

PRESENT AND ACCOUNTED FOR

High Speed On-Line Collaboration Yields Lower Costs and Better Practice in High Value Information Services

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Now that information technology (IT) has become a driver of economic growth, technology reporting has become a major new media specialty. Moreover, to promote investor interest in their stocks, vendors of IT products and services eagerly feed the media — especially the business press — up-to-the-minute news on their latest patents and planned new product roll-outs. A corps of independent industry analysts has also emerged, largely on-line, who help separate high-tech from its hype, and clarify the marketplace implications of impending IT innovations. These “previews of coming attractions” provide reasonably accurate depictions of the new IT applications that will enter the U.S. workplace during the next two to five years.

As the technologies discussed in this paper become commonplace, they will dramatically alter the operating environment for all high value information work, changing how, where and by whom issues are analyzed, questions are answered and problems are solved in laboratories and offices, by in-house staff and outside consultants. Firms will increasingly compete on the basis of new products and services made possible by the new technology, even as traditional products and services are commoditized by “info-mation.”

I. COMING SOON TO A FUTURE NEAR YOU!

Broadband (High-Speed) Internet

The IT innovations now entering the marketplace promise to be highly productive, and ... highly “disruptive.” Now that essentially all large and medium sized businesses have broadband (high-speed) access to the Internet, for example, most business long-distance telephone traffic, including 100% of all international calling, is expected to migrate to the Web before 2010, cutting costs for these services by 30% to 50%. Broadband also makes high resolution video-conferencing cheap enough for routine daily use, while sales of Web-casting services have doubled to \$55

million p.a. since 9/11, business air travel has fallen 15% to 18%, and most industry experts believe that these reductions are permanent. By 2010, most work stations will include one or more large, high-resolution flat-screen display for video conferencing and on-line learning.

“Smart” machines,

With most commercial space connected by the high speed Net, business equipment from milling machines to office coffee-makers are being “web-enabled,” so that their performance can be remotely monitored on-line. Smart photocopiers like the H-P/4100 order their own toner refills over the Net, so that the new cartridge arrives just before the machine runs dry. Smart Coke and Pepsi machines notify their service managers when they are malfunctioning, or when all the diet soda is used up. This sort of remote diagnostics is expected to eliminate one-half of all equipment service calls in 10 years.

“Wi-Fi,”

One IT innovation that is currently storming into the marketplace even faster than “smart” equipment is “Wi-Fi,” a wireless medium that can provide large numbers of computers with low-cost/high speed access to the Internet. Available free in growing numbers of public parks, airports, schools and libraries, Wi-Fi has already forced major land-line broadband providers to cut their fees in half, and will ultimately be instrumental in bridging the “digital divide” between the information “haves” and “have-nots.” Within ten years, Wi-Fi will be standard on all computers, PDA’s and cell-phones, and 80% to 90% of all Web access will be via portable devices.

and “Linux”...

In parallel with Wi-Fi, Linux, the free open-source programming language, is being rapidly adopted in the U.S. and around the world, replacing proprietary software like Unix and Microsoft. Linux, which has repeatedly proven to be not only cheaper, but faster, more secure and less

fault-prone than its proprietary competitors, is widely expected to be far more effective than the U.S. Justice Department in breaking Microsoft’s dominance of the business software market. Adopted as the official public sector software standard by 75 national governments — including Germany, Britain and France — during the past 24 months, open source programming language is also expected to give rise to an entrepreneurial boom in self-published special application software initially developed by practitioners (e.g. lawyers, accountants, radiologists, etc.) for their own professional use, and subsequently sold in the commercial marketplace.

... plus the “Information Grid;”

The U.S. National Science Foundation (NSF) — the folks who nurtured the original creation of the Internet — are now promoting the use of the Net to transfer computing power like an electric power grid transfers electricity, to permit the mobilization of many dispersed computers to perform a single processing task. The mathematical models that scientists increasingly use to analyze everything from weather forecasting and cancer cell replication to earthquake-proof building design and the behavior of sub-atomic particles routinely take more computing power than even large research universities possess in-house. To address this problem, the NSF underwrote the development of software that automatically co-ordinates the simultaneous contributions of multiple dispersed computers to different parts of a single computational assignment over the Internet.

