

## Liquid paper: the book as bits

Today's libraries would love to house all the books of the world, just as the great library of Alexandria in 300 B.C. wanted to possess all the scrolls known to man. The great library is said to have held about half a million scrolls, perhaps half of all those in existence. It was lost, and so, perhaps, was a time when a single building could hold all human knowledge. Today, at over a hundred locations around the world, thousands of workers toil with scanners and old books to re-create a global library—a single page at a time.

In 2004 Google began to scan some or all the books of five major university research libraries to make their content accessible digitally. The dream of a great library of all knowledge is now on the road to reality. The Google library holds the promise of universal access.

Scanning technology has been around since the 1960s, but digitized books demand search technology. When millions of books are digital, their texts will be available to anyone with a computer, for fee or not. Search technology will enable us to read any book ever written, or even any article from any newspaper or periodical. The new great library could include a digital version of every painting, photograph, movie, music composition, as well as radio and television broadcasts—plus a copy of the billions of dead Web pages and billions of blog posts. All the works of mankind will be available to all of us, always.

It is estimated that there are about 40 million books, 800 million articles, 30 million songs, 700 million images, 4 million TV shows, 490,000 movies, and 200 billion Web pages. There are already more than a 100 billion PDF pages. All of this content is spread among the libraries, corporate, governmental and non-governmental organizations, and archives of the world. All of it will fit onto a 100 petabyte hard disk, which might be as big as a building if it existed, but in the future it might shrink to the size of an iPod Nano. The mother of all libraries would fit in your pocket.

Corporations and libraries around the world are now scanning about a million publications per year. At AIIM/OnDemand '06, there were five automated scanner suppliers with systems to assist companies in converting paper or microfilm archives to searchable bits. Amazon has digitized close to one million contemporary books. Stanford University (a

library collaborating with Google) is scanning all eight million books in its collection. Its scanners automatically turn the pages of each book at the rate of 1,000 pages per hour.

Carnegie Mellon University shipped 30,000 volumes to China for scanning. Their goal is a million digitized books in two years. A university can expand a 50,000-volume physical book library into over a million digital volumes instantly by providing access to electronic archives. Books have long been isolated as they were silently stacked on shelves. Each book was an island and independent of its neighbors, except as related by subject. You had to read each book to find all the connections between them. Now, no book will be alone because the digital book is, well, an open book in terms of content.

Converting pages of type into electronic bits for screen reading is the vital step in creating this great library. Someday, every word in every book will be hypertextable, extractable, referenced, cross-linked, re-purposed, indexed, tagged, and available to all (if OCR'd correctly). In the new medium of books, every bit informs on every other bit; every page reads all the other pages. Metadata ties books to books and people to people. Surfing the Web will include surfing every book.

Search engines transform our knowledge base and our culture because they are based on relationships. There are over a trillion connections that comprise what we call the Web. But the book has always been static. The great library will have each page in a book discovering other pages in other books. Once text is digital, books extend beyond their pages and their covers. The collective knowledge of a library provides a vantage point to see beyond the single, isolated book into all books and possibly into human knowledge.

### DID YOU HEAR?

- Billboards and e-reading applications could help the market for e-paper surge to nearly \$900 million by 2011, from \$2 million last year (Tokyo-based market watcher Techno System Research).
- Nokia has sold its one billionth portable phone since it began producing the device in the 1980s. It has introduced about 400 different cell phone models. Nokia holds 30 percent of the global cell phone market of two billion plus subscribers with other industry giants like Motorola, Samsung, Sony Ericsson, and Siemens representing two thirds (Business Week).
- Fifty-seven percent of American teenagers create content for the Internet—from text to pictures, music, and video (The Pew Internet & American Life Project).
- One hundred and sixteen million adults read a newspaper over the course of a week, and 55 million Internet users visit a newspaper Web site over the course of a month. Unique visitors to newspaper Web sites jumped 21 percent in 2005, and page views increased by 43 percent (Newspaper Audience Database (NADbase)).
- A study conducted at Ball State University in Indiana observed 400 people over a broad age range for a day and found that 96 percent of them were “multitasking” and about a third of the time they were using media. Consumers spend about nine hours a day using media, most of it watching television.
- The digital print marketplace in the United States will grow at an annual rate of 12 percent to achieve total revenues of \$60 billion by 2009. By 2020, what the industry spends on POD is expected to exceed that of commercial print (Infotrends, 2006).

