Paperless: Reality or Dream

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Abstract
In this third millennium, the world is undergoing a revolution where technologies are being introduced almost daily. And until now, paperless has been a long dream of every organization and individual, which never became a reality. This paper will unveil all available technologies covering the communication, storage device, and retrieval methodologies toward paperless activities. We will see in the perspective of the provider and end user. By understanding the point view of both parties, it will help when deciding or concluding the real future of the approached technologies. We also cannot run away with legal issue, so we will look into any factors which affect or demoralized this idea of paperless and green world.

1. Introduction
The concept of the "paperless office" has been discussed for quite some time. The paperless concept is similar to predicting the end of the world, it is always being predicted but never happens. To date, it is still not 100% achievable. New tools are constantly being created to help achieve the paperless goal, but there are still many obstacles and considerations [15].

The concept of the paperless office was mooted in the 1970s and received with a great deal of optimism. The rapid rate of progress in the IT sector led many people at that time to believe that the paperless office was the inevitable way of the future. It sounded impressive - a system designed to facilitate filing, faxing, word processing, document retrieval, analysis and even basic communication, all done efficiently using computers without the need to use paper. Today, however, almost every office is still filled with piles of paper and rows of filing cabinets. What happened to being paperless?

The initial development of the paperless office was slow as only a handful of specialists at that time had the remotest idea of information storage and document retrieval [l]. The biggest idea at that time was the microfiche and portable microfiche viewer [2]. Then came the computer, and word processing done using the computer. Merging electronic data processing with word processing introduced electronic data storage, which became the backbone of the paperless office. Scanners and OCR software made it possible to convert existing paper documents to electronic documents. Computers then took a giant leap forward with their ability to connect everyone together with just a phone line and a modem. Electronically sending out documents using emails and fax-modems was seen as a way of eliminating the need to use postal service to send out documents [l].

Sad and surprisingly, the statistic shows that instead of a decrease in paper use in the office, there has actually been an increase. The American Forest and Paper Association estimates that use of printer and copy paper has increased by 30% over the past decade [3]. In most firms, hardcopy records are growing at about 7% annually [4]. The proliferation of paper has increased dramatically with the introduction of computers. Computers allow us to correct errors and make numerous revisions to documents very easily. The paperless office is supposed to be facilitated by more use of computers, but ironically every computer is hooked up to at least one printer, making it easier to generate more paper documents. In our quest for perfection, a document is printed out again simply because of a single typo, or because the formatting doesn't look so great. Documents are still printed out for reading even though they are available in electronic format. Currently, the average working person in Australia uses 30kg of paper every year [9] - hardly paperless!

1.1 What types of offices implementing paperless operation?

For some organization, paperless is no longer choice or something which is nice to have. Instead, paperless is a must issue and unavoidable. The companies with the following criteria can no longer survive with an old method of printing, faxing and photostats when transmitting the information. Those criteria are:

a. Companies which produces a large amount of document. It is stated that giant corporation like Aetna has eliminated 87 million pages of paper.

b. Companies which required frequent access of data. This is applied when data retrieving or searching due to customer number of inquiries is too large.

1.2 Advantages or aims of paperless operation
With all the hard-work and sweat in order to achieve this goal, everyone is having common goals to achieve. Some of the goals are giving tangible benefits and some are giving intangible benefits. The three goals are:

a. Space saving.

United Services Automobile Association claimed that they had saved 35.000 square feet of office space that used to be

taken up by paper files. Directly, hard money which required for renovation or warehousing are also saved.

b. Easy searching and retrieving.

Technology that enable electronic storing and retrieving are now available in many different forms.

c. Labor saving.

When end users can survive: on their own for data

retrieving, man power involved can be reduced. The same cased true ex. warehouse maintenance that no longer needs so many people or man power.

