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AICPA's top technologies 2004

Scott H. Cytron

Anne A. Stanton

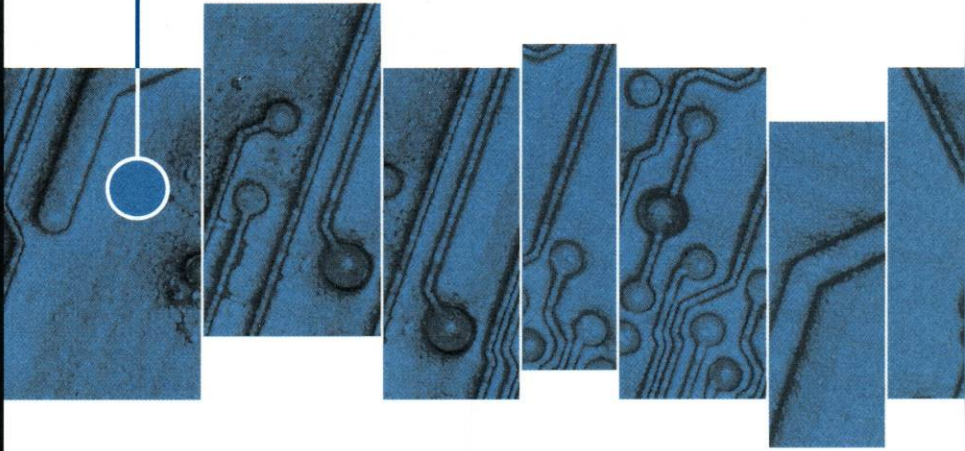
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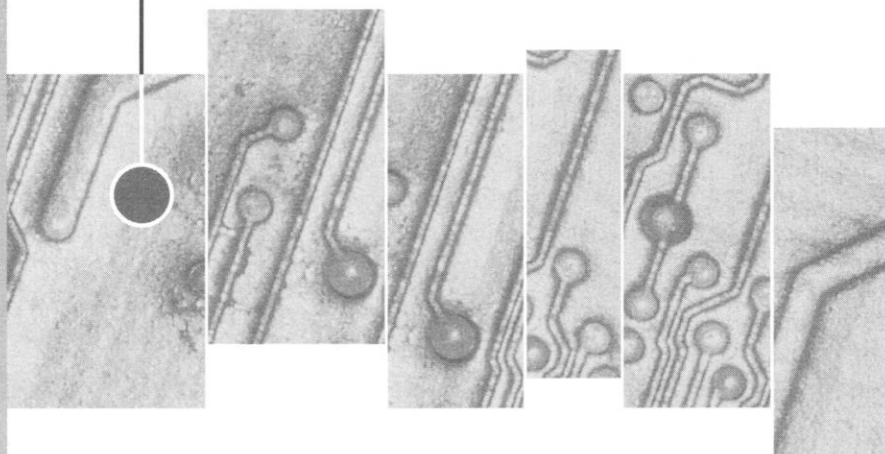
AICPA's Top Technologies 2004

Scott H. Cytron, ABC
Anne A. Stanton

AMERICAN INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS

AICPA

Information
Technology Section



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AICPA

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Scott's work is regularly published in the *Journal of Accountancy*, the Ohio Society of CPAs' *Catalyst* magazine, Intuit's *ProConnection* eNewsletter, and Accounting Software 411.com. He also consults with several CPA firms in practice management activities, communications, and collateral materials/Internet activities; and counsels a national accounting group working in business valuation, as well as an international group of CPA firms.

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Introduction

AICPA's Top Technologies 2004 is a resource guide and summary of the AICPA's Top Technologies project in which technologies are considered, recommended, voted on, and ranked according to the results. This book also covers AICPA initiatives, industry developments, and tools and activities affecting the accounting profession and technology consulting.

CPAs working in public practice and industry continue to provide value-added services to their firms and employers by integrating accounting-related core competencies with today's business marketplace. The result is a hybrid of technology strategist and consultant that continues to propel the CPA beyond traditional service delivery.

We encourage you to read these sections and consider how to further develop your own internal processes and systems that make the most sense to your own situation and needs. No two firms or businesses are exactly alike, and technology solutions will not be the same for any two entities. CPAs working in firms and companies learn more about what's working by networking with peers as well as by attending industry conferences and seminars.

As with any technology, the end is nowhere in sight and the landscape constantly changes. We hope that your own systems and processes also continue to evolve as well.

Purpose and History

Technology is an integral part of our business and personal lives, affecting virtually everything we do and experience in some form or fashion. New technologies continue to be introduced at an increasing pace, and often at a lower cost, providing users more opportunities than ever to advance their competencies and their professions. For business owners, the effective use of information technology (IT) provides a competitive advantage that directly

leads to improved profitability. The difficulty lies in determining which technologies should have the biggest impact and who would be best suited to create such a list.

Because CPAs are believed to be the most “trusted” business advisers and because they are intricately involved in the flow of information within business, they have become the logical choice for evaluating and recommending IT solutions. In that light, the AICPA created the top 10 technologies process in the late 1980s. The AICPA brought together many of the most technologically astute members of our profession to create a list of technologies, ranked according to priority, that members needed to be aware of in order to be effective with customers and clients.

In the past, this list served as a focal point for the development of guides, articles, and case studies for the AICPA’s IT Section and was also used as a guide by various committees to direct the planning of conferences and seminars. In addition, various accounting organizations across North America relied on this list each year to plan their own educational endeavors. Over the years, the list was released in the form of articles, books, video tapes, accounting industry newspapers and magazines, and even a domain-specific Web site.

Today, almost 20 years later, the AICPA top 10 technologies program continues to serve as a tool to educate members in business and industry, public accounting, government, and education.

History of Lab Process

Beginning in the late 1980s, members of the AICPA IT Research Subcommittee met to evaluate the most important technologies to serve as the research agenda for the coming year. This process became more formalized when a new type of software developed by the Ventana Corporation called a Group Decision Support System (GDSS) allowed a small group of people (approximately 30 invited guests) to collaborate on the same topic at the same time. Participants met at the University of Arizona in Tucson, in a special technology lab that was equipped to help groups seamlessly collaborate using a small network of computers. Over the

years, this GDSS allowed participants to simultaneously vote, add comments, and rank issues in an independent fashion.

To ensure that the laboratory process met the needs of the membership as a whole, selected participants represented a comprehensive cross section of CPAs working in business and industry, public accounting, government, and education. In addition, individuals with a specific focus in technology consulting, tax production, auditing, and accounting processes were included to add their specialized insights. The process of physically meeting and voting continued through the creation of the 2001 list, at which time a Web-based solution replaced the classroom process.

Over the last several years leading up to the Web-based solution, the evolution of Internet technologies had a profound impact on virtually every business process. With this in mind, AICPA leadership began looking for a method to expand participation in the development of the list, while at the same time lowering the cost to create it. In May 2002, the Top 10 Technologies Task Force opted for a Web-based survey and invited all Certified Information Technology Professionals (AICPA's CITP credential, awarded to CPAs who have both an extensive knowledge of business process/management and experience in the practical application of technology) and members of the Information Technology Alliance (ITA) to participate in the voting. The Web-based process kept the voting open for a longer period of time and allowed participants to vote at their convenience, rather than having to be physically present at the laboratory for three days. After voting was closed, the results were tabulated and released in a matter of days (rather than the months needed in previous years to fully calculate and assess the results), all at a fraction of previous costs. The following year, 2003, also saw the return to the Emerging Technologies list—absent for one year—created with the assistance of the ITA.

Current Web Process

The Top 10 Technologies Task Force has worked diligently to create the current process, which is reflected in the 2004 list. This effort begins by reviewing the findings of the previous year. The

comprehensive list of items to be voted on is updated for any new items, and the entire list of definitions is reviewed and updated as required. The task force then narrows the list to a manageable number of items to minimize the time spent online to vote. These items, along with specific open-ended questions, are placed within the survey application (<http://www.Zoomerang.com>), at which time the task force invites others to participate.

The current intention of the Top 10 Technologies Task Force is to include as many technologically astute individuals in the voting process as possible. Although the initial Web-based lists were limited to previous lab participants, CPAs with the CITP credential, and members of the ITA, the task force expanded participation in more recent years and voting now includes all members of the IT Membership Section. We invite individuals with exceptional technological knowledge and business insight to submit a request to be included in future top technologies developments. Please e-mail infotech@aicpa.org for more information.

2003 Top 10 Technologies

For reference, here are the 2003 top 10 technologies:

1. Information security
2. Business information management
3. Application integration
4. Web services
5. Disaster recovery
6. Wireless technologies
7. Intrusion detection
8. Remote connectivity
9. Customer relationship management
10. Privacy

2004 Top 10 Technologies

The 2004 top 10 technologies tabulation was one of exceptional change. Technology moved from productive applications, new features, and enhancements to security, spam control, and optimization.

The AICPA top 10 technologies for 2004 are as follows:

1. Information security
2. Spam technologies
3. Digital optimization
4. Database and application integration
5. Wireless technologies
6. Disaster recovery
7. Data mining
8. The virtual office
9. Business exchange technology
10. Messaging applications

2004 AICPA Emerging Technologies Watch List

The Top 10 Technologies Task Force also developed a “watch list” of technologies that may not have current financial viability, but show significant future promise for business owners:

1. Identification (ID) and authentication
2. Radio frequency identification (RFID)
3. 3G (Third-generation) wireless
4. Simple object access protocol (SOAP)
5. Autonomic computers

1—Information Security

The hardware, software, processes, and procedures in place to protect an organization's systems, including firewalls, antivirus protection, password management, patches, and locked facilities, among other areas

Information security is further defined as “techniques for ensuring that data stored in a computer cannot be read or compromised by any individuals without authorization. Most security measures involve data encryption and passwords. Data encryption is the translation of data into a form that is unintelligible without a deciphering mechanism.”¹ Information security is about protecting not only data critical to business, but also the valuable time and efficiencies that become greatly compromised when security breaches occur.

Information security is not about the latest tool to reach a business goal, and it is not about enhancements to applications to make life more efficient or prolific.

Information security is about preventing crime. Poor security can result in more than lost information. It can result in corruption that can create a paradigm that results in hardware that is more expensive to fix than to replace. It can result in companies going out of business and careers ended. Security breaches should concern many of us.

How can hardware be cheaper to replace—than to fix—when a simple software program is damaged by a security breach? Recently, a client requested the installation of a Microsoft small business server (SBS) in their offices. Previously, the office had a peer-to-peer network with access to the Internet. The customer had cutting edge Dell P4 workstation computers and had invested in all the right software and hardware; however, they neglected to install a firewall.

