

# The 'Consumerization' of Information Technology

## Position Paper

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**The 'consumerization' of information technology is a powerful trend that promises many significant long-term business consequences, including radically lower costs, greatly improved functionality, and successive generations of users who are ever more technology-savvy. Consumer devices and infrastructure are also becoming an important platform for a wide variety of innovative new products, services and applications.**

In this paper we take a high-level look at what we mean by consumerization, why this process matters to businesses of all sizes, and how companies should begin to approach and manage this important and still not fully appreciated phenomenon. Subsequent research will focus on consumerization's effect upon IT infrastructure, recommended strategies for implementation and detailed case studies. We believe that this issue is important enough to merit ongoing research coverage for the next few years.

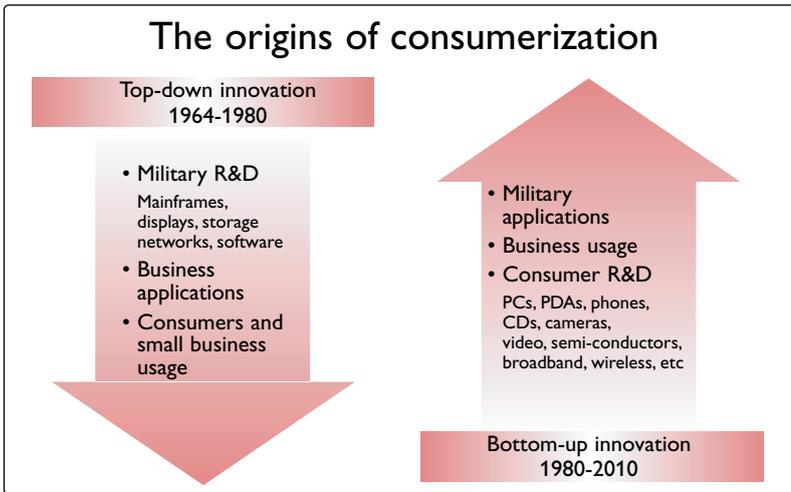
Our key findings thus far are:

- Consumerized technologies, infrastructure and applications can deliver dramatically lower costs and equally significant improvements in business functionality and ease of use. While most of these technologies have been on the radar screen for several years, we believe that they are now reaching critical mass, and that organizations need a process for adjusting to these developments.
- Enterprises have usually supported IT with private infrastructures. There is growing tension between this traditional sourcing model and the consumerized alternatives that are now available. Over time, comprehensive private IT infrastructures will become a luxury that even the biggest organizations cannot afford. We believe that consumerization will be the process by which many of these traditional infrastructures are transformed and revitalized.
- In many organizations, existing infrastructures and their supporting policies and assumptions have become a barrier to innovation and a source of increasing employee frustration with corporate IT. The potential conflicts between exciting new consumerized services and ageing business infrastructures must be minimized. CIOs must be on the side of change.
- Consumerization seems likely to be a classic case of 'disruptive' technology, which means many organizations will find it difficult to manage. To exploit consumerized technology and public infrastructure successfully, companies must decide

to support this transition and then learn to scan, evaluate and judge service maturity.

- CIOs will eventually be asked to integrate these new services with existing business systems. This will prove a daunting challenge, and will show that some consumer services are not as cheap as they first appear.
- Although the security issues are often very real and can in the short term be only partially addressed, they should not be allowed to stop emerging consumer infrastructure usage. Over time, market pressures will push many consumer systems to match or exceed the security of privately managed systems. In some areas, this has already happened.
- Companies must treat users as consumers, encouraging employee responsibility, ownership and trust by providing choice, simplicity and service. The parent/child attitude that many IT departments have traditionally taken toward end users is now obsolete.
- To take advantage of consumerization, companies must acknowledge and leverage the blurring of our personal and professional lives. This means adopting differentiated employee usage and support models. The traditional top-down, one-size-fits-all approach will increasingly alienate employees and result in lost business opportunities.
- As the current pace of technology improvement is expected to continue for many years, these issues are sure to become more important. Companies that gain an early understanding of consumerized technologies and their related issues will have significant cost and usage advantages.

In short, we believe that 21st century CIOs must actively push for consumerization before it passes them by. Only forward-thinking IT management can anticipate the impact of these changes on their organization's processes, systems and culture. It presents a real leadership opportunity.



While both top-down and bottom-up innovation models play important roles, the balance has clearly shifted towards the latter. This trend will only gain momentum over the next decade, and has now become strong enough to affect organizational IT strategies.

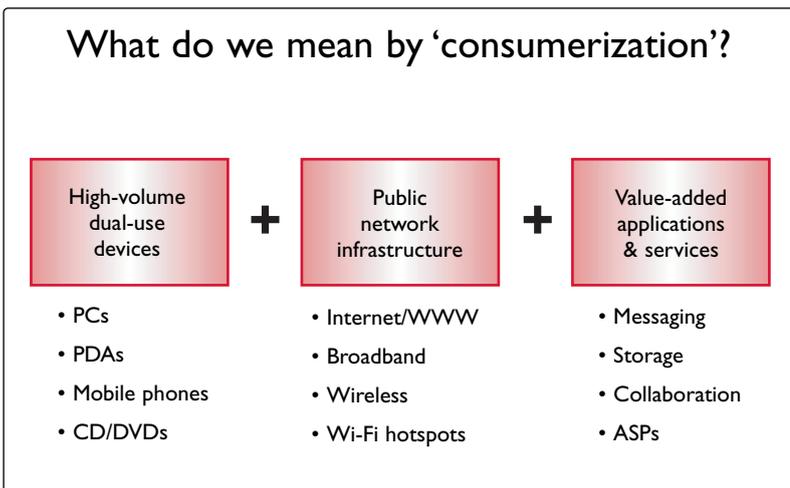
### What do we mean by 'consumerization'?

For much of the history of technological innovation, top-down processes have been dominant. The early users of most new technologies were customers with significant financial resources and sophisticated needs, with military projects often the primary source of major advances in IT. Over time, the benefits of this R&D trickled down, first to large organizations, and then eventually to consumers and small businesses. This was certainly the case with mainframes, minicomputers and other early IT platforms. The fax machine followed a shorter version of the same path: at first an expensive corporate device, it only later became affordable to consumers.

