

## A Diary Study of Information Capture at Work

### Extended abstract

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Advances in technology are increasingly enabling devices which allow for the capture of a wide variety of information or media, whether it be for capture of paper documents, scenes, sound, or hand-written notes. The boom in digital cameras is perhaps the most salient example, but we are also seeing an increasing number of gadgets hit the market in the form of voice recorders, video cameras and document scanners. Not only are such devices becoming more ubiquitous, but they are also becoming more personal: they are becoming smaller, more portable, and in some cases more specialised for particular kinds of information capture. In addition, we are seeing more diverse and sophisticated software for delivering, manipulating, storing and viewing captured information. These capabilities, coupled with huge advances in computer storage capacity mean that we will not only be able to capture but also store more of life's experiences.

While developers of information capture devices such as digital cameras can be safe in the knowledge of how cameras will be used and thus design their technology accordingly, there are many products currently on the market whose use or (to use marketing speak) whose "value proposition" is not well defined. Sometimes, as a result, such products fail to be marketed appropriately or are designed with unclear use models. At other times, users themselves will surprise developers by finding their own uses for such devices – ones they may not have predicted in prospect. From the point of view of the design and development of information capture devices, therefore, it is valuable to know in advance how particular kinds of capture devices might be used.

In order to begin to unpack these issues, we designed a study to investigate in more detail the many different ways in which information capture does and can occur, and what this means for the design of new capture technologies. In order to provide data grounded in people's real life experiences, and which also allows for rich descriptions, we chose a diary method paired with a series of semi-structured interviews. Diary methods are a popular data collection technique in sociology, but are still relatively rare in technology studies. We have been developing our own form of this methodology in the areas of reading (Adler, Gujar, Harrison, O'Hara, & Sellen, 1998), paper use (Sellen & Harper, 1997), and the research behaviour of library users (O'Hara, Smith, Newman, & Sellen, 1998). Eleven professionals who worked in Hewlett Packard took part in the study, with subjects being asked to use digital cameras as a diary tool for one week, recording incidents where they wanted to capture some information, in any form. Instructions to subjects were kept deliberately vague so as to elicit as wide a sampling of "capture incidents" as possible. These photographs were then used in semi-structured end of day interviews to discuss different aspects of the professionals capture behaviour.

The findings are discussed in three parts. We start by discussing a categorisation of the data into ten different "categories of capture". Capture activities were categorised in terms of the *whole activity*. Specifically, we were most interested in the reasons why people wanted to capture information and how they wanted to go on to use the information as opposed to details about what and how information was captured. These categories are listed in Table 1. As an example: *capture to post in a common information space* refers to examples of situations in which people wanted to capture information in order to display it on a common noticeboard, on a whiteboard or wall, in order to be visible and available to a group of people. Taking a view of the complete "capture action" like this helps to explain some of the choices which are made at the point of capture.

This broad generalisation also allows us to explore the range and diversity of people’s capture activities, and the differences and similarities amongst them. For example, in some capture categories, information is captured in order to be shared (e.g. Capture to Discuss, Capture to Distribute) , in others it may be captured for personal use (e.g. Capture to Read and Reflect, Capture for Task Management). As another example, sometimes information is captured for short term specific purposes (Capture to Re-use) and other times for longer term purposes (Capture to Collect, Capture to Archive).

<p><i>Capture to discuss</i></p> <p>Items which have been captured in order to have an interactive, synchronous conversation around the captured information or document. This can be done with those physically co-located, or those who are distant.</p>	<p><i>Capture to distribute</i></p> <p>Items which have been captured to be distributed or sent to someone asynchronously. In such cases, there is no need to have a conversation around the document although annotations or attached notes may be important. The intended receiver(s) may be remote or co-located.</p>
<p><i>Capture to post in a common information space</i></p> <p>Items which are captured and shared by putting them into a common space, such as a shared desk, a noticeboard, a shared whiteboard or a fridge door. These items are often positioned in prominent places so as to allow ‘incidental viewing’ – noticing the item without specifically looking for it.</p>	<p><i>Capture to archive</i></p> <p>These are items which are captured to be archived away in some form of storage. That is, the items are captured with no specific short term purpose in mind, but are kept because there is a feeling that they might be useful ‘just in case’. Archives may be personal or shared.</p>
<p><i>Capture to collect or collate</i></p> <p>Items which are captured to add to a collection of similar items. This might include collecting papers for a personal library, clippings for a magazine, interesting URLs, and so on. The important aspect here is that the collection unites objects with some sort of common theme, and it is the collection as a whole which is of worth.</p>	<p><i>Capture to read and reflect</i></p> <p>These are items which are captured to be read or reflected upon at a later time. The important issue is being able to easily and leisurely read documents when convenient – this might include at home, or during a quiet time.</p>
<p><i>Capture for task management</i></p> <p>Items which are captured in order to help remember things that need to be done in the future. People organise their time in many different ways, using task lists, post it notes and so on. Many recent inventions such as audio “speech bubble” devices, and PDAs, attempt to cater for this use.</p>	<p><i>Capture to refer to</i></p> <p>These are items which are captured to be referred to in some later activity. This includes referring to information for specific facts and figures (e.g. referring to a phone number), as well as for more general concepts and ideas. Does not include situations where information is captured to be incorporated into a document verbatim.</p>
<p><i>Capture to re-use</i></p> <p>These are items which are captured in order that they may be re-used in another context, such as in the production of another document. For example, it can mean taking a photo of a slide to incorporate into a new presentation or document. The emphasis here is on the verbatim reproduction of what was captured.</p>	<p><i>Capture to a living document</i></p> <p>Items which are captured and used as “living documents”, with the document being written on, annotated and edited over the course of time. “Living documents” are used as a place where notes can be made concerning whatever is on that document. A common example of this category is the use of medical records.</p>