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1. Webopedia, definition of *information security*, 2004 retrieved May 30, 2004, from <http://www.webopedia.com/TERM/s/security.html>.

What happened? At least one of the machines in the office was so badly infected by adware, malware, and Trojan software that it had to be formatted down to cold metal and all the software reinstalled. To do this would require at least four hours of consultant resources. As a result, the cost to replace the box was cheaper, and it was replaced. Given that this was a new computer; would the vendor fix the machine under warranty? The problem was caused by human neglect and was not covered.

Information security breaches can also compromise our political system. A recent article in ZDNet's *AnchorDesk* relates that one political party managed to access private information from another political party's computer. The party that managed to access the information defended itself by saying, "The bottom line here is that the technology staff of the [other party] was negligent. They put memos in a shared hard drive. It was like putting the memos on our desk."² Security is as much a responsibility of the company being breached as it is an unethical action by the individual breaching the security. Does the argument that data were readily available help to annul the actual act that was committed? It seemed to do so in the case described.

We continue to hear about identity theft, most recently in the often funny commercials for CitiGroup, and identity theft certainly falls under the security umbrella. How do people get our information, and why is it so easy to steal a person's identity? Take, for example, a recent post by The University of Texas at Austin:

The University of Texas at Austin regrets that one of its administrative databases was breached in March by a deliberate attack through the Internet. Thousands of names and Social Security numbers were illegally accessed and downloaded to a personal computer. Fortunately, it appears that prompt action by the Travis County District Attorney's Office, the U.S. Attorney's Office, and the U.S. Secret Service has secured the stolen data before they could be misused or further disseminated.³

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2. R. Vamosi, "Security Breach on Capitol Hill: It's Criminal," 2004, retrieved May 30, 2004, from http://reviews-zdnet.com.com/AnchorDesk/4520-7297_16-5118530.html.

3. University of Austin, "Data Theft Incident Response," retrieved May 30, 2004, from <https://www.utexas.edu/datatheft/>.

If our Social Security numbers are electronically available, then our personal data could be at risk.

If hearing about losses due to poor security isn't enough to motivate you to review and update your procedures, here are more reasons:

1. Major business resources are used to clean up after a security breach.
2. Intellectual property is a significant company asset that should not be compromised.
3. Intellectual property is a significant political asset that helps maintain a careful balance within the U.S. government.
4. A company can be held legally liable for damage associated with a security breach.
5. A loss of credibility and market opportunity can occur if there is a security breach.
6. A significant loss of money and staff hours is guaranteed.
7. Loss of a career or a business can result. (In the case of a system that regulates a life-sustaining or protective service, such as 911 call systems or electric power, even loss of life could result.)

Remember to check at least the following three items within your technical information security system:

1. An antivirus suite solution is implemented, including malware blocking.
2. A firewall solution is implemented.
3. A patch management procedure is in place.

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
Antivirus Information Exchange Network (AVIEN)	www.avien.org	Early Warning System provides virus information.
AICPA/CICA Privacy Framework	www.aicpa.org/privacy	This provides privacy resources and solutions, including the AICPA/CICA Privacy Framework, which can be used by CPAs in the United States and chartered accountants (CAs) in Canada, both in industry and in public practice, to guide and assist the organizations they serve in implementing privacy programs.
Center for Education and Research in Information Assurance and Security (CERIAS)	www.cerias.purdue.edu	This provides an exceptional list of topic-specific links under HotList.
Computer Emergency Response Team Coordination Center (CERT/CC)	www.CERT.org	This maintains listings of current vulnerabilities and has an extensive listing of articles and white papers.
Computer Incident Advisory Capability (CIAC)	www.ciac.org	Managed by the U.S. Department of Energy, this site maintains a listing of vulnerabilities and security information.
Center for Internet Security (CIS)	www.cisecurity.org	This provides methods and tools to improve, measure, monitor, and compare the security status of Internet-connected systems and appliances, plus those of your business partners. Systems are developed through input provided by the CIS membership.
Computer Security Institute (CSI)	www.gocsi.com	This is the host site for the CSI/FBI Computer Crime and Security Survey.
ICSA Labs (a division of TrueSecure)	www.icsalabs.com	This provides virus alerts, and white papers and studies on viruses and security vulnerabilities.
SysAdmin, Audit, Network and Security (SANS) Institute	www.sans.org	This is a comprehensive site for all information security issues.
Security Focus Online	www.securityfocus.com	This provides good, general information security information.

(continued)

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
Trust Services Principles and Criteria	www.aicpa.org/assurance/trustservices/index.asp	This is a set of principles and criteria to be used when providing assurance services, advisory services, or both on information technology (IT)-enabled systems, including electronic commerce (e-commerce) systems.
National Security Agency (NSA)	www.nsa.gov/snac	This offers security recommendation guides.
U.S. Computer Emergency Readiness Team (US-CERT)	www.us-cert.gov	This agency is charged with protecting the internet infrastructure of the United States by coordinating defense against and response to cyber attacks.

2—Spam Technology

The use of technology to reduce or eliminate unwanted e-mail (Technologies range from confirmation of the sender via Internet service provider (ISP) lookup, to methods whereby the recipient accepts e-mail only from specific senders.)

Many of us depend on e-mail as a tool to facilitate and complement the tools we use for communication, including the phone, meetings, videoconferencing, paper mail (snail mail), and instant messaging. Spam seriously compromises the efficiency of e-mail as a tool. It creates “noise” among the legitimate e-mail we want to read, uses valuable bandwidth and storage space, and can create a mess within carefully and not-so-carefully organized systems.

A number of companies are using a variety of techniques for fighting this nuisance, but just as we must tolerate the mosquito, we all tend to tolerate a certain amount of spam or the inconvenience of having wanted e-mail blocked through the task of preventing all spam.

E-Mail Software Filters

Many of the e-mail software packages that we use have filters and rules that can be defined to recognize and move spam out of our inbox to a separate folder for review or even automatically delete it. These systems range from simple ones that find the most obvious spam, to

quite complex systems that use Bayesian formulas and artificial intelligence to interpret subject matter and e-mail headers. Through logic, the more sophisticated systems flag spam mail as “garbage.”

White Lists

A white list is a list of contacts that have been approved by you. The list helps reduce spam by comparing incoming e-mail to the list of approved contacts. Mail that is not from an approved contact is either moved to a special folder or rejected. The risks involved with using a white list include rejecting e-mail that is, in fact, not spam. For instance, rejecting e-mail from a prospective client would not be a good idea.

Blacklists

A blacklist is a list of contacts that are blocked or prohibited from sending you mail. Mail that is from a person on a blacklist is deleted, returned, quarantined, or marked as spam.

More on Bayesian Techniques

The Bayesian technique identifies incoming e-mail spam. Unlike other filtering techniques that look for spam-identifying words in subject lines and headers, a Bayesian filter uses the entire context of an e-mail, looking for words or character strings that identify the e-mail as spam. Another difference between a Bayesian filter and other content filters is that the more spam that is analyzed, the easier it is for a Bayesian filter to learn to identify new spam.

In addition, Bayesian filters are adaptable in that the filter can train itself to identify new patterns of spam. These filters can also be adapted by the human user to adjust to the user’s specific parameters for identifying spam. Bayesian filters also are advantageous over more basic kinds of filters because they take the whole context of a message into consideration. For example, not every e-mail with the word *cash* in it is spam, so the filter identifies the probability of an e-mail with the word *cash* being spam based on the other content in the e-mail.⁴

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4. Webopedia, “What Is Bayesian Filtering?” 2004, retrieved June 1, 2004, from http://www.webopedia.com/TERM/B/Bayesian_filter.html.

The Ideal Spam Control

The current recommendations for spam control usually contain a combination of these approaches. A white list and blacklist can be used to filter mail and additionally Bayesian logic tools can be applied to search through mail that has already been filtered and placed in selected folders. Those who do not mind imposing an opt-in on people sending them mail, and who want total spam prevention might consider a tool like ChoiceMail (<http://www.choicemail.com>) or Qurb (<http://www.qurb.com>) that offer 100-percent spam protection to most users.

More detailed coverage of spam technology is available in the AICPA publication, *A CPA's Guide to Understanding and Controlling Spam* (Product Number 091015).

With spam on the thoughts and minds of nearly every e-mail user, information on the Internet is constantly updated, and a quick search of spam on Google (<http://www.google.com>) generates many sites for more information. The following table gives just a few for consideration.

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
Fight Spam on the Internet	Spam.abuse.net	This clearinghouse of information is related to preventing or controlling spam.
Controlling the Assault of Non-Solicited Pornography and Marketing Act (CAN-SPAM) of 2003	www.Spamlaws.com/federal/108s877.html	Text of the most current antispam legislation appears here.
Spam Filter Review	www.Spamfilterreview.com/Spam-statistics.html	A survey of spam statistics is given here.
<i>SMTP AUTH Relay Attacks</i>	www.vamsoft.com/orf/authattack.asp	This article by Vamsoft Ltd. discusses how to handle SMTP authentication relay attacks.
<i>Getting Rid of Spam</i>	www.Webopedia.com/DidYouKnow/Internet/2002/GettingRidofSpam.asp	This is a white paper from Webopedia on spam.
The SPAMHAUS Project	www.Spamhaus.org/index.lasso	Spamhaus tracks the Internet's spammers, spam gangs, and spam services, provides dependable real-time antispam protection for

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
Federal Trade Commission's (FTC) Spam Homepage	www.ftc.gov/bcp/conline/edcams/spam/index.html	Internet networks, and works with law enforcement to identify and pursue spammers worldwide. This provides tips, tools, and how to file a complaint against spammers.
Internet Education Foundation Spam Tips	spam.getnetwise.org/	Here are more tips and tools for managing spam.

3—Digital Optimization

Also known as “The Paperless Office,” the process of capturing and managing documents electronically, i.e., portable document format (PDF) and other formats

If you are feeling discouraged about your ability to go paperless, you can take comfort from the fact that you are not alone. Frank Romano, professor emeritus of digital publishing at Rochester Institute of Technology, (<http://www.rit.edu>) estimated that the number of printed documents would actually increase by about 20 trillion each year between 2000 and 2005. “No matter how they are created, 70 percent to 80 percent of all documents are eventually printed out at least once, in whole or part.”⁵

Scanning a paper document into an electronic format can easily be defined as paperless, but when you are working with hundreds of documents and the organization of those documents, you have a number of choices. These choices range from a collection of digital images that are organized manually, using layers of folders in a defined system, to sophisticated databases that store these documents in a database and have complex indexing systems. Paperless office systems also require and often include the actual hardware used for scanning the paper documents into electronic format. The most important elements to consider when going paperless are the conversion of paper to digital files, the storage of digital files, and the filing or indexing systems for these stored files.