However, beginning with the emergence of microprocessor-based systems in the early 1980s and building in momentum ever since, IT innovation has increasingly been driven by consumer markets. This

trend has become more obvious over the last few years, with the emergence of ever more powerful PCs, game machines, mobile phones, PDAs, digital cameras and so on. CD-ROMs and DVDs are also excellent examples of technologies aimed primarily at consumers, with business usage sometimes lagging behind and sometimes explicitly forbidden. Many employees now have significantly more capable devices and services at home than those provided in the workplace.

As these consumer devices have grown in capability, so have the infrastructures that support them, and it is these infrastructures and their supporting services that are of principal interest to business IT management. The combination of dual-use devices, public networks and related services is what we call 'consumerization'. Over time, more and more devices, networks and value-added services will be used and shared by both businesses and consumers.



The defining aspect of consumerization is the concept of 'dual use'. Increasingly, hardware devices, network infrastructure and value-added services will be used by both businesses and consumers. This will require IT organizations to rethink their investments and strategies.

In this paper we will see that, in many cases, consumerized services will compete or conflict with existing corporate systems. It is not that one will immediately or necessarily replace the other, but that companies need a process with which to choose between internally managed infrastructure and increasingly powerful mass-market alternatives.

Over time, however, this competition will become increasingly one-sided, since the rate of improvement for consumer infrastructures will continue to exceed what most companies can do on their own. Our experience suggests that fundamental changes in systems architecture tend to occur when an order of magnitude in customer savings or performance improvements can be achieved and when there is strong supplier leadership. All evidence indicates that consumer technologies will offer this degree of potential cost and service improvement, but because many of today's consumer services suppliers are still relatively weak, every proposal to use such services must be judged individually.

Consumer systems will evolve more rapidly than proprietary business systems for some very simple and largely irreversible reasons. The most important of these is volume. Many electronic devices and products are now being sold in tens and even hundreds of millions of units. Already there are more than 1 billion globally connected users – via mobile phones, the Internet and so on – and this figure is expected to rise to some 3 billion within a decade. Similarly, services such as Yahoo! and Google can easily have upward of 100 million customers, providing huge economies of scale (with near-zero marginal costs), along with a base of technology, experience and understanding which private infrastructure users simply cannot match.

With volumes like these, research and development costs account for only a tiny fraction of the cost of each device or service. More importantly, the networks that eventually emerge to support such volumes must be highly robust, or at least be designed so that users can cope with any problems without needing additional human assistance. While only a few consumer services have reached this high volume, high investment stage, many will eventually do so. And thus, while business infrastructures often have advantages in security and control, their ability to keep pace in terms of price, usability and performance is becoming increasingly questionable.

In addition to the impressive scale economies, consumerization has a number of other important features and benefits, including:

- **Standards.** Standards and consumerization are essentially inseparable, and it is global standards that make it possible for most consumer markets to evolve in a highly competitive commodity-like manner. Whether one is looking at PCs, PDAs, mobile phones, messaging or network services, there are usually many interoperable products and services on offer, in sharp contrast to most existing corporate IT networks. There is little reason to doubt that this high level of choice and interoperability will continue. In time, Web services will make it easier to integrate these systems into existing business environments, but even so, the coming integration challenges will prove daunting for many managers of private business infrastructures.
- **Convergence.** Many consumer devices were initially targeted at highly specific applications since this was often the best way to get a sufficiently useful product to market – consider the early generations of mobile phones. However, over time, consumer devices tend to acquire increasingly general-purpose capabilities. For example, video-game machines are now beginning to overlap with PCs, as PDAs do with mobile phones. Indeed, it now appears that PDAs will have to support voice services if they are to remain an important market force. More broadly, the convergence of work and personal technology and even of work and personal time is at the very heart of the consumerization process.
- **Training and knowledge.** In many ways, companies should be thankful that their employees are now being trained by these consumer systems. Instant and text messaging are just two examples of important future technologies which employees generally learn to use outside of the workplace. Indeed, in a widening number of areas, the days when companies had to train employees to use new technologies do seem to be passing. In many companies, both younger workers and IT-savvy employees are often ahead of IT professionals in using certain types of consumerized products and services. This base of knowledge and experience must be recognized and leveraged.

It is important that the use of these emerging consumerized systems is not confused with traditional forms of outsourcing. Public infrastructures can provide (for example) generic voice, data, messaging and application services directly to consumers. In contrast, outsourcing generally refers to an agent or operator providing proprietary applications or services for a specific company or client. While there can be significant overlap between these two concepts, they are usually much more different than alike. For example, a company could outsource the management and operation of its existing network and still not have access to basic consumer-oriented services. Indeed, this is exactly the case for many businesses.

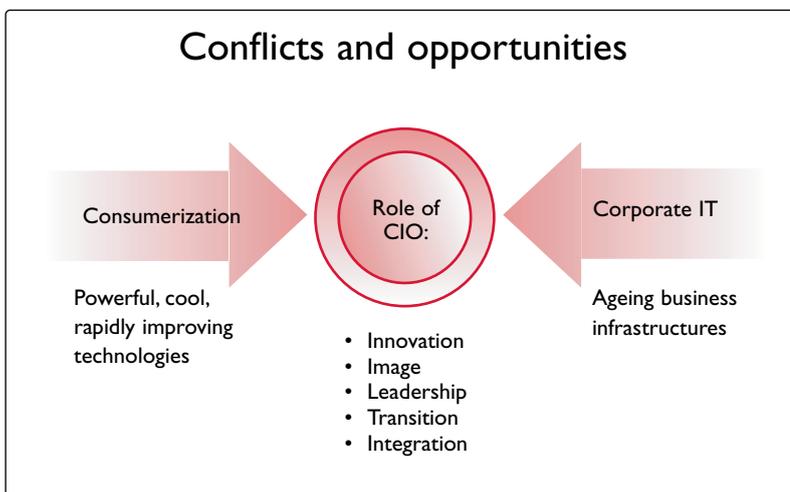
## How does all of this affect CIOs and other IT managers?

In recent years, corporate IT has often been accused of exaggerating the business potential of new technologies, and in many cases is seen as having lost its innovative edge. Any perceived inability to respond to emerging consumer technologies can only reinforce these damaging attitudes. What are employees supposed to think when the email systems they get for free at home seem so much simpler, more reliable and more functional than the expensive ones they are forced to use at work? How is it possible that the average consumer can set up a wireless LAN at home in a few hours, while corporate IT takes months, or deems the whole idea too difficult?

