ENABLING TOMORROW'S INNOVATION

AN IDC WHITE PAPER AND BSA CEO OPINION POLL

OCTOBER 2003

BSA
Business Software Alliance

IDC

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EXECUTIVE SUMMARY

THE BEST IS YET TO COME

Despite three decades of astonishing software innovation that has transformed nearly every aspect of our lives, the Business Software Alliance's CEOs believe *75 percent or more of the benefits software will deliver lie ahead*.

The CEOs share their vision for the next wave of breakthrough technologies, the benefits they will deliver, the challenges they may face and the concrete steps that businesses and governments must take to unleash their potential.

CEOs PREDICT A NEW WAVE OF BREAKTHROUGH INNOVATIONS

BSA CEOs offer a glimpse of the major innovations that promise to drive technological advances and productivity over the next decade, including:

- Wireless networks that open the ever-elusive last-mile bottleneck
- Web services that integrate global business applications and spark a new wave of technology-led productivity growth
- Security and digital rights management technologies that increase trust in the Internet and enable legitimate on-demand entertainment
- Nanotechnology advances that extend technology's reach to previously unimaginable scales
- Vast networks of small sensors that track inventories, improve efficiency and link technology more directly to the physical world
- Real-time communications that make it even easier to access people and services immediately using text, voice or video on a variety of new devices
- Grid and distributed computing that transform computing into a "utility" — allowing companies on-demand access to networked super computing power on a global scale
- Collaboration technologies that enable real-time teamwork and communications across the room, across the nation or around the globe

Consumers Are Poised to Take Advantage of These New Innovations. In the Next Four Years, IDC Predicts:

- Sixty-five percent of the world's billion-plus Web users will be able to access the Internet from a wireless device
- The number of people playing games online in the United States alone will swell to 100 million
- Local wireless hotspots will grow from 20,000 to 140,000
- The number of converged cell phone-PDAs will jump from 4 million to 80 million

CEOs SAY TRANSFORMATIONS WILL DELIVER BROAD BENEFITS

Over the next 10 years, BSA CEOs believe innovation will be a key driver of economic growth. The biggest benefits, they say, will come from increased productivity in business, education and government.

- Productivity improvements alone in the coming five years could yield *$140 billion in annual cost savings* to industries, leading to broader economic growth and better standards of living
- Making the Internet safe for all commercial transactions will help Internet commerce grow a full six times, increasing from $1 trillion last year to nearly $6 trillion by 2006

Software Is a Driving Force Behind These New Benefits

According to a recent IDC study, four out of five non-IT executives believe software is integral to their success, and two-thirds believe it will give them a competitive advantage. Commercial software is a $175 billion industry that generates jobs for 2.3 million people around the world with wages that are higher than other private sector jobs. The software industry's increasing growth rate, combined with its ability to adapt to new development and service models, has propelled it into a new position of prominence as a primary driver of IT growth and benefits. That growth is expected to continue at a rate of 7 percent to 8 percent over the next four years:

- Creating more than 1.5 million new high-paying jobs worldwide
- Generating an additional $290 billion in tax benefits worldwide

ALONG WITH PROMISE, CEOs FORESEE CHALLENGES

The rapid advance of new technologies is bringing with it a new set of challenges and opportunities. Security, privacy, spam and identity theft threaten to restrain the spread of commerce on the Internet. Lack of user confidence and familiarity with technology can prevent consumers from taking full advantage of innovation's benefits. Limited intellectual property protection can hamper expanded research and development and the financing of start-ups. A lack of skilled workers means a smaller pool of potential inventors of the next "killer app." The CEOs understand that governments play a critical role in helping overcome these emerging challenges and nurturing future innovation.

CEOs LAY OUT CONCRETE STEPS FOR UNLEASHING TECHNOLOGY'S POTENTIAL

Businesses and governments must take five concrete steps to promote these advances and the benefits they drive:

ONE: Invest in Innovation. Public and private investment in research accelerates the development process and speeds the benefits to businesses and consumers.

