Appendix C
Technology Trends Analysis:
Trends in Business Technology Integration

Let us look at the relationship with technology through a different, sometimes personal lens—sometimes even angry lens—and let us see if it frames what the new business technology relationship should look like.

Let us assert that the wheels have come off the digital revolution. While there have been important productivity gains attributable to the widespread deployment of computing and communications technology, a lot of the productivity has been the result of extraordinary human effort. Worse, the digital revolution was supposed to be as much about fun and fulfillment as it was productivity and efficiency. It has not played out that way: what started as a genuine new wave phenomenon quickly morphed into a darker process distorted by professionals with no lives.

Remember when companies began selling older personal computers to their employees as fringe benefits? They quickly began to give them away so they could connect everyone to corporate networks—so they could work in the evening and on weekends from home. Remember when it was acceptable not to reply to e-mail messages immediately? Now digital tyrants want instant messaging to come to the workplace—after they have marveled at the compulsive effect it is had on their kids.

The angry lens sees this as a plot.

Digital technology is infiltrating our lives as quickly as they are deteriorating. Access to technology—and expectations about the role it should play in our lives—is
driving massive change in our personal and professional behavior. Most of us are clueless about the effect the pace of technology change is exerting on how we work, learn and live. The digital revolution—like all of the others—is about money, power, productivity, and manipulation. But stop and think about who is in control. Your work week is longer, your privacy is gone, and you spend several hundred hours a year servicing your personal technology infrastructure. You check voice-mail and e-mail ten times a day—and at least once a day while on vacation. Your personal digital devices interrupt everything. You carry a pager, a cell phone and a personal digital assistant (PDA), and you cannot wait until they all converge into one really reliable, really smart monster device. We are digital now, we are netizens. But what the hell does that mean? How much of this is good and how much is a pain?

Digital technology intersects with our culture and lifestyle in unprecedented ways. We are working harder—not smarter—and managing lots more stress. Our personal lives have been under serious attack from our professional lives for at least a decade, just about the time the digital revolution kicked into high gear. We are wired. We are mobile. When we finally get home we exploit the same connectivity to relax, to be entertained, but have no demilitarized zones between work and play. The bozos who champion convergence actually believe that you and I will want our movies interrupted with phone calls received through our television sets.

Switch over to the corporate environments in which we all work. While we have gotten good at procuring PCs and other devices, we are still not clear about usage protocols. We are still not sure about how to manage all this stuff and we are forever searching for ways to measure the relationship between technology and business productivity. We have connected everyone but we are still not exactly sure why we did so.

Let us look at this convergence phenomenon—the poster child for digital schizophrenia—more closely. After the Internet bubble burst, and especially after the business-to-consumer (B2C) and business-to-business (B2B) business models were savagely rejected by investors, lots of gurus jumped onto the convergence bandwagon as the next new, new thing. The thinking here is that all those digital devices that we maintain at home and work should be connected, that convergence is a logical technological step, and a very good thing for personal and professional life management. After all, who would not want voice-mail from one's spouse to have priority over your boss'? Or a reminder about your kid's soccer game? But it does not stop there. The way convergence plays out is anything but pretty. Our cell phones will evolve into smart professional digital assistants (PDAs) that will process e-mail, voice-mail, pages, and other “opportunities” from work, retailers, wholesalers, and anyone else who can get access to our digital persona. Access
will be facilitated by embedded global positioning systems (GPSs) that will track us, integrating our locations with databases that understand our preferences. What all this means is that a little voice will let us know that a sushi bar is only 15 feet away and if we are interested in the diversion our pending appointment can be rescheduled. A really smart assistant will know that it is been 2 months since the last sushi experience and will automatically reschedule the next appointment. Of course while eating we will be interrupted by any number of communiqués that have priority over food and relaxation. So we will gobble down the fish and run into the digitally summoned cab to take us to an unanticipated location where we will discuss things we will think about for the first time.

Convergence will make it possible for us to immediately know the cholesterol impact of the filet we are about to eat, when our kids are speeding, when our friends are avoiding us, when we are missing meetings, and how the hell to almost get away from it all. The net effect is total immersion into a digital prison.

Technology has so completely preoccupied us with work that there is little time for anything else. The very process of continuous connectivity saps our availability for activities outside the world of digitalia, yet we are told that continuous connectivity will be wonderful. The soccer game you were able to make because a device located and reminded you also interrupts the game, diverting attention from the simplest pleasures to much more complex and often unsolvable problems. What used to be the normal ebb and flow of demarcated personal and professional lives has been replaced by continuous problem-solving that intrudes on everything else—especially those activities so far removed from aggressive competition—like intimacy.

All of this is really about what might become the most important lost opportunity in modern history: technology can free us—but we are well on the way to technology enslavement.

While it is relatively easy to at least entertain arguments about a dubious relationship between technology that connects (annoys?) us and our personal lives, the professional argument is more difficult to make. Why? Because we have all been conditioned to believe that technology helps business, that without technology there would be no business. Both true, but it is essential that we place all assessments within the context in which they are made. For example, in the 1970s technology began to support back office processes in some significant ways; in the 1980s it began to move to the front office. The 1990s gave us distributed computing and of course the World Wide Web. What is worrisome is that technology has not merely “evolved”: the changes that occurred in the 1990s are revolutionary—yet our perceptions about their value are absolutely evolutionary.
DO YOU THINK?

The 21st century ushered in lots of stuff. Thinking was not high on the list. As the pace of our lives has increased (with the aid of digital technology) we have abdicated thinking for reacting. Digital technology has created only defensive opportunities: so much information is pumped into us that it is all we can do to just react. Problem-solving is data-driven, not managed by creative insight. The whole process by which we identify, decompose, and solve problems is dependent upon the data we receive, not insights we create. How many times have problems at work been parked until FedEx delivers a package or another e-mail arrives: “we need to hear from Charlie before we do anything … Charlie has the data!” Without realizing what is happened we have fallen into patterns that reduce the importance of natural intelligence and creativity for those that reward reactive speed. Even personal decisions—like deciding where to go to college—are data-driven. Web sites enable “if – then” processing: if you want an urban, small, artsy school, then you should go to college X – and not college Y. An expert system embedded in the Q&A process actually suggests where students should and should not go. How many open houses are skipped because Web sites say the school is a bad fit?

Thinking takes effort. Reacting is easier and faster, especially with digital gadgets. The more we connect employees the more we reward reactive agility.

The significance of this shift is enormous. Interpersonal relationships, primary, secondary, and higher education, and lifelong training are all affected by reaction- vs. pro-action-based understanding and communication. Instead of inductive learning we have compromised to deductive processes, where we react to known facts—presented to us through our digital toys. The infiltration of digital media into the classroom is sometimes good but potentially very dangerous. Discussions about science, geography, and history often take the form of asking students what they think about a demonstrated phenomenon instead of how the phenomenon came to be. We all know that discussions can be jump-started by providing examples, strawmen, demonstrations, and the like, but we also know that such techniques are often reserved for less-than-creative groups who need stimuli to get started. Digital technology and media make it possible to insert examples and demonstrations of all kinds into curriculum whenever an opportunity presents itself. Teachers familiar with multimedia tools can import pictures, video clips, and other media into their lessons that are minutes old, and then ask their students to react. Kids love this stuff, but are they learning how to compose or decompose? How about grown-ups getting trained?
ACCEPTABLE ADDICTION

You are 40 years old. You are a professional. You use technology every day to do your job and manage certain aspects of your life. You are smart and productive. You are connected. But you are harried, conflicted, and overwhelmed. What happened to you? Probably two things: you fell for the American dream believing technology was one of the springboards to the dream’s realization. Ask yourself: would you rather have a restored 1954 Corvette or a 1+ gigahertz personal computer? What did you say? How about the value of private, disconnected time? More valuable than day trading? Or incessantly checking e-mail and voice-mail?

