Challenges For The Quality Of Information In The Paperless Office

Ph. D. Professor Mircea Georgesku, Ph. D. Professor Alexandru Tugui, Ph. D. Professor Florin Dumitriu
Business Informatics Department, Alexandru Ioan Cuza University
Iasi, Romania
mirceag@uaic.ro; altug@uaic.ro; fdumi@uaic.ro

Ph. D. Professor Iuliana Georgesku
Accounting Department, Alexandru Ioan Cuza University
Iasi, Romania,
iuliag@uaic.ro

Abstract
This paper explores the implications of paperless office environments and the realities organizations face in their attempts to go paperless. With many states going through budget cuts year after year, we need to take advantage of electronic innovations that can take the place of traditionally labour-intensive tasks. Recent figures suggest though that paper consumption continues to increase unabatedly, with a correspondingly adverse environmental impact. In this research we will discuss how to automate current paper processes by bridging new and emerging technologies with current paper and electronic systems.

Keywords: Paperless office, environmental impacts, office of the future, electronic document management.

Introduction

For the most important part of the world, **paper is the principal cause of modern bureaucracy**, **but it can also be the vehicle for vital business agreements**. It's not particularly friendly to our environment, and technologists have told us for years that we can do without it. But are we willing to let go of paper entirely?

Whether it has two employees or one thousand, almost every office has too much paper. But this is not for lack of trying. What ever happened to the "***paperless office***" which was predicted by the business writers and futurists back in the ***mid 1970s***? Since the explosion of personal computing and email in the late 1980s and early 1990s, the production and use of paper has grown exponentially, rather than slowed.

Software developers have attempted to entice us into greater use of electronically presented information by coming up with virtual paper and electronic 'post-its', with limited success. They claim to provide the readability and navigational features of their paper counterparts, but users are still choosing to print to paper.

In the XXI century, called also the Informational century, paradoxally, the requirement for business paper in the world is accelerating rather than diminishing. For example, in USA, the average office worker now consumes over 250 pounds of paper each year, and according to the paper industry, that rate is increasing. Many other statistics point towards a continued growth in the consumption of business forms and high quality paper products in today's workplace. Will these trends continue as we move to the next years? These issues are obviously important to those of us in the business of managing

paper documents, but is it prudent to assume that the "paperless office" is not only inevitable but also fast approaching?

Since the Egyptians first used rudimentary writing utensils to communicate on sheets made from reed, paper has been the most common method of documenting information. This method of transmitting the written word has been so etched into the minds of today's society that giving up this means of communication will be a very long time coming. In fact, studies have even shown that people are able to retain 30% more information if it is shown to them on paper than if they see it on a computer screen (King, 2001, p 42).

Discussions

The concept of the paperless office entered the public's imagination in 1975, when a Business Week article entitled "The Office of the Future" predicted that by 1990 "most record-handling will be electronic". But, the promoter of the phrase 'paperless office' is traced to Xerox PARC, although they trace the idea of replacing paper-based methods of working all the way back to the 1800s with Samuel Morse's idea of electronic mail. They mention other precedents for trying to do away with paper, moving forward in time from that early date, including digital libraries and the Internet.

Why to go paperless?

- As much as 90% of all documents already exist somewhere electronically;
- Develop a more holistic view of information and the many places and forms that information resides in:
- Traditional documents;
- Electronic Mail;
- PDA and other portable devices;
- New forms such as audio and video Information.
- Reduce the cost of printing;
- Reduce the cost of handling;
- Implement a more cost effective approach to regulatory compliance.

The amount of information is doubling every three to four years. Therefore, although the percentage of documents printed goes down, the total number of printed documents is still going up.

Richard Harper and Abigail Sellen (Sellen, Harper, 2003) considered that there are three classes of problems that paper presents:

- Symbolic problems;
- Cost problems;
- Interactional problem.

From ***symbolic point of view***, paper is a symbol of how the old fashioned past is rooted in some real issues having to due with costs and interactional limitations. In other words, paper is sometimes the more costly, less efficient, more cumbersome option when compared to new technologies. These are kinds of problems document system consultants will point out to Information Technology managers. It's important to say, that for example, e-mail has actually increased paper usage by some 40% in offices (Seele, Harper, 2003). C. Robinson

states that "UK businesses throw away about five million tones of printing and writing paper every year" (Robinson, 2006, p 15).