While IT professionals can usually give valid answers to questions like these, the explanations are necessarily complex, and will often fall on largely deaf ears. Fortunately, there may be a happy solution. As companies begin to sense that the post-dotcom bubble downturn is finally over, there is renewed pressure for top-line growth. This is creating an increasing appetite for business innovation. Coincidentally, this demand is coming just when many consumer systems are starting to reach sufficient maturity. Consequently, the enthusiastic support for the use of public infrastructures has the potential to help revitalize both business IT usage and the reputation of corporate IT itself.

The potential range of these generic technology services and ASP-style business applications is surprisingly wide. In addition to the general-purpose devices and networks already mentioned, employees are already using many specific technology services, either with or without the knowledge of company IT management. All would appear to present real opportunities for innovation and savings. Among some of the more interesting are:

- **Email.** Web-based email has the potential to be the single biggest consumerized application. One of our clients has about 6,000 employees using hosted Webmail accessible from anywhere via the Internet. Like other employees, their email addresses include the company domain name, and their names are included in the company address book. The fully burdened cost for this service is



While many CIOs may see emerging consumer technologies as difficult to integrate and full of risk, there can be a significant upside. Companies that successfully manage the transition can rebuild their image and provide important company leadership.

about one-quarter that of the previous in-house approach. These savings should only grow over time. Some employees have taken matters into their own hands, routinely using their personal email accounts as an easy way around the limitations of internal company systems.

Looking ahead, it has been widely reported that Google will soon introduce a free, advertising-based email service that will allow each user to have up to 1 GB (one gigabyte) of online storage space; an astonishing increase over today's mainstream capabilities. And while this type of free service is probably not suitable for most businesses, it is certainly indicative of the tremendous service and capacity improvements to come.

- **Wi-Fi.** Of the many dual-use projects going on in this area, perhaps the most interesting is at McDonald's, which plans to outfit some 6,000 of its US franchises by 2005. Not only will the new systems support customer Internet access, but the company will use the same network to handle credit-card payments and distribute information to employees. Perhaps the best part of the deal is that much of the initial cost will be borne by McDonald's Wi-Fi provider, with McDonald's also getting a cut of the \$2.95/hour rate. While many IT organizations view Wi-Fi as just another security headache, the retail industry is showing that there are real business opportunities, as well as partners willing to share the considerable financial risk.
- **Storage and file transfer.** Many employees already use the Web as a virtual disk drive where individual and group files can be stored for ready access from any Web connection. For example, X-drive offers a Web-based service that allows individuals to store up to 1 GB for \$16/month. Similarly, most ISPs and email providers offer incremental storage at very reasonable monthly rates which employees often use to store and transfer business files. At the high end of the market, one of our clients uses a service that enables the exchange of files up to 500 MB – much greater than the attachment limitation in most enterprise email gateways.
- **Automatic backup.** Another client has about 500 users subscribing to an automated backup service. Incremental, encrypted backups are made each day without any action required by the user. These files can then be recovered via any Internet machine, after proper credentials are presented. In addition to the superior quality of this approach, the company has enjoyed substantial savings by eliminating the in-house file servers whose primary function was providing desktop backup services. Before they chose this service, the system's security was reviewed by our client's staff. Their conclusion was that the security was, if anything, over-engineered and superior to the client's own facilities.
- **Collaboration.** Another client uses a hosted Web service for inter-enterprise collaboration. These systems can be set up quickly with little or no infrastructure investment, and shut down when their purpose is complete. The use of Webex and similar conferencing services is now extensive and frequently outside the control or even awareness of IT management. Even the free, members-only group discussion facilities on Yahoo! and other portals are sufficient to meet some companies' needs.
- **Social networking.** Many employees are using Instant Messaging systems, despite well-publicized business concerns about security, logging and the like. This usage could skyrocket once voice capabilities are added. Contact management systems such as Plaxo are another example of a Web-based social support system, whose usage is expanding quickly. Overall, the use of technology to facilitate business and personal networking can be expected to rise rapidly, and is an excellent example of the blurring of business and personal services.

- **Personal mobile phones.** Another client has experimented with buying incremental time on its employees' personal mobile phone plans for business use by the employee. The cost of the incremental minutes was much less than the best enterprise-wide plan available to the company. This is a good example of how to leverage company and employee technology investments.
- **Internet fax.** Another client uses the Web to manage both inbound and outbound fax services. Inbound faxes are delivered into the email inbox of the recipient as an attachment. The fully burdened cost of this service is estimated to be less than 10 percent of the company's previous stand-alone fax machine approach. Because of the need for signatures, contracts and other (often non-digital) information, many companies still spend a considerable amount on facsimile systems. Over time, enabling legislation will eliminate the need for most paper documents, but in the interim there are real savings to be had.

Other important or potentially important consumer services include: mobile phone services, voice over IP services, calling card services, mobile Internet access, photo-messaging services, blog technology, wireless hotspots, streaming media, and the use of consumer ISPs to support branch offices and international connectivity.

In addition to these relatively generic services, the range of more specific ASP-style applications is now almost as wide as the Web itself. Many employees find the Web, and even just Google, to be more useful than many of their company's internal services and online databases. Similar preferences and savings can be found everywhere, from sales force management to business travel, training, education, and even purchasing. In addition to cost savings, employees are likely to find these systems simpler and more intuitive to use, with many of the additional features they have come to expect from Web-based offerings. Taken together, the accumulated use of such services can eventually result in profound organizational change.

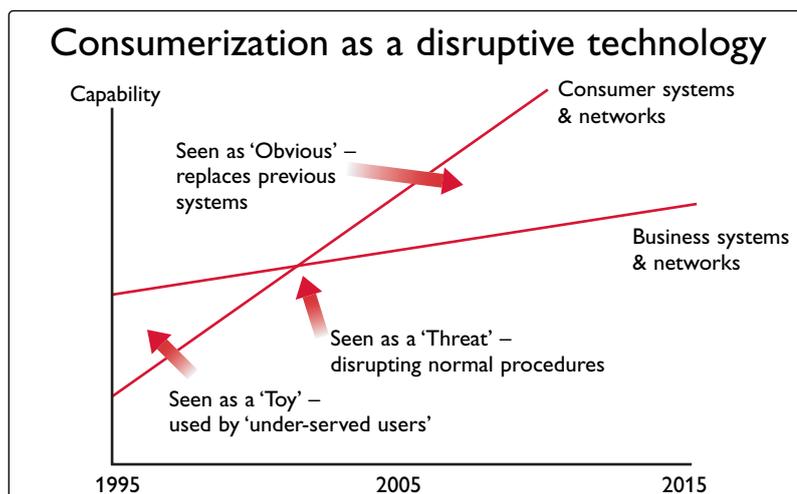
Clearly, companies need to think carefully about how many of these new doors they wish to open, but at a minimum both general management and the IT department must be willing to re-examine their company's voice, messaging, collaboration, storage, office automation, mobility, information and general application systems. And they must do this with a truly open and forward-thinking mind.

