

The Paperless Society and Me:

From PC to PocketPC to TabletPC

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ABSTRACT

This paper presents an informal discussion of my attempts to escape the bonds of paper (bad pun). It recalls my experiences with a traditional PC, a PocketPC, and finally a TabletPC. The goal of this paper is to provide an anecdotal form of a “self-ethnography” to share with others who have already made, or have future plans that include, exploring moving to a more paper-free environment.

1. Introduction

The image of a paperless society appears in both science fiction [refs] and science research [refs]. As computers have dropped in cost, increased in storage capacity, and become easily connected to each other, it seems that the dream of a paperless existence should have become a reality. However, this is far from the case. Though there are success stories (e.g.: people do not appear to generally print Web pages to read them) there are far fewer than seem to have been predicted (e.g.: some people still print out email messages they have received or bring handouts to meetings rather than distribute documents in advance electronically). This paper does not seek to explore the root causes of these stories of success and failure, nor does it propose an avenue of research to address them. Rather it seeks to give an overview of a single person’s trials and tribulations in attempting to go paper-free (or at least as paper-free as possible).

The scenarios and anecdotes provided in this paper are neither exhaustive nor extensive, but rather representative. When I decided to investigate how much I could remove paper from my world I decided to journal the highlights of the experience in some way. This paper is the final form which I selected. It is my hope that either the reader will gain insights that will assist in their own endeavors to reduce their use of paper products or that they will obtain a sense of camaraderie (i.e.: “Wow, it’s not just me”) regarding their own adventures in the electronic world.

2. Paperless Attempt 1: The PC

The personal computer has found its place in the home and office. When working in conjunction with Internet resources, it felt that a large amount of the paper I was producing in my life was coming from my PC via a printer. Since I had a networked computer (either laptop or desktop) wherever I found myself working, it seemed natural to simply interact with these documents directly on the computer rather than via printout. While this did not work well for me with a variety of document-based tasks, there were some for which accessing information via Web sites was a suitable replacement for printed resources.

2.1 Reading PDF articles

An example of a common activity in any given week is reading a journal article. With many such articles available for download as PDF files on the Internet, common if not typical behavior is to download the PDF file and then print it to read. This seemed to be a natural candidate for replacing printouts with the PC. However, there were several barriers to this.

The first challenge was adapting to reading documents formatted for portrait viewing via landscape oriented monitor. One option was to fill the screen top-to-bottom with the document, and not make use of the sides of the screen. With my monitors, reading the documents in this fashion was difficult. There were issues with clarity of some text and also general screen glare. In order to have the same level of reading quality as paper versions of the documents, I needed to have the PDF at a 115% zoom. However, this meant that I was unable to have an entire page on screen at a time. For documents formatted into two-columns, it was frustrating to scroll at least three times within each page. Though these issues might have been addressed at the desk via larger screens or flat-panel displays, the fact was that my existing 19” CRT monitors were not quite up to the viewing task. Scrolling was an even larger issue with my laptop with its approximately 12” screen.

The next challenge was in annotating papers as I read them. Adobe's free reader program provided no ability to add notations. The full Acrobat package did provide that ability, but my explorations with it were frustrating. Drawing with a pen tool was problematic since I would often select an existing pen mark when I was attempting to add a new stroke. Highlighting also had some difficulties at two levels. Acrobat did not always identify lines correctly so an attempt to highlight a line would not work correctly. Also, I was unable to perform common actions such as circle a segment of text or image using the highlighter tool.

The final noteworthy challenge was availability. Although all of the documents were available online, and if I wanted to save and organize them I could have a central network-accessible drive on which to hold files, this meant that I needed to consider in advance situations where I would want access to the documents. If I wanted them available during a meeting, I would need to bring my laptop and be sure to have the files on that machine since my location might not have network access. Due to the issues discussed previously about my laptop's screen size, my laptop was the least likely machine on which to have been reading the documents. Additionally, I found that using a laptop to read during a meeting felt socially awkward.