1.3 Other issues to consider

Besides all the beauty and positive points that we like to hear, there is also a dark side of paperless in office automation. So we look at some negative points that eventually stop or slow this paperless idea to progress in the rapid phase. Two main issues that always hunting are security and legal issues. For some small transaction's company, another issue is costing. This third issue can be easily overcome once they seen the long effect or future direction of the companies. For this reason, cost and benefit playing a major role in convincing the necessity. It is interesting to note that there is a cases where this paperless is being implemented riot because they want to do it, but due to enforcement by their customers. Basically the customer can choose to do bus:iness only with company that using latest form of communication that is paperless. This simple point dictate the possibility that paperless is no longer a choice but a way of life.

2. Deciding on the right tools

For any technologies or methods available, the application is decided by a lot of factors. Those factors are:

2.1 Read-only or Writable

a. Once the documents are stored can they be edited?

b. If editing is allowed, what type of security do you want to control who has the rights to edit the files?

C. Do you need an audit trail tracking who and when modifications were made?

2.2 Accessibility

a. Should all documents be accessible to everyone or do you require limited access?
b. Do all documents need to be accessible immediately or can they be retrieved from some type of archival media?

c. Are you using portable computers that need access **to** documents remotely?

2.3 Frequency

How ofien do you need to access the documents?
- several times a week
- onceamonth
- or seldom

2.4 Duration

- days
- months
- years

3. Technologies available

The rapid development of technology presents that make everyone to be excited again since the old long dream is now can be a reality. Surely more new technologies will be introduced. For now, we will only concentrate our discussion on technologies currently available.

3.1 Electronic Data Interchanged (EDI)

This activity involves exchanged of data between organization of transaction such as orders, confirmations, invoices, etc.
An ED1 message contains a string of ***data elements,*** each of which represents a singular fact, such as a price, product model number, and ***so*** forth, separated by delimiter. The entire string is called a ***data segment.*** One or more data segments framed by a header and trailer form a ***transaction set,*** which is the ED1 unit of transmission (equivalent to a ***message).*** A transaction set often consists of what would usually be contained in a typical business document or form. The parties who exchange EDI transmissions are referred to as ***tradingpartners.***

General Motors (2000) orders via EDI about 90 percent of the production materials it uses in the manufacture of its automobiles. Likewise, Ford's Computer network links over 4800 of its dealer and over 3000 of its production material suppliers to its corporate data center. IBM is connecting 2000 of its largest suppliers worldwide via EDI network. Sears Roebuck's ED1 network has 135,000 terminals in 7000 locations and over 800 suppliers. [13]

So all these big figure showed what the actual progress is toward paperless. It is interesting to note that most of the paperless through EDI is initiated by one company. This one company or organization then imposed a new requirement to all the connected or trading partners to stop submitting or sending any printed material ; but through EDI.

What *so* significant about EDI? The answer is that EDI is indirectly forcing more than one parties toward paperless.

3.2 Optical Character Recognition (OCR)

OCR (optical character recognition) is the recognition of printed or written text character by a computer. This involves photo scanning of the text character-by-character, analysis of the scanned-in image, and then translation of the character image into character codes, such as ASCII, commonly used in data processing.

In OCR processing, the scanned-in image or bitmap is analyzed for light and dark areas in order to identify each alphabetic letter or numeric digit. When a character is recognized, it is converted into an ASCII code. Special circuit boards and computer chips designed expressly for OCR are used to speed up the recognition process.

OCR is being used by libraries to digitize and preserve their holdings. OCR is also used to process checks and credit card slips and sort the mail. Billions of magazines and letters are sorted every day by OCR machines, considerably speeding up mail delivery.

The OCR is not totally paperless because the technology is that to enable the device to read information from printed material. However, OCR
contributes toward paperless by reducing number of unnecessary copies when reading or detection can be done by device at a lightning speed.

3.3 Optical Mark Reader (OMR)

Contains a light beam that passes over the scan sheet and detects the filled-in ovals. This is commonly used when filling the given shape on answer sheet. The lead pencil used to fill the shape will stop the beam from getting through.