### Why will consumerization be such a difficult issue to manage?

While the topic of consumerization presents many important cultural, political and security challenges, in this section we make a more abstract analysis, arguing that consumerization shows all the signs of being a textbook case of 'disruptive' technology. This is important because coping with truly disruptive technologies often requires companies to change their thinking and processes significantly. Few organizations find this easy.

Many readers are no doubt familiar with the models of Professor Clayton Christensen, which were first presented in his seminal 1997 book, *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail* and further expanded in his 2003 work, *The Innovator's Solution: Creating and Sustaining Successful Growth* (both Harvard Business School Press). While Christensen's work is typically associated with the impact of innovation upon IT vendors, we believe that it can have equally powerful effects upon IT customers.

For example, we all know that the emergence of the personal computer wreaked havoc on the vendors of minicomputers, but we have nearly forgotten that it also caused serious problems for the many IT departments that had major investments in increasingly outdated minicomputer systems. We expect consumerized systems to have very similar effects on corporate IT organizations, which in many ways serve as vendors to their user communities. Consequently, IT organizations need to understand the theory of disruption and how it could affect their operations.



The emergence of high-performance consumer technologies and networks appears to be a classic case of what Clayton Christensen has labelled as a 'disruptive technology'.

As the saying goes, first new technologies are seen as a toy or a joke, then as a threat, then they become obvious. Many consumer technologies are now moving from the first to the second of these phases.

Christensen's main idea is that companies will often respond to innovations in ways that, while appearing to be completely rational in the short run, can in the long run have severe and even disastrous consequences. The figure shows our application of Christensen's basic model to the issue of IT consumerization and its impact upon business customers.

The classic case of disruption runs as follows. When a new technology or innovation emerges, it often has many obvious shortcomings – performance, reliability, security and so on – that make it inappropriate for many large business environments. Thus new customers with relatively new applications, not well served by existing technologies or systems, are usually the first to adopt these products and services. Initially, existing businesses and systems are not significantly affected, and therefore the innovation is often dismissed or otherwise ignored.

However, if this new technology consistently improves at a rate faster than previous technologies, it will eventually match and then exceed the capabilities of those older technologies. This does not necessarily happen quickly. Contrary to much popular opinion, technological disruptions seldom make a major impact overnight; it often takes years for their full effects to become apparent. But those firms that master disruptive innovations early on tend to ride the learning curve successfully, while those that wait too long eventually face a large, and sometimes all-but-impossible, adjustment.

The trick in dealing with such challenges is being able to identify quickly when a new technology is

fundamentally disruptive – PCs, the Internet – as opposed to being just the latest technological innovation – tablet PCs, speech recognition, ebooks – which, however useful they may be, do not radically alter IT usage and dynamics. There is no magic formula with which to make such judgments, only the combination of information, advice and experience. As the saying goes, new technologies are often viewed:

- First as a joke
- Then as a threat
- And finally as obvious

We believe that the current evidence strongly suggests that robust consumer facilities have moved well past the joke phase and will soon prove increasingly disruptive to existing business infrastructures. Consider that in many cases their base of usage is already large and still growing rapidly, and that future technological progress seems all but assured. Many of these systems have already reached critical mass, and seem well past the point of possible failure.

Perhaps the main warning suggested by Christensen's work is that companies need to be wary of focusing only on the shortcomings of an emerging technology. It is often easy to overlook the benefits and the fact that the marketplace will address most shortcomings over time. It is indeed ironic that IT executives should so often fall victim to such thinking when information technology, perhaps more than any other field, is filled with stories about companies that, like minicomputer vendors, failed to adjust to new technologies and suffered the most severe of consequences. Nevertheless, scepticism and resistance to change remain powerful forces within IT.

This is certainly the case with consumer infrastructures. Too often, a company's private infrastructure can become a barrier to employee innovation, even as the organization defends its internal systems and continues to invest in increasingly obsolete approaches. Too few companies have done the hard work of re-thinking their IT portfolios in light of the consumerization trend. Companies should ask themselves whether, if they were starting from scratch, they would build their systems and applications the way they are now, or select a radically different approach. They also need to ask whether their systems are driving away some of their users, who increasingly prefer simpler consumerized services.

In today's turbulent and competitive environment, technology is generally recognized as essential in finding new ways to deliver improvements in cost, quality, speed and customer satisfaction. And yet few corporate IT groups have looked carefully at what may be the most promising development affecting all four of these areas: the increasing sophistication of the global public infrastructure. The good news is that companies that do take advantage of today's opportunities could well accrue both improved effectiveness and significant cost savings. However, those organizations that fail to take advantage of consumerization could easily see their infrastructures and services eroded, as users increasingly look elsewhere to meet their needs.

### **Don't security requirements preclude using most consumer services?**

While specific security issues are well outside the scope of this report, it is clear that before a company can take advantage of consumerization safely, it must address the security and reliability issues. Compared to today's conventional IT environment – for example, a network-connected desktop PC and phone – today's public infrastructure technologies are often significantly less reliable. Batteries go flat. Mobile phone connections drop. Devices are lost or stolen. SMS and email messages fail to arrive when expected. Other wireless devices disrupt wireless LAN connections. Roaming is still immature. Viruses are a constant concern.

On the other hand, providers of public infrastructure will eventually do as good or even better a job with security than any one company can do. For example, providers such as Hotmail, Yahoo! and CriticalPath are

now much better at filtering spam than most companies are. The reasons for this are simple: dedicated email companies have vastly more resources, much more financial incentive and considerably more experience in the field, and while there are some good anti-spam packages on the market, the ongoing arms race with spammers is not something most companies really want to participate in. Over time, this general pattern will repeat itself in an increasing number of security areas.

Additionally, there are now many tools – VPNs, personal firewalls, encryption, authentication and so on – that can help companies make consumer-style services available to employees with minimal security risk. One radical recent idea is that companies should treat every machine, in or out of the office, as if it were connected to the public Internet. Accordingly, each machine would have virus and personal firewall software as well as remote server access, and would work no differently from PCs used in homes or connected via an Internet hotspot.

