



## Future Shock

# Paper use proliferates in 'paperless' world

People still see paper as a 'security blanket' but habits will change

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Special to The Journal

Forget the paperless office. Technology is driving us to use more paper and to use it in different ways.

"Paper is darn useful. It doesn't require much technology. You don't need a screen or electricity — you can write on it with a burnt match," said Richard Descarries, a spokesperson for the Canadian Pulp and Paper Association.

"Paper is going to be a part of our life for a long time."

In fact, CPPA analysts are forecasting a 50-per-cent increase in paper use over the next 10 to 15 years. Use of newsprint has been growing at an average of two per cent a year since the 1960s. Except for forms, the use of office paper, especially photocopy and printer paper, is up.

The Internet has, ironically, been a big driver of paper usage. "People are finding references to newspaper information on the Internet and then they get hold of a paper copy locally," said Descarries.

Ultimately, the Internet will play a huge roll in reducing paper use, said Wayne Crandall, senior vice-president, sales and business development at Scansoft, a Boston-area scanner software maker.

"But the biggest problem we need to overcome is that people like to hold paper," he said.

"You can read it anywhere and make notes in the margin. That physical piece of paper is a security blanket."

Armando Garcia, IBM's vice-president of content management solutions, based in Hawthorne, N.Y., said display technology and access to data continue to be barriers.

"Studies show you lose 25 per cent of your reading efficiency when reading on computers," he said.

However, that may be changing, partly thanks to better display technology.

Paul Muter, assistant professor at the



Nick Sheridan, inventor of Xerox's Electronic Paper, and Fereshteh Lesani show off the first roll of electronic paper produced by 3M, which is partnering with Xerox on the project.

University of Toronto, and U of T student Paula Maurutto conducted a study in 1991 that revealed text on monitors and paper are equally readable.

The researchers acknowledged past research that showed reading from computer monitors of the 1980s was not as efficient as reading from paper. Their 1991 study, in fact, showed that skimming text

was 41 per cent slower from a monitor than it was from a book.

But results for skimming and reading were not the same. "Reading speed and comprehension were equivalent for the high-quality CRTs (cathode-ray-tube monitors) and the book," the researchers found.

And display technology continues to improve. New flat panel displays have resolutions of 600 dots per inch (dpi), the same as laser-printer output.

Current monitors have resolutions between 69 dpi and 89 dpi.

Alas, reading comprehension is not the only issue.

A 1998 research paper by Martina Ziefle at the Institute of Psychology, Rheinisch-Westfälische Technische Hochschule in Aachen, Germany, showed that, for proofreading, speed, accuracy and fatigue are worse with a CRT than with hard copy.

Data access has also been another big limit to adoption of paperless technologies.

A filed piece of paper can be found in a hurry, but search technology, while more convenient, can be less efficient.

"We need to bring products to help companies capture data and provide tools to find and search and retrieve it quickly," said Garcia.

IBM hopes its content management tool called Content Manager, which is based on its DB2 database product will pave the digital path.



XEROX PARC

A prototype of Xerox electronic paper.

Those products are industrial strength and industrially priced, however.

The small-to medium-sized office has been left out of the loop, though information storage, processors, and scanners — required to store information digitally — have dropped drastically in price.

Desktop scanners, which cost \$1,050 or \$1,500 five years ago, now cost \$150 or less.

And of all the technologies, storage has become most affordable. In 1988, the average price per megabyte (MB) of storage was \$17. In 1998, that fell to less than seven cents per MB and is expected to cost less than a cent by 2001.

"Space required for storage is shrinking," said William Cody, senior manager, database research, at IBM Research in San Jose, Cal.

"Devices that can store 10 gigabytes of data per square inch are shipping now. A 20-GB-per-square inch is being demonstrated in the laboratory; that (capacity) doubles every 18 months."

A 100-GB-per-square-inch storage technology will be shortly possible in a lab.

But what may ultimately trim paper usage is an innovation in ink. Xerox and E Ink Corp., are both developing products that give paper new life.

The idea is to coat a page with ink made of microscopic balls that can be manipulated with an electronic charge. When a ball is rotated, it can appear as a pixel, so a page can be erased and re-used. And the ink can be applied to any surface, not just paper.

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