## EDSF BOARD OF DIRECTORS

### EXECUTIVE COMMITTEE

#### Chair

Brian M. Baxendale, Exec. Vice President, Pitney Bowes (ret.)

#### Executive Vice Chair

Don F. Lowe, CEO, Franchise Services, Inc.

#### Secretary & Treasurer

Wolfgang Pfizenmaier, Senior VP, Heidelberg Americas (ret.)

#### Vice Chair of Education

Mike Jackson, Sr. Vice President, Pulp & White Paper, Weyerhaeuser Co.

#### Vice Chair of Research

Kenneth M. Morris, Ph.D., CEO, Lightbulb Press, Inc.

#### Members-at-Large

Guy Gecht, CEO, EFI

Quincy L. Allen, President, Production Systems Group, Xerox

Jeanne Mowlds, EDP, Executive Director, EDSF

### DIRECTORS

Christopher Baker, President, Group 1 Software, Inc., A Pitney Bowes Company

Alfons Buts, President, Nipson Digital Printing Systems PLC

Joel Cartun, Founder & Vice Chair, Vestcom International

Carl Frappaolo, Co-Founder, Delphi Group, A Perot Systems Co.

Harold "Skip" Henk, EDP, President, Xplor International

P. Tom Jenkins, Chair & CEO, Open Text, Inc.

John Lombard, President, Böwe Bell & Howell

John A. Lopiano, President, Spinet Associates

John Mancini, President, AIM International

Ed Marino, President & CEO, Presstek

Keenie McDonald, General Manager, IBM Printing Systems

Stephen Nigro, Sr. Vice President, Graphic & Imaging Business, Hewlett-Packard Company

Charles Pesko, Managing Director, InfoTrends

Barbara C. Pellow, Pellow and Partners

Tod D. Pike, Senior Vice President, Imaging Systems Group, Canon U.S.A.

Frank Romano, EDP, Professor Emeritus, Rochester Institute of Technology

Kazem Samandari, Ph.d., Executive Vice President of Global Sales and Marketing, Kodak Versamark

Joel Wecksell, Group Vice President, Gartner

## SHORT TAKES: FACTS AND OPINIONS

Communication Technologies, Inc. (COMTek) upgraded all of its 600 broadband over Powerline (BPL) devices in Manassas, VA to further enhance the broadband services it is delivering to a rapidly growing number of residential and commercial customers. The company has now conducted rigorous FCC-mandated testing. COMTek will soon reach its 1000th customer. This is the first commercial deployment of BPL in the nation to use a city-wide electricity grid to provide individual homes and businesses with direct "plug in" broadband access through electric sockets, rather than over phone or cable TV lines. COMTek has completed 100 percent notching of all BPL devices (internal and external to customer premises) in the overhead areas of Manassas and is now engaged in ongoing monitoring of the BPL network.

*The promise of plug-and-play broadband may soon emphasize the plug part. But it involves a plug, where wireless is plugless.*

There were nearly 40 million online banking customers in 2006, a 27-percent increase over the previous year, according to comScore Networks. Use of online bill payment services has grown 36 percent during the same period. Consumers continue to migrate to online banking. The nation's largest banks attracted more than 8.5 million new online banking customers in 2005. In Q4 2005, the total number of online banking customers grew by 3.1 percent over the previous quarter, representing the lowest sequential quarterly growth in three years. Ease-of-use and convenience were previously the major drivers. Incentives and deflating security concerns are the primary motivations nudging customers to adopt online banking today, according to the study. When asked about reasons for enrollment, 33 percent of new online banking consumers referenced the free banking products that were offered as an inducement, and 23 percent responded that they felt more secure about online banking than they did previously.