2.2 Reading books

There are a wide variety of formats for eBooks, including Microsoft Reader, Adobe eBook Reader, and HTML-formatted eTexts. I used Microsoft Internet Explorer to explore this aspect of escaping the paper world. These documents repaginate based upon the current screen size and were nicely readable on my various screens. There are some books that I read with the expectation that I will annotate them. However, since I expected to encounter similar issues regarding annotations (as I had with PDF files previously), I decided to try reading a strictly recreational book on my PC.

I decided to read H.G. Wells' "The Time Machine". As a relatively short book that I wanted to read at the time, it felt like a good candidate. I decided to use an HTML-formatted version of the book. Each chapter was its own page. At the bottom of each chapter, there was a link to the following one. In my initial experience I found the text easy to read and the ability to use the page-down key to progress through the chapter natural. However, as I continued to read this short book, I found that I did not enjoy reading this book at my computer for long periods of time. I typically enjoy reading for several straight hours, and for a short book such as this one, I would complete it in one sitting. However, I found myself taking several breaks during which I would stretch and even do other tasks before returning to continue reading. The story itself was enjoyable; my setting was not.

Although I have sat at the same station for even longer hours working on programming projects, e-mail, etc. In those situations I

would be switching between tasks. I would also naturally get up to do other things so it wasn't continuous time. Finally, I read to relax; sitting at my workstation is not my typical setting for relaxing. I was reminded of a Berkeley Breathed cartoon from the early 1990s. In this cartoon, one of the characters wants to relax and read a good book. In the final panel the character is curled up in a large chair in front of a warm fire. He is curled up with a very unsettled look on his face. He is holding a compact disk that we the reader must assume holds an eBook.

2.3 Web pages replacing paper products

I have, however, encountered several examples of paper documents that I have been able to replace with my PC. A common thread worth considering in the examples to follow is the fact that a for-fee document was replaced with a "free" one.

In the past I had used a printed movie guidebook to look up movie plots and casts. I have fully replaced this with online resources, primarily the Internet Movie Database (IMDB) [ref]. The reason for this replacement was two-fold. First, there was no need to purchase a new copy every year or two. Second, and more importantly, using a hypertext guide offers the obvious advantages when searching, browsing, and exploring.

Another category of paper documents I have fully replaced with my PC is that of television programming guides. In the past I had either purchased a magazine such as TV Guide or had gotten a free guide in the Sunday newspaper or supermarket checkout line. Now I use one of several different online services [refs]. It is worth noting that I move between these services as their user interfaces change; I use the best (or least annoying) interface at the current time. The advantages of this switch cover several levels. It is no longer possible to forget to pick up a copy at the supermarket or misplace it in the living room. The listings are less likely to be out-of-date and are often more detailed. By selecting your provider (e.g.: broadcast, cable, satellite) listings show the numeric channel on your specific system rather than a station's call letters. Several guide sites offer the ability to find future airings of a program with a single click. Additionally, using this resource at the PC means having simultaneous direct access to resources such as the IMDB.

3. Paperless Attempt 2: The PocketPC

The so-called Personal Digital Assistant (it doesn't actively assist one, does it?) appeared to present some interesting potential in moving towards a reduction of paper.

3.1 PDA as electronic organizer

Before the ubiquity of computers, organizing address books, task lists and meetings were the job of paper-based pads and books. Prior to using my first PocketPC [ref], I actually had moved away

from paper by making use of a collection of text files in a network-accessible UNIX account as an organizer. I would store commonly used e-mail addresses in a `.mailrc` file. I used a text file named **ToDo** as a general repository for reminders of things to do and short-term meetings. I used the UNIX **calendar** service for automated long-term reminders. Though this system might not scale well, it suited my goals.

Upon getting my first PocketPC I decided to switch the above activities to that device. I used Microsoft Outlook as my central organizational tool. After transferring my existing task and meeting lists and address book into Outlook and, via cradle synchronization, the PDA, I began exclusive use of it for organizational activities. On several occasions I forget to take the PDA with me when leaving my office, and on occasion forget it at home in the morning. I would then need to go back to retrieve it since I did not want to risk forgetting an appointment or overlook completing an intended task. These occasions became less frequent over the course of a few weeks, but there came times that having yet another item to carry in my pocket was frustrating.