Rather than using security concerns to rule out experimenting with new alternatives, companies must embrace the use of public infrastructure in a way that over time will minimize their security risks. Keep in mind that not every employee, application or project requires the same level of security and service, and therefore companies must be flexible. Perhaps the worst thing an IT organization can do is find too much satisfaction in identifying security bugs which in fact could be overcome if more positive attitudes were adopted. (For further information on IT security, see our research report, *The Vandals are at the Gates: Managing Information Security*, CSC's Research & Advisory Services, November 2002, which advocates a risk management approach to information security.)

### **How much freedom should employees be given?**

Working through these security issues is clearly easier said than done, but we believe the long-term solution is to involve users more deeply in the security process. The days of relying solely on rules and procedures (if they ever worked in the first place) are almost certainly coming to an end. Part of the process of adjusting to consumerization is deciding to treat employees increasingly like adult consumers who are expected to use technology responsibly. In this sense, consumerization is more than a technological process; it also affects the way that employees are viewed and managed.

Too often, IT security policies have been based on a non-existent uniformity. Because the emphasis has been on efficiency and cost, IT organizations have tended to offer a standardized level of support. The recent focus on service-level agreements with outsourcers has further entrenched this rule-based approach. However, the reality is that the knowledge of IT users varies widely, from support staff (and some senior executives) who often have neither the interest nor the knowledge to do more than basic word processing, through accountants who are extremely PC-savvy and eager to help others, to engineers, many of whom could build a computer from the ground up.

Not only does one size not fit all, but having different sizes fosters different dynamics. Consider the emergence of the Blaster virus, which started infecting networks just a few weeks after the security loophole was publicly identified in the middle of 2003. Blaster demonstrated that large organizations could no longer manage their IT security without the active participation of users. The cycle time was simply too short, and the near-term risks too high. Employees had to be part of the process, and to do this they needed to be trusted.

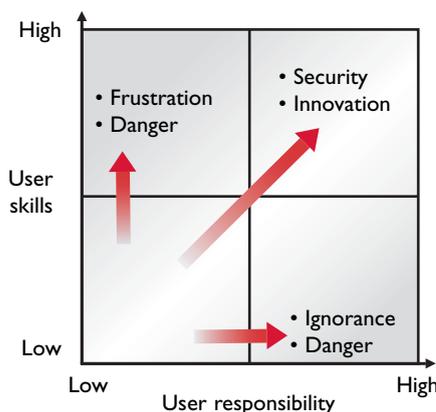
Developing relationships based on trust and mutual respect provides an opportunity for companies to reduce the bureaucratic imposition of new technologies, and instead try to use their employees as scouts and testers for new equipment and new ways of working. The following are some of the more innovative approaches we have seen or pondered:

- **Increased sense of ownership.** Using the theory that no one has ever washed a rented car, one of our clients is considering an

approach where mobile devices become the personal property of the user after a certain period. The expectation is that these devices will be damaged much less often than standard company-owned equipment. Proper care is also more likely if the device becomes 'an unconscious carry' – something like your wallet or watch, which you always have with you. For this, however, the device needs to be both useful and desirable – something that users would choose for themselves. In most companies, such choices are usually not available.

- **Variable support.** One of our clients is experimenting with differentiating IT support services based on each employee's level of knowledge, behaviour and willingness to help others, as assessed in their annual 360-degree evaluation. Using this approach, companies might let employees demonstrate their IT abilities in order to be granted privileges such as installing software on their machines, or experimenting with outside consumerized services. If successfully implemented, this would formalize what already happens in many companies where the most knowledgeable and helpful people tend to get a superior level of cooperation and support, as well as greater individual freedom.
- **More individual choice.** Today, most companies offer employees a menu of health care, training, fitness and other choices that can be drawn down from their individual benefit fund. It may make sense to include IT in this type of decision-making. Giving employees a choice would seem a logical way of steering the right technology toward the right hands, as employees would have an incentive

### The need for variable support



Companies cannot prevent users from becoming more skilful and capable. Thus, if we cannot find a way to build mutual trust with them and give them increased responsibilities, they will wind up in the upper left corner where they will become frustrated and even dangerous. We know from our research that in the real world, serious security threats are much more likely to come from disgruntled, angry employees than from hackers in distant lands.

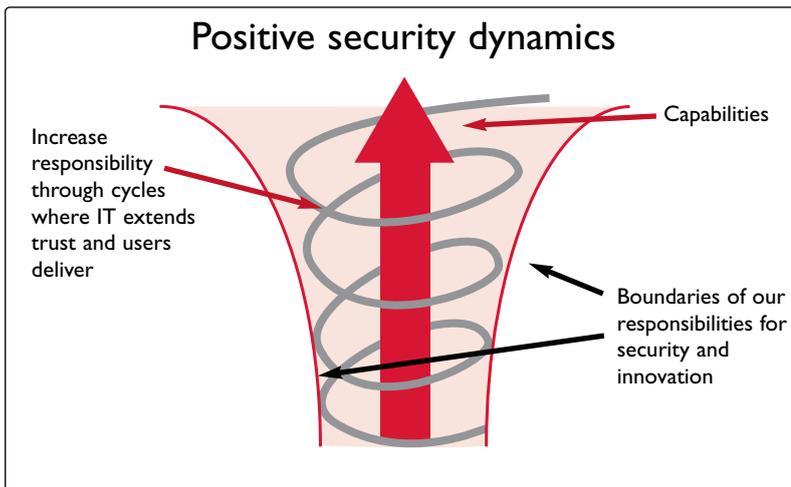
to use their financial allotment wisely. This approach should also greatly reinforce employees' sense of ownership. If nothing else, if individuals can choose from a range of simple and advanced devices, there should be much fewer grounds for complaint.