*What percentage of all banking customers will use online services? ATMs abound, but there are still lines for tellers. In fact, there are ATM lines. Will we print cash from PCs someday?*

According to Dow Jones, there's big demand for American newspapers in China, but not the way you think. China's economy needs raw material for papermaking, but has relatively few trees. For products like paper, it must rely on imports. Though China buys a range of materials to make paper, used or recovered paper can be cheaper and easier than virgin pulp to turn into newsprint and corrugated cardboard boxes. Exports of American recovered paper to China and Hong Kong have grown to \$694 million in 2005 from \$66.9 million in 1998, according to the American Forest & Paper Association. The Recycle America unit of Waste Management Inc. (WMI) sells about 20 percent of its fiber to Asia alone and that has been growing at a few percentage points a year. The same is true for cardboard boxes. As manufacturing moved to China, box makers followed. Now they make boxes in China to package goods they shipped back to the U.S. Over the last decade the Chinese have built state-of-the-art mills, some of the largest mills in the world, to process pulp. The growing overseas demand has helped push up the paper recovery rate in the U.S. In 2005, 51.5 percent of the paper and cardboard consumed in the U.S. was collected for reuse, up from 38.7 percent in 1993, according to the American Forest & Paper Association.

*So we can thank the Chinese for American recycling success. Once someone figured out that there's money in those old papers, we now need to show that there's money in new paper too.*

In the first decline in output from the United States since 1999, U.S. book publishing titles plunged by more than 18,000 in 2005 from 172,000 to 154,000 new titles and editions. Bowker Statistics, a firm that tracks bibliographic information, claims the number of new titles released by the largest general trade houses decreased 4.7 percent, to 23,017. University presses, however, boosted their output by 1.8 percent to 14,746, their largest annual total since 2000. Since 1995, new titles have increased 51 percent for all U.S. publishers, 17 percent for the largest trade houses, and 14 percent for university presses. The study found that Great Britain, already the world's per capita leader in the publication of new books in any language, has eclipsed the United States as the publisher of most new books in English. 206,000 new books were published in the U.K. in 2005, representing an increase of some 45,000 (28 percent) over 2004.

*These statistics are based on retail books. Many on-demand books do not have ISBN numbers and are not counted; yet, that is where the growth in books has been and will be.*

## EDSF REPORT

Editor-in-chief: FRANK J. ROMANO, EDP

Editors: Toby Cobrin, EDP; Roberta McKee, EDP; Jeanne Mowlds, EDP; Sidney F. Huttner, Univ. of Iowa

Design courtesy of Lightbulb Press, Inc.

Printing courtesy of PIP Printing & Document Services

Mailing courtesy of IBM Printing Systems Division

Price: \$50

Copyright ©2006 by The Electronic Document Systems Foundation. All rights reserved. Reproduction in whole or in part by any means without permission is prohibited. When reproduced, the credit line should read "Reprinted courtesy of EDSF." EDSF is funded by individual and corporate contributions. To make your contribution, contact Jeanne Mowlds at [jcmowlds@edsf.org](mailto:jcmowlds@edsf.org)

This newsletter is based on sources considered reliable. However, EDSF cannot guarantee its accuracy, completeness, or reliability, due to errors in fact or judgment.

**EDSF**

The Electronic Document Systems Foundation

608 Silver Spur Road, Suite 280  
Rolling Hills Estates, CA 90274  
USA  
Tel: +1-310-265-5510  
Fax: +1-310-265-5588  
[info@edsf.org](mailto:info@edsf.org)  
[www.edsf.org](http://www.edsf.org)

## NEW EDSF RESEARCH ON DOCUMENT COMMUNICATIONS

In the first quarter of 2006, consultants at Doculabs and faculty at the University of Illinois at Chicago collaborated with The Electronic Document Systems Foundation (EDSF) to conduct a study to gain an in-depth understanding of key issues and trends in the document communications industry. The study identified the following facts:

