

Collaborating over Electronic Books

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Bill N. Schilit

FX Palo Alto Laboratory
3400 Hillview Avenue
Palo Alto, CA 94304 USA
650 813-7220
schilit@pal.xerox.com

Catherine C. Marshall

Xerox PARC
3333 Coyote Hill Road
Palo Alto, CA 94304 USA
650 813-6957
marshall@parc.xerox.com

Morgan Price

FX Palo Alto Laboratory
3400 Hillview Avenue
Palo Alto, CA 94304 USA
650 813-7233
price@pal.xerox.com

ABSTRACT

In this position paper we argue that electronic book and document readers (*e-readers*) open new avenues for computer supported collaborative work. This position draws on our experience building and e-reading with the XLibris “active reading machine,” a portable pen-based computer specialized for the task of reading, critical thinking, and analysis.

KEYWORDS

Electronic book, electronic reader, e-reader, reading appliance, computer supported collaborative work.

INTRODUCTION

During the last two years we have been investigating how electronic book and document readers (*e-readers*) can augment knowledge work. The paper-document metaphor we designed for our XLibris research prototype¹ (Figure 1) imitates the physical experience of working with paper: readers hold an electronic page in their lap, moving the e-reader to avoid glare; mark with various pens and highlighters; and riffle through an electronic document. Beyond imitation, XLibris uses computation to augment existing analytic reading practices, such as searching for related documents, organizing your readings, and skimming for important information [2].

XLibris and other e-readers create exciting opportunities for collaboration not possible with previous interfaces. This is because e-readers blur the distinction between paper and computer work. People easily collaborate over paper books and documents everyday in all sorts of ways, yet people are limited to passing and faxing paper around. On the other hand existing computer-based tools provide many benefits for collaborative work, yet they often get in the way. By combining the ease of use of paper with the computation and communication of computers, e-readers are a unique

¹ XLibris is hosted on commercial pen computers including the Fujitsu Point 510: 3.9 lbs.; 2.1 GB disk; 800 x 600 SVGA color display; 1.6 Mbps spread spectrum wireless LAN.

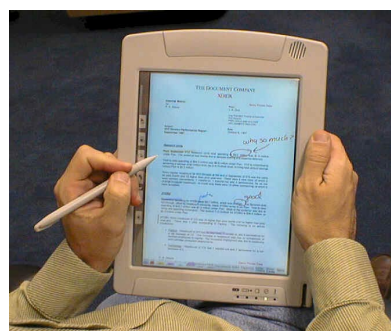


Figure 1: The XLibris E-Reader

platform for a new class of computer supported cooperative work applications.

Here we present five visions of how collaborative work might change with the introduction of e-readers. Each idea starts with the free-form ink marks that people naturally make as a part of their work with books and documents and adds computation and communication to make these marks more useful in a collaborative setting. The first two cases explore different aspects of using e-readers in the course of common document activities: reviewing/revising and discussing. The last three amplify positive effects that arise in paper document work: serendipitous sharing of marginalia, identifying passages of common interest, and discovering people with like interests by what they read.

WRITING AND REVIEWING

How do writers collaborate? They create documents and circulate them for review. Typically, reviewers are handed paper documents to mark up, return, and sometimes discuss. In the end the writer revises the text while referring to the marked-up drafts. How might writers and reviewers collaborate over e-readers?

The writer's point of view

Writers often receive comments from more than one reviewer. Revising a document by integrating the comments from multiple reviewers is awkward. The writer is forced to

navigate among multiple marked-up paper copies as well as the online version under revision.

Because they support free-form markup, e-readers can electronically record and later present comments from multiple reviewers so that the revisions can be easily integrated. The comments can be presented to the writer all at once, in a single draft (perhaps in different colors). When multiple comments in a passage interfere with each other, the writer might ask to selectively show or hide certain reviewers comments (e.g., “hide all of Cathy’s scrawls”).

The reviewer’s point of view

On the way to producing a final document, reviewers are asked to comment on several revisions. When reviewers do this, they ask themselves: “Didn’t I comment on this last time? How has this changed?”

Change bars and online markup (ala Microsoft Word) can help answers these questions, but force the reviewer and writer to use the same text-editor interface for making and responding to comments. This isn’t a problem for the writer, but people prefer making free-form ink marks when reviewing.