5. Samuel Greengard, “The Paperless Office,” *iQ Magazine*, Cisco Systems, Inc., First Quarter 2004, http://business.cisco.com/prod/tree.taf%3Fasset_id=106661&MagID=106627&public_view=true&kbns=1.html.

Conversion of Paper Files to Digital Records

Scanning is the most prevalent method of converting paper records. Scanning hardware ranges from a \$50 scanner that transfers a paper document into digital format to more sophisticated copier systems that can scan hundreds of pages a minute. Just as printers are rated by image clarity and speed, so are scanners. A scanner that can read two sides of a page would be much more valuable to a firm that is handling hundreds of two-sided pieces of paper, than to a firm that occasionally scans a few documents. In addition, the format of the paper that needs to be scanned should be considered. For example, a receipt is better scanned on a flatbed scanner than on a sophisticated feeder where a small scrap of paper can be easily mangled or lost. For some offices, having both a high-speed scanner and a slower flatbed scanner is required. In addition to hardware decisions related to file scanning, business rules need to be developed to determine what should and should not be converted. Finally, decisions need to be made regarding what is the most appropriate format in which to store these digital files.

You can also skip the step of scanning paper faxes into digital files if you purchase software to receive faxes electronically. There are many popular software programs and online services that allow you to accept e-faxes.

File Formats

Files can be converted to a number of digital formats, from simple optical character recognition (OCR) formats to Word documents, which allows for the electronic editing of files after they are converted. However, in most cases, the original character of the documents will want to be retained after conversion. PDF is one of the most popular formats in which a scanned document can be stored. PDFs in effect “print” the document to an electronic file. *PDF* has come to be a fairly generic term, although it was invented by and continues to be a trademark of Adobe® Systems. To view a file in PDF format, you will need the Adobe Reader, a free application distributed by Adobe. However, to create a PDF file, numerous applications can be purchased at many different price points, and with many different features, to assist you in your efforts.

File Management

The less sophisticated and often cheaper paperless office solutions help organize individual files. These files are either captured images or captured text that is stored in a digitally readable format. You can think of multiple digital files as being similar to pictures taken and stored, with each picture on one file. These files can then be stored and organized just as you would file papers in a defined folder system. Some of the paperless office solutions that address individual files have built-in filing systems, while others depend on the user to provide definitions. One implication of the cheaper solution is that the organization of these files and folders is very dependent on the people who understand and defined the system. Electronic files that need to be put in certain folders can be misfiled, just as can paper files.

The beauty of database storage options is that the files are both better protected from data corruption and extremely easy to retrieve. By the nature of their structure, databases are indexed, such that the more expensive the paperless office solution is, the more sophisticated the indexing options tend to be. Database systems embed the data into a structured database format that is indexed. Indexing supports the wide variety of choices that humans tend to think of when wanting to look for a specific document. Indexing, when initialized, can scan all words within a document and then key off of specific terms within the document itself. A sophisticated database system needs little, if any, human decision or process. The process is defined by the software that is installed. As such, human error is eliminated.

Getting Started

Although best practices for paperless office solutions could be a chapter in a book all by itself, it is important to remember that, ideally, today's paperless office is really a "less-paper" solution. Paper still plays an important psychological, aesthetic, and legal function in today's business world and the costs versus benefit of converting all paper files to digital files needs to be weighed when deciding to go paperless.

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
<i>Moving to Paperless</i>	www.itpna.com/Vision/2002/20020930%20Moving%20to%20Paperless.htm	Article written by Tom C. Davis, CPA
<i>Paperless Audit Opportunities</i>	www.itpna.com/Vision/2002/20020416%20Paperless%20Audit%20Opportunities.htm	Article written by Roman H. Kepczyk, CPA, CITP and Tom C. Davis, CPA
<i>Information Management in the CPA Firm</i>	www.tcdcpa.com	Article written by John Stein and Tom C. Davis
Capterra	www.capterra.com/professional-services-automation-software	A virtual clearinghouse that offers a variety of resources for professional services automation (PSA) software, including articles, research, and vendor links
<i>10 Steps to Choosing the Right PSA Software</i>	www.cio.com/archive/031502/roboboss_sidebar1.html	<i>CIO Magazine</i> article that discusses professional services automation software
<i>Best Practices: What's in Store at Office Depot</i>	business.cisco.com/prod/tree.taf%3Fasset_id=83316&public_view=true&kbns=1.html	A case study by Cisco Systems on how one of America's largest online retailers converted its travel and expense reporting to a paperless system
<i>Low-Cost Document Management: When "Lite" is Right</i>	www.transformmag.com/showArticle.jhtml?articleID=22101082	Article in <i>Transform Magazine</i> that discusses several collaborative products that also handle document management

4—Database and Application Integration

The ability to update one field and have it automatically synchronize between multiple databases (An example would be the transfer of data between disparate systems.)

Every software application that collects data has a system for storing that data, and the most common storage structure is a database. A *database* is a collection of data that traditionally is organized by “fields, records, and files. A field is a single piece of information; a record is one complete set of fields; and a file is a collection of records. For example, a telephone book is analogous

to a file. It contains a list of records, each of which consists of three fields, namely, name, address, and telephone number.”⁶

There are a number of firms that have two, three, four, or more applications that are collecting similar data. The most common redundant data are contact information. Applications include tax preparation, accounting, practice management, and contact relationship management software. There continues to be a “pain point” for firms who have to update multiple instances of contact information manually. The same holds true for organizations that need to integrate various applications. In-house applications are developed in the context of different technologies and/or business needs, off-the-shelf applications from different vendors, supply chain management applications, and e-commerce applications, that all have to work together. As more and more software programs are written using the same tools, and more and more data are stored in similar database structures, the synchronization between databases and applications becomes easier.

A central database is not necessarily needed. Rather, the single updating of data that are then distributed to the appropriate redundant locations makes more sense. To prepare for a time when your organization integrates a tool to synchronize data, you must logically define or simply decide which system is the current and most accurate place for contact information. Usually, both the most current and the most accurate database is stored within the software that is used most frequently. As users work on a system, they update contact information. As a result, it becomes an impossible task for computer software to interpret which address is correct when faced with multiple choices, *unless* that program can cross-reference to an original source, such as a Web-based repository of data.

This is not a new problem, and although it is still faced in a number of industries, the big software vendors have solutions. In one example of how it works, a business can access and integrate relational data in DB2 Universal Database (IBM) and Oracle, images in Doc-

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6. Webopedia, definition of a *database*, 2004, retrieved June 7, 2004, from <http://www.webopedia.com/TERM/d/database.html>.

umentum, e-mail in Lotus Notes, spreadsheets in Microsoft Excel, and Web Services generated by WebSphere Application Server, in one query. The resulting data are presented in a consolidated view. Why is this so important? It saves the IT staff time. IBM said in-house testing shows that DB2 Information Integrator can slash the requirements for hand-coding programs by as much as 65 percent, the point being that time is money. DB2 Information Integrator software is tailored to help users integrate information in multiple locations as if it were stored in one location. It is platform-agnostic, allowing business to manage data, text, images, photos, video, and audio files that sit in a variety of databases. Products like this one are indicative of the push for integration software by enterprises looking to assimilate disparate software products into one central system.⁷

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
<i>Business Integration Journal</i>	www.bijonline.com	Magazine devoted to application integration issues, trends and opportunities
Gartner Group	www.gartner.com	Search for “application integration and middleware” to find free content, market predictions and studies available for purchase on application integration
Bitpipe IT Research	www.bitpipe.com	Search for “Application Integration” in the search field (Note that most of the free content was developed by vendors.)
Computer Sciences Corporation	www.csc.com/solutions/enterprise-applicationintegration	Site devoted to application integration with case studies, white papers and more
Microsoft	www.microsoft.com	A keyword search for <i>application integration</i> generates many articles and resources

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 7. C. Boulton, “IBM to Roll Out Database Integration Software,” 2003, retrieved June 7, 2004, from <http://www.itmanagement.earthweb.com/datbus/article.php/2207801>.

5—Wireless Technologies

The transfer of voice or data from one machine to another via the airwaves and without physical connectivity

Perhaps the best way to grasp how wireless technology for computer networking is developing is to look back at the evolution of cellular phone service.

Prior to the availability and affordability of cellular phone service, someone who was away from the office had to find a public pay phone in order to make a local call. Cell phones freed individuals from such constraints. As cell phones became the tool of choice for making local calls, pay phones began to vanish. At the same time, the larger telecommunications companies began erecting cell phone towers and developing the other infrastructure needed to make long-distance cellular phone service possible.

Wireless local area networks (WLANs), also referred to as WiFi, or 802.11, are developing in much the same way as local cell phone service. Such networks provide wireless connections to other computers or the Internet, as long as the user is within about 150 feet or of a base station. That radius from the base station is known as a *hot spot*.

Although the flexibility and convenience of WiFi are attractive factors, the low equipment costs also are boosting the popularity of such networks. The cost for installing such a network is typically several hundred dollars or less.

In-Stat/MDR, a high-tech market research firm based in Scottsdale, AZ, projected that shipments of WiFi equipment to businesses increased by 65 percent during 2002.⁸ Jupiter Research, an international research advisory organization specializing in business and technology market research based in Darien, CT, reported that 57 percent of U.S. companies already support WiFi networks, and that an additional 22 percent are planning to implement such networks during the next year.⁹

8. <http://www.80216news.com/publications/page207-456000.asp>.

9. <http://ofdmnews.com/publications/page207-473384.asp>.

Jupiter also reported that small businesses—those with less than \$10 million in annual revenues—are gravitating to WiFi networks at a much faster pace than larger organizations. For smaller businesses, the limited range of a WiFi network is not a great issue, and the low cost and conveniences of installing such a network are quite attractive.

For larger businesses, security is a major concern. In the Jupiter survey, 31 percent of the executives surveyed cited security concerns as the primary reason for not implementing WiFi networks. They feared that such networks can be accessed too easily by someone outside of the corporation. Seventy percent of the executives surveyed say that a combination of proprietary measures and newer standards will be needed to make such networks more secure.

As with cellular phone service, the popularity of local networks will likely promote the development of national wireless networks. Those networks will likely feature third-generation (3G) wireless standards that will link local wireless networks through fixed line networks and infrastructure specifically designed for wireless, high-speed multimedia transmissions. (See the section entitled “Emerging Technologies.”)

Infrared

Infrared is the simplest form of wireless transmission. An infrared enabled device translates digital information into lightwaves and sends these lightwaves to an infrared enabled receptor. The receiving device converts the electronic signals back into their original digital pattern. Infrared is used for short range (up to 20 feet) and through-the-air data transmission. It does not interfere with radio frequency or other signals and is a very secure form of transmission. Its drawbacks are that it has a very short range and does not pass through solid objects. Infrared capability is found in many PDAs, notebook computers, printers, and cell phones.