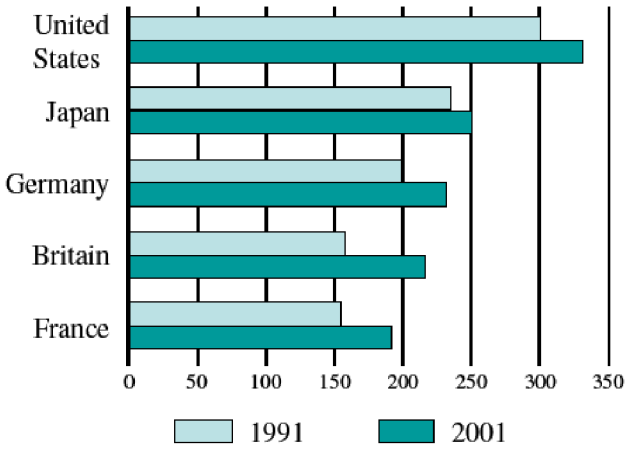

Figure 1: Paper consumption per head, Kg/year (The Economist, 2002)

The Gartner Group of Price Waterhouse Coopers has indicated the following problem areas in particular:

- 7.5% of all documents are misfiled;
- 5% of all documents are lost;
- It takes 10 minutes to retrieve and properly file a misfiled document;
- It costs $250 to reproduce a lost document;
- In the average office, staffs make more than 60 trips per week to the fax, copier and printer.

When we talk about ***costs*** there are not only the physical costs with obtaining the paper. These include also the delivery, storage and retrieval costs of paper based systems. It's important to summarize the considerable costs with physical storage space; also the paper can only be used by one person at a time, without making costly copies. The paper requires extensive labour to organize, file and retrieve, and dispose properly. It is also difficult to conveniently make file cabinets secure (lock-unlock-lock), and the paper does not lend itself to a disaster recovery plan (fire or water damage).

Interactional problems with paper, or limitations on the use of paper include: paper must be used locally, can't be remotely accessed; paper occupies physical space, it must be stored; paper requires physical delivery; one person to one paper document, or the way the document is used changes dramatically; paper documents are hard to revise or integrate into other documents; paper documents are hard to replicate (without technologies for replicating them); and paper documents are static, visual displays.

The figures are impressive. **How much paper do we use** (see http://www.moea.state.mn.us/campaign/paper)?

- The average office worker uses 10000 sheets of copy paper each year;
- Each canadian uses up to four trees every year in paper products;

- The United States alone, which has les then 5% of the world's population consumes 30% of the world's paper;
- Over 40% of wood pulp goes toward the production of paper;
- Printing and writing paper equals about one half of US paper production;
- Citigroup Financial Company, a very important financial company from US, determined that each employee used double sided copying to conserve just one sheet of paper each week, the firm will save 700000 $ each year;
- Bank of America cut its paper consumption by 25% in two years by increasing the use of on line forms and reports, email, double-sided copying and lighter weight paper.

It` s not enough to go paperless? More reasons?

- The number of pages consumed in U.S. offices is going up at a rate of 20% per year;
- It is estimated that 80% of information is still retained on paper even though more than 80% of the documents with which we work are already in a computer somewhere (CAP Venture Group);
- Organizations now maintain 30 times more data than in 1999 (Gartner Group);
- The U.S. annually spends $25-35B filing, storing, and retrieving paper (IDC);
- Typical office workers spend 40% of their time looking for information;
- Professionals spend over 500 hours annually reviewing and routing files and another 150 hours looking for incorrectly filed documents;
- Over 42 billion pages were faxed last year alone;
- The average document is copied 9 times (Gartner Group).

The above problems with paper demonstrate reasons why one might want to eliminate or at least reduce the use of paper. Over the past few years, however, there have been great advantages in scanning, optical character recognition (OCR), image processing/storage, as well as indexing/searching software. Also, the prices for hardware components (hard drives, scanners, CD-Writters) have reduced.

It's now important to say that **creating a paperless office is no longer a technological issue, it is an organizational issue.** Given the advantages of a paperless office, why is society not yet there? The answer is deceptively simple: paradoxally there is no substitute on the market today that is as portable, durable, simple, and accessible as paper. Canada is the world's largest exporter of office printing paper, and they have seen their paper exports more than double in the last 15 years, the same time frame as the computer revolution (New Zealand Management, 2001, p 42). There seems to be no retarding the propagation of paper in the office, at least not in the near term.