TWO: Protect Intellectual Property. Without such protection, investors won't invest and software developers and computer makers won't be able to create cutting-edge products.

THREE: Focus on Users. This means creating easy-to-use, secure and reliable software that can be optimized to specific environments.

FOUR: Advance Business Models as Well as Technology. Business models must continue to be adjusted, advanced and evolved. New delivery, development and deployment techniques promise new choices and options for businesses and consumers alike.

FIVE: Invest in a Skilled Workforce. Fully reaping the benefits of innovation will require a world-class education system, access to the best minds and the ability to attract and retain skilled workers through compensation linked to company performance.

ENABLING TOMORROW'S INNOVATION

"What differentiates this period from other periods in our history is the extraordinary role played by information and communication technologies. The effect of these technologies could rival and arguably even surpass the impact the telegraph had prior to, and just after, the Civil War."

— Alan Greenspan
July 13, 2000

Over the past three decades, $11 trillion in global information technology investment has unleashed unprecedented innovations that have transformed almost every aspect of our lives, grown our economies and increased our standards of living. Yet technology has achieved only a fraction of its potential.

On the horizon is a new wave of software-driven technological advances that promises to make life more livable, businesses more productive, jobs more plentiful and the Internet more accessible.

In fact, 80 percent of the Business Software Alliance's member company CEOs *believe that 75 percent or more of the benefits software will deliver lie ahead* (see figure 1).

This paper combines IDC's cutting-edge research with key insights from those CEOs to preview the future and the technologies that will drive it. The BSA CEOs, who represent the world's leading software, hardware and Internet companies, share their vision — providing perspective on the breakthrough technologies that will drive the next wave of innovation and the benefits, challenges and concrete steps that businesses and governments must take to realize this potential.

CEOs PREDICT A NEW WAVE OF INNOVATION

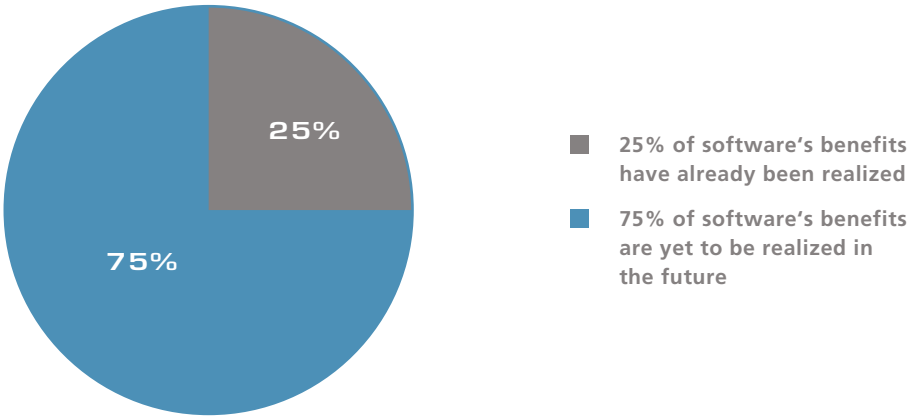
Software innovation has changed, for the better, almost every aspect of our lives. The products and services of commercial software companies have led these contributions, delivering improved productivity in the workplace, substantial cost savings in manufacturing and better educational opportunities for our children.

But just around the corner are thrilling new technologies that will deliver even greater benefits — sparking altogether new ways of doing things.

Innovators are hard at work speeding to the marketplace new ways to save time in busy people's lives, change how teachers teach and students learn, provide us with even more freedom in what we do and unleash our own personal potential and creativity. They are developing simpler ways to communicate, collaborate and integrate; applications that can provide computing power on demand, much like electricity, water or other utilities; and technology that can do for music and movies what the word processor has done for text. They are perfecting tools that allow data to flow farther and faster; wireless technologies that allow users to access almost anything, anywhere; and software that shrinks the gap between idea and application.