- Overall, only increased support for electronic document delivery will improve document communications with customers. Security concerns and the need to integrate paper and electronic delivery systems most inhibit migration toward electronic delivery.
- Electronic document delivery continues to grow, but not at an accelerated rate, most likely because of poor promotional efforts and suppliers' failure to offer sufficient incentives. There may also be user concerns about privacy and frustrations with functionality.
- Electronic delivery has not reduced print volume and thus has not provided print or postal savings. Simply "getting users online" may have been expected to reduce print volume, but the relationship between electronic delivery and print suppression is more complex.
- Color print is gaining market share, not only with marketing materials but also for service fulfillment (transactional) documents such as quarterly statements. The number of organizations using color in 10% or more of their documents has nearly doubled each year.
- Responsibility for document communication strategies is increasingly consolidated but remains fragmented. Respondents whose firms have a single executive to manage document strategy lodged responsibility variously in IT, operations, or marketing. This suggests that many firms remain unsure where document communications fits organizationally.

Based on these findings, it is critical to consider a number of implications:

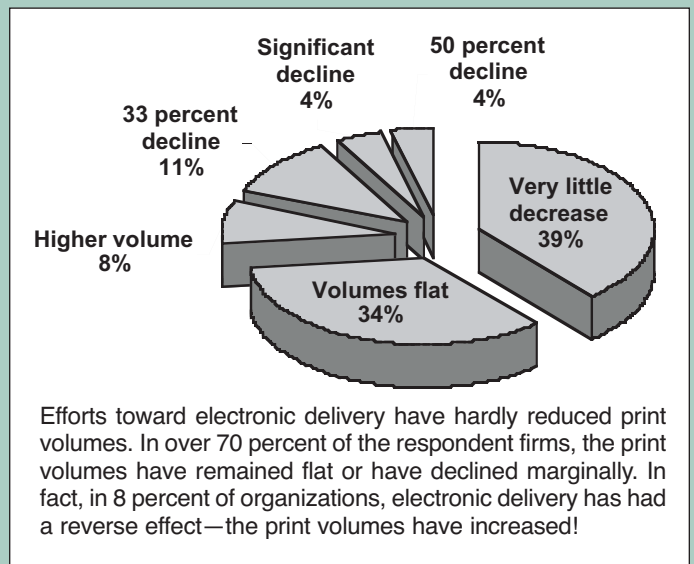
First, organizations must factor increasingly complex dynamics in their document communications strategies. Understanding increased use of color, electronic delivery adoption rates, print suppression metrics, etc., all in the light of cost constraints, will require more sophisticated approaches to forecasting and modeling than previously expected.

Second, lack of centralized responsibility for document communication strategies and clear budgeting / charge-back mechanisms further clouds the financial implications of these trends. Many line managers or business unit managers make their own decisions, perhaps unaware of the long-term impact upon customer experience and spending optimization.

Third, these trends are likely to erode current black-and-white (bi-tonal) print volumes for in-plant print operations. While the decline may be slow initially, if in-plant operations are unable to scale down their staffing and asset bases or migrate to digital color, at some point the migration to electronic delivery and data-driven color will make unit costs non-competitive. In fact, internal black-and-white print functions may follow a pattern similar to the in-plant offset printing functions of just a decade ago: commoditization and, potentially, extinction.

While the document communications industry was once constrained to the narrow domain of "print," today it must be considered in a much larger context. The trends identified in this 2006 study, coupled with the findings of the 2004 and 2005 studies, confirm that the industry continues a transition between paper and electronic communications. If an organization wants to increase its communication effectiveness and maximize the impact of its document-related expenditure, managing the transition requires an integrated, interdisciplinary approach.

"Document Communications Industry Trends: 2006 Survey Results," by James Watson, Jr., PhD, Doculabs, and C. Ranganathan, PhD, University of Illinois, Chicago. Go to [www.edsf.org](http://www.edsf.org) for a copy of the full report.



