical and digital collections and the visual interaction) were supported by what was found in practice. The biggest success was the merger of physical and digital visual material that took place with all participants. Furthermore, all participants were fluent and positive about the purely visual interaction with **Cabinet**. The expectations on social use of the prototype were not supported by observations, although collaborative functions were mentioned prominently as envisioned uses in the evaluation interviews. Similarly, although we found that **Cabinet** did break the rhythm of activities and involved body movement in the interaction, we found no evidence that this was linked specifically to inspiration or new ideas.

One unexpected and remarkable merger came out of this study. All the participants used **Cabinet** to organise existing visual material together with their own design solutions. In the research setup and prototype this effect was not taken into account at all. The possibility of adding sketches and renderings was foreseen, but not the notion of using composition and grouping in **Cabinet** to compare and organise design solutions directly with source material.

### 3.6 *Discussion of the method*

The method of having **Cabinet** as an intervention in such an open setting worked well as a form of evaluating the prototype. This confrontation with life in the real world gave more general confidence in the appropriateness of the tool and its features. Still, the findings are explorative and general.

The study focused very closely on how designers work in practice, showing realistic behaviour from real users in a real working context. **Cabinet** was expected to elicit different kinds of use, work methods and attitudes towards collecting. Though **Cabinet** had an effect in the collecting behaviour, the



open-ended structure of the study led to many different uses and interpretations by the participants. A pre-described procedure might have given more answers on the designer's behaviour, but this would have come at the cost of evaluating the prototype's inherent value and its effects on new uses.

## *4 Conclusions*

This study has been a reality check for both tools and theory in practice. By placing **Cabinet**, a working prototype of a tool, in real-world practice over a long time period a lot of confidence has been gained regarding its function. At the end of the period two out of three designers valued **Cabinet** as a positive addition to their working methods, and even wanted to have **Cabinet** back to use it on further design projects. During the 4-week period, **Cabinet's** use was instigated by the designers own initiative and they were not guided by narrowly described procedures. Given the work pressure in design studios and the limitations of the working prototype, these are promising results.

In the evaluation the **Cabinet** prototype worked convincingly to bridge the gap between the physical and the digital divide. All the participants readily accepted the size and the scale of the interaction on a tabletop. The lack of verbal feedback in the purely visual interface was not seen as a problem. Many of **Cabinet's** intended virtues were not explicitly mentioned during the evaluation interviews, because they did not cause friction in the designers' interaction. This study makes a strong case for doing research through prototypes in practice. **Cabinet** has a lot of potential to be used for different experiments and explorations in practice.

One approach could be to make a similar case study but embed the prototype over an even longer period in the designer's workplace. This will make it easier for designers to really make **Cabinet** part of their working method. To get reliable and valid results this would not necessarily require more participants. Possibly an experiment with just one designer or one design agency could be enough. In such an approach, the log files can provide reliable data on the change of the behaviour and patterns of uses over time.

Another approach could be to take more control over the conditions in practice by moderating the use of **Cabinet**. In moderated workshops or weekly sessions a design process could be observed in relatively controlled conditions. This approach is especially interesting to explore the effects on other aspects than just collecting. The interesting behaviour that emerged during the study, in which all three participant used **Cabinet** to combine both existing visual material for image generation with their design solutions, is an interesting area for further exploration.

In addition to confidence in a prototype's design, and a way to observe image collecting behaviour, this study also showed a glimpse of a possible future for design tools; a greater balance between the visual and verbal qualities of computer tools.

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