After several weeks of using the PDA, I hadn't found a great advantage to using it over my previous system. Having it with me did mean that I also had a calculator, solitaire game and notepad at all times. These, in addition to my desire to allow time to reveal advantages my PDA could offer me, led to my continued usage. Until it broke. Without apparent reason, I was no longer able to sync the PDA with my computers. After spending an entire afternoon on the phone with technical support and reinstalling everything as directed, I was told that I would need to send the unit in for servicing. I transferred my information back to my prior text-file based system and sent the unit in for repair.

A replacement unit arrived almost two weeks later. By this time I had realized how overly dependent upon this device I had become, and how little benefit it seemed to add over my existing system. I decided to continue to keep an open mind in terms of looking for ways in which a PDA could enhance my activities. I did not, however, actively pursue this. In retrospect I realized that this was partially due to the low screen quality, poor battery life and weakness of available development tools.

3.2 PDA as document viewer

It wasn't until about a year later when I got my second PocketPC [ref] that I had renewed interest in exploring the world of the PDA. The one activity relevant to this paper was the use of it to read eBooks. Unlike my previous attempt at the PC, I would be able to take my PocketPC wherever I chose to read.

I decided to take a larger leap than I had with my first eBook experience. I decided to read Charles Dickens' "Great Expectations". I searched the Web and found a version of the book available for Microsoft Reader. Over the following few

days, I read in my normal reading pattern. This did, however, present a problem rather quickly; the battery life of this PDA was much improved over the previous one, but not as long as my reading sessions. As I had left my charging cable at work, I had to cut my reading short. However, the fact that the battery died before I had become tired of reading or had switched to other tasks was a positive indicator that this method of reading books could work for me.

After finishing the book, I found that I had enjoyed the experience and other than the power issue, had no reservations regarding reading another book in this manner. However, it was almost two years until I did so again. In general I estimate that I read at least 6 non-work-related books over the course of a year. This does vary based in part on time constraints and in part on the number of books friends recommend. The latter of these reasons is important within the context of eBooks; when a friend recommends a book, I usually borrow it from them or the library. Finding publicly available eBooks of books proved to be a challenge, so I continued reading borrowed paper copies.

There was one book that I decided to buy. However, due to concerns with the ability to read an eBook with digital rights media (DRM) security over time, as well as the limitation of not being able to lend it to a friend myself, I decided to purchase a traditional paper copy of it.

The second and third eBooks I read on my third PocketPC [ref] were mainstream books from David Weber's "Honor Harrington" series; "On Basilisk Station" and "The Honor of the Queen". Weber's publisher, Baen Books, maintains a free library of eBooks [ref] of selected works of their authors. As was the case in of "Great Expectations," the experience was a pleasant one. Since my most recent PocketPC had expansion pack battery sleeves, I was able to read each book almost in its entirety without needing to recharge the batteries while reading. In the case of "The Honor of the Queen," I primarily read the book during a blackout. The screen's backlight was more than sufficient, and I was not hampered by a need to clip a flashlight to a book.

As more books become readily available as eBooks from libraries and/or publishers, I expect that I will return to the PocketPC as a preferred medium for reading at leisure. It is also possible that if DRM issues are handled well, and the cost of eBooks is noticeably lower than that of printed books, that even without library support, I might return to eBooks. One thing I would note is that when I searched out a copy of "Wuthering Heights" as an eBook, Amazon.com had it for sale for as a paperback for \$3.00 and as an eBook for \$2.99, while Project Gutenberg had it online for free.

4. Paperless Attempt 3: The TabletPC

The TabletPC appeared to be “the solution” for going paperless. It would have all of the power inherent in a personal computer but also have the portability of a laptop and the ability to be held comfortably and directly written on like a PDA. As I present my thoughts and personal discoveries in this section, you might find yourself thinking “that’s not new to the TabletPC – the laptop and the PDA had those problems also”. Although this might very well be the case, I would simply note that I did not make a dramatic attempt to go paperless with my laptop due to my initial dissatisfaction with it for that purpose, that I had a narrow set of goals when using my PDA, and that I do not claim the issues I discuss to be perfectly partitioned into the categories in which I present them, but rather claim that I mention them where I first noticed them in my own work.