According to survey data, if your household makes over $75,000 a year and has a couple of kids, your technology infrastructure looks something like this:

- 1 Work Provided Cell Phone
- 1 Personal Digital Assistant (PDA)
- 1.5 Work Personal Computers
- 2.5 Personal Home Computers
- 1 Printer at Work (Access to Many More)
- 1.5 Home Printers
- 1 Conventional Fax Receiver at Work
- 1 Computer-Embedded Fax Receiver at Work
- 1 Home Fax Receiver
- 1 Work Pager
- 1 Family Pager
- 1 Home DVD Player
- 2 Home Video Cassette Recorders
- 3 TVs
- 1 Home MP3 Player
- 2 Home Telephone Lines
- 5 Wired Phones
- 3 Family Cell Phones
- 1 Work Phone Line
- Voice-Mail at Work
- 1.5 Voice-mails at Home
- 1 Work Internet E-Mail Account
- 3 Home Internet E-Mail Accounts
- 1 Analog Camcorder
- .5 Digital Camera
- 1 Video Game Player
This “average” inventory is sometimes supplemented with a global positioning system (GPS) in a car and a cell phone, the use of intelligent agents to find the cheapest prices on the Web, and a home theater fed by cable, satellite, DVD, and Internet signals. If your kids are even semigeeky, they have their own Web pages. Lots and lots of technology. Does it all work as advertised? Does it work at all? At work you should be asking some really tough questions about the return-on-technology-investments—not to mention the total cost of ownership of all this stuff.

If this list resembles your current technology holdings, you are out of control. A time and motion specialist would have a field day assessing your utilization efficiency. With this much junk, it is impossible to target it all at activities and processes that enrich your life. Hell, you probably spend a couple of days a year just replacing batteries. Does any of this sound familiar? Is your professional environment similarly chaotic? Do you know exactly how many computing devices are in your company?

You are also knee deep in the idea of technology. Those who manipulate us for a living use multimedia to associate technology with “new,” “smart,” and “successful.” Until recently, the New York Stock Exchange was “out” while the Nasdaq was “in.” Desktop computers are “out,” PDAs are “in.” The number of on-board processors in your luxury car is a status symbol. If you are technologically illiterate, you are inferior.

Even if you do not realize it, you are in deep. You have bought into fulfillment through technology at home and at work.

Our relationship with technology is sadomasochistic. It is warm enough to seem friendly, but it is a Trojan horse. It is an acceptable, politically correct, but deadly, addiction.

What if someone told you that the average cost for a corporate PDA was $250, but the annual support costs per device exceeded $2,000? Would you still buy PDAs for everyone, even if the deployment was “cool”?  

**HAVING FUN YET?**

About 40 years ago someone said that the biggest problem we would have would be the disposal of surplus leisure time. Technology was going to create this surplus. But it has not turned out that way: while technology makes aspects of our lives fun and efficient, it also often betrays us. How many hours a week do you tinker with your personal technology infrastructure? What is the real cost of continuous connectivity? Do you even have any idea of what you spend annually at work on all forms of “hard” and “soft” technology support?
A lot of our infatuation with technology is stupid. It is also expensive. Look around your house. How many computers do you have? Are they all the same, or do have to maintain a bunch of nonstandard machines? Does your fax machine connect to your PC and personal digital assistant? Why not? How many telephone lines do you have coming into your house? How man AOL accounts do you have? Do you have a broadband connection to your home? And if you have a broadband connection, do you still have an AOL or another Internet service provider (ISP) account? Why?

What does it cost you a year to maintain all this stuff? Do you have any idea? What is the total-cost-of-ownership of your high-end servers at work?

At work you are a geek, sort of. You cannot live without e-mail and voice-mail. Nor can you survive without Powerpoint, Microsoft’s venerable presentation package. You probably have trouble discussing ideas without Powerpoint (though you are really good at reacting to Powerpoint content). But when anything breaks you have to call the help desk, because you cannot help yourself: we are dependent on technologies we barely understand. This wasn’t always the case. The percentage of people whose early driving experiences included the ability to actually fix their cars was much higher than was ever the case with computers, VCRs, or cell phones. Hardly anyone ever bonded with digital technology; instead, a gap appeared almost immediately between digital technology and everyone’s ability to keep it humming. Our digital dependency is thus much greater than it was on industrial or analog technology. We are happy when the machines stay up; depressed when they are down. Do you think there is a relationship between this frustration and our interest in outsourcing?

Technology is a fair-weather, multiphrenic friend that simultaneously increases productivity, complexity and confusion. If we take a hard look at our use of technology tools and gadgets the picture’s pretty ugly. We spend way too much for way too little, and we are by and large oblivious to the lack of return on our personal or professional technology investments.

There are lots of reasons why this is the case. Most of the obvious ones—like bad business cases, early adoption of unproven technology, and bad management—are easy to understand, but the less obvious ones are what is really driving the technology/productivity disconnect. As suggested above, we still think technology development is evolutionary, still treat its impact on business as only enabling, and still think that technologies (and technologists) are really separate and different from other professionals in our companies. While ROI and TCO models are almost always useful barometers of how much we are spending with what impact, there are those among us completely obsessed with long division. Revenge of the CFOs? Sometimes.
PRIVACY

What about privacy? The linkage of global positioning systems, mass customization, and continuous connectivity means that people who want to sell you stuff know what you like and where you are all the time. While you might think it is cool that your cell phone rings with a message about a sushi opportunity in 15 feet, after it happens 20 or 30 times you will (and your customers will) turn off the phone, and the pager and the PDA, since the sushi message will roll from one device to the other if any of them are dead. Specific knowledge about consumer preferences will be widely shared, sold for huge profits when the consumers are big spenders, and used to develop individual marketing campaigns designed to woo every consumer in the ever-growing database.

A recent survey revealed some truly amazing opinions about privacy. Seems that in spite of rhetoric about the value of privacy, the majority of Americans are willing to sell their consumer preference data—their privacy—for $462 per year. This is clear evidence that those surveyed have absolutely no understanding of the privacy threat, or the survey was populated with people eager to expose all aspects of their personal lives. The sane among us should have serious concerns about the amount of data advertisers and manufacturers are collecting. The annoying telemarketers that call during dinner now have enough data to inform us, during dinner, that we should have clicked on the sale links while browsing online for books at 3:09p.m. The same people also know what we have purchased online, how long we lingered on specific merchandise, and what we are likely to buy at various times during the year. You tell me who is in control?

Or, from another perspective, are you the telemarketer? If you are, or are otherwise committed to customer personalization, then you understand the fragile relationship between privacy and business. (Truth be told, you understand how to exploit our quasicommitment to partial privacy.)

WHO IS TECHNOLOGY?

Technology will play a larger and larger role in our lives. This is inevitable. Much of this technology will become “seamless”: it will operate out of sight, like electricity or the way the telephone system used to operate. But make sure that the subtleties of what happened to telephone service do not fall through the cracks of misunderstanding or misrepresentation—or your emerging relationship with digital technology. The government in its infinite wisdom decided that we needed more telecommunications competition, so it broke up Ma Bell’s family to protect us from price gouging. Lots and lots of companies were permitted to enter the
market. No longer could you make one call to satisfy all of your needs. You had to call one company to arrange for the line to come into your house, another to install the phones that you purchased from a retailer, and two more to service problems that occur, since the company that brought the line to your house refuses to touch anything inside your house, and of course vice versa. The net effect of all this is that we have to actively participate in the planning, implementation and support of our personal and professional telecommunications systems. In order to do this, we have to know something about the technology. So what started as government intervention intended to make telecommunications easier and cheaper ended with a complex, expensive anti-solution. Relatedly, the enterprise application integration (EAI) cottage industry exists today because of all of the disembodied pieces that IT managers have to interconnect. Would someone please think solutions before tinkering with regulations or standards?

As the role of digital technology increases, we will all be expected to know more and more about what works, what is expensive and what is obsolete. At home, we will have to know what Nintendo, Sony, and Microsoft have planned for their personal video games and at work what Cisco and IBM have planned for corporate networking. Pretty soon the distinctions between home and work will blur and we will have to track technology integration and interoperability progress as well. The trend toward technology decentralization and democratization will actually require us to continuously upgrade our technology knowledge, just what we need, as we try to manage the collapsing walls of our personal and professional lives. We are all going to learn how it feels to stand in a digital bread line.

What about the World Wide Web (WWW)? The Internet is the most important information technology of the 20th century. When the WWW appeared in the early-1990s unprecedented access to massive amounts of information was granted to anyone with a PC, a modem, and an account at an ISP. Never before had so much information and knowledge been “published.” Never before was information and knowledge wrapped in instant, cheap communications: arguably e-mail is the most important communications medium on the planet. But just as certain are search problems on the Web. With millions and millions of Web pages out there organized around all sorts of themes, transactions, and biases, finding what you need when you need it continues to be one of the unpleasant side-effects of universal access. “Search engines” are still pretty dumb, understanding only what you say—not what you mean. So when you ask for information about Indians you will get information about the Sioux, Indians from Madras, and more than you ever wanted to know about the Cleveland Indians baseball team. Redundancy is also a problem: there are numerous sites that do exactly the same thing. You can buy books, CDs, DVDs, and videos at about 100 sites, post your resume on 50, and plan a trip on another 100, each with links to scores of related sites. Skillful Web navigational requires lots of
practice. It is been estimated that efficient searching requires between 100 and 300 hours of inefficient searching. Considering that there are 2,080 hours of work in a year, all you need to do is carve out a couple of months of your work year to learn how to find stuff fast on the Web. Of course if you cannot learn while at work you can always take 100 to 300 hours from your personal life. Did I miss something here? There is a thin line between fun and frustration.