Bluetooth

Bluetooth is an open platform wireless technology that can be implemented into products as diverse as automobiles and medical

devices, and are available on a worldwide basis. There are more than 1,000 different Bluetooth products on the market. Bluetooth technology is commonly used for either appliances with small amounts of electronic data storage space, such as a printer or in instances in which power consumption and range are controlled. Bluetooth wireless technology uses radio waves and operates on an unlicensed radio spectrum, and in its most common implementations, has a range of 30 feet (10 meters); is low-power consuming; is designed for battery-operated mobile devices; and provides voice, data, and audio connections between devices. Bluetooth is promoting its products as the foundation for users' "Personal Area Network." Bluetooth technology is often found in computer, telephone, and entertainment equipment.

WI-FI®

Wireless Fidelity (Wi-Fi) is based on the 802.11 Institute of Electrical and Electronics Engineers (IEEE) specifications for WLAN technology. 802.11 specifies an over-the-air interface between a wireless client and a base station or between two wireless clients. The IEEE accepted the specification in 1997.”¹⁰

802.11 is available in several standards, each with its own strength and weaknesses:

- *802.11a* is a standard for WLANs operating in the 5-GHz frequency range with a maximum data rate of 54 Mbps.
- *802.11b* is a standard for WLANs operating in the 2.4-GHz spectrum with a bandwidth of 11 Mbps. It is the standard that is most commonly used for WiFi. Typically, a land-line Internet access (DSL or faster) is connected to a WiFi transmitter that enables any device equipped with a WiFi transceiver to send and receive data at broadband speeds. The working distance for most WiFi devices is 300 feet. Beyond 300 feet, the throughput of the connection speed decreases.

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10. Webopedia, definition of *802.11 specifications*, retrieved June 7, 2004, from <http://www.webopedia.com>.

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- *802.11g* is a standard for WLANs operating in the same frequency as 802.11b (2.4-GHz frequency) but with a greater bandwidth, moving data at a rate of up to 54 Mbps.

Wireless Wide Area Networks

The final category, wireless wide area networks (WWANs), uses cellular phone technology to enable users to connect to the Internet to surf the Web, connect to host networks, and send/receive e-mail. Many new and exciting developments are occurring with WWAN technology, but keeping track of them can be downright confusing. An abundance of options are available depending on the cellular provider and the progress the provider has made with rolling out its chosen technology. Choices include:

- Second-generation (2G), i.e., 800 Mhz or 1900 Mhz, includes analog and digital networks, as follows:
 - CDMA (Code-Division Multiple Access)
 - TDMA (Time-Division Multiple Access)
 - CDPD (Cellular Digital Packet Data)
 - GSM (Global system for mobile communications)
- 2.5G
 - GPRS (General Packet Radio Service)
 - 1xRTT (Radio Transmission Technology)
- 3G (2mbs+)
 - EDGE (Enhanced Data rates for Global Evolution)
 - WCDMA (Wideband Code-Division Multiple Access)
 - CDMA 2000 1x→CDMA 1xEV-DO→CDMA 1xEV-DV
 - UMTS (Universal Mobile Telecommunications System)

Today, most vendors are signing up customers for one of their 2.5G or 3G data network plans. These plans vary in price and coverage, but most are now offering some type of fixed price for unlimited connection time. To connect to one of these high-speed data networks, a user needs to purchase a special card to plug into a laptop or PDA expansion slot. These cards are programmed to dial the

vendor's high-speed network when activated. See the section entitled "Emerging Technologies" for more about 3G Wireless.

Ultra Wideband

Ultra wideband (UWB) is an emerging wireless technology. UWB devices can be used for precise measurement of distances or locations and for obtaining the images of objects buried underground or behind surfaces. UWB devices also can be used for wireless communications, particularly for short-range high-speed data transmissions suitable for broadband access to the Internet. UWB radio systems typically employ pulse modulation, whereby extremely narrow pulses are modulated and emitted to convey or receive information. The emission bandwidths generally exceed one gigahertz."¹¹ The benefit of UWB is that it transmits data by emitting pulses over a spectrum of frequencies, rather than using a narrow band radio frequency. By dividing the signal across a range of frequencies, it appears only as an acceptable background noise to other radio frequencies. Today, UWB's only common application is for ground-penetrating radar (GPR). Wider use is expected once the IEEE agrees on common standards for UWB.

Conflicts With Other Radio Frequency Devices

When implementing a number of different types of wireless solutions in your home or office, it is necessary to consider the compatibility of these devices. For example, there are several cordless phones, particularly ones labeled "Long Range," that could interfere with WiFi (802.11a/b/g/i). Generally, interference can be in the form of signals on the same channel, adjacent channels or frequencies that can easily be divided by three and return a whole number (called third harmonics).

Items that can cause interference with WiFi include remote monitoring alarm systems, cordless phones (900 Mhz and above), mobile phones (CDMA and digital), other WiFi installations, wireless broad band transmitters, long-range pager stations and, in at least one instance, a satellite decoder card.

11. Ultra wideband working group, "About UWB," 2003, retrieved June 7, 2004, from <http://www.uwb.org/about/about.html>.

If you do have an interference problem and you cannot troubleshoot and resolve it yourself, there are monitoring programs available to track the source of the interference, such as AirMagnet (<http://www.airmagnet.com>). AirMagnet gives real-time displays of all traffic being received by the WiFi card, which must be a compatible card.

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
Bluetooth	www.bluetooth.com	This has been dubbed the "official Bluetooth Web site" and is supported by a number of worldwide vendors. Another site, www.bluetooth.org , is a companion site, which hosts the Bluetooth special interest group.
Intel	www.intel.com	Intel has white papers on deploying a Wireless LAN, as well as implementing security.
WiFi Alliance	www.wifialliance.org	WiFi compatible products are included, based on IEEE 802.11 specification.
Wireless Developer Network	www.wirelessdevnet.com	News and technical publications for wireless developers are included.
Cellular Telecommunications & Internet Association	www.wow-com.com	This is the international association for the wireless telecommunications industry.
Infrared Data Association	http://irda.affiniscape.com	This nonprofit organization develops globally accepted specifications for infrared wireless communication.
Institute of Electrical and Electronics Engineers, Inc.	www.ieee.org	Information is included on standards for the wireless industry.

6—Disaster Recovery

The development, monitoring, and updating of the process by which organizations plan for the continuity of their business in the event of a loss of business information resources due to theft, weather damage, accidents, or malicious destruction

Do you have a plan? Have you discussed how things should be handled with your management team? Have you written down your expectations, to which people can refer if you are not present? Is this plan easy to find with a duplicate in the company safe?

Look around your office. What devices, technologies, and data can you just not be without for an extended period of time? Now, determine what means you need to build in a reasonably priced redundant solution. Do not forget to plan on technologies and processes that ensure your data will be stored offsite as well. If your backups are in the building that is burning down, that's not going to help.

Disaster recovery (DR) is not only concerned with a problem in the IT infrastructure, but also covers the events associated with all disasters and how they can affect a business. It is often synergistic with continuity planning. Best practices for business disaster recovery are quite detailed and a wealth of information exists, but to give you a small summary, here are just a few items that would be considered during the DR planning process:

- The planning process (This covers the “how to” of creating a good DR plan.)
- Preliminary cost/benefit analysis (What is the cost to the firm?)
- Alternative methods of continuation of critical business functions (This includes outside-the-box thinking and solutions if things go wrong.)
- The necessary components of a business continuity plan (This means what not to miss.)
- Gaining plan support and approval (Get management buy-in and commitment.)

- Writing the plan
- Testing the plan
- Long-term maintenance of the plan procedures and documentation
- Staff awareness training
- Public relations and crisis communication procedures
- Coordinating and communicating with public authorities

If you do not have a plan and have not identified technologies and people key to keeping your organization going forward after a disaster, you are putting your firm or business at a serious risk for failure. Give yourself peace of mind by planning now while you have time, instead of trying to pick up the pieces afterwards.

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
CPA2Biz	www.cpa2biz.com/recovery	This site has a resource center dealing with business continuity issues important to accountants.
DR Planning.Org	www.drplanning.org	This is a vendor-neutral information clearinghouse for all things pertaining to disaster recovery and business continuity planning.
Disaster Recovery Institute International	www.drii.org	This provides education on business continuity, as well as certification for individuals interested in a career in disaster recovery.
Rothstein Associates, Inc.	www.rothstein.com	A comprehensive Web site and a forum dealing with disaster recovery planning.
Tennessee Bar Association	www.tba.org/tnbarms/disaster.html	This site lists a sample of disaster recovery steps that can be incorporated into an organization's business continuation plans.

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
"Twenty Seconds Into The Future"	www.tsif.com	Dr. Bob Spencer provides a sample disaster recovery plan on his Web site.
California Society of CPAs	www.calcpa.org/MAP/disaster.pdf	This Web site contains sample disaster plans.
California Society of CPAs	www.calcpa.org/californiacpa/newstrends/2003/11.29.html	This Web site contains a list of disaster recovery resources.
NPOWER	www.npower.org/cpr_guide+final.pdf	This includes the "Nonprofit Guide to Business Recovery Continuity and Disaster Recovery CPR—Communications, Protection, Readiness," an excellent guide with lost-cost methods.
FEMA	www.fema.gov/library/bizindex.shtm	This Web site includes an Emergency Management Guide For Business & Industry.
Disaster Recovery Journal	www.drj.com/special/smallbusiness/samples.html	This is the Business Continuity Resource Center for the SMB and has an excellent collection of sample plans in Word files.
Institute for Business and Home Safety	www.ibhs.org/business_protection/	The Small Business Administration (SBA) and Institute for Business and Home Safety (IBHS, an insurance industry trade group) have developed "Open for Business," a disaster recovery toolkit. A downloadable PDF with checklists and forms in the back is available from this Web page.