FIGURE 1: THE VAST MAJORITY OF BSA CEOs BELIEVE THAT 75% OR MORE OF THE BENEFITS SOFTWARE WILL DELIVER STILL LIE AHEAD

How much of the benefits that software innovations promise to deliver have already been realized?



SOURCE: IDC BSA CEO OPINION POLL

Some of these new technologies are already being tested:

- "Location aware" applications are already in use, like those on the Dartmouth College campus that change content based on location
- Nanotechnology is being used in atomic force microscopy, where tiny objects are seen not via magnification, but by small physical probes that run over their surfaces
- A biotech company in Hayward, Calif., is experimenting with inhalers that use ink jet printer nozzle technology to optimize insulin delivery
- Radio frequency ID tags are tracking cattle in Britain, tracking railroad cars across the country and paying for meals at McDonald's™
- The European Union is using software to translate among the 11 official EU languages
- The C-Leg prosthetic leg uses microprocessors and software to stabilize the gait of users
- Software agents designed at Carnegie Mellon University are helping aircraft mechanics with wearable computers perform inspection and maintenance at Robbins Air Force Base
- New "smart maps," or geospatial mapping software that provides multiple layers of data in one electronic map, are playing a key role in homeland security by helping local law enforcement officials and emergency response teams plan for and react to threats and emergencies
- Innovations once exclusively driven by hardware are already moving to software, like voice-over-IP telephony that turns any broadband connection into a software-driven telephone system

Not all of these innovations are assured. Some will fail in the laboratory. Some will fail in the marketplace. But those that succeed — and there will be many — will deliver significant benefits. BSA CEOs offer a glimpse at the technologies that will drive these future benefits (see figure 2).

CEOs PREDICT TOP 10 TECHNOLOGIES FOR FOSTERING TOMORROW'S BENEFITS

1. Wireless networks that can open the last-mile bottleneck and converge computing and communications. IDC forecasts the number of "converged devices" — like combination PDA-cell phones — will grow from less than 4 million units in 2002 to more than 80 million in 2007.

2. Web services that can integrate far-flung business applications and spark a new wave of technology-led productivity growth. In 2002, only 5 percent of U.S. businesses had completed a Web services project; IDC projects that more than 80 percent will have such projects completed or underway by 2008.

3. XML and extended enterprise applications that connect intelligent systems within and between businesses, computers and devices; span legacy data architectures; and bridge the gap between one application and the next.

4. Security and digital rights management technologies that bring greater trust to the Internet, promote greater Internet commerce and enable legitimate on-demand music, movies and games.

5. Nanotechnology advances where the smallest innovations can deliver some of the greatest benefits by extending technology's reach to atomic scales.

6. Vast networks of small sensors that can track inventory, improve efficiency and link technology more directly to the physical world.

7. Real-time communications that make it easier to access people and services immediately across a broad range of devices, using everything from text to voice to video.

8. Grid and distributed computing that transform computing into a utility — allowing companies on-demand access to networked super computing power on a global scale.