The Web provides all kinds of opportunities for technology optimization—and all kinds of opportunity costs. Connectivity, hardware, and software decisions are many and varied, not to mention the most daunting of all: deciding where to go and how to get there. Do you need the newest version of America Online? Should you download plug-ins and players every time you get an on-screen message suggesting you do so? How much time should you devote to all this? People stay up all night, having fun, trying to figure out the Web. Have you? Worse, how many hours a week do your employees surf around looking for what they need to do their jobs (and other stuff)?

**NOW WHAT?**

This report is about technology optimization through a new relationship between business and technology. It is about cost-effectiveness, return-on-investment, and all that kind of thinking, but it is really about unlocking technology’s potential to improve things, not just your image, and especially your business. The arguments here are designed to redistribute control over technology, control that can provide you with opportunities well beyond our current thinking about why we need so much technology in our personal and professional lives.

The larger hypothesis is that we have bet too heavily on technology, that we are still in the early stages of technology optimization, and that we are pretty clueless about how to get the most out all this digital paraphernalia—just as all this stuff is actually beginning to work! Again: “just as all this stuff is actually beginning to work!” The implications are huge. The United States is the first trillion-dollar-per-year-information-technology-spender. Many other countries are closing in on the trillion dollar mark. IBM and Microsoft each spend well over $5 billion a year on research and development. Individual households are spending upwards of 20% of their disposal income on technology in one form or another. It is safe to say that 50% of this personal and professional cash is wasted on misguided investments that do not satisfy serious requirements. The truth is that we are in transition from Stone Age digital processing to bona fide technological ubiquity. But those who market and sell the stuff make us think we cannot live without MP3 wristwatches, Web-enabled cell phones, multiple e-mail accounts, Web services, natural language
processing, or storage area networks. Pain killers are always more valuable than vitamins, but technology marketing gurus keep us away from comparisons.

Like a lot of what we think we cannot live without, digital technology is only valuable when it solves specific problems or frees us from difficult, time-consuming, or ridiculous tasks. It is time for a reality check.

Certainly no one believes that technology will not power the new economy. Long term it is the best bet in town. But the timing of all this is tricky—and manipulated. What the Internet stock frenzy really offered was a glimpse of what will happen when the best business models succeed. The exuberance that persisted was a proxy for just how incredible the new economy will be. But if you are like me you are still waiting for reliable, unobtrusive broadband service to your home, still excited more by the promise than the reality of the new economy. Make no mistake: the new economy will be anchored by “pervasive computing” capabilities, with “always on” and continuous computing and communications capabilities. Personal and business processes will be automated and secure. But the new economy’s digital infrastructure will not be ready for a while. How long, really? The best we can do until then is buy little pieces of it and coldly assess its meaningfulness to our personal and professional lives—which is precisely where the challenge of technology optimization lies. Buy the wrong pieces and you’ll experience all sorts of problems; buy the right ones and the quality of your personal and business life will be enriched. Along the way you’ll have to navigate aggressive marketers hawking half-truths about how wonderfully all the pieces fit together.

The emphasis here is on the role technology should play in your personal and professional lives. Technology will not lead your life processes and decisions, it will follow and enhance them—and you will know how to spot and defuse all varieties of hype.

But most importantly this report resets the digital revolution in the context of business and technology progress. When all is said and done, this second major wave of digital technology will earn its place in history by stimulating debates and influencing lasting change. This report launches a debate in an effort to influence the changes digital technology will trigger. We are at a flashpoint: the pace of technology deployment and business velocity has already outstripped our ability to assess its impact on how we live, produce, and distribute. It is now time to think about where all this is going—and how to optimize it. Let us reset the dials:

We have lived through several computing and communications “waves,” all the way from mainframe-based computing to business processes that only exist on the Web delivered by distributed servers.

Some of the effects of technology have not been well studied, or studied at all; the life/work balance is out of kilter—and getting worse; life/work disequilibrium is threatening overall productivity and laying the groundwork for future workplace revolutions.
Lots of the early, and current, stuff does not work as advertised, resulting in a cynicism about “business/technology alignment.”

The bursting of the Internet bubble resulted in an over-correction, a dubiousness about all varieties of distributed computing equilibrium.

Just when the stuff started to work and just when business models were beginning to morph out of their traditional vertical silos, capital spending in technology collapsed.

In spite of all these reactions and trends, we are now sitting at one of the most important crossroads in the history of business technology, and especially business technology management—the subject of the rest of this report.

THE NEW COMPACT, OR “ALIGNMENT” IN THE 21ST CENTURY

Let us assert that the computing and communications technology we have developed and deployed over the past 30 years represents a kind of prototype. Of course it is robust. PCs have gotten cheaper. Serious companies all have access to the Web, and we are now free to think about customer relationship management, Web services, and the emerging semantic Web. But we still struggle with a lack of standards, growing integration, and interoperability problems and chronic disconnects among our back office, front office, and Internet applications. We have gotten good at creating technology pieces, but we are only now beginning to focus on how they all work together.

Let us also assert that business models are evolving, morphing, and accelerating faster than ever before. Let us assert that your company now finds it hard to draw old lines around what it does and how it operates, or around what we used to call it is core competency. In fact, the whole notion of core competencies is now confused since companies began rethinking their supply chains, partnerships and alliances. Here is a thought: is Dell a computer manufacturing company or a supply chain planning and management company? How hard is it to imagine Dell as a company with multiple lines of business including one that sells supply chain management software and services? The other lines of business will focus on manufacturing and distribution using Dell’s advanced software platforms. Dell’s core competency is this scenario? Supply chain integration.

The last 30 years constitute the first digital revolution. The next 30 will define the second one. Companies that treat the interplay between business and technology as a simple extrapolation from even the most recent past (yes, that includes our initial infatuation with the Web) will be out-maneuvered by companies that see it all differently, that is, as a revolution enabled by the pure business technology con-
The convergence of technology and business change is what is different. But unlike a perfect storm when lots of bad things happen at the same time, what we have now is a perfect opportunity fueled by the convergence of technology that is finally ready for prime time, business models that embrace speed and flexibility, and management possibilities that will treat the relationship holistically. Stated a little differently, the stuff now almost works as advertised. Of course, you might argue that “almost” is not good enough, or that you have heard it all before, and that the most prudent approach is to simply wait until the stuff starts really working—as advertised. You can take this approach but the problem is that when convergence hits you’ll have to scramble to catch up to those who saw it coming. Remember the Internet: have we forgotten that Microsoft actually missed it, only to respond with the now famous “extend and embrace” initiative? If all this is true then the way we approach business and technology modeling should change dramatically. The approaches we have taken to business/technology “alignment” served us well for a while, but grossly miss the point of holistic modeling.

So how should we proceed? If a picture is worth a thousand words, Figure 1 is one that hopefully communicates the essence of what I am talking about and what this report describes.

What does all this mean? First, it means that questions that belabor business technology “alignment” are obsolete. It means that organizational distinctions

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Figure 1. How to think about business technology integration
between business and technology should disappear and be replaced by a seamless interconnection that makes it impossible to address one without the others. It also means that chief generalists (CEOs, CFOs, CIOs, and even CTOs) need to become wider and deeper, redefining the whole notion of generalist practitioners. Can you really lead a company if you do not understand technology architectures and applications? Can you enable a company if all you understand are architectures and applications?

The relationship between technology and business has evolved in a largely productive way that is served each community pretty well over the past 30 years. Companies spend millions and in some cases billions of dollars a year feeding each community that essentially co-exist for the greater good—profit, bonuses, and shareholder value. By and large, the relationship “works,” though there is increasingly evidence of dysfunctionality in the trenches where wars continue to erupt among technologists, business managers, and finance professionals, the latter group for the life of them cannot understand how an enterprise resource planning (ERP) implementation project in a Fortune 500 company can cost a 100 million dollars and take 3 years to complete, or why in the same company it takes 3 years to migrate from one desktop/laptop operating system to another.