Determining document storage guidelines

But, what is Document Management? **Document management** is the processes that control and organize documents throughout an enterprise. It incorporates document and content capture, workflow, document repositories, Computer On-line Document (COLD), Electronic Records Management (ERM) and output systems, and information retrieval systems.

Developing your firm's document storage plan is a two-step process—creating a list of all documents that your firm might want to print and then narrowing the list to remove any unnecessary items.

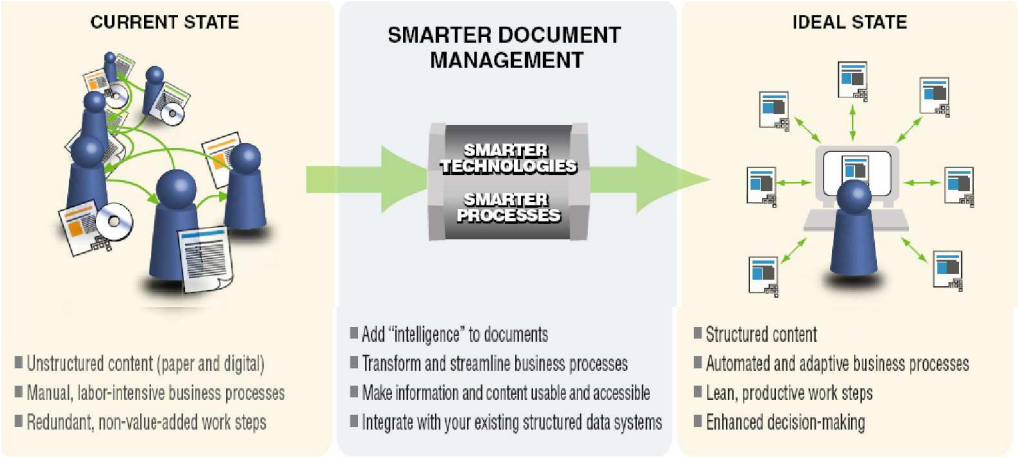

Figure 2: What is Smarter Document Management?

Posing the following **questions** it's very important **for your firm's document list**:

- What are all of the possible documents your firm might want to store electronically?
- What documents do you have in your current filing system(s)?
- Which documents do you need to access quickly and frequently?
- Which internal documents, such as memoranda and meeting minutes, could be stored electronically?
- Should you store documents and other files needed for your practice (such as human resource files and billing reports) electronically?
- Should you store legacy documents?
- From which date should you begin to store the identified documents electronically?
- Who Needs Access to the Information? Is the Information Sensitive?
- Why the information is needed and how long will be kept?

When defining the system you must follow the **steps**:

- Form a staff planning team. Include staff from disciplines such as information technology, quality control, project management, and administration.
- Develop a flow chart of all communication that comes in or goes out of the office, including phone calls and e-mail.
- Establish guidelines for the filing system. Our staff planning team agreed on the following:

- Scan all incoming/outgoing documents 11"x17" or smaller, including phone records and all project-related documents;
- Do not scan CAD drawings or specifications already created and stored electronically. Establish guidelines for archiving these electronic documents on CD-ROM;

- Do not scan shop drawings, other submittals, or samples. Do scan all transmittals that record the receipt and issuance of submittals to and from other parties;
- Scan all financial and contractual documents not already created and stored electronically; password-protect such documents;
- Establish a firm-wide policy for scanning and archiving.

What is the preferred file format ***used for storage***? Traditional Digital File Formats are: Tagged Information Format File (TIF); Portable Document Format File (PDF); Joint Photographers enhanced Graphic (JPEG); Graphic Interchange Format File (GIF); ASCII Format File; Binary Large Object file (BLOB) and Extensible Markup Language – XML (XPS).

To go paperless, you must instil also a **paperless culture in your firm.** You must examine how work is done today, and the processes that will work in a paperless environment.

Defining the benefits is a critical step in the planning process for going paperless. Without a list of benefits that the firm's decision makers understand and agree to, it is not going to be possible to make an informed decision about the best course of action. If we want to summarize ***the benefits of paperless office***, it's important to say:

- Printing costs;
- Paper costs;
- Shipping costs;
- Reduced time spent filing and locating;
- Elevated staff productivity;
- Happier clients;
- More usable office space;
- Healthier environment.