7—Data Mining

The methods by which a user can sift through volumes of data to find specific answers

Data mining is a broad term that has been used to describe a number of different data-gathering and analysis activities. Data mining can refer to activities as simple as manually "slicing" and

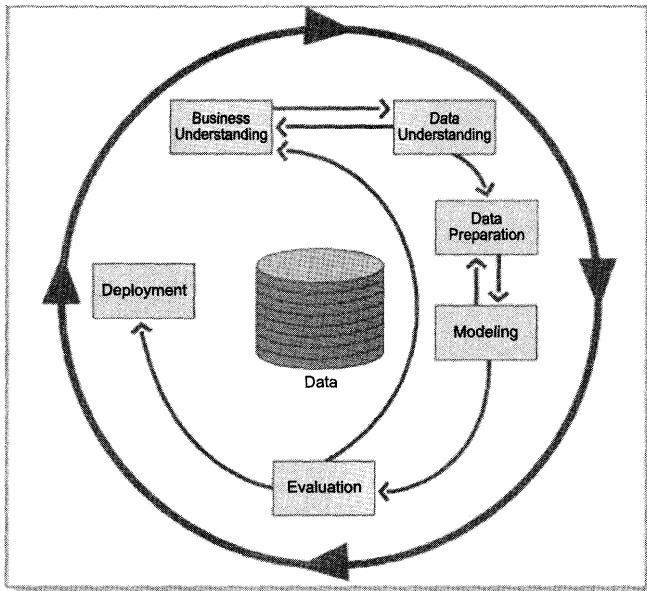
“dicing” spreadsheet data to uncover patterns and relationships in the data to analytical capability in CRM applications to activities as far ranging as the large-scale collection and aggregation of data from “loyalty card” programs or Web tools. Data mining is a growing field that is not only supported by technological tools but has given rise to special interest groups, journals, conferences, and certification programs.

In the late 1990s, some of the leaders in the nascent field of data mining formed a consortium to develop an industry-, application-, and tool-neutral standardized process model for data mining. This consortium received initial funding from the European Commission (EC) and also invited interested parties to join a special interest group. The standardized process, called Cross Industry Standard Process for Data Mining (CRISP-DM) was released in August 2000. According to this model, there are six phases to any data-mining process. Those six phases are:

- *Business understanding.* This defines the business purpose and project objectives.
- *Data understanding.* This is the process of reviewing existing data to gain an understanding of the data available and identify any problems that may exist with the existing data.
- *Data preparation.* Actions are performed on the raw data to prepare the final data used for modeling (dataset).
- *Modeling.* Various common modeling techniques are selected and applied to the dataset. These preliminary results are calibrated to determine the optimal model to produce final data.
- *Evaluation.* This is the review of the steps involved in the developing the model and to make sure that the data it produces is suitable for analysis and to make sure that it meets the business objectives of the project.
- *Deployment.* Depending upon the complexity of the business objectives, deployment of the model can be as simple as the issuance of a report or as involved as implementing a repeatable data-mining process across an enterprise. If the

users will be carrying out the implementation of the models, they need to be properly educated on the implementation of the model as well as understanding the output of the model.

Illustration of the CRISP-DM Process Model¹²



For more detailed information about this process, you should refer to CRISP-DM v1.0.

As data mining, particularly by third parties, has become more prevalent, the issue of privacy has become a greater concern among consumers and Web users.

Currently, no legislation has been proposed to curtail data mining solely for commercial purposes, but legislation has been proposed to help control this type of data mining by government agencies. The “Data-Mining Reporting Act of 2003,” introduced

12. CRISP-DM Consortium, *CRISP-DM v1.0 Step-by-Step Data Mining Guide*, United States, Denmark, and Germany, 2000, page 13.

into the Senate by Senator Russell Feingold in July 2003, would require the head of each federal department or agency that is engaged in any activity to use or develop data-mining technology to report annually to Congress on all such activities. An identical bill was introduced into the House of Representatives in May 2004 as the “Data-Mining Reporting Act of 2004.”

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
CRISP-DM	www.crisp-dm.org/	This is the Cross Industry Standard Process for Data Mining Web site.
SPSS	www.spss.com	This developer of statistical software’s Web site includes a step-by-step guide to data mining based upon CRISP-DM v.1.0.
The Orator	www.theorator.com/bills/108/s1544.html	This includes the text of the Data-Mining Reporting Act of 2003.
Legislative Information on the Internet	http://thomas.loc.gov	This includes the text and status report on the Data-Mining Reporting Act of 2003.
About.com	http://databases.about.com/od/datamining/	This Web site lists good references, including “Data Mining: An Introduction,” a basic article that serves as a good introduction to the topic.
<i>ComputerWorld</i>	www.computerworld.databases/topics/business.com/intelligence/datamining/resourcepage/0,5242,,00.html	This includes a page devoted to data mining, which includes vendor-sponsored white papers. It is a good resource for identifying vendors of products that support data-mining applications.

8—The Virtual Office

The technologies, processes, and procedures that allow personnel to work effectively, either individually or with others, regardless of physical location

The virtual office is about being able to work *outside* of your fixed office and be as productive, efficient, available, and communicative as you are in the office. Setting realistic expectations and enabling high levels of communication make a significant difference; however, personal responsibility, ethics, and style also play a role. The virtual office addresses workers' need for a good work/life balance by allowing work to get done on different schedules. It also helps to reduce commuting time and office space overhead. A virtual office arrangement can range from allowing employees to telecommute part of the time to the deployment of technologies that allow an entire company to be formed with no central office. The successful deployment of a virtual office is dependent upon proper analysis of the enterprise's business needs as well as the technological solutions required to support business applications virtually.

Before implementing a virtual office arrangement, an enterprise should research issues related to the virtual office and consider the pros and cons of establishing a virtual office. Some items to research and analyze are:

- *Business objectives.* Will a virtual office allow us to continue to meet our client or customer needs? Will it improve our ability to meet our client or customer needs? Will it help or hinder our ability to attract and retain clients or customers?
- *Communication styles.* Does our work style rely on impromptu communication and face-to-face interaction? Are our current communications methods adequate and can they be transported in a virtual environment?
- *Facilities costs.* Would virtual office arrangements decrease or increase our facilities costs?

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- *Management style.* Is our management style easily adaptable to a virtual environment? Can we adopt a new management style that will be more suitable for a virtual work force?
 - *Commutation and relocation costs.* Would a virtual office save the company money spent on reimbursing or subsidizing employee relocation costs? Would reducing commutation costs or eliminating the need for relocation prove to be an attractive benefit that would help retain or attract high-caliber employees?
 - *Employee base.* Are our employees capable of self-management? Do they have a preference for a virtual office, or do they prefer face-to-face interaction? What policies and procedures do we need to put in place to avoid employee abuse of the virtual work environment?
 - *Technology.* What tools and solutions do we need to support a virtual office? What are the costs involved in purchasing and maintaining the infrastructure and applications necessary to support a virtual office? Are our employees sufficiently technologically savvy to operate in a virtual environment? How will we provide tech support in a virtual work environment? Have we thoroughly considered and addressed the security issues involved in maintaining a virtual workplace?
 - *Equipment Costs.* What are the equipment costs involved in establishing and maintaining a virtual office? What type of equipment is most cost effective?
 - *Risk management issues.* Have we thoroughly researched the legal, financial, and insurance issues involved in establishing a virtual office? Have we researched and taken steps to minimize any liabilities arising from maintaining a virtual workplace? Have we developed and documented policies and procedures that would minimize risk in a virtual environment? Have we educated our employees about these policies and procedures?

Once you have completed your research and analysis of the virtual office, you need to weigh the pros and cons of becoming a

virtual workplace. If the pros outweigh the cons, and the decision is made to make the transition to a virtual environment, you must to develop a written plan. A written plan is important because it can be used to educate management and obtain management buy-in for the plan, and then subsequently to educate all employees about what will be expected of them in a virtual work environment. You should also send this written plan to your legal counsel to ensure that it is compliant with all employment, commerce, and tax laws.

Once you have developed and finalized your plan, you should research the various technology solutions that will support the virtual office. In order to select the appropriate solutions, you should consider ease of use, scalability, adaptability, and maintainability as well as cost. The types of solutions and vendors of these solutions are too numerous to list here, so please see “More Information” for virtual office solutions resources.

Now that you have a plan in place, policies, and procedures have been developed, and solutions have been purchased, you are ready to implement the virtual office. Expect some major “tweaking” to your arrangements, once the plan has been implemented. If your virtual office implementation is going to be really significant, you may even want to do a pilot first before the rollout to the entire organization. The virtual office plan should be reviewed on a regular basis, at least annually, to ensure that it remains compatible with your organization’s business needs as well as the state of technology.

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
How Stuff Works	http://money.howstuffworks.com/virtual-office.htm	This site provides a good overview of the virtual office for sole proprietors or small companies.
Object Services and Consulting Inc.	www.objs.com/survey/vo.htm	This technology solutions company shares the knowledge it has gained as a virtual enterprise.

(continued)

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
Citrix	www.citrix.com	This site provides solutions for enabling remote connectivity over dial-up or Internet access.
GoToMyPC	www.gotomypc.com	A solution that allows individuals to safely and securely connect from one computer to a specific computer in another location.
LapLink Gold	www.laplink.com	The developer of connectivity software has a number of different solutions for PCs and PDAs.
Microsoft	www.microsoft.com	In addition to providing a number of different popular solutions and tools for the virtual office, such as Sharepoint, this site offers a guide to the virtual office and working remotely.
pcAnywhere	www.symantec.com/ pcanywhere	This is another popular application that provides remote access to a home or business PC.
Webex	www.webex.com	This is a provider of Web-based conferencing solutions.
ProjectPlace	www.projectplace.com	This is a provider of on-line project management solutions.
Ring Central	www.ringcentral.com	This offers a number of communications solutions for a virtual enterprise.
Groove Networks	www.groove.net/home/	This offers a solution called <i>virtual office</i> which provides file sharing, collaborative tools, instant messaging, and other features in one integrated application.
CNet Downloads	www.download.com	This offers free demos and trials of a number of popular remote access applications and tools to support communications and collaboration.

9—Business Exchange Technology

The natural evolution from electronic data interchange (EDI) to greater business transaction and data exchange, via the Internet, using datasets that are transported easily between programs and databases, e.g., eXtensible Business Reporting Language (XBRL)

What's involved in the evolutionary chain? What types of improvements in data exchange have occurred? What evolutions have not been successful? Which ones are here to stay, and which ones have created the most progress for the industry? How do eXtensible Markup Language (XML) and XBRL figure into the changing environment of business exchange technology (BET)?

In the past, companies relied on standard data format methods to manage their data exchange. Old-fashioned EDI usually required custom applications and direct business-to-business systems interfaces. XML and XBRL use Internet protocols and an open structure to allow companies to make information available to a multitude of users and systems without compatibility concerns. With these processes, EDI has certainly found its niche on the Web.

XML

Currently, there is XML. Previously, hyper-text markup language (HTML), dynamic HTML, and other computing languages had begun the slow migration toward Internet-based information exchange. Nevertheless, these languages were generic in application, and often were not compatible with many software packages. HTML allowed for the creation of Web sites, but lacked the flexibility needed to interface with business software applications. What the business world needed was a standardized language dataset that spoke *directly* to the needs of business software and reporting. Enter XML.