These wars aside, we now have lots of applications, data bases, devices, communications, virus protection, security, and even the means to resume business if a disaster occurs—and all of this stuff works reasonably well most of the time. Analysts like Paul Strassmann tell us that we are overspending on technology and the relationship between technology investments and productivity is anything but clear. Others, especially in this bearish economy, have resurrected total cost of ownership (TCO) and return-on-investment calculi to derail big technology initiatives.

But things are improving all the time. We whipped the Year 2000 problem, connected just about everyone to the Internet, and have begun to more deeply appreciate the need for integration and interoperability even as proprietary vendors make it tricky to have the pieces all fit together. So life in the trenches is, well, pretty good.

Let us continue with the assertion: we have reached the point where if continue along the same business technology relationship path, we will undermine the very business models and processes we are trying to define and deploy. Worse, the current relationship will eventually collapse under its own weight due to organizational ambiguities, technology complexity, and our inability to satisfy consumer or business-to-business requirements that are appearing and changing faster than they can be supported.

While the evidence tells us that computing and communications technology have made enormous strides over the past 30 years, and we now routinely talk about business/technology “alignment,” technology optimization, and how companies
can extend their business models through pervasive communications, our current discussions about supply chain planning and management, collaborative forecasting and automation all assume a business/technology relationship that is fundamentally different from our notions of “alignment” or our organizational attempts to get technology to the head table: discussions about whether CIOs and CTOs should report to the CEO or CFO are really very 20th century, since everyone now knows that CIOs and CTOs should breakfast with the big guys (assuming, of course, that they are house-broken).

From another perspective, it is no longer possible for a chief executive or any sane senior management team to conceive of new—or extend an existing—business model without addressing technology requirements, capabilities, and costs. Some of these models are actually created in reverse, where business models extend from what is technologically feasible, not necessarily from solid (read: profitable) business models. Remember the dot.coms?

We have been through a lot over the past few years. We discovered the Internet, successfully managed the Y2K compliance problem, over-hyped Web-based business models, and confused even the most loyal technology investors about what drives capital technology spending.

A longer view, way back to the 1960s, saw the introduction of “data processing” to industries that barely knew what to make of computers, software and data bases. The 1970s took us to a much higher level where mainframes got a little flexible, minicomputers arrived for the frugal, and PCs began to procreate among parents—like Sinclair and Osborne—long since extinct.

During the 1980s everyone absolutely had to have a PC at work and increasing numbers of us had to have them at home. Even personal software got easier to use, principally through Apple’s introduction of the Macintosh, though business applications continued to only slowly evolve.

The 1990s gave us client/server computing, our first real freedom from mainframe architectures, the Internet, the World Wide Web, multitier applications, data warehouses, data mining, applications integration, online exchanges, new security requirements, privacy issues, virtual private networks, application service providers, content management, knowledge management, network services, C++, Java, Perl, Linux, customer relationship management, e-CRM, interactive marketing, Bluetooth, 802.11, and a whole lot more.

Lots of us think we have achieved a new level of “alignment,” or the process by which technology supports business. The truth is that the questions that dominate this new alignment consciousness are still the wrong questions. Why? Because technology and business are no longer even “equal” partners—they are an integrated whole.
Here are some questions that no longer make any sense:

- How can we leverage IT onto the “right” business processes in the most cost-effective ways?
- In which technologies should we invest?
- How should we acquire and manage these technologies?

They make no sense because they ignore macro trends in business and technology and they ignore the purposeful aspects of the questions. Why is one technology more important than another? Why is a technology important at all? Technologies without business models are as useless as business models without technologies. This is the key point: technology, business and management can no longer be treated in relative vacuums. They work together or not at all.

The approach we have taken to “aligning” information technology with business models and processes served us well until the year 2000. While most companies never quite got there it is time that they stop trying to achieve the old objective. Not because the goal was wrong, but because it is no longer consistent with the business and technology trends that are upon us: the pace of technology and business change has forever altered the way we should think about how we find and service customers and organize ourselves to compete.

The net effect of all this is that we will continue to spend far more on technology than we should, that we will continue to ask the wrong questions about technology, that we will miss myriad opportunities to leverage IT onto our business strategies, models, and processes, and that we will continue to march to agendas set by consultants and, especially, vendors. We also tend to default to conservative interpretations of what is really outside the box: very few companies are really serious about radically changing, or even challenging, their existing business models. Unfortunately, this perfect storm requires much more than conservative extrapolations of current business models.

While there are certainly organizations that suffer less than others, the lion’s share of companies older than 20 are in serious trouble. Really scary is the number of executives unaware of just how serious their condition is. Huge numbers believe that Microsoft, Oracle, or Netscape have the answers to their problems, or management consultants can set them straight, or—even more bizarre—that in-house people that missed seeing the problems can somehow solve them.

All of this occurs as the promise, and reality, of IT is at an all-time high. The producers of IT products and services wax damn near poetic about what they have made possible—and what they plan to do next. Executives crow about how their companies are “upgrading” their “infrastructures” and deploying “state-of-the-art” communications and computing “architectures.” The fact is that precious few
really understand their own speeches. The consumers of technology are thus at a
distinct disadvantage, a disadvantage that is systematically exploited by producers.
The facilitators of IT, the consultants, play both sides, offering advice to harried,
perplexed consumers and the producers of IT, brokering the relationship often with
the finesse of a magician.

Comptrollers are forever writing checks to buy more computers, more telecommu-
nications, more software, and more technology professionals. But Chief Execu-
tive Officers want to document the return on their investments. Chief Information
Officers find themselves on the defensive far more often than they find themselves
in the winner's circle: who wants to be at the head table if you always get served
last?

The technology marketplace is one of the largest and fastest growing in the world
today. But everywhere one looks, everywhere one goes, and over and over again
in the technical journals and trade publications we still see references to the same
issues, problems, and challenges: “the software crisis,” “the requirements problem,”
“the return on investment challenge,” “process improvement,” and “total quality
software management,” among all sorts of others dopey things. Many of us wrote
about requirements problems 2 decades ago, we called for project “dashboards” for
managing multiple projects, and committed ourselves to “process improvement.”
Well, here we are 20 years later asking the same damn questions and, worse, pro-
posing the same damn solutions.

But these are “tactical” problems, problems that are created by—so they can be
solved by—the producers of technology products, systems, and services. Is this a
conspiracy? You bet (though we could argue about how conscious it really is).

Problems are easy to identify. Solutions are harder to come by. There are legiti-
mate reasons why there are more books about problems than solutions. Perhaps the
most obvious is the “moving target syndrome”: as business requirements change,
technology changes. As technology changes, price/performance ratios change. As
price/performance ratios change, corporate cultures change. As corporate cultures
change, global competition changes. As global competition changes, profitability
changes. As profitability changes, the technology market changes. And so it goes.
What do you do first?

Enter the consultants. There are “conventional” consultants, “contrarian” con-
sultants, and consultants who have solutions for problems yet to be invented. And
there are vendors—thousands and thousands of vendors. Consultants and vendors
seek to reduce problems to their simplest terms, not because problems are by nature
cooperative, but because it is the only way they can appear confident enough to
convince CIOs, CEOs, and CFOs to spend more money.

This report looks at the intersection of computing and communications technol-
ogy, people, organizations, requirements, markets and constraints. It documents the
problems in an effort to understand and explain them. It challenges “conventional” and “contrarian” wisdom. It takes the prevailing “bunker mentality” and generates prescriptions, predictions, and an adaptive approach to the acquisition, deployment, and management of information technology.

The report assumes that problems and solutions cannot be traced to computers, management, software, people or networks—but to all of above and then some. We are no longer in the age of disembodied solutions to anything; we are in an era of complexity, integration, and synergism. It no longer makes any sense to hire a consultant who knows just about everything there is to know about software but very little about hardware (just as it makes no sense to hire a car mechanic who does not drive).

The report is partly diagnostic but mostly prescriptive. It is about a set of concepts, perspectives and technologies; it is not filled with “silver bullets.” It is about how technology can be leveraged onto problems that are difficult to model, certain to change, and often expensive to fix. It acknowledges the complexity of technology-based organizational effectiveness. It stands tall for analysis and discipline—and evidence-based option generation and selection. In other words, if you want to win the second digital revolution, you had better understand and manage the politics swirling around your company.

The report also identifies a suite of principles that define processes that point to methods. Not long ago I received a call from the CFO of a Fortune 500 company about to write a check for $30,000,000 for a network and systems management framework. I asked if his requirements analysis was able to profile his organization’s computing assets and network management needs, if his in-house technology professionals had performed trade-off analyses of several alternative frameworks, and if those who would actually be using the framework (to presumably manage their networks better, faster and cheaper than before) had ever used similar tools to help solve network management problems. The CFO asked me to explain what requirements analysis was, the CIO had no idea what network management point solutions were already in the organization, and the network operations center director had not compared the new network management environment about to be acquired with anything else (but liked the vendor’s brochures and videotapes). No one had even talked to the network managers who would actually use the application. This short story illustrates how principles, processes and methods can be ignored—and how some relatively simple steps can lead to enhanced productivity and cost-effectiveness.