Some benefits most of the people thinks there are not important. We believe there are more important that the financials advantages: Sharing - Among the many activities that coincide with reading, collaboration is worth special mention because paper seems ideally suited for sharing.

Much of the work in offices and schools involves handing and mailing paper around. For the most part, paper provides an easy and inexpensive solution that is unlikely to be bettered by reading appliances. As document management catches on, users want additional capabilities.

The most important capabilities for professionals will be allowing their staffs to work with flexibility, and sharing documents with their clients. Multiple display surfaces - Readers often work with more than one page at a time. With paper, people do this unconsciously by flipping between pages in a book or by moving papers around on a desk. Physical mobility – The worker is able to carry paper documents but not usable electronic ones. But, using mobile devices and the Internet, it's possible to have access at the documents of the company 24 hours of 24.

It's clear that a paperless office has also some ***disadvantages***. Some of them are:

- Initial cost associated with the purchase of a paperless filing system;
- Number of users to access the system at one time and cost associated with licensing;
- Modifications/changes to documents or files.

The paperless office is being transformed from a much ridiculed cliché into a cost saving reality. Especially now it ties in with worries about the ecological consequences of endless paper documents and forms. One in six pages printed in the workplace is never used – the equivalent of over 1.2 million average sized trees – according to printer supplier, Lexmark.

According surveys into paper use **in France, 50% of offices store more than 50% of their documents in paper format**. In our days, every business has to cut the costs to remain competitive. According to research done by Gartner Group, the cost of document production accounts for between one and three per cent of company's total revenue. If we look at the research done by International data Corporation, it's more like five per cent.

We can also discuss about the **hidden costs of paper based process**. Gartner Group has estimated that it costs 15 £ just to file a piece of paper and 500 £ a year rental space for a single filing cabinet. For office space, a cubic foot of records was estimated in US to cost $23.24, about 98% of which is the rental cost of the office space. That is only the cost of leaving the records in place for many years. The cost of employee time to prepare the records for storage, access them as needed, and determine when they can be disposed of is usually much larger.

There are also hidden costs derived from the loss of productivity when it takes so long to find paper documents. Typical office workers spend 40% of their time looking for information. Professionals spend over 500 hours annually reviewing and routing files, and another 150 hours looking for incorrectly filed documents. Over 42 billion pages were faxed only in 2006. Document security must be also discussed. Electronic documents can be protected using passwords and encryption, meaning that cannot be read or multiply by an unauthorized person.

When we say electronic documents, we use not only hardware like desk computers or laptops and software programs for writing. These means also components and software solutions like: scanners, storage systems, Fax over IP (Internet protocol), Wireless Local Area Networks, Secure remote access, E-learning systems, and advanced printers.

The XXI century brings us important directions that will force the organizations sooner or later to go paperless:

- Faster and Cheaper Computers
- Faster, Smarter Scanners;
- Bigger, Cheaper and Faster Disk Drives/Storage Solutions;
- Faster (greater bandwidth) Networks; Faster, Improved Internet;
- Improved WiFi Services;
- Better Programming Tools and Techniques (.NET, SOA, PHP,AHA, Ajax, etc);

- Radio Frequency Identification Technology.

There is also an important problem that must be resolved if we want to develop faster the paperless office: the standards. The real problem with standards is that we always have more forms. At the beginning it was Xopen but we have yet another standard for long term electronic document storage and exchange and more lofty ideals from involved parties.

There are four types of document-oriented systems, which often leads to confusion regarding which one is the most appropriate for an organization. By understanding the capabilities of each type of system, organizations can mitigate the risk of implementing the "wrong" one:

- **Image Archival Systems** are used to save unchanging images of paper documents for long periods of time. Because these systems are primarily for archiving documents that may be needed in the future, they are not designed to enable instant access;
- **Document Management (DM) Systems** are used for capturing, preserving, managing, storing and delivering electronic objects. These objects can include images, word processing documents, voice and photos. Often DM systems encompass workflow, which includes revision control: check-in, check-out and versioning. Some systems also provide search capabilities;
- **Content Management (CM) Systems** are used to manage the content of a Web site. Typically, a CM system consists of two elements: the content management application (CMA) and the content delivery application (CDA). The CMA allows the content manager or author, who may not know HTML, to manage the creation, modification and removal of content from a Web site. The CDA element uses and compiles that information to update the Web site. Most CM systems provide Web based publishing, format management, revision control, indexing, search and retrieval;
- **Records Management (RM) Systems** are used for the systematic control of the creation, maintenance, use and disposition of records. Disposition –the deleting of records at the appropriate time – is a key feature of RM systems.