Table 1: A taxonomy of information capture activities

While this taxonomy is helpful in getting an overview of the subjects behavior it necessarily focuses on generalities over specific details. The main body of data collected in the study was in-depth detailed descriptions of subjects’ capture practice obtained in semi-structured end of day interviews. To present more detailed data, the second part of our discussion focuses on six examples from the study. These examples help to illustrate some of the characteristics of each category, while uncovering the specifics of

how capture activity is integrated into a wider task. Further, these descriptions endeavor to communicate specific details of capture events which can have important implications for technology.

One of these examples we discuss is that of a subject who printed out a web page from the English football team's web site and left it on his desk. He wrote a phone number on it which he planned to call later that day in order to buy some tickets. Leaving the printed page on his desk both reminded him that he had to do this in the afternoon and also gave him the phone number he would need to call.



Figure 1. An example of a printed out Web page from the study

This example is interesting in that it shows both the complexity and detail of actual capture situations, a complexity which is glossed somewhat by the (still useful) taxonomy. In this example, information is captured from the internet into a more flexible and portable form – a printed page. The printed page helps *task management* in that placing the paper on the desk worked as a form of prospective memory: reminding him to make the call<sup>1</sup>. The positioning of the paper as well as the scribbled phone number meant that the relevant information would be readily to hand when he was to make the call. The environment here was being used as an extension to memory in a way that could not be easily replicated with a simple alarm on a personal organiser, nor with a bookmark on an electronic Web page. The piece of paper became both a repository for information surrounding the action (such as the date of the football match, contact details, etc.) and also an object artfully incorporated into the work environment to better support the task at hand, and the juggling of that task with other commitments.

The full paper discusses five more of these 'key capture' events, unpacking them to see how it is that capture as an activity is organised in specific cases.

In the third and final part of the paper, we discuss the implications of these findings for the design of capture devices. The opportunities for extended the kinds of media that can be captured are highlighted. Specifically, the value of scene as opposed to document capture in the workplace is discussed. Equipping subjects with cameras privilege images over other forms of capture. Subjects using the camera as a diary tool were extra sensitive to opportunities for visual capture. A large number of images were captured where it was clear that it was the scene that was wanted, and subjects talked at length about how they could usefully incorporate such images into their work life. This lends support for the concept of a "work camera" which is specifically designed with features distinct from that of a consumer capture, designed to support visual capture activities in the workplace. Due to the ease of use of digital over silver halide photograph, this data suggests how the widespread use of digital cameras could lead to use of images as a new genre of organisational communication.

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<sup>1</sup> This is a common theme in much of the distributed cognition literature (Hutchins, 1995; Hutchins & Tore, 1996; Rogers, 1992) and is also a topic in its own right in psychology (Kvavilashvili, 1987; Sellen, Louie, Harris, & Wilkins, 1997).

Another important aspect of the data was the finding that while the capture of information is important, it is also important to consider the requirements for the use of captured information, and the ways in which actions are associated with what was captured. This leads the discussion onto notions of task closure with capture devices. Capture devices are designed to support the capturing of information. However, there is limited support for using the capture media – be it communication the information, storing it, printing it or so on. We discuss one possible solution to this by extending these devices in the direction of “task closure” – allowing the user to indicate the action at the time of capture (even if the action is not done until the device is docked). These design suggestions are being incorporated into future work being implemented within our laboratory. Lastly, we cover how the methodology used in this study could be used in other design processes to advise the development of other mobile appliances. In particular, the use of digital cameras proved to be a useful innovation to standard diary methodologies.

In conclusion, this paper presents a review of information capture needs in the workplace. Using naturalistic data collected with an innovative diary methodology, it presents both a taxonomy of capture, and an analysis of the particularistic details of individual capture events. This data is used to present a number of grounded design implications which are being used as part of ongoing work within our laboratory.

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