The analyses and recommendations here are anchored in field and case studies not as evidence or documentation, but as points on a new compass. Over the past 20 years, we have cataloged problems and documented successes. But remember that 20 year old cases are about as relevant today as a single anecdote about a guy down
the block who had success with approach A, consultant B, or vendor C. The key lies in the extent to which generalizations hold against the moving target backdrop. For example, who the hell really cares about centralized computing environments today? How can technology investment decisions be made independent of technology forecasts? Who cares about flat data files? The report argues that any rational approach to the technology business of business technology is multidisciplinary, adaptive, cautious, and evidence-based.

So what happens if you read this trends analysis? If you are a CEO you will be armed with questions that should be asked of your business and technology professionals—at the same time and in the same room. You will also gain insight into one of the largest, most voracious, yet potentially most significant, “sink holes” in history. A strategy, complete with tactics, will also be developed. If you are a CIO, you will receive some tactical insight on technology acquisition, deployment, and management. You will be cautioned about repeating the mistakes of your competitors. You will think twice before authorizing big technology buys.

Regardless of your role the report will provide you with a new perspective—an analytical compass. The central theme is simple: in spite of all of the hype, all of the serious technology, and all of the rapidly changing business models, we are at a crossroads. It is now time to rethink the business technology relationship and move it from a less-than-equal partner model to an integrated holistic one. The objective of the report is to help you construct a business technology convergence plan that will work for your organization, your people, your corporate culture, and your resources.

**HOW TO THINK**

True business technology convergence assumes that all discussions about existing or new business models and processes will occur with immediate reference to technology and the best management practices necessary to integrate all of the pieces. With that in mind, let us look at the pieces and how they should be assembled. Let us also keep in mind the earlier perspectives on personal and professional technology, and how the decisions we make from this point forward should be approached.

**Business**

If a company does not understand its competitive advantages and its current and future business models, it is doomed. Not only will it fail in the marketplace but it will waste tons of cash on technology along the way. We used to ask: “what is
our core business?” “What do we do well?” “What markets do we own?” The new questions are different:

- “What do we do profitably today?”
- “What should we do tomorrow?”
- “How does technology define and enable these efficiencies?”
- “What business models and processes are underserved by technology?”
- “Which are adequately or over-served by technology?”

Let us look at business models and processes, technology (and management) holistically. Figure 2 offers some ideas and key questions.

It is all about the big questions. Do you know what you do well, poorly, and with whom you compete? Have you thought about what your business will look like in 3 years? Have you segmented what you do according to margins? (One of the more interesting things about the HP/Compaq merger is all of the arguments that broke out over control of a low margin, commodity business.) Larger questions include the long-term survival of your business via partnerships and alliances, the rate at which you can really change, and the interplay among business creativity, technology delivery and management efficiency.

If you are like most companies, those who run “strategic planning” are often one step away from retirement. But holistic modeling requires that business creativity

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Figure 2. How to think about business, technology, and management
be taken more than seriously, and that those who define and engineer innovation are also good strategic technologists and managers. If they are not, you will miss the historic convergence occurring as we speak.

Do you know if your technology infrastructure, applications, and support all “work?” Do you know if they “match” your business models and processes? Do you know how the pieces might break? And, most importantly, do you know if your technology can grow with your business creativity? If someone asked you if you had too much or too little technology how would you answer them? Would it be easier if they asked if you had the right or the wrong technology?

Who owns creativity? Who owns technology? You have made your first mistake if they live in silos which seldom communicate. (When we talk about organization later you will see just how dangerous business/technology segmentation actually is.) Who manages the integrated process? How is success and failure defined and measured?

Here is the benchmark: if you develop “new” business models (or improve existing ones) and then ask technology if it can support the changes, then you are suboptimizing the business → technology relationship—and you are likely to over- or underspend on the business technology initiative. Why? Because business models cannot exist without enabling technology and technology’s only purpose is to support business models and processes. Yes, the implications here are huge. If you revisit the perspectives described at the beginning of this report, you should note that without near perfect synergism, then you will end up with too much, too little, wrong, expensive, and unreliable technology supporting business models that may or may not exceed their potential.

Communications

If we have learned anything over the past few years, it is the importance of pervasive, secure, reliable communications. It not just about the Internet. It is about communications inside and outside of your firewalls and it is about mobile communications. It is about communications among your employees, suppliers and customers—and even your competitors. Have you ever wondered about Dell’s (and other) online computer sites that sell Microsoft software and HP’s printers? Since all of these vendors need each other to some extent or another, they therefore need to communicate.

It is no exaggeration to say that communications technology will make or break your ability to compete. There are all sorts of issues, problems, and challenges that face your organization as it wrestles with its business strategy, its communications response and its ability to adapt quickly to unpredictable events. Figure 3 identifies some of the synergistic issues and questions. Assessments need to be made first
about who will connect to your “network.” If your network will be wide—lots of employees, customers, employers, partners—then you may need to re-architect your communications infrastructure. You should simultaneously ask questions about your communications infrastructure, the applications (like e-mail and workflow) that will ride on the infrastructure, and how you’ll manage infrastructure migration and measure communications efficiency.

Note that the distinction between business and e-business is gone: all business technology plans should assume full connectivity among a constantly growing number of participants. If you fast-forward to 2009, you will be expected to have the capability to add or delete network nodes and users at a moment’s notice. The whole concept of “communications support” is already obsolete, since communications is not a supporting player but an integral part of every aspect of your business process.

Applications

There is a pretty good chance that your applications portfolio is a hodge-podge of applications developed over the past 30 years or so that require some form of life support to exist. You have probably got applications that are mainframe-based, some client-server applications, and some Internet applications that are driving your e-business strategy—and herein lies the problem: for the past 30 years we have been defining applications around silos and fiefdoms. In fairness, we developed
applications around tasks we needed to complete. Initially these tasks were computational; over time, they became transactional, and now they are collaborative. Unfortunately, many of us are still just “computing.”

The applications end-game consists of a set of inter-related, interoperable back-office, front-office, virtual-office, desktop, and personal digital assistant (PDA and other thin client) applications that support evolving transactional, collaborative business strategies.

Figure 4 lists some of the questions begging for immediate answers.

A key application question should focus on the relationship between transactions and profit. Do you know which ones yield the greatest profit? Do your applications facilitate the touching of employees, suppliers, customers and partners? How many applications do you have (that run on your desk-tops, lap-tops, PDAs and other access devices)? Do you have an applications portfolio management system that helps you locate and support your applications?

Data

Data is the lifeblood of your applications and your plans to link employees, customers, suppliers, and partners in a virtual world. We now think beyond data base administration and about intelligent decision support, online analytical processing, data warehousing, data mining, metadata, and universal data access. Or at least we should.
Figure 5 lists some of the major questions about data, questions that should get you thinking about the interrelationships among business, data, and management. The business questions about data are the proverbial ones: can we cross-sell and up-sell? Can we connect everyone? Can we extend our business models through integrated data, content and knowledge bases? The technology questions address variation and integration, and the management questions address administration efficiency and gaps.

**Security and Privacy**

Security—and its first cousin, privacy—are now household requirements. If you ignore them, you are toast. How did this happen so fast? Blame it on distributed computing, and the distributed steroid known as the Internet. As business models moved into cyberspace we found ourselves facing new threats. We are now surrounded by security and privacy technologies, officers, consultants, and regulators.

Figure 6 lists some key questions.

Trust is critical here. While many consumers have increased their online purchasing, there are still lots that have reservations about making serious purchases over the Web. Business professionals feel the same way about large B2B transactions, and problems with spam and pornography continue to grow.

Denial of service attacks, viruses, sabotage, and full-blown information warfare are all likely to increase as our dependency on digital transaction processing increases.
The technology has to provide trust and protection in cost-effective ways, and all of the trust, protection, and technology pieces have to work together in an environment that is procedural and disciplined. The key point? Trust and protection are business technology goals, not just technology goals.