XML was developed by a working group of the World Wide Web Consortium (W3C) in 1996. XML has been one of the most significant enabling technologies behind the migration to the Web. This standardized, flexible text format is derived from Standard Generalized Markup Language (SGML), as is HTML and is designed for interoperability. In other words, it is effective for reaching across multiple computer platforms. XML does what HTML couldn't by allowing different computer programs and software packages to share and process data.

One of the most important features of XML is that data can define a document separate from its formatting, making the docu-

ment reusable in other applications. Also useful is the ability to print out a document from the Web browser software, including transactions that otherwise cannot be handled electronically.

XML is far from perfect; in fact, it has a large cost factor associated with its development and implementation. For example, converting tables to XML is a cumbersome process. Older software cannot read it and it chews up a lot of bandwidth. In addition, XML is not appropriate for every scenario.

Still, XML does offer certain advantages. It's easy to read, and it's flexible. It can be used to define other languages, and does have the appealing ability to separate its process from the content. Although the cost of initial implementation is large, XML systems offer a cost savings over time. Since businesses have widely adopted XML standards, XML's impact on business exchange technology will be long lasting.

XBRL

XBRL takes XML's capabilities and applies them to financial- and nonfinancial-based information, making it extremely useful for the accounting profession and the clients, employers, and customers it serves. In short, what XBRL does best is bring speed and consistency to the task of business reporting while still allowing flexibility to preparers to make company-specific disclosures as necessary. Because XBRL is a *specific* language, standard developers believe its use of XML as a base will give it credibility and make for an easier adoption of XBRL standards.

The continuing development and support of XBRL as a standard is one of the most important and beneficial trends for CPAs and others entrusted with compiling, interpreting, and communicating financial information. AICPA is working extensively with XBRL International¹³ to develop and perpetuate this standard throughout the accounting community and the business marketplace.

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13. XBRL International is a not-for-profit consortium of approximately 250 companies and agencies worldwide working together to build the XBRL language and promote and support its adoption.

To date, an estimated 250 XBRL Consortium member organizations are working toward developing a standard XBRL platform, which will allow for greater ease in business reporting.

Why another language dataset? What XML is to business in general, XBRL is to the finance industry. XBRL is a drilled-down version of XML, a subset of a successful language set. Supporters of the XBRL standards claim it will allow the financial industry at large to prepare, publish, exchange, and analyze financial reports with greater flexibility. Yet, is XBRL an improvement over XML?

According to Al Anderson, CPA, senior vice president of Member and Public Interests for the AICPA, it definitely is. "XBRL helps the capital markets by leveraging the capabilities of the Internet to facilitate global exchange of financial information."

Like HTML or XML, XBRL uses tags to identify items. Unlike HTML, which uses a more generalized set of tags to identify data, XBRL tags are based on standardized accounting definitions, such as net revenue, and can be recognized by vastly different computer networks, operating systems, and software.

The benefits of such a standard are immense. Because XBRL can be recognized across various platforms and applications, the need to print out reports and then rekey information into one unified document is eliminated. That represents an immense time savings for CPAs and others entrusted with compiling financial information. The XBRL standard requires consistency, thereby decreasing the chances for errors or ambiguity.

There is a range of benefits to be realized from being able to compile, transmit, and receive financial information with greater speed, accuracy, and consistency. Company executives will be better equipped to make sound business decisions because crucial financial information is more readily available.

Financial services companies, such as banks or brokerage firms, will be able to use XBRL to reduce the processing time and costs associated with recording transactions and maintaining accurate account information.

XBRL can also play a key role in restoring trust toward corporations and the accounting profession. With XBRL, investment analysts, stockholders, and government regulators can have greater access to crucial financial information used to judge the performance of publicly held companies.

In March 2002, Microsoft® Corporation began publishing its financial reports in XBRL. Microsoft has also incorporated XBRL functions into its Business Solutions, Navision, and Financial Reporter applications. It also offers an XBRL prototype tool for Microsoft Office, which would allow users to convert documents from Excel or Word to XBRL. Several large software developers also are adding XBRL functionality to their applications. Oracle E-Business Suite is offering XBRL capabilities in its Financial Statement Generator, and Creative Solutions is offering XBRL functionality in its Write Up and Trial Balance Solution applications. In addition, a number of companies that specialize in research and providing financial information on corporations are also supporting XBRL.

Financial statement distributor EDGAR Online now offers XBRL formatted financial information for 12,000 public companies and OneSource, a provider of information on companies from around the world, also has started delivering that information in XBRL. The company is offering reports in XBRL for over 25,000 Global Public Companies with five years of annual and quarterly data. These reports include balance sheets, income statements, statements of cash flows, and a ratio report.

In addition to private sector organizations, XBRL also is being established as the standard for various federal government functions. The new Call Report system from the Federal Deposit Insurance Corporation (FDIC) is now based entirely in XBRL. As a result, more than 10,000 U.S. banks are now submitting quarterly financial status and performance data in XBRL. Other federal agencies, including the Federal Reserve and Office of Thrift Supervision (OTS), are working with the FDIC to streamline data gathering. The Securities and Exchange Commission (SEC) announced in July 2004 that it is seeking public comments on alternative methods and the costs and benefits associ-

ated with XBRL-tagged data. The SEC also announced that it will consider an SEC staff proposal to accept voluntary supplemental filings of financial data using XBRL. This voluntary program would enable the SEC to further investigate the types of data tagging currently available in the marketplace. The SEC may propose a rule this fall that would, if adopted, establish the voluntary XBRL-tagged filing program beginning with the 2004 calendar year-end reporting season.

BET's Future

XML's widespread use, despite any pitfalls, does seem to assure that it will be a driving force for business exchange technology going forward. The fact that other standards are using XML as a foundation cements its place in the business transaction and data exchange environment. The W3C continues to work on refinements to XML and to other language sets that leverage off the principles of XML, such as XHTML. These new specifications will lead to continuous improvement in business exchange technologies.

Throughout the world, the various XBRL jurisdictions are meeting regularly and discussing ways the standard can be implemented within the financial reporting functions of both government and the private sector. As this standard gains further acceptance and use, more applications will also be developed to support XBRL. In time, XBRL will likely become as much a part of everyday vocabulary as Web site or e-mail.

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
World Wide Web Consortium	www.w3.org	XML specifications and information on other XML-based specifications in development
XBRL International	www.xbrl.org	Information on how XBRL works, the XBRL specification, news about the adoption of XBRL, and XBRL events
XBRL for Earnings Releases	www.xbrlforearningsreleases.com	A demonstration site developed by Ernst & Young, PR Newswire, Microsoft, Reuters, Bowne, and

(continued)

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
		SunTrust Banks to illustrate the lifecycle of an XBRL-enabled earnings release from creation to distribution to retrieval and use
Microsoft	www.microsoft.com/msft/earn.msp	Microsoft Earnings Releases, which are available in XBRL format.
Reuters	http://about.reuters.com/investors/results/archive/2003.asp	Reuters' Earnings Releases, which are available in XBRL format
EDGAR Online	www.edgar-online.com/xbrl	General information about XBRL, as well as information about XBRL-enabled products
Securities and Exchange Commission	www.sec.gov/news/press/2004-97.htm	The announcement of the SEC's initiative to invite public comment on XBRL-tagged financial data

10—Messaging Applications

Applications that permit users to communicate electronically, including e-mail, voicemail, and instant messaging

Today's messaging applications include phone systems, e-mail, instant messaging, voice mail, fax messaging, and unified messaging.

Phone Systems

Phone systems continue to improve as technology blurs the line between traditional telecommunications infrastructure and information technology infrastructure. In addition to traditional telecommunications, which is dependent upon information being carried primarily over wires, cellular technology has expanded phone service to areas without existing, wired-based infrastructure.

Voice data are now also transmitted over the Internet through Voice-over-IP (VoIP). VoIP uses session initiation protocol (SIP) which is an instant messaging technology to facilitate peer-to-peer telephone connections anywhere in the world. VoIP allows a user to make telephone calls from PC to PC, from PC to phone or from phone to PC. VoIP has existed for quite some time, but has only recently become popular due the proliferation of high-

speed Internet connections and new technology that has improved voice quality. VoIP is less costly and more flexible than traditional telephone service. There are still some reliability issues, so it is still recommended that a traditional phone line be kept as a backup.

One reason for VoIP's price advantage over traditional phone service is that VoIP companies are not currently recognized as telephone companies, and, therefore, are exempt from local taxes and regulations. Some states have introduced legislation which would lead to local regulation of these companies, but Congress is trying to pass legislation that would regulate VoIP only at the federal level. It is unclear whether legislation will be passed before the end of the legislative session and whether the final form of the legislation will prevent local authorities from imposing their own regulation and tax assessments on this nascent industry.

A phone system makes a first impression on customers and must strike a balance between efficiency, access, and communication. Careful consideration should be given to what mix of telephone technologies (traditional, cellular, and VoIP) will enable you to provide the most efficient and cost-effective level of communications while promoting positive customer relations.

E-Mail

Hundreds of conversations a day are possible because of the invention of e-mail. E-mail is the transmission of messages over communications networks. The messages can be notes entered from the keyboard or electronic files stored on disk. Some e-mail systems are confined to a single computer system or network, but others have gateways to other computer systems, enabling users to send electronic mail anywhere in the world. Companies that are fully computerized make extensive use of e-mail because it is fast, flexible, and reliable.¹⁴

14. Webopedia, "What Is E-mail," 2004, retrieved June 7, 2004, from http://www.webopedia.com/TERM/e/e_mail.html.

With e-mail, contacts can be followed up immediately, and the history of communications can be stored and its details outlined. E-mail is one of the greatest tools ever invented, but it can also be a huge source of inefficiency if staff are not trained on its proper use and administration. Adequate e-mail tools, such as spam filters and virus blockers, need to be combined with the proper internal guidelines on e-mail usage to maintain the benefits of e-mail.

Instant Messaging

Instant messaging (IM) is a software tool that allows users to instantly communicate with others in their predefined list of contacts. If someone uses the software to send a message to someone in their contact list, the message is instantly displayed on the receiving party's screen. An interruption occurs.

It has other uses as well. For example, IM is also a software package that can “instantly” indicate whether someone in this predefined contact list is logged on to their computer and online. IM supports real-time conversations and helps to reduce the need to leave multiple voice mails. Another key benefit to Corporate IM is global communication, which often can be a cultural and technological challenge. International telephone transmissions can be full of static and time zones can be extremely difficult to track. Accents can garble clarity, and frustration grows easily. IM between multinational offices really solves some major headaches.