- **Designated hotspots.** Many organizations want to provide the equivalent of an Internet hotspot on their premises, so that visitors can have access to the Web without compromising security. To do this, some organizations use a separately provisioned DSL, cable modem or kiosk-based service so that there is no direct link to the company network. For those worried about supporting such systems, specialized hotspot providers can install and support the modern equivalent of a public telephone in your lobby – be it a complimentary or a pay-to-use system. As more companies begin to use outside caterers, coffee shops and other such services on their premises, this option will likely become increasingly available and attractive.
- **Demonstration areas.** Large companies might (as Hewlett-Packard has done) want to set up a 'coolville' exhibition where vendors can demonstrate new technologies and relevant business services. This is similar to the way many companies bring in outside firms to talk about health care, fitness, training, volunteering and other areas of mutual business and employee interest. Outside vendors will usually provide this sort of service for free, as part of their overall marketing effort. Such exhibitions

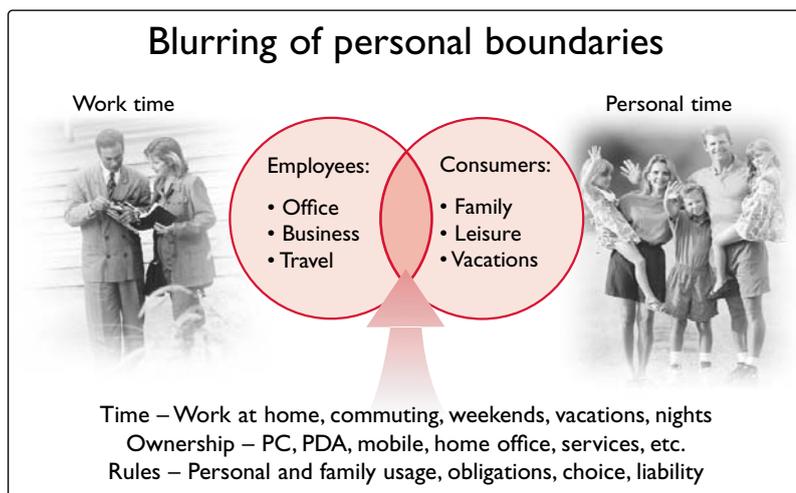
can significantly increase IT interest and innovation, but only if they are done with real commitment. Many companies have tried this sort of thing, only to wind up with a half-hearted embarrassment that is eventually shut down.

- **Pilot projects.** Not surprisingly, the best way to start exploring this new world is to initiate pilot projects in selected areas. There are almost certainly many potential such projects already running in your company today. Happily, when based on public infrastructure, such pilots are usually quite inexpensive, and can be set up either quietly or with fanfare, depending on company preference. Pilot projects typically bring three main benefits: new sources of value can be identified; the necessary support and technical problems can be practically understood by all participants; and the users can articulate their business case with much more conviction and credibility. They should be part of just about every company's consumerization process.

Increased ownership, variable responsibility, pilot projects and the other steps above are all about setting in motion more favourable dynamics of trust and responsibility, and improving the interaction between IT and employees – an area that has not always progressed smoothly. This potentially powerful long-term, mutually reinforcing dynamic is shown in the figure. Over time, IT will increasingly be asked to abandon the traditional parent/child relationship it has often had with employees. Instead, it will need to support more customer-like relationships, based upon choices, contracts, respect and trust. Most companies still have a long way to go.



Trust must be the outcome of a series of positive interactions. To build trust, IT departments need to work out a sequence of steps in which users can be trusted to do a specific thing and then be verified to have done it. These steps must build upon each other. Employees who do take on these new responsibilities must be recognized and valued.



The boundaries between work time and personal time have been blurring ever since the emergence of the first PCs and then the remote network access that made working at home more feasible. However, the emergence of truly portable and mobile devices has raised the stakes to the point where companies will at some stage have to be much more explicit about what is expected of employees and how various pieces of company property can be used.

## What guidelines can we give to employees and their bosses?

However, before going too far down the consumerization path, companies must realize what they are getting into. Setting the proper responsibility dynamics in motion creates a whole new set of management challenges, many of which are more complex and more subtle than those involved in the provision of personal computers, providing Internet access at work, or the enabling of working at home.

The lines between work and personal life are blurring – a process that consumerization will accelerate.

Companies will inevitably come to depend upon the same technologies employees use in their personal lives, and thus the relationship between IT and employees must change. The need to treat employees more like customers and adults becomes clear when one looks at the management issues raised by even the most basic of consumer devices. Consider the following questions that an employee might have upon receiving a company-provided mobile phone:

- Does my boss now have the right to criticize me if I do not have my phone with me on the weekend?
- If my phone can support email, can my boss expect that I will have checked my messages on the train to work each morning?
- What happens if I use the phone for personal needs? Are there any limits? Can this phone be used by my spouse or children?
- What if I want to use a product that I have previously purchased, instead of the device the corporation wants to give me?

- If my phone can take photos, are there any restrictions on using this inside or outside the office?
- Mobile technology allows companies to know exactly where I am. Are there any limits on a company's right to know this?
- How available should I be while on vacation, whether by email or phone?
- What are the HR and legal ramifications of all of the above? How should these policies vary by country? What are the potential liabilities?

In other words, what is the deal? In too many mobile phone, laptop and PDA cases, there really isn't one. This is odd since most companies and employees would agree that these issues should be resolved upfront, before equipment is handed out. They know that failure to do so can result in misunderstandings, unmet expectations and reduced value. Nevertheless, relatively few companies have such policies, and even when they do, it is difficult to keep up with rapidly changing issues and requirements. This seems to be one of those challenges that will have to work itself out over time, especially since all of these dilemmas will only grow in importance as employees have access to more and more systems with both work and personal applications.

There is nothing fundamentally unmanageable about this, but there is a clear need to establish new social and workplace norms. What is novel is that these norms will probably be established by

teenagers and college students – another instance, like text messaging, of how innovation and learning in the consumer world is going to migrate into business environments. While organizations must find a way to learn from the young, it does seem that as in many things, the Golden Rule may well apply: treating employees the same way you would like to be treated is usually a good place to start.

A key question is to what extent IT management should be involved in such issues. While one could argue that the blurring of work and private life is really a human resources problem, the devices and usage patterns within a company will say a great deal about the type of applications and systems that eventually emerge. More politically, IT needs to be seen as involved in things that are important and forward thinking, and therefore ceding the management of mobile systems to other parts of the organization is probably not a wise career move. Neither is handing out valuable equipment without a reasonably explicit social contract, ideally one co-crafted with HR. Managing the use of such systems is another important IT leadership opportunity.