**Standards**

The whole area of standards is fraught with emotion. Nearly everyone in your organization will have an opinion about what the company should do about operating systems, applications, hardware, software acquisition, services, and even system development life cycles. Everyone. Even the people who have nothing to do with maintaining your computing and communications environment will have strong opinions about when everyone should move to the next version of Microsoft Office. In fact, discussions about standards often take on epic proportions with otherwise sane professionals threatening to fall on their swords if the organization does not move to the newest version of Windows (or Notes, or Exchange—or whatever).

The other side of standards is technology-based: will the world migrate to Java applications or will extensible mark-up language (XML) obviate the need for common applications architectures? Will fast Ethernet grow dramatically? Will Bluetooth or other wireless standards like 802.11 (a/b) dominate mobile computing?
Why are variation and technology standards so important? Because they determine how much business agility you have, how much business technology efficiency you enjoy, and how much you spend to keep the trains running on time.

It is likely you have heard references to return on investment (ROI) and the total cost of ownership (TCO) every time the subject of standards comes up. Lest there be no misunderstanding here, there is no question that environments with less-rather-than-more variation will save money. Or put another way, you have some choices here. You can aspire to be sane or insane.

What does management really want here? Standards are a second-order business driver. Most businesses do not associate standards-setting with business models, processes, profits or losses. Whether the environment has 1, 5, or 20 word processing systems variation is seldom associated with business performance: it is hard to link homogeneity with sales! But the fact remains that expenses are clearly related to sales, and standards are closely related to expenses. Herein lies the subtlety of standards and 21st century business technology convergence.

What else does business management want? They want flexibility—and here lies the only sometimes-valid argument against standards. If your environment does not support the business computing or communications processes the business feels it needs to compete, there will be loud complaints. Business managers want to compute and communicate competitively. Standards are often perceived as obstacles, not enablers. But almost always, nothing could be farther from the truth.

If we have learned anything over the past few decades, it is that standards are as much about organizational structures, processes, and cultures as they are about technology. The ability to actually control computing and communications environments through thoughtful governance policies and procedures will determine to a great extent how standardized organizations become. We have also learned that the more you succeed the less you will pay.

We have also just recently learned that technology standards yield business flexibility. Not only do standard architectures permit business agility but less-rather-than-more variation in your environment will keep costs manageable. The following figure lists some questions that will help you implement a standards strategy.

**Organization**

Beyond the endless discussions about death march CIOs who report to CFOs, and Cheshire CIOs who have landed seats at the big table courtesy of their CEO-reporting relationship, are huge issues around how to make IT “work” in your company. Here are a few of them:
• The re-engineering of IT organizations will surface as one of the major corporate imperatives of the new millennium: companies will look to IT to (really) integrate with the business and provide competitive advantage; organizations that fail to assume this new role will be ousted in favor of new regimes that “get it.”

• Speed and flexibility will become as important as consistency; “good ‘ol boy” relationships will be (partially, not completely!) replaced by strategic partnerships that will be judged by performance—not historical inertia.

• As skill sets become obsolete faster and faster, there will be pressure to change IT organizations at a moment’s notice. This will dictate against large permanent in-house staffs organized to protect their existence. New applications pressures will kill entrenched bureaucracies and give rise to a new class of results-oriented hired guns.

• The emphasis on business/IT convergence will increasingly focus on business requirements which in turn will lead to business applications and computing and communications infrastructure specifications. Given the pace of technology change, it is essential that your organizational infer requirements and produce specifications quickly and efficiently. This will require companies to tilt toward staff with these kinds of capabilities as they proportionately tilt away from implementation skills. IT organizations will be driven by “architects” and “specifiers”—not programmers.
Companies will find it increasingly difficult—if not impossible—to keep their staff current in the newest business technologies. This means that IT organizations by default will have to outsource certain skills. The approach that may make the most sense is one that recognizes that future core competencies will not consist of in-house implementation expertise but expertise that can abstract, synthesize, integrate, design, plan, and manage IT.

Figure 8 lists the key organization questions. The questions focus essentially on the role that business technology plays in the company as well as the tools necessary to manage business technology assets. As always, incentives should play a pivotal role in business technology optimization.

**People**

It is naive to believe that behavior will change by redrawing organizational boundaries or by codifying new responsibilities. In order to make 21st century business technology convergence work, several things must be true:

Skillsets must be re-examined: skillsets that supported mainframe-based applications, data center operations, and related activities are less valuable today— and will certainly be less so in the future—than architecture design, systems integration, distributed applications (so-called network centric applications), project management, and program management skillsets.

*Figure 8. How to think about organizations*
Incentives must be re-examined: we must revisit the reward structure to make certain that the skills, talent, and activities that mean the most to the company are generously rewarded, while those of less importance are rewarded accordingly. It is essential that the “right” message be sent here: employees must believe that (a) there is a clear vision for the business/technology relationship and (b) they will be rewarded for their dedication to this relationship.

A new breed of business/IT professionals must be fielded, professionals with an understanding of broad and specific technology trends, business trends, and how to convert the intersection into system requirements and system specifications. Such professionals will work directly within the businesses to understand how technology can cost-effectively define, enable, and support business models and processes.

Take a look at Figure 9. Many of the serious people questions are there.

**BUSINESS TECHNOLOGY TRENDS**

Who is in charge of tracking business technology trends in your company? Lots of places have in-house gurus but very few have created formal positions to track the major technology trends that can impact their companies. I must confess that I have always found this amazing given the pace of technology and business change. Maybe it is time for all of us to rethink our technology watch strategies.

So how do you identify the technologies most likely to keep your company grow-

*Figure 9. How to think about people*
ing and profitable? The explosion in technology has changed the way you buy and apply technology and has forever changed expectations about how technology can and should influence your connectivity to customers, suppliers, and employees.

What you need is a technology investment agenda that helps you identify the technologies in which you should invest more and those that get little or none of your financial attention.

The agenda ultimately must be practical: while blue sky research projects can be lots of fun (especially for those who conduct them), management must find the technologies likely to yield the most growth and profitability, not the coolest write-up in a technical trade publication. But this can be tough especially when there is so much technology to track—and relatively little certainty about what your business models and processes will look like in two or three years.

The trick is to identify the right technologies at the right time and make the most cost-effective investments possible. Or, stated a little differently, it is hard to innovate if you do not track trends in computing and communications technology.

Let us identify some technologies that should appear on everyone’s list, technologies that will impact a wide range of horizontal and vertical industries:

- Objects
- Wireless
- Peer-to-Peer
- Optimization
- Web services
- Artificial intelligence
- Customization & personalization
- Data integration
- Applications integration
- Security solutions

No doubt there are others. This is an almost generic list; the key is to distill it down to those likely to most impact your business by addressing each of the technologies with reference to trends in business models and processes and the management policies and procedures necessary to optimize performance.

Simplicity is important here. A long list of cool technologies does not help many companies with their business/technology alignment. The key is to reduce the number to those that can be monitored and piloted. This is the proverbial technology hit list—as famous for what is on it as for what is not.

The purpose of technology monitoring and assessment is to develop lists of technologies likely to impact your business. Hit lists are excellent devices for rank-
ordering and screening technologies. They also focus attention on specific technology opportunities. But remember that the holistic approach requires that you identify technologies with reference to current and future business models and processes.

Pilot projects should be real projects. They should have project managers, schedules, milestones, and budgets. They also need dedicated professionals to objectively determine where the promise really lies.

Pilot projects should not last too long: a pilot project that requires 6 or more months to yield the classic go/no go result is much less likely to succeed than one that yields an answer in 60 days. In fact, if you institutionalize the piloting process, your ability to attract funds to conduct technology pilots will correlate to how quickly you have delivered results in the past.

Investments you make in new technologies (and in the pilots that justify these investments) should be measured over time to determine if the technology is delivering on the promise you expected. Metrics should be developed that address the rationale for the technology’s deployment, metrics such as cost, speed, effectiveness, and the like, as well as business value metrics, like customer satisfaction, market share, and profitability.

Again, and as argued throughout this report, technology trends assessment in a vacuum is useless: technology’s value is only calculated through business success. So we also need to track the major trends in business models and processes, such as:

- Transaction processing
- Execution speed
- “Agility”
- Adaptation
- Collaboration
- Supply chain integration

All of this is summarized in Figure 10.

10 TAKE-AWAYS

This trends report is about the relationship among business, technology, and management. Ideally, after reading the report you would think a little differently, know some things you did not know before, and be able to do some new things.

Here is a summary of some of the key ideas in the report that address the think/know/do possibilities:
1. Technology decisions cannot be made in a business or management vacuum; all technology decisions touch internal (employees) and external (customers, suppliers, partners) players and all technology investments should be driven by holistic strategies.