For example, one company with three offices—one in the United Kingdom, one in Australia, and one in the United States—faced extreme communication challenges. Coordinating conversations was almost impossible, and at best, difficult. In addition to the time difference, technical people like to burn the midnight oil. This company installed IM between key people. Immediately, communication improved and their international problems were solved.

Perhaps you do not have global offices, but are concerned with the resolution of a problem between two different people or two different locations. There are additional benefits to using IM to resolve issues. By using IM as a tool for discussions, conversations can be saved to a file, which captures suggested links, references,

and referral sources mentioned. If, for example, you have a unique tax question and are interested in a quick answer, wouldn't it help to instantly get an answer from an associate? Or perhaps, if you need to check the inventory level of a product in the storeroom, a quick IM to the storeroom manager will give you the answer. You might prepare for situations that need immediate answers by setting up a small IM contact list of experts. IM an associate or expert, capture the answer, and then either print it out for your bulletin board, or put it into a personal knowledge base. IM can redefine business networking and support.

Worried about security? Secure corporate instant messaging is here. There are numerous corporate secure IM applications available, so whether you decide to use one of the free applications from AOL, Microsoft, Yahoo!, or ICQ, or whether you invest in secure instant messaging, the tool is a good one to consider.

Voice Mail

Basic voice mail and voice messaging systems offer one of the easiest methods of improving communications within an organization and with customers. Organizations can rely on these systems to help:

- *Improve communications.* Users will never miss an important message regardless of time or geographical location.
- *Improve message handling.* Users can set up rules for incoming messages and retrieve the most important messages first.
- *Reduce costs.* Organizations can implement automated voice messaging systems at a fraction of the cost of a live operator.
- *Increase convenience.* Users can access their messages from any phone, any time, anywhere.
- *Increase productivity.* Users can cut through long recorded menus using speech-enabled voice mail, with the most natural user interface—the human voice.¹⁵

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15. <http://www.intel.com/network/csp/solutions/messaging/8309web.htm>.

Fax Messaging

Fax messaging continues to be a successful solution for organizations seeking ways to improve communications and employee productivity.

Huge improvements have been made to give fax messaging new life. Computer-based fax lets users send and receive faxes from their PC where they can view, forward, and print the fax to the nearest printer. Fax messaging systems receive and store fax messages, letting users retrieve their fax messages in the location of their choice. Fax servers let companies distribute information to large audiences for just pennies a page, as well as eliminate the operational bottlenecks associated with a traditional fax machine's limited capacities.

Fax systems offer a cost-effective and convenient method of fax communication and can help prevent sensitive information from lying around a public area waiting for pickup or delivery. What's more, IP-based fax solutions let users send faxes over the Internet (known as Fax Over IP or FOIP), saving on toll charges and associated stand-alone hardware costs and extending the life of fax technology for years to come.¹⁶

Unified Messaging

Unified messaging refers to a service that combines voice, fax, and e-mail capabilities. This service provides a one-stop-shop for the end user, where the user can access all communication from a central point.

Some of the advanced features of unified messaging are as follows:

- *E-mail.* Users can listen and reply to all e-mail messages using any phone or can access email via the Web.
- *Message conversion.* The service automatically converts a message (text/voice/fax) to the preferred method of the receiver based on receiver preferences setup online.

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16. <http://www.intel.com/network/csp/solutions/messaging/8310web.htm>.

- *Voice-mail.* Users can listen to voice-mail and forward the same as a text or speech in an email.
- *Pager alerts.* Stock quotes, etc., are available here.

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
<i>Inc. Magazine</i>	www.inc.com/magazine/20031001/rcringely.html	Various updates on VoIP, including, "What's Next: Internet Phone Service is Here", by Robert Cringley, page 55, October 2003.
The Register	www.theregister.com/enterprise/networking/	Provides information about the state of the VoIP industry.
How Stuff Works	http://computer.howstuffworks.com/instant-messaging.htm	Provides an introduction and basic, how-to approach to using instant messaging.
Instant Messaging.com— "2003's Top Trends in IM"	www.instantmessagingplanet.com/enterprise/article.php/3294081	Provides a survey of what occurred with respect to instant messaging, and also tackled the security issue associated with IM.
ZDNet	http://itpapers.zdnet.com/abstract.aspx?docid=71462&tag=tu.scblog.6673 http://itpapers.zdnet.com/abstract.aspx?docid=76967&tag=tu.scblog.6673 http://itpapers.zdnet.com/abstract.aspx?docid=55855&tag=tu.scblog.6673	Contains a number of resources for messaging technologies, including white papers entitled "Sun ONE Instant Messaging 6.1: Real-time Collaboration for the Extended Enterprise;" "IM Guardian: Real-Time Security for the Real-Time Enterprise;" and "Security: The Business Value of Blocking Unwanted Content."

Emerging Technologies

1—Identification and Authentication

Verifying either the identity of a user who is logging onto a computer system or the integrity of a transmitted message

A problem facing the network owner is how to securely provide access for mobile and remote workers to rich data over the Internet. In this context, *rich data* means a high level of network connectivity or functionally similar to that experienced by a PC on

the corporate network. The remote worker may need to use a number of internal resources and a variety of protocols, such as the ability to map a network drive, establish a terminal emulation session with a mainframe, print documents on networked printers, and upload a file to an file transfer protocol (ftp) server. These are functions easily accomplished, even simultaneously, by a PC on the office network, but can be challenging to provide to remote Internet users in a secure manner.

Traditional identification (ID) and authentication methods have focused on “clearing” the user account that is attempting to log in by means of a user ID and a password. In high-security environments, a simple doctrine known as *something you have + something you know* is implemented through Digital Certificates, Smartcards, or biometric devices, including fingerprint and eye-scanners, in conjunction with a password or personal identification number (PIN). These measures attempt to compare the presumed identity of the user against a list of users authorized access, and the successful outcome of the comparison process is authentication of the user.

Broad selections of advanced, proven technologies are available in the IT industry when building user authentication solutions, even for the most challenging deployment and operational scenarios. Since most of these solutions rely solely on user identification, remote devices, with all the authorized and unauthorized software installed on it, are admitted onto the private corporate network alongside the authenticated user. As a result, uninvited stowaways, including electronic pathogens and hostile applications, can seriously affect the conduct of business on the network for all corporate users. The same threat is present when workers with mobile computers return to the office and connect to the corporate network, following a connection to a home network or other business network that allowed the hostile application to be installed without the PC user’s knowledge.¹⁷

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17. J. Joyner and ClearPointe Technology (www.clearpointe.com), “Providing Remote Secure Access to Rich Data,” *InfoTech Update*, January/February 2004.

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
SANS Institute	www.sans.org	The SANS Institute's Reading Room includes numerous white papers on authentication.
Nuclear Regulatory Commission	www.nrc.gov	This site provides a good overview of ID and authentication under its "Frequently Asked Questions" section.

2—Radio Frequency Identification

Radio frequency identification (RFID), consisting of silicon chips and an antenna that can transmit data to a wireless receiver; RFID could one day be used to track everything from soda cans to cereal boxes (Unlike bar codes, radio tags do not require line-of-sight for reading.)

Wal-Mart recently spread the term RFID across the news, by requiring that every vendor with whom it does business integrate RFID technology before the end of 2005.

A basic RFID system consist of the three components, namely, an antenna or coil; a transceiver (with decoder); and a transponder (RF tag) electronically programmed with unique information.

The RF tag is a tiny wafer-like chip that is literally attached to inventory, and stores a small amount of data that describes the product. The tag is read using a special RFID reader, but unlike a barcode reader, the tag does not have to be visible to be read. "To be read, a reader sends a signal to the tag. The tag absorbs some RF energy from this signal and reflects a radio signal back with information from its memory."¹⁸

As indicated, the significant advantage of all types of RFID systems is the noncontact, non-line-of-sight nature of the technology. Tags can be read through a variety of substances such as snow, fog,

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18. C. Yudkowsky, "The Promise of RFID," published in eNewsletter *Bytes of Success* and retrieved from <http://www.bytesofsuccess.com>.

ice, paint, crusted grime, and other challenging visual and environmental conditions, in which barcodes or other optically read technologies would be useless. RFID tags can also be read in challenging circumstances at remarkable speeds, in most cases responding in less than 100 milliseconds. The read/write capability of an active RFID system is also a significant advantage in interactive applications such as work-in-process or maintenance tracking. Though it is a costlier technology (compared with barcode), RFID has become indispensable for a wide range of automated data collection and identification applications that would not be possible otherwise.

RFID offers many advantages to organizations, but at the same time is causing alarm among privacy advocates. They worry that the technology will allow other uses, such as real-time tracking of customers in stores, or even after they leave stores. They see the potential for retailers and other companies to be able to track consumers long after a consumer purchases an item.¹⁹

Although a number of privacy groups have raised concerns about the potential uses of RFID chips, Congress has not yet drafted legislation to regulate their use. Several states have considered RFID privacy legislation, and the Federal Trade Commission (FTC) held a workshop on the uses of RFID and the effect on consumers earlier this year.

Developments in RFID technology continue to yield larger memory capacities, wider reading ranges, and faster processing. It is highly unlikely that the technology will ultimately replace barcodes. Even given the inevitable reduction in raw materials, coupled with economies of scale, the integrated circuit in an RF tag will never be as cost-effective as a barcode label. However, RFID will continue to grow in its established niches in which barcode or other optical technologies are not effective. If some standards commonality is achieved, whereby RFID equipment from different manufacturers can be used interchangeably, the market will very likely grow exponentially.²⁰

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19. <http://www.computerweekly.com/articles/article.asp?liArticleID=130941&liArticleTypeID=1&liCategoryID=2&liChannelID=24&liFlavourID=1&csSearch=&nPage=1>.

20. http://www.aimglobal.org/technologies/rfid/what_is_rfid.asp.

Rick Richardson (<http://www.richardson.com>) in his keynote talk at the AICPA Technology 2004 conference indicated that RFID will be as significant to business as the Internet! Now think about this for a minute. The supply chain of every business in the world could be affected! We are talking about significant cost savings.

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
RFID Journal	www.rfidjournal.com/	A portal for information about RFID in business
Electronic Privacy Information Center	www.epic.org	News about privacy issues related to the use of RFID
CIO Magazine	www.cio.com/archive/120103/retail.html	Articles about retail implementations of RFID

3—3G Wireless

Designed for high-speed multimedia data and voice

3G is an International Telecommunication Union (ITU) “specification for the third generation (3G) (analog cellular was the first generation, digital PCS the second) of mobile communications technology. Wireless 3G promises increased bandwidth! 3G will work over wireless air interfaces such as GSM, TDMA, and CDMA.”²¹

Basically, 3G services combine high-speed mobile access with Internet protocol (IP) based services. In addition to fast mobile connection to the World Wide Web, it opens up new ways to communicate, access information, conduct business, learn, and be entertained by IP—free from slow, cumbersome equipment, and immovable points of access.