## The multi-tasking multi-media consumer

The Emerging Media Lab in Los Angeles is run by the Interpublic Group of Companies. It is seeking to understand the state of the divided American attention span. How do you reach consumers who seem to be doing so many things simultaneously? People now surf the Internet while watching television. Children instant-message their friends while listening to music. Homemakers talk on the phone and check e-mail while they cook. Research shows that people somehow manage to compress 31 hours of activity into a 24-hour day. Market researchers are struggling to understand "concurrent media usage."

For advertisers, the challenge is getting their message across in one medium while the consumer is active at the same time in several others. The buzzword these days is "engagement"—as in how engaged, or involved, the consumer is in a particular activity. Multi-tasking engagement is not quantified and the metrics are still unknown.

A study for MTV used an online sample of 4,213 people, and found that those responding engaged in 15.6 hours of leisure activity a day, which included nonmedia activities like shopping, socializing, or eating. Almost a third of that time involved doing

more than one thing at a time, the study found. Most of the multitasking involves television plus another activity, whether reading a newspaper, surfing the Internet, or talking on the phone. Which activity is getting the primary attention, if any?

Forrester Research noted that only 11 percent of consumers who went online while watching television said they paid the greatest attention to TV. Some 61 percent paid more attention to the Internet, while 28 percent said they gave equal attention to both. Forrester used online surveys of 12,000 people as the basis for its findings.

## The nose knows

Olfactory scientists say scent is now a marketing tool. Of all the human senses, smell has the most direct pathway to the emotional center of the brain and is very important for memory. There are strong neural connections between the two. The nose is also closely associated with the autonomic nervous system, so scents trigger subconscious physical responses, even when the aroma is slight.

Smell means cookies or dinner or even danger. Yankee Candle Co. has used a scented ink made by New York's Scentsphere since 2004: Yankee Candle catalogs with the scented ink have seen a sales increase of more than 20 percent.

Drink companies have become experts at using color to revitalize aging brands and catch the interest of younger consumers. Manufacturers of household cleaning agents are giving a sensory twist to heritage brands, such as P&G's Fairy dishwashing liquid, by mixing natural extracts (tea tree, lemon grass, orange, and lime) into their products. Washing the dishes is transformed from a chore into a sensuous citric indulgence. Sensory branding is heading for the mainstream. Today marketers acknowledge that sensory stimulation can aid branding and marketing. Pass the entrance of a gift shop and you are hit by a rush of fragrance. Step inside and it's like entering a botanical garden.

Packaging is boring. Smelling and touching is more fun for the senses. Last year, Kodak was awarded a patent for incorporating scents into an inkjet-printed image. Your photos may have scents in the future. And let's not call it stinkjet.

## The micro printing press

In the nano- and micro-world, machines and materials can be the size of molecules and atoms. University of Hawaii nanotechnology experts have invented the world's smallest brush, boasting bristles a thousand times finer than a strand of human hair. The brush may be used to sweep nano dust, paint tiny micro-tubes, and purify pollutants. These materials are measured in nanometers or billionths of a meter. Nanotechnology could permit even smaller chips that would reduce the size and weight of computers while increasing their speed and memory. Nanotechnology may allow for better-performing fuel cells and testing technology.

Biologists have sought to detect different types of biological molecules in a single sample. Polymer tags, with barcode-like lines, can glow different colors when receptors on the tags bind to specific molecules, but making them has been very expensive. MIT researchers have created a microfluidic printing press that can produce nano particles in a single step and turn out shapes from keys to cylinders to swirls, for nano- and micro-electro-mechanical machines and fabrics.

The process begins with one or several closely spaced, parallel, micrometer-sized streams of liquid. The liquids contain polymers some of which may be bound to proteins that can serve as receptors on a biotag. A flash of ultraviolet light projected through a stencil causes the polymers to solidify in specific shapes. The resulting particles can have several stripes—each created from a separate stream of fluid.

# EDSF

The Electronic  
Document Systems  
Foundation

608 Silver Spur Road, Suite 280  
Rolling Hills Estates, CA 90274-3616

*Liquid paper: Books as bits*

*The nose knows*

*The micro printing press*

*New EDSF research*

*Short Takes*