This is similar concept to OCR. Paper circulation for grading or marking can be eliminated once the existing technology can perform with a better result compared to human being. Again, the purpose of paperless operation is not only to reduce the printed material but also stop the physical circulation

3.4 Magnetic Ink Character Recognition (M1CR)

This is a technique which commonly used in banking environment where customer identification, **bank** information are preprinted with ion oxide based ink. The device which detects the ink will translate to the readable form. An MICR reader translates these characters into digital form for the computer. [10]

3.5 Intelligent Character Recognition (ICR)

Software capable of reading handwriting. It adapts and learns according to the shapes of letters and configurations encountered. It is used by the United States Postal Service for scanning mail.

Through ICR, how paper can be saved? The answer is the scanning and recognizing capability. When the information can be stored and displayed on the electronic device, the target toward paperless is visible.

3.6 Audioffideo Conferences

The telecommunications system may involve only audio (sound) exchanges among the participants, as in a telephone conference, Audio,-graphic conferences using microphone-speakers, a computer terminal, and electronic tablet, make it possible to hear and see written information at the same time. This method which looked simple is surely reducing the number of printed material.

3.7 Electronic Document Conferencing

Preparation of documents among geographically removed users. The originator displays the rnaster document on a screen; it is also displayed on the screen of the other participants. The participants can annotate the document while discussing it.

This is clearly a good method. Instead of sending the printed material to all the attendees, document will be viewed electronically. Other benefits are clarification and attraction of the presented materials which should be animated. which meet the three key word criteria.

3.8 Imaging / Scanning & Indexing

The conversion of documents from a physical medium
(for example, paper) to a digital form where they can be manipulated by computers for easier access and retrieval. Most image management systems include workstations for viewing and manipulating images; storage devices; and servers to manage the image database, run application software and connect to host devices.
It is time consuming and exhausting to retrieve documents stored in filing cabinets. Statistics show that the average working person in a traditional paper-based office spends an average of 15% of his time retrieving documents [5]. Electronic data storage reduces the inconvenience and time often associated with document retrieval. Furthermore, flexibility is a strong point of electronic data storage. Documents can be sorted and stored according to the liking of the user, and its electronic nature facilitates document tracking and easy distribution of documents. Electronic documents can also be accessed simultaneously by different people, whereas a paper-based process forces serial work [6]. All this enhances office productivity.

Another excellent feature is indexing. The name of the index corresponds to the name of the paper or report title. In the index software search engine, we can pick up through many different indexes or by entering a key word search. For example, if I were looking for a letter written by Mr. Jones and I remember it came sometime in December 1996, we would type the key words "Jones AND December AND 1996." The key word search uses the same nomenclature as LEXIS and the Internet, using the operators "and" "or" "wl I' "not" etc. The indexing software would search the indexes and find any text files which meet the three key word criteria. The computer then lists all of the text files meeting the search criteria which may be a long list of files requiring a second level of search. Searching for documents using these key words is somewhat of an art form and requires practice.

Once you have found the corresponding text file, the computer will electronically link the text file to the graphic file which is the actual photocopy of the document. You then pop the electronic document on the screen, page through it to read, review, print, fax or attach electronic "sticky notes." This same document can be searched, found and viewed from a computer outside the office via modem and telephone lines.[14]

So, once document can be scanned, stored, and retrieved, then future need to reprint the material will can be reduced tremendously.

3.9 Personal Digital Assistant (PDA)

Personal digital assistant PDA (personal digital assistant) is a term for any small mobile hand-held device that provides computing and information storage and retrieval capabilities for personal or business use, often for keeping schedule

calendars and address book information handy. The term handheld is a synonym. Many people use the name of one of the popular PDA products as a generic term. These include Hewlett- Packard's Palmtop and 3Com's Palmpilot.
Most PDAs have a small keyboard. Some PDAs have an electronically sensitive pad on which handwriting can be received. Apple's Newton, which has been withdrawn from the market, was the first widely sold PDA that accepted handwriting. Typical uses include schedule and address book storage and retrieval and note-entering. However, many applications have been written for PDAs. Increasingly, PDAs are combined with telephones and paging systems.

Some PDAs offer a variation of the Microsoft Windows operating system called Windows CE. Other products have their own or another operating system.