Since first demonstrated in 1996, NSF’s resulting “Globus Toolkit” software platform has been used to create more than thirty distributed computing systems that serve the scientific and engineering research communities in most industrial nations. And because it is public domain software, more than a dozen major IT vendors — including IBM, H-P, Sun and Oracle — already use the software as the basis for two new types of commercial computer services: [1] *distributed* computing, and [2] *utility* computing.

featuring “Distributed Computing,”

Using distributed computing, organizations with large numbers of computers — or consortia of small firms — are able to link all their computers on line —

nationally or globally — either to “borrow” data, software and computing capacity from each other as needed, or to function as a single, large multi-tasking machine. West Coast operations automatically tap into unused computing capacity and software in East coast offices that have closed for the night. Individual databases in dozens of local computers can be instantly assembled for comparative analysis or merged into a single national or global database. Costly specialty software (e.g. risk analysis, CAD, object-oriented graphics, etc.) residing in one computer on a grid can be applied to work requested by any other computer on that grid whenever that software isn’t already in use which, it turns out, *is much of the time!*

Because desktop computers have become so powerful — and cheap — users routinely buy considerably more computing capacity than they ever use. Moreover, in-house IT managers typically design surplus capacity into their systems to be able to accommodate “spikes” in user demand. And while most software is used on a daily basis (e.g. spreadsheets, schedulers, word processing, etc.) many special use software packages (e.g. statistical graphing, discriminant function analysis, operations research algorithms, etc.) are not only expensive, but are also infrequently used. As a consequence, most organizations have considerable underutilized computing capability and capacity.

The former Chief Technology Officer of Goldman Sachs, recently quoted in the Wall Street Journal, estimates that the average utilization of their in-house computing systems is “maybe 10%.” Other industry experts variously estimate the typical utilization rate for business computer systems at between 10% and 60%. By pooling that substantial implied surplus IT capacity and making it available on demand, distributed computing co-operatives give participating firms access to enhanced data processing capabilities without members having to expand their own in-house IT operations. And enhanced computing capacity will be essential for the future of all high-value information workers. Just as scientists and engineers are using increasingly complex computer simulations in their daily work, so too are management consultants, transportation planners and financial analysts.

and Utility Computing

In order to participate in a distributed computing arrangement, of course, you must have your own computer hardware

and software to contribute to the collective shared capacity of the system.

Organizations **without** their own in-house computing capacity can, however, get **all** of their data processing services on-line by subscribing to a computer “utility.” Currently, IBM, Hewlett-Packard and Sun offer utility computing, supplying all of an organization’s routine data processing requirements for a fixed monthly charge, plus surcharges for unplanned user requirements, which are provided by the utility as needed — “on demand” — in real time. This is not a new idea. Similar services were first marketed back in the 1960s, when the concept was called “computer time-sharing.” While technically feasible at the time, the high cost of data transmission made computer time-sharing prohibitively expensive. Today the broadband Internet has made the instantaneous long-distance transmission of high volumes of data a low-cost, mass-market reality.

Users of utility computing report savings of 20% to 55% in comparison with their in-house systems. The bulk of these savings arise from not having to provide space, IT personnel, system back-ups and security for in-house data processing operations. Industry experts believe that continuous rapid IT innovation, plus the growing chronic shortage of qualified IT personnel, will force the adoption of utility computing, especially among small and medium sized firms who are already experiencing an increasingly difficult time matching the salaries and benefits offered to IT professionals by Fortune 500 firms. Meanwhile, as grid based computing becomes common practice over the next two to three years, thousands of independent “application service providers” (ASPs) will sell special purpose software and computing on-line to **both** distributed computing co-operatives **and** computer utilities.