Using an e-reader, a reviewer can still use free-form ink to markup a document, but can also use the computer to help compare the versions. In this case, Cathy can say: “ditto on that same comment I made last time!”

USING THE PAGE TO FOCUS A DISCUSSION

When people work with documents, they crowd over the page, pointing at and marking on text. What happens when people aren’t co-located? They might fax the document back and forth and discuss it over the phone, but they lose the sense of shared focus that comes from face-to-face interaction. Or they might give up, turning the desired tightly focused synchronous collaboration into an asynchronous exchange.

With e-readers people can crowd over a shared page even when they are not co-located. The e-reader might present marks or a cursor from other e-readers and synchronize page navigation. Free-form ink is a natural means for a group to work on a document [3].

SERENDIPITOUS SHARING

Paper documents and books pass from hand to hand. The marks people have made on the documents travel with them, seamlessly, without the intentional act of publishing the annotations (as most shared annotation systems demand). How will electronic books – and the facility to mark in them – play into this practice? Can we take advantage of how marks on paper are unintentionally shared?

The marks that readers make are not universally valuable or intelligible [2]. Nor is their status unambiguously public or clearly private. A used book may have valuable (or annoying) markings that have been rendered anonymous if they are resold by a third party (a bookstore, for example). The reader has no real way of assessing their worth except

by the marks themselves. On the other hand, if a person borrows a paper from a colleague she respects, she may value even a simple underline or an exclamation point in the margin. Anonymity and reciprocity are issues that need to be addressed by designers of systems that share electronic book annotations.

BUILDING CONSENSUS

Annotations on paper documents and books reflect a reader’s unselfconscious engagement with the text. Free-form annotations on e-readers enable this same sort of engagement with digital media. The question then becomes: Can we parlay these marks into something more? How can free form annotations become a resource for a community of annotators focused on the same document?

If we examine the kinds of marks that readers make, there is great variability among individuals. However, one thing is clear: the annotations, highlights, and other marks demonstrate a reader’s focus. By looking at *where* people mark, rather than *how* they mark we can find areas of consensus: places in the text that all or many of the readers found sufficiently important to mark [1]. This view can then be used to create summaries based on a group reading, or can focus a group discussion in, for example, a face-to-face meeting or distance-learning classroom. This way, readers not only know what the author found important (through structural or typographical cues like topic sentences or boldface text), but also what *other readers* thought remarkable.

BRINGING PEOPLE TOGETHER

The books and documents we read along with the ink annotations we make on e-readers create a new way to identify potential collaborators. For example, you have expressed interest in finding collaborators in your work. You are reading and marking-up a company report on low-emission vehicles and your e-reader notifies you that “someone in manufacturing has been reading the same report, they are also interested in nitroglycerine fuel cells, would you like to send e-mail?” A system for connecting people may work best with a *quid pro quo* arrangement: you must publish your reading and annotation data before you can search other people’s reading data for collaborators.

Bringing together people with similar interests and goals *as they perform knowledge work* can be extremely powerful. The key advantage of e-readers is taking people’s existing practice of making marks and then inferring interest and matching one persons reading interests to another.

Of course “docu-dating” might prove valuable for non-work situations as well: “the attractive blond at the end of the bar also reads lawyer-drama fiction.”

CAVEATS

E-readers exist within a broader setting of work and technology, something that designers of e-reader supported cooperative work must account for. In particular, the e-reader will likely be used in tandem with paper and traditional

desktop computers. Also, documents are used in ways beyond just conveying information; placing a paper on your boss' keyboard is different than putting it in her mailbox. Finally, as with most CSCW technologies, collaborative e-reading will require up-front social negotiation about privacy and reciprocity.

CONCLUSIONS

We use paper books and documents in our daily collaborations. E-readers have the potential to enhance these paper-based collaborations and also to create new opportunities and ways of working together. In this position paper we focused on people's free-form ink marks as the principal means for initiating collaborative activities with little additional overhead. Collaborative practices using paper books and documents are rich, complex, and varied, and invariably e-reading will increase this diversity. This position paper has explored but a few aspects of how e-readers may help us collaborate.

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