2. There are “levels” of technology, infrastructure technology, enabling technology, and applications technology, that work inside and outside of their corporate firewalls.

3. There are management processes that can make technology investments more cost-effective, processes such as business case development, assessments of total cost of ownership (TCO) and return-on-investment, performance metrics management, and due diligence.

4. The relationship between business, technology, and management is inseparable—no matter how hard we try to treat them independently.

5. The range of mainstream technologies necessary to define and support successful business models, such as communications, applications, data, and security distributed across the infrastructure/enabling/application technologies landscape.

6. The range of emerging technologies, like wireless, Web services, natural language understanding, and automation (including the “semantic” Web) likely to impact business the most.

7. The range of business technology management tools and techniques necessary to deploy the right technologies in the right way, tools, and techniques...
like ROI, TCO, metrics, EVA, due diligence, business cases, benchmarking, requirements modeling, and systems analysis.

8. The range of organizational and people (political) strategies necessary to make all of the pieces work together including strategies like decentralization, standards-setting, project management, and e-learning.

9. Develop a strategic business technology management plan with all of the necessary components, such as business cases for specific technology projects (like ERP or CRM projects), the financials around TCO, ROI, and strategic EVA), organizational strategies, people strategies, and a plan to monitor mainstream and emerging technologies.

10. Communicate—“sell”—the plan to a skeptical audience.

WHERE IS IT ALL GOING?

The business technology relationship is changing. Let us look at the drivers that are defining the new business technology relationship.

Transformation Trend # 1: Operational vs. Strategic Technology

Discussions about the commoditization of technology are accurate to a point. There is no question that PCs, laptops, and routers are commodities; even some services—like legacy systems maintenance, data center management, and certainly programming—have become commoditized. But the real story here is not the commoditization per se but the bifurcation of business technology into operational and strategic layers. Operational technology is what is becoming commoditized; strategic technology is alive and well—and still a competitive differentiator, in spite of what some recent articles have been arguing.¹ What is the difference? Operational technology supports current and emerging business models and processes in well-defined ways with equipment and services whose costs have become stable and predictable and have generally declined significantly over the past decade. Hardware price/performance ratios are perhaps the most obvious example of this trend but there are others as well including what we are willing to pay for programming. Strategic technology, on the other hand, is the result of creative business technology convergence where, for example, a Wal-Mart streamlines its supply chain, a Starbucks offers wireless access to the Web, and a Vanguard leverages its Web site to dramatically reduce it is costs. There is no limit to how creative business technology convergence can become; there is no limit to how strategic the business technology relationship can be.

¹ What is the difference? Operational technology supports current and emerging business models and processes in well-defined ways with equipment and services whose costs have become stable and predictable and have generally declined significantly over the past decade. Hardware price/performance ratios are perhaps the most obvious example of this trend but there are others as well including what we are willing to pay for programming. Strategic technology, on the other hand, is the result of creative business technology convergence where, for example, a Wal-Mart streamlines its supply chain, a Starbucks offers wireless access to the Web, and a Vanguard leverages its Web site to dramatically reduce it is costs. There is no limit to how creative business technology convergence can become; there is no limit to how strategic the business technology relationship can be.
Implications

Figure 11 draws the important line. Above the line is where management lives. It is also where big front office applications—like CRM applications—live. Below the line are the back office applications and the infrastructure that enables digital contact with customers, suppliers, partners, and employees.

Companies should segment their technologies into operational and strategic layers and adjust their acquisition, deployment, and support procedures accordingly. They should also segment the professionals who tend to these tasks. Beyond this, consideration should be given about the need for Infrastructure Officers, Business Technology Officers, and Business Technology Strategists. Today’s Chief Information Officers and Chief Technology Officers do not map well onto these new requirements. The segmentation suggested here would better support the management of the transformed organization.

Transformation Trend #2: Consolidation

The technology industry is consolidating, not in absolute numbers, but in terms of the number of companies from which companies buy most of their technology. There is much more of a tendency to buy from those with the largest market share than from smaller vendors, even if these vendors are spectacularly hungry for business (and therefore more willing to deal). Some of this is because of risk aversion, and some because we are now comfortable with a relatively small number of vendors as suppliers of our computing and communications technology and services. Requests

Figure 11. Strategic versus operational technology
for Proposals (RFPs) that used to be sent to ten PC/laptop manufacturers or VARs are now sent to three or four; requests for data base (DB) management platforms now only go to two or three DB vendors.

**Implications**

The good news is that consolidation reduces complexity. It is easier, and safer, to select among 5 rather than 50 alternatives. The industry has matured to the point where “best of breed” and “single source” decisions have all but disappeared. Often—though certainly not always—the best of breed is the dominant (single) source.

**Transformation Trend #3: Discipline**

There is also a general increase in discipline used to acquire, deploy, and support technology. We are getting much more disciplined about the use of business cases, total cost of ownership models, return on investment calculations, and project management best practices than we were a decade ago. Some of this is attributable to the general bear technology market over the past few years but some from our discovery of key relationships, like technology variation and support costs or formal vs. “informal” project management and project success. We are just better at making technology investment decisions.

**Implications?**

Since we no longer have to beg for logic in the technology investment process, we are more free to think about high impact strategic technology and cost-effective operational technology. We can also institutionalize policies and procedures for technology acquisition, deployment and support so we do not have to fight about these things nearly as often as we have in the past.

**Transformation Trend #4: Integration & Interoperability**

A significant additional transformation trend is our increasing ability to make disparate stuff—data bases, hardware systems, applications—work with one another. We have seen the field move from application programming interfaces (APIs) to data extraction, translation, and loading (ETL) to enterprise application integration (EAI) to Web services—all in about a decade. Good progress to an even better end game: ubiquitous transaction processing through seamless technology integration. Integration is now a core competency in many companies and the industry has
responded with a barrage of new tools to make things cooperate. This trend will continue and threatens to dramatically alter software architectures and technology infrastructures.

Implications

We are now able to wrap older legacy systems in newer standards-based technologies. We are able to integrate supply chains with Web services, and we are able to think holistically about application integration and the transactions it supports—like up-selling and cross-selling.

Transformation Trend #5: Sourcing

Another major trend is our willingness to optimize sourcing. As more and more technology gets commoditized, we will see more and more hybrid sourcing models. Some companies outsource lots of processes while others have adopted a co-sourcing model where their own people work closely with the outsourcer. The trend, however, is clear: companies are re-evaluating their sourcing strategies and have lengthened the list of potential candidates for full or partial outsourcing. Some of these include help desk support, production programming and application maintenance. If we extend this trend it is likely that we will see a lot more hosting of large applications that companies will increasingly rent instead of wrestling with implementation and support challenges.

Implications

We are faced with an interesting optimization challenge that is ultimately tied to core competency assessments. Figure 12 shows the decision matrix we all need to master:

Transformation Trend #6: Thinstructure

Network access is now almost ubiquitous today: we use desktops, laptops, personal digital assistants (PDAs), thin clients, and a host of multifunctional converged devices, such as integrated pagers, cell phones, and PDAs to access local area networks, wide area networks, virtual private networks, the Internet, hosted applications on these networks, as well as applications that run locally on these devices. These networks work.

Many companies provide multiple access devices to their employees, and employees often ask their companies to make personal devices (like PDAs) compatible
with their networks. All of this is made even more complicated with the introduction of wireless networks which make employees more independent and mobile.

Small, cheap, reliable devices that rely on always-on networks make sense. Shifting computing power from desktops and laptops to professionally managed servers makes sense. Moving storage from local drives to remote storage area networks makes sense. Fat clients should lose some weight—as we bulk up our already able servers. The total-cost-of-ownership (TCO)—not to mention the return-on-investment (ROI)—of skinny client/fat server architectures is compelling (to put it mildly).

Implications

Anyone updating their infrastructures should think about thininfrastructure. Migrations should be filtered with thininfrastructure opportunities. Pilots should be launched to collect TCO and ROI data, and you should begin the education process in your organization to raise everyone’s consciousness about the potential for thininfrastructure in your company.

Transformation Trend #7: Collaboration

As data bases become more integrated, as shopping becomes more digital, and as “always on” access devices become more pervasive, we can expect to be treated to all sorts of offers. I already get e-mail (and snail mail) from companies that have profiled me. The have analyzed data about where I live, what I earn, and what I buy to determine what I like and what I would pay for what they are selling. This is first generation mass customization, child’s play compared to what is coming.

Built on much the same data that mass marketing assumes, mass customization infers beyond the simpler correlations—like age, wealth, time of year—to specific

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ideas about what you and me would really like to buy, based on inferences about us as part of a larger group and as individual consumers.