II. GROUPWARE!

Just as the high speed Internet enables geographically-dispersed computers to contribute a variety of resources (e.g. processing power, data, software, storage capacity, etc.) to perform a single task, broadband also makes it possible for physically dispersed **individuals** to bring their diverse knowledge, skills and experience to bear on a single project, or the resolution of a single problem. The family of programs that facilitates interpersonal, on-line collaboration is collectively called “groupware,” and incorporates a wide array of applications. Groupware’s most popular feature to date

has been Instant Messaging (IM), which allows immediate text conversations via pop-up windows on the computer screens of individuals who are on-line. Another popular groupware feature is Peer-to-Peer (P2P) file-sharing, which permits users to freely access and download specific files in each other’s computers. The most successful P2P software was the notorious Napster, whose sole purpose was to search for and download music files. The purpose of most P2P systems is to permit participants to share pre-designated subject matter information or project files.

Introducing Instant Messaging (IM)

First introduced in Europe and Asia during the mid-1990s as a feature on their Web-enabled cell-phones, *IM has been more rapidly adopted around the world than either e-mail or the cell phone.* Available in the U.S. in 1997, since March 2003, instant messaging was being used for intra-company communications by 84% of large North American firms, according to Osterman Research, of Black Diamond, Washington. Forrester Research, in Cambridge, MA, estimates that two-thirds of all e-mailers now use IM. Less intrusive than a phone call, but more immediate than an e-mail, IM has clearly filled a compelling marketplace need. In fact, IMing has proven such a popular feature that the software for establishing IM networks — commonly called “buddy lists” — can be downloaded free from AOL, Yahoo or Microsoft, or from specialized groupware firms like www.groove.net and www.ipswitch.com. In addition, Windows Office XP now incorporates IM as one of its basic features.

“Free Range” IM Systems

Freely available instant messaging software is a powerful but rudimentary piece of technology. Messages sent via basic IM vanish forever as soon as they are answered, leaving no electronic trail. While such transiency is preferred by most personal/social users of IM, workplace IMers are frustrated by the absence of records from basic IM exchanges. So are the SEC and NASD, both of which mandated in 2002 that IM transmissions must be treated the same as e-mail — including archiving and monitoring — when used by financial institutions for vendor-client communications regarding equities transactions. Basic IM transmissions are also unfiltered, unidentified and unencrypted, all of which leave businesses exposed to unacceptable security risks. To address these shortcomings, the same firms that give away free

basic IM software also offer a full range of encryptable, archivable and sanitizable IM software products, ... for a price.

The vendors of IM software and system services have successfully used a classic loss-leader marketing strategy to achieve four years of exponential user growth. But the free give-away of basic instant messaging software only partially explains the boom in IM subscribers. Users report that instant messaging is addictively useful in a myriad of day-to-day work activities. IMing has essentially all of the virtues of e-mail, but poses lower psychological barriers and time costs, especially in IM's free, unarchived, firewall-breaching basic form. What's more, an essential feature of instant messaging is that an IM transmission can only be made to computers that are *currently on-line*. Thus, an IM user is initially presented with a list of those members of the sender's "buddy list" who are on the Internet at that moment and available to receive an incoming transmittal. This one feature has proven so useful to supervisors, dispersed team members, and customers that the great majority of IMers are absolutely unwilling to go back to regular e-mail.

Taming the Wild IM

In spite of the overwhelmingly positive feedback from among IM users, some managements find the anarchic potential of instant messaging so threatening that they ban their employees from using it at work. But the business press — and IT industry surveys — make it clear that most large employers recognize the productivity-enhancing potential of IM. They also understand that, with the integration of the cell phone and the Internet, most of their employees are — or soon will be — using instant messaging on the job whether the employers like it or not. Thus, most large North American firms have installed — or plan to install — formal, secure corporate IM systems over the next three years. Employees are typically required to use their company's in-house system for all work-related instant messaging. And, because the cost of an encrypted, archived IM system is directly dependent on the number of participants, corporate systems routinely prohibit employees from adding friends and family members to the company's IM network. As a consequence, a growing number of IMers are forced to have two instant messaging systems, effectively separating their personal and professional "buddy lists."

While corporate IT managers are pleased to purge employees' social contacts from their business IM systems, employees themselves are of two minds. Many users report that they prefer posting an "At Work!" notice on their personal buddy lists, rather than having to respond to personal IMs on the job. But many younger users resent being barred from accessing their personal IM networks while on the job, since their buddy list also represents their primary intellectual reference group: e.g. family and friends, former classmates/roommates, teachers, co-workers, supervisors and customers, etc. And knowledge management experts observe that our personal networks include people who are also important contributors to the "communities of practice" upon which we rely to support our competencies on the job.