4.1 Getting ready for a TabletPC

Based upon my interest in the TabletPC for use with my student note-taking project, Microsoft University Relations donated a Toshiba Portege 3500. Once I knew which model TabletPC would be en-route from Microsoft, I began considering what peripherals would be of use when it arrived. The following items made the list:

- spare battery
- spare tablet pen
- case/cover for the tablet
- clip-on webcam
- 5 megapixel digital camera
- flatbed scanner
- compact sheetfed portable scanner [ref]

I found it interesting that the majority of these devices were for getting information *into* the computer. The following sections will reflect back upon these purchases.

I have found it frustrating that although I did get a second battery, I have no way of charging it while I am using the TabletPC. Yes, there is an external charger, but at a cost of almost \$300, this did not seem like a reasonable expenditure. This has meant that I’ve been limited to about 5 hours of battery life (assuming I remember to fully charge both batteries). This has proved insufficient in several scenarios – most notably at conferences.

4.2 Still not paper-free

On the afternoon of the second day with my TabletPC I attended the first meeting of a graduate course in which I was participating. The professor wanted to get various bits of information from everyone in the class (such as e-mail contact information). He had prepared photocopied forms for everyone to fill out and then hand in. I had to borrow a pen.

I had anticipated the situation would arise quite often that handouts would be distributed. This was the motivation of the

purchase of the compact sheetfed portable scanner. I would be able to scan the pages and then directly annotate the digital versions of those documents. I had anticipated that I would still need to provide others with handouts in classes or at meetings. What I had not anticipated was the situation which would also arise quite often; that I would be asked to fill out some sort of form to return on the spot.

4.3 My first meeting with a TabletPC in hand

The first meeting that I attended with my newfound ally in the war against paper was a short meeting to discuss a workshop being hosted at the University over the summer. During this meeting I used Microsoft Journal to take notes that I would have normally taken on a pad of paper. I found the tablet pen and Journal application easy and natural to use and was (and still am in many ways) quite happy at how easily this worked.

As the meeting ended two faculty members approached me to inquire what in the world “that” was. Though they did seem impressed at the quality of the writing on the Journal pages, they also appeared to view it as a cute and overpriced toy that they were happy to see amused me. I, however, already had the roots of hope taking hold – I had no new sheets of paper to add to the growing stacks of notes in my office or to remember to bring with me to my next workshop planning meeting.

4.4 Handling handouts

I knew that one challenge for which I should prepare was that of dealing with handouts in meetings. I experimented in advance with using the sheetfed scanner, the webcam, and the compact digital camera as “scanning” devices. What I found was that the quality of the sheetfed scanner combined with its portability and non-obtrusiveness made it the “winner” of the three for use with handouts. By bringing the very small sheetfed scanner with me, I was able to scan the handouts and then read them and annotate them using Journal. In all of my situations I was able to perform the scanning while the handouts were being distributed. The quality of the scans was good enough that I did not keep the handouts themselves (often giving mine to someone who arrived late for the meeting).

A related issue arose when I served as a thesis reviewer for an undergraduate research team (part of the local Gemstone project). I did not have the forethought to request the document in electronic form due to its size. This was the first time I had served as a Gemstone reviewer, and had not been expecting the 100 page document with which I was presented. Rather than scanning the document (far too much of a burden) or going back to ask for an electronic copy (which I felt might be a burden on them) I used the printed version. What I found was that on several occasions, I had some spare time to read the thesis, but did not have the thesis. I did, however, have my TabletPC. The next year

when I served as a reviewer for another Gemstone team I was careful to request (in advance) a PDF version of their thesis.

In addition to scanning documents distributed at meetings, rather than print documents distributed in advance of meetings, I would import those documents to Journal. For most documents this solution worked well. However, some PDF files, and almost all PostScript files, that I received were illegible when viewed in Journal. In these cases, I read them using their native viewer (i.e.: Acrobat or Ghostview) and then annotated the illegible versions in Journal since there was no convenient way to do so in the native readers using the tablet. I anticipate that this will become less of a problem as an increase of tablet users provides more incentive to improve the ability to import to Journal.