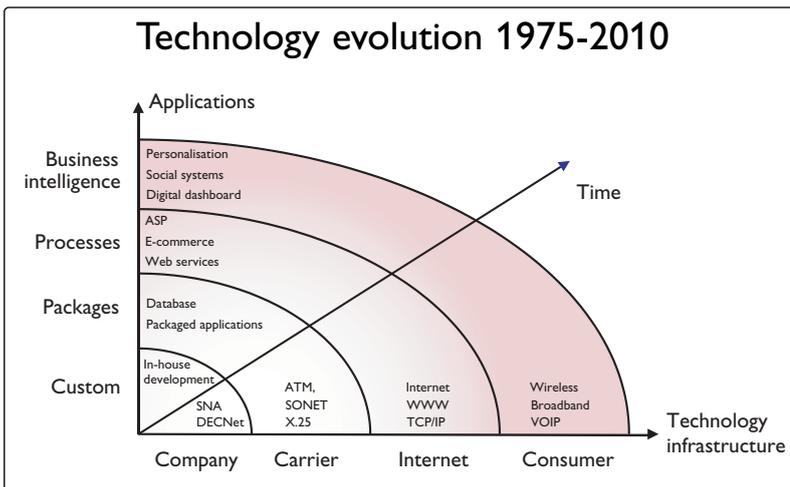
## What does the future hold?

As noted at the outset, we believe that a company's ability to take advantage of emerging consumer infrastructures will be a critical success factor over the next few years, and will be one of the acid tests of a successful IT organization. These consumerized systems will comprise a core technological resource. Accordingly, it is important to have a broad sense of where the

technology is heading. Looking ahead over the next few years, we think it is reasonable to expect the following:

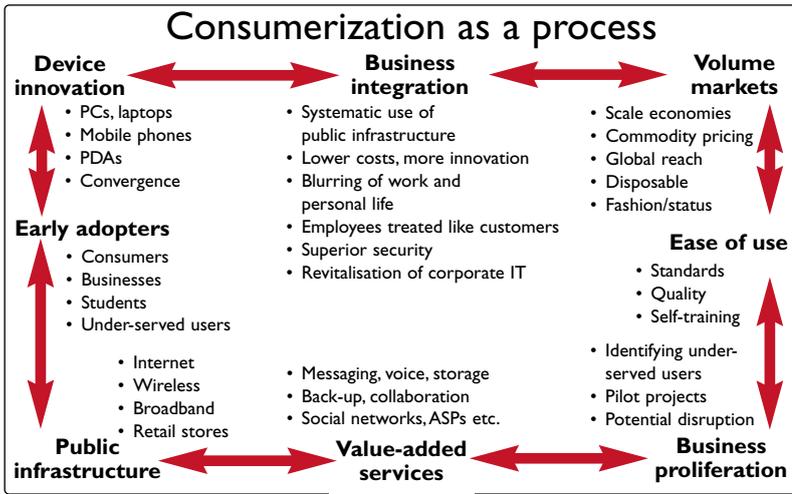
- **Devices.** Computer processing power and storage will increase at or above historic norms. This means that the capacity of both personal computers and handheld devices will double roughly every 12 to 18 months. In addition to their current Internet, telephone and MP3 capabilities, future PDAs will increasingly be able to handle unmodified Web pages (thanks to XHTML) and be able to receive radio, television and streaming media services. Within a few years, virtually all laptops and many desktops will include wireless capabilities as a standard capability. During this time, laptops will become the preferred system for most employees. The next generation of CD/DVD technology should enable storage of 25 GB per disk.

Similarly, PDA and mobile phone screen resolution will continue to improve visibly. Even more dramatic progress can be expected with audio quality. Should fuel cell technology enable a dramatic increase in battery power, the use of mobile systems could accelerate greatly. Suffice to say that, given these improvements, consumers and employees will continue to find many new uses for these increasingly attractive and affordable devices, and their willingness to carry them and make them part of their work and personal lives will only increase.



The focus of business IT innovation has always changed significantly over time, and will almost certainly continue to do so. The two main poles of IT innovation have traditionally been applications and infrastructure. Just as companies once replaced networks of SNA, DECNet and X.25 equipment, so will they increasingly replace private with public infrastructures.

- **Vast new volumes.** China and India are expected to soon become the two largest markets for all of the above devices, and for many of their supporting services. The huge volumes and relative lack of affluence in these two countries should ensure continued low prices for many consumer technologies. Indeed, many digital products will increasingly be viewed as largely disposable items while others will be prized possessions, making traditional business management practices seem old-fashioned. In the case of mobile phones, this is already happening. Over time, fashion and style will generally become more important than price and functionality.
- **Network transmission.** If anything, the gains here will be even more impressive. Already in Japan, many consumers can get access to 100 Mbps services for as little as \$40/month. These types of speeds will open up a whole new range of applications, especially those involving video. The new generation of large, flat-panel HDTV-type screens will further this trend, enabling much more advanced work-at-home capabilities. Similarly, wireless transmission speeds can be expected to rise rapidly. In South Korea, these systems can already provide a 600 kbps downlink. It is not at all unlikely that within four to five years, nearly half of all consumer Internet access could be via wireless technology. Within ten years, so-called 4G wireless could make 100 Mbps wireless systems a reality. Such speeds would be sufficient to deliver 3D hologram-style images.
- **Voice Over IP.** Even the traditional telephone companies are now preparing for a world where consumer voice services are increasingly delivered over the Web for a flat monthly fee. The impact of this on the overall telephony business will be hard to overestimate, but for business infrastructures there is one critical question: will separate internal voice networks survive, or will they be replaced by IP-enabled offerings? Additionally, the competition between corporate VOIP systems and consumer ones (such as those from Vonage and others) will be one of the more interesting examples of the clash between business and consumer infrastructures.
- **Large viable players.** In many ways, the IT industry is just recovering from the excesses of the dotcom bubble. But going forward, we can expect a new generation of proven, reliable market leaders to greatly accelerate the consumerization trend. Whether this list will include current entrants such as Yahoo!, CriticalPath, X-Drive, Webex, Vonage and Plaxo, or whether many of these will be replaced or absorbed into larger entities, remains to be seen. But a set of established market leaders will eventually emerge and help release pent-up demand. Today, many of these companies are still too small and financially weak to gain the full confidence of business decision-makers.
- **Web services integration.** As these new specialised services catch on, there will be a need to integrate them into existing business systems. This will prove to be a major opportunity for Web services. Speciality ASP-style players will have the incentive and the ability to build links to internal company systems, enabling Web services to live up to all the hype of the last few years. Even large monolithic systems such as SAP will need to open up and interact with these emerging new services. The shift toward more component-based applications and an increased focus on Business Process Management will further this trend.
- **Utility computing.** Although this idea is being heavily promoted by major IT vendors such as IBM, Sun and HP, utility computing will actually be a bottom-up, consumer-led movement. Indeed, the idea of using utilities is one that consumers already understand and have long become accustomed to. Consider that most consumers and small businesses are already charged monthly according to their Web-based usage of storage, transmission speeds and similar services. This approach will evolve upwards to larger organizations and be another strong example of consumerization.