By requiring employees to use corporate IM networks while at work, employers limit their employees' ability to access important informal sources of decision input. Almost all IM software is "brand specific," like early fax machines and e-mail, and cannot message each other. (A person using the IBM-Lotus Instant Messaging system, for example, cannot IM a person using Yahoo's instant messaging service.) There is some "translator" software available that bridges across the principal IM protocols (e.g. *Trillian*, AOL's *IM/ICQ*, etc.) but these programs are not cheap. While industry experts expect IMing to become a standard option on all email software by 2005, and that there will be wide-spread business use of video-IMing by 2006, the major IM vendors are not expected to agree on a single inter-operability standard until 2007 — at the earliest.

In-House, LAN-Based IM

The lack of inter-operability among Net-based instant messaging systems does not trouble the operators of large in-house IM systems, since such systems are solely concerned with facilitating collaboration **within** the firm. In fact, most corporate IM systems don't interface with the Net at all; they run on the companies' LAN's, which substantially reduces the security issues posed by using Net-based instant messaging systems. Several dozen vendors — from IT giants IBM and Sun to specialist teamware providers, like Gordano, Groove and Ipswitch — offer LAN-based IM systems. A formal Net-based IM network serving up to 200 people can be up and running for under \$1,000; LAN-based corporate IM systems typically serve thousands

of employees and cost between \$100,000 and \$200,000 per year. For that kind of money, of course, corporate systems feature a full range of powerful collaboration tools, including audio and video messaging/conferencing, message broadcasting, chat rooms, screen sharing, joint-use white boards and co-browsing, plus file, calendar and contact sharing. Net-based IM systems also offer such features, singly or packaged together. (A comparative review of seven top IM systems appeared in the June 26, 2003, issue of *Network Computing*, and can be downloaded from www.nwc.com/1412/1412f3.html.)

Full-feature in-house IM systems give employees easy access to each other, and multiple means by which they can quickly share knowledge and judgement, enabling them to make better informed decisions, plans and analyses. A few in-house systems, like IBM's *SameTime*, also incorporate a "knowledge management" capability, that permits 220,000 IM subscriber-employees around the world to conduct subject-matter searches to find IBM's in-house experts on topics like "super-conductivity" or "open source software" who are currently available to answer a question on-line. The ability to quickly locate and apply the collective intellectual capital of so many knowledgeable professional and technical personnel is expected to give organizations like IBM, GE, Accenture and Siemens a significant competitive advantage in the increasingly information-driven 21st Century marketplace.

The problem with placing all employees on a LAN-based in-house IM system is that many instrumental work-place relationships are with people **OUTSIDE** of the firm — e.g. customers, suppliers, business service providers, etc. — each of whom is likely to be mobilized into his or her employer's IM network, most of which cannot communicate with each other. The counter-productive implications of this development are all the more potent in light of the increasingly common management strategy of outsourcing administrative and other non-core functions, including facilities and human resources management, training, accounting and financial management.

IMproving Workplace Relationships

A growing number of groupware vendors are offering IM software and services designed to support specific management functions — including sales and marketing, procurement, logistics and customer relations management — *that necessarily*

involve participants from *outside* the organization. “IM” buttons on Websites and pop-up ads enable prospective customers to immediately access live sales-reps on-line. IM procurement networks let contracting offices broadcast last-minute revisions of bid specifications to all potential vendors. IM systems software for logistics management facilitates schedule changes among the multiple suppliers contributing to the production of a single product or service. Firms are offering their best customers IM subscriptions that enable them to communicate instantly with live company representatives, while permitting corporate design engineers to organize on-line discussions to solicit customer input on individual product features or proposed product changes.