All **Document management systems** should have **five basic components**:

- Capture and import tools to bring documents into the system;
- Methods for storing and archiving documents;
- Indexing and retrieval tools to locate documents;
- Distribution tools for exporting documents from the system;
- Security to protect documents from unauthorized access.

All document management systems must be adaptable to workflow changes. Any system that is difficult to change risks becoming increasingly out of synch with the changing world that it supports.

The software solution depends by the size of the company. For the entry Level or Personal Solutions (Single User or Small Group solutions - Typically in the $50 - $200 per user range) we can discuss about: Adobe www.adobe.com; Nuance's PaperPort www.nuance.com; Nitro PDF Software www.nitropdf.com; ABBYY www.abbyy.com; or SourceLink www.personable.com.

For Small to Medium Business Solutions (Typically 5-25 user solutions but most are scalable; Cost will typically be $300 - $500 per user; Many applications are industry specific and some are generic with the user defining the environment parameters. The following are best practice examples in the US: Documentum & Captiva (EMC); FileNet (IBM); Stellent (Oracle); OpenText & Hummingbird (OpenText – used for SAP, Oracle, Microsoft), CCH; Thompson; Lacerte; Doc-It; Caseware.

What about the prices for Electronic Document Management Solutions?

Company	EDM Product	Base Price **	Users	Maint.
AccountantsWorld	CyberCabinet *	$695 w/website $695	Unl. staff and clients	
Acct1st Technology Group	Acct1st EDRMS *	$600	1	20%
CCH	ProSystem fx Document Client Portal	$1,825 +$995	1	45%
Computhink, Inc	ViewWise **	$5,000	5	18%
Doc.it	Doc.it DM suite	$$$$		
Doculex	Doculex Goby Capture *	$3,995	1	20%
Interwoven	Interwoven DM suite	$$$$		
Intuit	Lacerte Document Management **	$450	unl. local	
Thompson Creative Sol.	FileCabinet CS	$1,500	1	$350
Thompson RIA	GoFileRoom* (prev. Immediatech) Client access	$3,950 +$3/usr/mo	5	
	* web-hosted only ** local/net only	** Storage, networking, web-access, additional users, client access, training may be charged separately		

Cost of Paperless System Software Depends on the Size of an Organization

	1 user	2–10 users	11–50 users	50+ users
Imaging software	$200–$500	$600–$6,000	$3,000–$25,000	$15,000+
Capture-preparation software	$300	Included	Included	$15,000
OCR software	$500	$1,000	$2,000	$5,000
Workflow software	N/A	N/A	Included	$10,000
Scanner software	$700	$4,000	$7,000	$12,000
Implementation	Self	$3,000	$10,000	$20,000+
Total	$1,700–$2,000	$8,600–$14,000	$22,000–$44,000	$77,000+

The prices are not very low but it's been estimated that every dollar invested in going paperless will generate a return of as much as $30. Even if that estimate is overblown, the savings still would be considerable. Just redesigning a business's workflow and eliminating all the disconnects and redundant paper handling will enhance the bottom line. A conversion now is even more alluring because prices for paperless equipment—computers, scanners, storage devices and software—have dropped markedly in the past five years.

Digital document management increases profitability by reducing costs and by increasing revenue. EDI Group Ltd., estimates that implementing a document management system results in a cost savings of $ 1-5 per document, while Gartner Inc., estimates that a document management system can reduce overall document-related costs by 40 %. There are the benefits of reduced overhead, lower costs for both on-site and off site storage, reduced costs of regulatory compliance and, often the elimination of staff positions.