This diagram brings together this paper's major themes. It provides a simple way to judge where your organization is in the consumerization process, and helps interpret future developments.

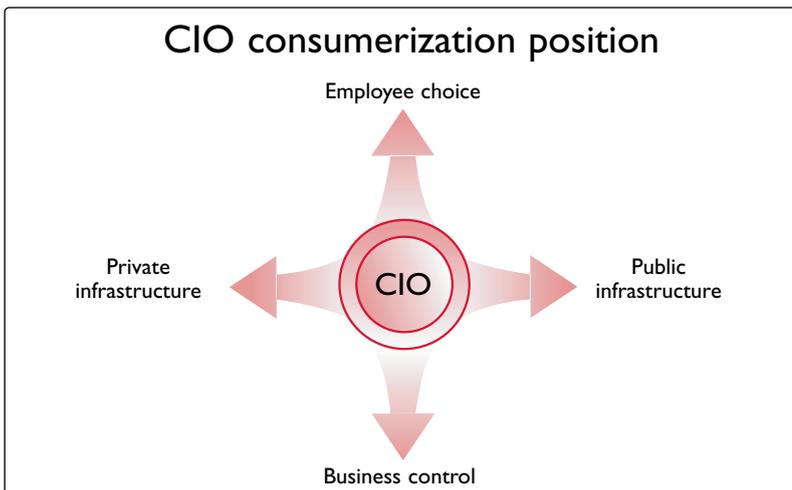
Clearly, a broad series of technological changes is now in motion. While the exact timing of these changes is not always foreseeable, we do expect significant movements over the next 24 months. This means that businesses need to start responding now. To help you move forward, the figure summarizes the many consumerization forces and issues that you need to assess. The final section of this paper introduces some of the research we will be doing to help companies cope with these many changes and challenges.

### What should we do next?

CIOs will need to find a way to manage the change from private to public infrastructures and from an environment of employee control to one of increasing employee choice and freedom. While this won't be easy, the experience will not be entirely foreign. Just

think back to the shift away from corporate mainframes and minicomputers toward more employee-oriented personal computers and LANs. Consumerization will be a similar process, only on a much broader scale.

In this sense, the use of consumerized systems is just another wave of IT innovation that IT organizations must come to grips with. In these situations, resistance is often futile, and one may as well get first-hand experience and be seen as being on the side of change. CIOs can provide a real service to their companies by recommending consumer services when they are ready, and explaining the integration and hidden cost issues that may lie ahead. As always, having a proactive planning process is usually a good place to start.



CIOs are used to being pulled in many directions, and in this sense consumerization is just another major process of technology-driven change. The trick is to make sure that your organization moves towards the upper right quadrant of this figure.

To begin this process, we recommend that companies use our basic Innovation Clarity Framework.

#### **Innovation Clarity Framework – achieving the benefits of innovation**

<b>Supply</b>	Do we know what is now possible and how to get it done?
<b>Demand</b>	Do we understand, manage and negotiate the demand, both internally and externally?
<b>Risks</b>	Do we appreciate the risks, especially those of project management, as well as those of not doing this project?
<b>Connection</b>	Do we see broadly the connections to other applications or processes, and do we focus narrowly on what we should do first?
<b>Approach</b>	Do we know the right approach to use to communicate with users and other audiences about this innovation?

This framework defines the key factors that influence most innovation decision-making.

But, like all innovations, the emergence of consumerized systems presents its own specific issues and has its own context.

We have noticed that IT organizations are often not accustomed to looking for, evaluating and taking advantage of consumer technologies. Doing so requires new skills and approaches that encourage innovation and minimize risk. Toward this end, we are developing a *Consumerized Technology Workbook*, which will serve as the practical implementation companion for this topic. The Workbook will cover the following areas:

- **Familiarization and opportunity monitoring.** Understanding how the process of consumerization drives markets requires something more than reading the traditional

computer industry trade press. While technologies such as Real Simple Syndication (RSS) can help automate the scanning process, this is fundamentally a human task, which requires someone committed to doing this kind of analytic work. A key aspect of consumerized technologies is that they can switch very quickly from inadequate or expensive to fully capable or affordable. Unless monitoring is frequent, it is easy to miss just when a product or service becomes a candidate to meet an under-served need. Often, hands-on experience is the only way to tell that an item has finally met a critical performance threshold. Familiarization and opportunity monitoring happen only if they are someone's job.

- **Identifying under-served populations and service gaps.** Taking full advantage of consumerization means keeping a constant watch on both the supply and demand sides. Be on the lookout for groups in your organization that are already using consumer systems, and for groups that don't but possibly could. The latter may require a bit of IT evangelizing and education. In some ways, IT could become a kind of consumerization 'store' that provides a catalogue of useful consumer services. Employees in remote regions or undeveloped countries are often an eager source of under-served groups.
- **Preparing for the experiment.** Once you have matched a need with a technology, the next stage is probably a pilot test. Often a simple, small-scale test will identify whether a product or service is completely inadequate or not yet sufficiently mature – or it may lead to negotiation, problem solving and future planning, not just with potential vendors but with pilot participants as well.

- Developing the business case, setting expectations and tracking results. The business case is an important step in synchronizing expectations. It can make explicit to both management and employees concerns such as 'will this technology be used for inappropriate personal purposes?' or 'does this put our data at risk?' Often, the benefits emphasized in the business case focus on time savings, but tracking all benefits formally can help fend off detractors and provide legitimacy for going further.
- Provisioning for the experiment. The participants in the pilot need to be trained, not just in the mechanical operation of whatever new capability they are going to try, but also in how it will be used in the business, including any personal responsibilities they need to assume. They must understand the success criteria for the experiment and their responsibility for collecting the metrics needed to validate the success of the pilot.
- Transitioning to production. Companies should decide, in advance, how they will know that the pilot is over. Have a communications plan for the rest of the organization and a coordination plan for those who have to take over support, security and training. Consumerized technologies can often be tested without much direct internal impact, but over the long haul they have to mesh with and be understood by the organization as a whole.

These steps will be described in detail in the R&AS *Consumerized Technology Workbook*, as well as in on-site workshops. The Workbook will be published mid-2004.

Over the next 12 months, we will continue to research and report on this subject, which we see as one of our core areas of focus. For now, we seek your reaction to this initial Position Paper, and look forward to working with you on this important emerging issue.



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