3.10 Screen Input System

Manufacturers have also recognized the importance of the need to write on the screen, and have responded quite admirably. While there is still no widely accepted screen input system for the desktop computer, hand-held electronic organizers that can be "written on" is already in the mainstream. 3Com's Palm has garnered incredible popularity thanks mostly to its intuitive pen-to-screen interface [7]. In many cases, it has completely replaced the office worker's diary. In its latest incarnation, it even
offers a wireless Internet connection - an appetizing sign of things to come.

3.1 1 Document-Sharing Software

"Document-sharing" software has appeared on the market, attempting to solve the problem of incompatible document formats. Software such as Adobe's Acrobat serves to read documents of various formats and export them to a single standard format, which in this case would be the PDF format [8]. This format would then presumably be readable across the board. The idea behind this is ease of management and use. However, document-sharing software in its current state of infancy appears to be a crude hack at present, not having, the power and finesse to truly implement complete document coherency and integration throughout the workflow. Still, it is a promising step in the right direction.

4. Legal Issues Involved

Among the various legal issues that may arise are the validity of electronic documents and digital signatures, defamation, professional negligence, cyber crimes and intellectual property issues. However, among these reasons, I would only touch on legality and crimes issues.[12]

4.1 Validity of Electronic Documents and Digital Signatures

In contrast to the paper-based documents, although ED1 can satisfy the requirement of informative function, it may create potential legal problem relating to the evidential and symbolic function. Further, there are yet very disturbing apprehensions -would digital signatures secured by cryptography constitutes **a** signature when that is required and would the digital signature constitute proof of the signatory's responsibility for the correctness of the information on the document and to the genuineness of the source from which it is supposed to have been sent.[l2]

4.2 Cyber Crimes

With the technological advancement and progress in information technology, a whole spectrum of activity - various types of abuse of computer system, coupled with the traditional crimes the penetration of which get facilitated, such as offence of theft, deception and fraud. Computer systems are particularly vulnerable to computer crimes because of a number of factors. Some of the important factors relate to the density of information and processes, open connectivity, system accessibility, and electronic technology and last but not the least the human factor. Computer data can be incidentally changed or erases with minimum chances of detection e.g. virus or logic bomb. Anybody can easily modify the files and then screen the evidence of the offence. Data can be duplicated on floppies/tapes without any audit trails. Due these concern, some organization reluctant to fully paperless.[l2]

5. Other relevant issues

a. **High Up-front Cost**
Apart from computers, we need file storage system, scanner, high quality monitors, computer network, etc.... It costs a large amount of money for these installations. This is a very expensive start-up cost.

b.**High Ongoing Cost**

In order to have the best performance of computer system, we need a large amount of money for maintenance. Besides, companies need to employ network managers to supervise the establishment of computer network. Therefore, the ongoing cost is also very high.

6. Conclusion

In conclusion, we have seen a lot of improvement in new technologies, but human seem to think that the two problems stated - legality and security always overcome the benefit of paperless. Other than that, it is always been understood that human always comfortable with the old ways of life and always reluctant to accept changes. However, we have to admit there has been some progress made, there are substantial gaps to a totally paperless. The enthusiastic predictions made way back in the 1970s have not been fulfilled in its entirety - no doubt, we now have some offices that use very little paper, but a fully paper-free office environment remains impracticality in most cases. The only real foothold that the paperless idea has taken in daily activities is the use of an Intranet for internal communication, but even that is mostly restricted to emails, memos, and the occasional document or two.

We believe that given enough motivation and technological advancement, we could very well have a completely paperless at some point in the future. But the question needs to be asked: Do we really want a paperless? It all depends on how far the technology can be pushed. If we ever reach the point where a computer looks and behaves almost exactly like a piece of paper, then in all likelihood, yes, a paperless is a sound possibility. Otherwise, we suspect that the answer will be that we will still want paper for a lot of things, simply

because it is so convenient and natural. [11] One thing for sure that the major obstacle isn't technological, or even economic. Instead it's that people prefer paper.

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