4.5 Reading eDocuments

One use for which I had been anxiously awaiting the TabletPC was using it to read and annotate various papers. My existing habit was to carry around printouts of all of the papers I wanted to read, as well as any which I had read that I thought might come up in discussions. Since the vast majority of those were obtained in electronic form (e.g.: PDFs from the ACM digital library) this was a reasonable goal. In fact, this worked quite well. With few exceptions, the papers were easily imported to Journal and from there were easy to read and annotate. By pre-fetching all papers I was able to read one whenever an opportunity arose, even if it was not an anticipated opportunity.

I found that the TabletPC offered a nice form factor for reading. Unlike in my experience with reading on a PC, I could read in any location in which I would normally read a paper (e.g.: leaning back in a chair, sitting or reclining on a couch). Additionally, unlike reading on a PocketPC, I was able to see a full “standard” page of the document on-screen at once.

The one issue that I did have was one of weight. With the Portege I found that I would shift positions on occasion due to the tablet becoming “heavy” in my hands. However, it was not so much of an issue that it prevented my continued use of it for reading papers. In many ways, it was no different from reading a large hardcover book. When I later began using a Compaq TC1100 which was a slightly smaller slate model (no keyboard) I found that the weight issue was diminished further.

4.6 Reading “regular” books

One hope which I had for my use of the TabletPC was to also make use of it while reading “regular” books. While I knew that it would be prohibitive to scan entire books for my own use, I hoped that I would be able to make use of the webcam or the compact digital camera. It was my hope that the handwriting input abilities of the tablet would make this a worthwhile venture

where I did not see any potential for success with the laptop in this context.

What I found was that switching between those “scanning” devices, and the TabletPC, and the book itself in the middle of reading was more disruptive than my typical habit of having a stack of small and medium Post-It notes handy to jot down thoughts and mark pages. This disruption would likely be more noticeable to those who directly annotate texts. While I did consider creating a system similar to the A-Book [ref] through which I would have a camera attached to the back of the TabletPC and read the pages on the Tablet screen, I decided that this would remove all of the portability and comfort that the TabletPC had given me over the PC and the PocketPC.

4.7 Teaching transformation

I was unsure as to how the TabletPC would alter my teaching activities. I had been using a laptop in the classroom since the mid-1990s and in terms of my class presentations, it was unclear how the tablet might lead to alterations. Additionally, since my students were not changing their practices, even if I wanted to stop producing paper artifacts in my world, I was not comfortable at the idea of trying to enforce the same restrictions on them.

One nice use that I found for the TabletPC within the framework of my teaching was using it to create the grading keys for my teaching assistants to use. My prior habit was to take one of the blank exams and write the correct answers as well as any grading rules directly on the test. I would then photocopy this since I often have two or three teaching assistants grading exams in large courses. When I decided to move this task to the tablet, and to use Journal to write the key, I also decided to use a color printer rather than a grayscale printer. I had previously refrained from color-coding the answer key since I did not have easy access to a color copier. I expect that the use of colors made it easier for the teaching assistants to read the keys. Additionally, since the key was now in a Journal document, if any quick questions about an exam question arose in class, I could refer to the answer key since I was sure to have it with me.

A larger set of transformations came in how I made use of the TabletPC in the classroom. The one class in which I had never used computer presentation tools was the Discrete Mathematics course I taught. There are some obvious advantages of computer-assisted instruction such as supporting a faster pace when desired, the ability to better prepare orderly presentations, and ease of archiving and reuse of notes. However, I found the time investment and lack of flexibility of using a tool such as PowerPoint to be serious deterrents to computer presentation in this scenario. I far preferred to use transparencies since I would not need to fiddle with an equation editor, and I would be able to have a single example span several pages while maintaining the

ability to scroll through the example by connecting several transparencies to become one very long transparency sheet.

While neither PowerPoint nor Journal gave me this ability, I was able to build my own pen-based presentation system to use with this class. In addition to the anticipated benefits, I was also now able to share my slides with my teaching assistant or even students without any contention for physical slides. A more extensive discussion of this tool and its uses can be found in [ref].