Contact can be “personalized” with customers, suppliers, partners, and employees through all varieties of messages including sales, marketing, service, and distribution. Over time, given how low digital transaction costs are compared to other ways companies touch the members of their value and supply chains, and how ubiquitous digital communication is becoming, companies will reassess their advertising and marketing budgets. They will go increasingly personal.

Supply chains will become more and more integrated over the next few years, and though we are still probably ten years away from real-time analysis and optimization, all of the business models and technologies assume that real-time is the end-game.

Figure 13 tries to map these trends. Companies will strive toward the top of the cube.

Implications

Think holistically and then make your technology integrate and interoperate. Cross-selling, up-selling, and supply chain optimization are only a few of the outcomes we should target. It is also important to let all of the collaborators in: who will be your suppliers, distributors, customers, partners?

Figure 13. Collaboration trends
Transformation Trend #8: Renting

Five years ago application service providers (ASPs) were all the rage. Lots of companies emerged to host dot-com Web sites and facilitate business-to-business (B2B) and business-to-consumer (B2C) transactions. There was talk about extending the idea to all kinds of hosting, but before they could launch the next wave the dot.com bubble burst. The large enterprise software vendors breathed a sigh of relief: they were safe for a while at least. But little by little the ASPs—like zombies—came back from the dead. Worse, the software vendors themselves broke ranks and began to host their own applications for customers that were too small or scared to implement the software in-house. Up until now, this trend has been relatively slow to mature. But now even Siebel Systems has decided, again, to host its CRM software. SAP’s are also doing it. What is going on?

Research in the field tells us that the probability of a successful enterprise software implementation is somewhere around .25. We know that unless you have got Houdini working for you, it is almost impossible to decipher enterprise software licenses. Unless you are blessed with internal “competency groups” (and the deep pockets necessary to keep them happy) you will need consultants to help you implement and support the application (and even deeper pockets to keep them happy). But much more importantly, unless your company adopts the processes that underlie the application—that is, unless your company has, for example, a customer centric culture with supporting models and processes—you are unlikely to ever recoup your technology investment in, for example, a customer relationship management (CRM) application. Need more logic? Compute the (real) total-cost-of-ownership and return-on-investment (ROI) of a major enterprise application and see if the numbers make sense over some reasonable period of time. There are also some risk calculations we could walk through.

There is a trend toward renting. Sometime this year Salesforce.com, the premier CRM ASP, is likely to go public—and lots of people think that it is likely to be a very successful IPO. Siebel Systems has responded with its own hosting services. Others have followed suit with more on the way. In fact, when we step back and look at a variety of trends in the industry, we see even more evidence that hosting will expand with a vengeance. Web services, utility computing, thin client architectures, and even the Semantic Web are all conceptually consistent with the hosting trend.

Are we sliding toward to new implementation standard? Are large scale enterprise application projects dinosaurs? Will paying-by-the-drink become the new revenue model for enterprise software vendors?
Implications

Given your odds of implementation success, given the uncertainties around TCO and ROI, and given other supporting trends, should you buy or rent? Without question, it makes sense to pilot some hosted applications. While you may not want to give up the enterprise applications and its supporting infrastructure, you might be surprised by the results of a well-conceived pilot.

The industry itself will also have to reconfigure its software licensing and pricing models—something it is been unwilling embrace. Many companies have already experienced the pain of shelfware; hosted applications open the door to customer expectations about “paying by the drink.”

Transformation Trend #9: Clustering

Technologies have limited impact until full clusters develop around them consisting of all of the things necessary for technologies to grow, all of the applications, data, support, standards, and developers that keep technologies alive and well over long periods of time. It is really about wide and deep acceptance. Some technologies—like business rule servers—have crossed the prototype-to-cluster chasm, but the cluster is relatively small (and so is the technology’s impact). Other technologies, like large enterprise resource planning platforms, have enormous supporting clusters and have had huge business impact. It is too early to tell if many of what the technology trade publications declare as “technologies-to-watch” will become high impact technologies. Real-time synchronization, business process modeling, grid computing and utility computing, among others, may or may not yield successful prototypes, which may or may not evolve into full-blown clusters. It is our job to objectively segment technology concepts, emerging technology prototypes, and technology clusters—before pulling out our checkbooks.

So what do you think should go on each list?

Some concepts would include:

- The Semantic Web
- Realtime synchronization
- Dynamic business processing modeling

Some emerging technologies would include:

- Grid computing
- Nanotechnology
• Web services
• Personalization
• Customization
• Voice recognition
• Thin clients
• The segway
• RFID

Some technology clusters include:

• ERP
• CRM
• B2B transaction processing
• Business intelligence
• Wireless communications
• Application servers
• Security services
• Technology outsourcing

Implications

The trick is to correctly categorize technologies before making major financial commitments to them. The prize goes to whoever can predict which technologies will cross the emerging technologies/technology clusters chasm. If you can do this accurately you can get a jump on the competition—but if you do it poorly you will waste a lot of money. Marching orders? Mostly buy clusters, occasionally invest in prototypes, and enjoy (but do not buy any) concepts. Or put another way, unless you are in the technology business, do not be an early adopter, a pioneer, or live on the bleeding edge.

Transformation Trend #10: 2007

Seems like only yesterday that technology companies were going public at an incredible pace and stock prices reached inexplicable highs. But then April of 2000 happened and everyone sobered up on exactly the same day. So what can we expect now that everyone is “cured”? We have weathered some tough times since the bubble burst. Does 2007 look good? Bad? What are the trends that matter?

2007 will see the return of solid, though not exuberant, technology spending. Stuff is wearing out, but do not expect those ten aging servers to be replaced by ten new ones. Capacity and architecture will reduce the need for additional boxes
and in many cases enable technology managers to reduce the number of boxes they deploy (and the cost per box). PC sales will improve but instead of desktops and laptops, we will see more laptops, high-end PDAs, and thin clients dotting the network access and computational landscape. Total spending will increase slightly for access devices but do not expect PCs sales to skyrocket.

Enterprise software acquisition is going to get interesting in 2007 to 2009. More and more companies will invest in their existing enterprise ERP and CRM platforms and some will decide to rent them. The net effect of this acquisition/optimization shift will be modest increases in mega enterprise applications platforms and larger increases in optimization software and enterprise application hosting through vendor-specific and third party ASPs.

The data base world will continue its movement toward a triumvirate of Oracle, IBM, and Microsoft, but the real action will be in business intelligence and the tools that make it possible to better understand internal business processes and external customers, suppliers, and partners. Look for a lot of new products and investments here consistent with the optimization theme.

Lots more companies will get out of the technology business in 2007. Outsourcing will continue to increase as companies export more and more of their technology infrastructures to third parties in the US and abroad. It is not just about saving money; it is much more about core competencies, technology complexity, and flexibility. Companies will outsource their technology infrastructures as aggressively as they protect their business technology strategies. The big story in 2007 will be the increase in front-office outsourcing built on top of the technology infrastructure outsourcing that is been growing for some time now.

Technology managers will become even more practical than they have been over the past few years because more and more of what they buy, deploy, and support has been commoditized. There is also a solid appreciation for basic best practices, like standardization. Technology strategists, on the other hand, will see things holistically, blurring distinctions between business models and the technologies that enable them. Organizationally, we can expect to see technology organizations bifurcate into "operational" and "strategic" units, with the latter ideally moving to Mahogany Row. Lots of CIOs will think about changing their titles and job descriptions opting to spend more time with business managers than technologists. Companies will begin to reorganize around the operational/strategic distinction.

We will also see some important technologies mature in 2007. On the top of the list is wireless technology, followed by Web services and thin client architectures. Other technologies—like the Semantic Web and grid computing—will have more hype than substance in 2007 (though 2008 could be their breakout year).

The structure of the technology industry will continue to morph through acquisitions and mergers. As we come out of the technology capital expenditures slump, and
companies begin to see the value of their currency, their stock prices and revenue prospects, rise, we can expect companies to try to maximize their relative strengths in specific sectors like software, communications, networking, and devices.

The really big story in 2007 will be psychological: for the first time in several years more technology professionals will see the glass as half full—not half empty.

The key is to recognize the crossroads we are at now and begin to take steps to think about which new direction to take. Start with a business technology management health check framed by the questions posed in Figures 2 through 10. The answers to these questions might help you better understand where you are now and where you should be going.

ENDNOTE

1 Perhaps the most famous of these treatises was Nickolas G. Carr’s “IT Doesn’t Matter,” published in the Harvard Business Review, May 1, 2003.