Being “Present” in Cyberspace

Until instant messaging, “cyberspace” was simply a figure of speech referring to the networks of circuits, wires, fibers, and radio waves through which our e-mail passed to reach its addressee; the electronic equivalent of the network of mail boxes, letter carriers, sorting machines, postal clerks, trucks, trains and planes that carry a letter to its destination. **With** IM, cyberspace becomes place; a big metaphorical room that can be entered simply by clicking into instant messaging mode, which immediately displays those members of the user’s buddy list who are currently on-line — in effect, present **in** cyberspace at that moment. In fact, IMers routinely speak of being “present” on the Internet as the same as being present in the office, where co-workers and supervisors can pop in to ask a quick question. The *Wall Street Journal* recently reported that IM’s “presence” function has been especially influential in gaining supervisor acceptance of flexplace work arrangements.

III. THE STRATEGIC OUTLOOK FOR ACCOUNTING AND CONSULTING

The current new generation of applied information technology is clearly changing the physical context of human enterprise by substantially augmenting our ability to communicate with each other at a distance. Strikingly, both economic globalization and the current disaggregation of corporate enterprise is steadily increasing the frequency with which we find ourselves in collaboration with people in other locations

who work for other organizations than our own. The outsourcing revolution, which began incrementally a decade or so ago with businesses outsourcing payroll or benefits management, has now become a mass movement. The U.S. Bureau of Labor Statistics projects that employment in the “Business Services” sector of the economy will grow 50% — twice as fast as any other sector, with firms outsourcing their entire data processing, HR and financial management functions.

Just as rapidly, white collar jobs — including engineers, architects, programmers, actuaries and accountants, etc. — are following blue collar jobs off shore, especially to Russia, China, The Philippines and India. In India alone, over 100,000 U.S. tax returns were prepared for filing this year. While such off-shoring of accounting, audit and tax work can be expected to grow quickly over the next several years, it is likely to be a temporary phenomenon. A rapidly growing proportion of **all** business transactions and financial record-keeping will become info-mated during the next five to seven years, and the great bulk of all traditional accounting and audit work will be done electronically, including tax filings and auditing. This information of corporate accounts will facilitate the outsourcing of financial management to CPA firms, but it will also serve to reduce the skilled labor required by traditional accounting operations, and accelerate the trend toward commodity pricing and profits for such services.

The recent revelations of massive corporate malfeasance have shone a bright public spotlight on the nation’s CPAs, and highlighted the importance of an independent audit function, triggering a worldwide debate over the potential conflicts of interest arising from non-audit work performed by CPAs for their accounting clientele. While the huge financial scandals — some of which are still unfolding — have led to increased expenditures on traditional accounting services, most large and mid-sized CPA firms continue to generate most of their income from non-audit services.

Consulting and other non-audit work — like traditional accounting and audit work — will involve ever more pervasive use of IT from now on. But, on the accounting side of the practice, IT will be employed largely as an info-structure to process and document the continuous orderly flow of revenue and expenses. On the non-audit side, IT will bury consultancies in an avalanche of increasingly sophisticated tools — expert

systems, mathematical simulations, on-line Delphi surveys, neural networks, etc. — to answer specific questions and to solve an ever-widening array of discrete problems. Corporate finance departments, for example, are promoting the concept of *human capital* as a means of getting a better ROI on human resources, their biggest single operating expense, but they have not yet developed a satisfactory way of measuring human capital. There is mounting pressure from the Financial Accounting Standards Board for firms to measure, publicly report, and account for their intangible assets — including brands, customer relationships and patents — to better guide investors. And both corporations and corporate reformers are together trying to hammer out ways of assessing a company’s “sustainability” or degree of “social responsibility.”

Whether responding to the initiatives of U.S. and international regulators, or helping corporate enterprise develop meaningful metrics for addressing the concerns of investors and environmentalists, accounting firms will have to explore and exploit the rapidly evolving potential for on-line collaborations. Since actual business use of these technologies is still quite limited, there is little published research on this topic, and certainly, there are no “cook-books” to follow. Thus, CPA firms should undertake a purposeful program of experimentation and evaluation, to develop protocols for the most effective use of instant messaging, file-sharing, information mining, knowledge management, etc.

We are in a genuine, technology-driven revolution, and like all revolutions, it will be driven from the bottom up, not the top down. Those organizations that are able to foster their front-line employees efforts to make the most productive use of these new collaborative tools will, in all likelihood, reinvent the practice — if not the profession — of accounting for the information age.



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