3G systems will provide access, by means of one or more radio links, to a wide range of telecommunication services supported by the fixed telecommunication networks and to other services that are specific to mobile users. A range of mobile terminal types will

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21. Webopedia, “What is 3G?” retrieved June 7, 2004, from <http://www.webopedia.com/TERM/3/3G.html>.

be encompassed, linking to terrestrial and/or satellite-based networks, and the terminals may be designed for mobile or fixed use.

3G services will add an invaluable mobile dimension to services that are already becoming an integral part of modern business life, namely, Internet and Intranet access, video-conferencing, and interactive application sharing.

This not only applies to “road warriors” who spend their entire lives traveling, but to those organizations who support new, flexible working practices in which employees need access to a wide range of information and services via their corporate intranets, whether they are at their own desks or elsewhere.

3G will play a valuable role in situations that include employees who spend some of their working at home; accountants who carry out audits at client premises; on-site maintenance engineers who need access to detailed instruction manuals, and mobile emergency services who need a video link with a hospital or doctor for specialized advice.²²

3G CDMA efficiently provides high-quality voice services and high-speed packet data access, and it is the preferred technology for 3G. And of all the 3G operating modes, WCDMA and CDMA2000 are by far the most dominant in terms of current commercial services, operator deployment plans, and vendor support. Using CDMA2000 and WCDMA technologies, commercial 3G networks are providing service to over 128 million paying subscribers as of July 31, 2004.²³

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
FCC	www.fcc.gov/3G	Information on 3G wireless
CDMA Development Group	www.cdg.org	International consortium of companies dedicated to promoting the worldwide adoption of CDMA wireless systems

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22. http://www.3gnewsroom.com/html/what_is_3g/index.shtml.

23. <http://www.3gtoday.com/subscribers/index.html>.

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
GSM World	www.gsmworld.com	Global trade association representing over 600 GSM mobile operators
International Engineering Consortium	www.iec.org/online/tutorials/tdma/topic02.html	Provides a tutorial on how TDMA works

4—Simple Object Access Protocol

A message-based protocol based on XML for accessing services on the Internet

SOAP is a lightweight XML-based messaging protocol used to encode the information in Web service request and response messages before sending them over a network. SOAP messages are independent of any operating system or protocol and may be transported using a variety of Internet protocols, including SMTP (Simple Mail Transfer Protocol), MIME (Multipurpose Internet Mail Extensions) and HTTP (HyperText Transfer Protocol). As the World Wide Web and Web Services become more and more in demand, the new emerging Web services standards, such as SOAP, enable machine-to-machine, program-to-program and system-to-system integration that is easier than ever before.

“Web services standards and technologies allows a user to describe and deploy applications or services on a network in a consistent way so that they can be discovered and invoked in a secure and reliable manner,” states Dr. Bob Sutor, IBM’s Director of Web Services Technology. He defines *Web service* as “an application that uses these standards and technologies and provides standards for an electronic envelope, a language for describing how you talk to a service and what it says back, plus techniques for publishing and discovering these descriptions. Web services allow me to standardize the way I talk to similar applications.”²⁴

SOAP eliminates the operating system limitations currently faced in multioperating system environments, ranging from very big

24. http://searchwebservices.techtarget.com/originalContent/0%2C289142%2Csid26_gci874060%2C00.html.

data centers all the way down to the smallest company integrating Linux to save costs. Take, for example, the data center supporting Wall Street. This data center includes thousands, and even millions of bits of data on different machines, running under different operating systems. Although much of this data is interrelated, it is currently duplicated. Colleges and many universities have the same problem, and represent another example of extensive data transfer routines. Even smaller and medium-size businesses that are now supporting Linux, Macintosh, and Windows platforms have integration needs, and, as a result, want a choice of vendor products to help reduce costs. Web Services and the World Wide Web are going to provide the answer as we move forward.

Apache, a clearinghouse of Web Services projects, reports that SOAP consists of three parts, namely, an envelop that defines a framework for describing what is in a message and how to process it, a set of encoding rules for expressing instances of application-defined data types, and a convention for representing remote procedure calls and responses.²⁵ “If XML represents the basic language, then SOAP is the grammar” (Microsoft, 2004).

Today, SOAP is in its infancy. The current version of SOAP is v1.1, and the actual specifications can be found at <http://www.w3.org/tr/soap>. The XML schema specifications are standard and available, but the standardized metadata (how the data is formatted) for SOAP is not yet complete. Spearheading this effort as the centralized body is the W3C, the international consortium of companies involved with the World Wide Web, the Internet, and the development of SOAP.

For the CPA, SOAP, and Web Services can provide data integration. Microsoft reports that companies often find that valuable information is locked away in stand-alone systems that were not designed to exchange information with other systems. Systems and software programs do what they were made to do, but often fail to meet company goals because of all the different systems within an office. Many CPAs are often frustrated with the duplication

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25. News, Apache Draft W3C specifications, 2003, 12, retrieved April 6, 2004, from <http://ws.apache.org/axis/>.

within their own office and with multiple databases, multiple-copies of customer information, and bits and pieces of data spread throughout accounting, tax preparation, and practice management software. Web Services and SOAP, and its sister tools, are all about solving this problem in a scalable format.²⁶

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
World Wide Web Consortium (W3C)	www.w3.org/2000/xml/Group	Sponsor of the XML Protocol Working Group, which is developing standardized SOAP specifications
Apache	ws.apache.org/axis	A clearinghouse of Web Services projects
Microsoft	http://msdn.microsoft.com/archive/default.asp?url=/archive/en-us/dnarxml/html/Websvcs_platform.asp	An article that presents an overview on the Web services model for building applications
Web Service Resource Center	www.Webservice.com/resource.com	A resource for everything relating to Web services including links to articles, tutorials, examples, and much more

5—Autonomic Computers

Tools and strategies to manage and maintain all systems across the enterprise, including system maintenance, upgrades, automatic patching, and self-healing, e.g., ZenWorks, Unicenter TNG, management alerts (This is an approach toward self-managed computing systems with a minimum of human interference. The term derives from the body's autonomic nervous system, which controls key functions without conscious awareness or involvement.)

Autonomic computing already frees up IT workers from mundane, repetitive tasks, such as restoring a failed system or moving around network resources. The focus for the next few years for

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26. A. Stanton, "SOAP Integrates Data and Processes," *InfoTech Update*, May/June 2004.

vendors will be to deliver systems and networks that feature self-healing capabilities across resources and applications. A computing infrastructure that modifies itself for business strategy and operational needs is likely a decade away, say experts.

As a market/research leader, IBM uses the term *autonomic* to describe its technology approaches for more fully automated computer functions. IBM is promoting the idea of autonomic computing that mirrors the automatic functioning of the human body as closely as possible. The autonomic capabilities of the human body related to breathing, infection fighting, survival, and other functions, can be analogized onto computer-based platforms, and will hopefully aid in the continuing automation of computing functions.²⁷ It sees autonomic computing in five levels or stages. Stage One contains no coordinated systems management. Stage Two offers management tools that are centralized and require human intervention. Systems begin to analyze problems and suggest solutions in Stage Three. In Stage Four, systems correct problems without humans. Stage Five brings in an organization's business objectives so that the system can manage to those objectives.

IBM's vision of autonomic computing highlights eight key areas:

1. The computer's inherent knowledge of itself, and of its operating environment
2. The capability to self-configure and reconfigure
3. The continued effort of optimization
4. The ability to self-heal
5. The ability to self-protect
6. The computer's ability to adapt to the operating environment it is in
7. Commitment to an open systems approach
8. The ability to anticipate resource needs

27. Mary Shacklett, "Autonomic Computing Champions More IT Automation," *Unisys World*, January 2003, <http://www.unisysworld.com/monthly/2003/01/autonomic.shtml>.

Just as the human body activates hormones and heart rate to respond to an urgent situation, computers of the future will be able to anticipate needs and allocate resources accordingly. The goal is to make this happen in a way that is transparent to users and systems support.²⁸

The reality for CPAs and accounting professionals who provide consulting services is to offer their clients, employers, and customers information about how autonomic computers can help an organization save time, money, and other resources.

Because of the newness associated with this technology, some of the long-lasting effects are still not completely known. However, experts already are projecting that the potential for cost savings from using autonomic computers is enormous. A Forrester Research study, for example, reports that server utilization rates could jump from the current average of 20 percent to 80 percent or higher.²⁹ With a server capable of constantly monitoring its own efficiency instead of a network analyst who would be bored performing this task, companies will be able to do much more with much less computing power, as well as less labor. In addition to reducing labor costs, this technology is predicted to significantly speed up response times and overall system efficiency by using less computer power more productively.

One day, CPAs will be able to describe the business processes that they want automated, and the systems will simply assemble themselves. That is the vision of IBM's Vice President of Autonomic Computing, Alan Ganek, and the potential of autonomic computing in our future. For now, CPAs can be content with potential savings in network hardware and labor, and the knowledge that on the horizon, their business's computing infrastructure will become increasingly easier to manage.³⁰

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28. Mary Shacklett, "Autonomic Computing Champions More IT Automation," *Unisys World*, January 2003, <http://www.unisysworld.com/monthly/2003/01/autonomic.shtml>.

29. Matt Hamblen, "The Once and Future IT," *ComputerWorld*, September 8, 2003, <http://www.computerworld.com/networkingtopics/networking/management/story/0%2C10801%2C84604%2C00.html>

30. S. Smith, "Autonomic Computers Self-Heal Themselves," *InfoTech Update*, July/August 2004.

MORE INFORMATION

<i>Organization/Product</i>	<i>Web Site</i>	<i>Notes</i>
IBM	www.306.ibm.com/autonomic/index.shtml	Information about IBM's autonomic computing software
Network World Fusion	www.nwfusion.com/supp/2004/ndc2/0322ideas.html	Feature article on how autonomic computing benefits enterprises
Unisys World	www.unisysworld.com/monthly/2003/01/autonomic.shtml	Article on how autonomic computing champions more IT automation
Federal Computer Week	www.fcw.com/fcw/articles/2004/0329/tec-heal-03-29-04.asp	Article on how government agencies will benefit from autonomic computing

Top Technologies for 2005

Certified Information Technology Professionals and members of the AICPA's IT Membership Section will begin voting on the Top Technologies for 2005 in the Fall of 2004, and the list of Top Technologies for 2005 and Emerging Technologies of 2005 will be released in January 2005. For more information about the current Top Technologies, or to view new lists as they are released, please visit <http://www.aicpa.org/infotech>.