On hearing that the TabletPC was in development, I had envisioned a system in which students would be able to grab a copy of whatever was being presented at the front of the classroom, and then take notes on and around this image. I began the implementation of the BIRD note-taking system with a laptop as the medium and could now finally transition to using the TabletPC. While the system was designed for students to use to take notes during class, I found it quite useful myself as a faculty member taking notes during student presentations in class. Using the BIRD system along with a simple text editor, I was able to stop using paper for note-taking during student presentations, and was also able to improve the quality of the notes that I was taking. A more extensive discussion of this experience can be found in [ref].

4.10 Places where a TabletPC doesn't fit

There have been certain situations in which using the TabletPC was not appropriate in my opinion. I have divided these into two categories; practical issues and social issues.

There were tasks during which I felt it would be impractical to use my TabletPC rather than paper. The most notable one is for driving directions. While using resources such as MapQuest [ref] or having a friend e-mail you directions is a good way to obtain the information, I did not feel comfortable with the notion of learning over to look at the tablet while driving, or driving with the tablet on my steering wheel (though I have seen people with a copy of the Washington Post spread out across their steering wheel). I explored the idea of using a Compact Flash GPS card with my TabletPC and MapPoint to have directions read aloud while I was driving, but I discovered that the tablet generated too much interference for the GPS unit to obtain a positional lock.

I was surprised at the social awkwardness I felt at the thought of using the TabletPC in certain situations. For example, when doing some price-comparison shopping at the local Circuit City and Best Buy, I felt that it would be unwise to wander around with my computer. When preparing for an outreach event with students living in one of the campus dorms, it felt like it would seem too “stuffy” and formal to take notes on the computer while attempting to have an open discourse on student concerns regarding education (the topic of the outreach event). I also felt uncomfortable at the idea of bringing the TabletPC for note-taking

during an informal meeting with a senior professor in the department.

I suspect that there could be some interesting explorations in social psychology waiting to be studied here.

4.11 Need more tablets!

One observation I have made is that one computer is not enough in some situations. Very similar to how one would spread out several sheets of paper across a desk, there are times when I needed to spread several computers out across a desk. In general, this is not a cost-effective solution for many. I made use of my PC, my laptop, and my TabletPC to solve my problem. While grading final projects for my Human-Computer Interaction course, I found that I wanted to have the students' projects running on one machine while looking at my BIRD notes from the presentations along with the teaching assistant's grading notes, in order to write my final comments to the student teams.

My solution was to create an arch of machines on my desk and to use the teaching assistants comments document as the foundation for my final comments document. I had the projects running on my PC tower, and my BIRD notes displayed on my TabletPC. I then viewed and modified my teaching assistant's notes document on my laptop.

My hope is that future technologies (such as cheap ePaper using OLEDs or eInk or some similar technology) will enable more of these multi-document tasks being done without the use of traditional paper.

5. Is there a benefit to dust?

An accidental observation I made recently was that a lack of visually apparent clutter might have a down side. While cleaning my office between semesters I came across several short notes I had written to myself. They had things such as the name of a person I wanted to look up, or some real-world example I wanted to add to my lecture notes, or some pet program I wanted to write one afternoon. On finding some, I would stop my cleaning to look up the person, or add the example to my lecture notes. Others, however, were merely transferred to a new location, typically an electronic one such as my **ToDo** list file or a bookmark list.

This opened my eyes to a different line of investigation that could prove interesting. I am now pondering new things. For example, how often should I clean up my bookmarks list or scroll down my **ToDo** file in search of activities. Also, without dust to motivate me, why would I *bother* cleaning my bookmarks list rather than just creating yet another “old bookmarks” folder to explore “when I have a chance” as is my current practice?

6. Commencement

Just as graduation is called “Commencement” since it is not the end, but rather just a new beginning, I choose not to call this section “Conclusions”.

One of the largest non-revelations has been that there are some places where paper is currently still better since it is just so easy to use. However, I have been very happy with many of my explorations and have altered my use of paper considerably. Endeavors which were failures when attempted with a PC or PocketPC were successes with a TabletPC. This was very encouraging personally, and I hope that others who have made paper-free attempts in the past approach this new resource with an open mind and fresh ideas.

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