Table 1: Increased profitability by Business Size (The Example of Laserfiche Solution) -(adapted from www.laserfiche.com)

Business Size	**$ 500000 in annual revenue**	**$ 1000000 in annual revenue**	**$ 5000000 in annual revenue**
Technology investment	1,4% of revenues ($ 7000)	2% of revenues ($ 20000)	1% of revenues ($ 40000)
Staff savings	1000 hours (0,4 of a full time employee)	1500 hours (0,6 of a full time employee)	6000 hours (2,4 of a full time employee)
Overhead savings	8,6% of revenues ($43000)	8,9% of revenues ($89000)	8,6% of revenues ($342000)
Profit increase	41,2%	55,9%	40%
Business value increase	$216000	$626000	$3421000

When we talk about the paperless office (the technical term is a content-management system) we don't mean the elimination of all paper—a condition that's still years away. Even if you aren't ready to dump paper entirely, there are intermediate steps you can take.

For example, if you're in public practice, there are systems for paperless tax preparation, paperless audit, engagement management and general document imaging, and for those in industry, there are systems that scan invoices and automatically enter their data into your accounts-payable program, eliminating manual data entry.

Conclusions

For us it`s clear that only **one major obstacle** stands in the way of a paperless office—and it's not technology. It's **resistance to re-engineering business processes** to accommodate such a switch. That shouldn't come as a surprise. Business has relied on paper documents for thousands of years. Even today, with computers on most everyone's desk and e-mail fast becoming the leading mode of business communication, paper maintains a firm foothold.

We appreciate, that successfully **becoming "office paperless" is directly tied to**:

- The quality of the electronic document management software that you use;
- The software's integration with your PC and scanner (appraisal software or document management software);
- A short learning curve and a system that is easy to maintain;
- A system that we know we can stick with and rely on for many years.

In fact, use of paper grows an average 7% a year. Check out most any business office and you'll still see desks with overflowing in- and outboxes and copies of e-mail, memos and reports scattered about. The irony is that much of that paper is copies of documents already stored in computers. The reliance on paper isn't cost effective for any business. For companies to move away from paper based processes and embrace electronic document production, we have to be sure that it doesn't replace paper, it improves on it.

In the next ten years will predominate the activities that involve knowledge work. We would expect to see, then, the paper is gradually

replaced. Estimates are that over 30 percent of the US workforce now consists of knowledge workers, and this proportion will continue to grow. Also, the mobile working and working from home will be an important part of our life, which will improve paperless office to. The number of home computers is also quickly growing, that will increase interconnectivity and step by step the society without paper.

References

Aguila-Obra, D., Melendez, A.,2006, Organisational factors affecting Internet technology adoption, *Internet Research*, vol 16, no 1, p 94.

Anonymous, 2002, In praise of clutter, *The Economist*, 19th December 2002, Available at http://www.economist.com/business/displayStory.cfm?story_id=1489224, accessed 12 September 2007.

Fan, X., Liu, Q., Ng, P., 1999, An Automated Document Filing System, in *Journal of Systems Integration,* Springer Netherlands, Volume 9, Number 3 / October, 1999, pp. 223-262.

King, N., 2001, Pursuing the paperless office, *Computer User*, 20,p 42.

Marshall, C., 2000, The Future of Annotation in a Digital (Paper) World, in *Successes and Failures of Digital Libraries* (Harum and Twidale, eds), Urbana-Champaign: University of Illinois, pp. 97-117.

Melville, N., K. Kraemer, V. Gurbaxani. 2004. “Review: Information Technology and Organizational Performance: An Integrative Model of IT Business Value.” MIS Quarterly 28(2): 283-322.

Muter, P., & Maurutto, P., 1991, Reading and skimming from computer screens and books: The paperless office revisited? *Behaviour & Information Technology*, Vol. 10, No.4, pp.257-266, Available at http://www.psych.utoronto.ca/~muter/pmuter2.htm, Accessed 20 February 2008.

Robinson, C., 2006, Modern Life is Rubbish, *Mid Hampshire Observer*, Issue 261, 22nd, February 2006.

Schal, T., 2006, *Workflow Management Systems for Process Organisations*, Springer Edition, New York, pp. 83-111.

Wagner, V., 2001, Chase kicks off business document archive service, *Bank Systems & Technology*, 38(6), pp 24-25

Wu, Y., 2005, Efficient Authentication of Electronic Document Workflow, in *Information Security and Cryptology*, Springer Edition, New York, p. 172.

http://www.accountantsworld.com/

http://www.cchgroup.com/document