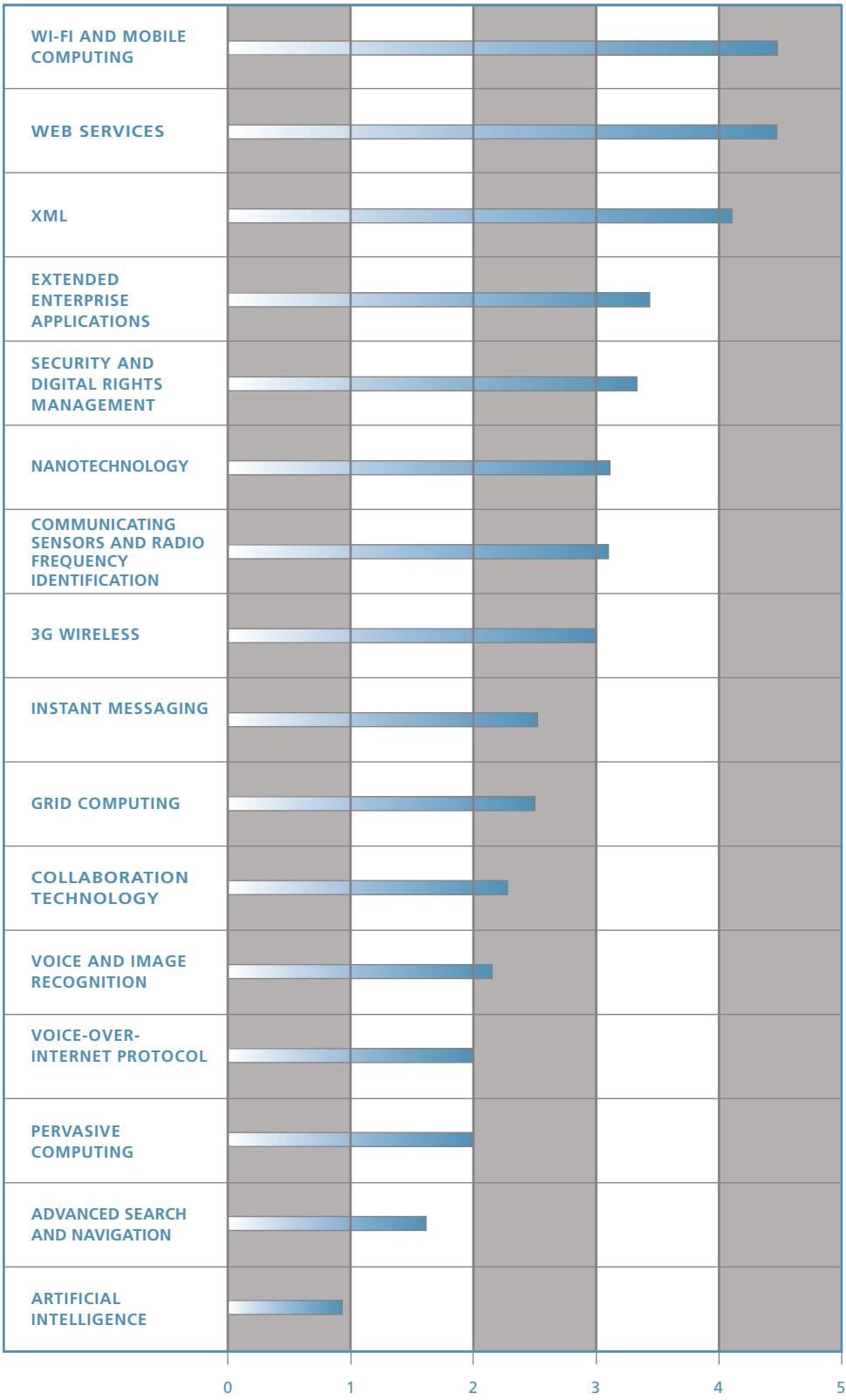
9. Collaboration technologies that empower workers and enable real-time teamwork — across the room, across the nation or around the globe.

10. Voice-over-Internet technologies, where any broadband connection can transform voice into a software application that integrates e-mail and voicemail, provides live voice language translation and saves businesses and consumers money.

Technological innovations that promise to turn into tomorrow's benefits — especially the top three as predicted by BSA CEOs — will extend the limits and stretch the boundaries of technology as we know it today (see page 17, Technology and Innovation).

FIGURE 2: EMERGING TECHNOLOGIES ARE POWERING THE FUTURE

Which emerging technologies will have the greatest impact over the next 10 years?
(Rating of 1-5, with 5 highest)



SOURCE: IDC BSA CEO OPINION POLL

CEOs SAY TRANSFORMATIONS WILL DELIVER BROAD BENEFITS

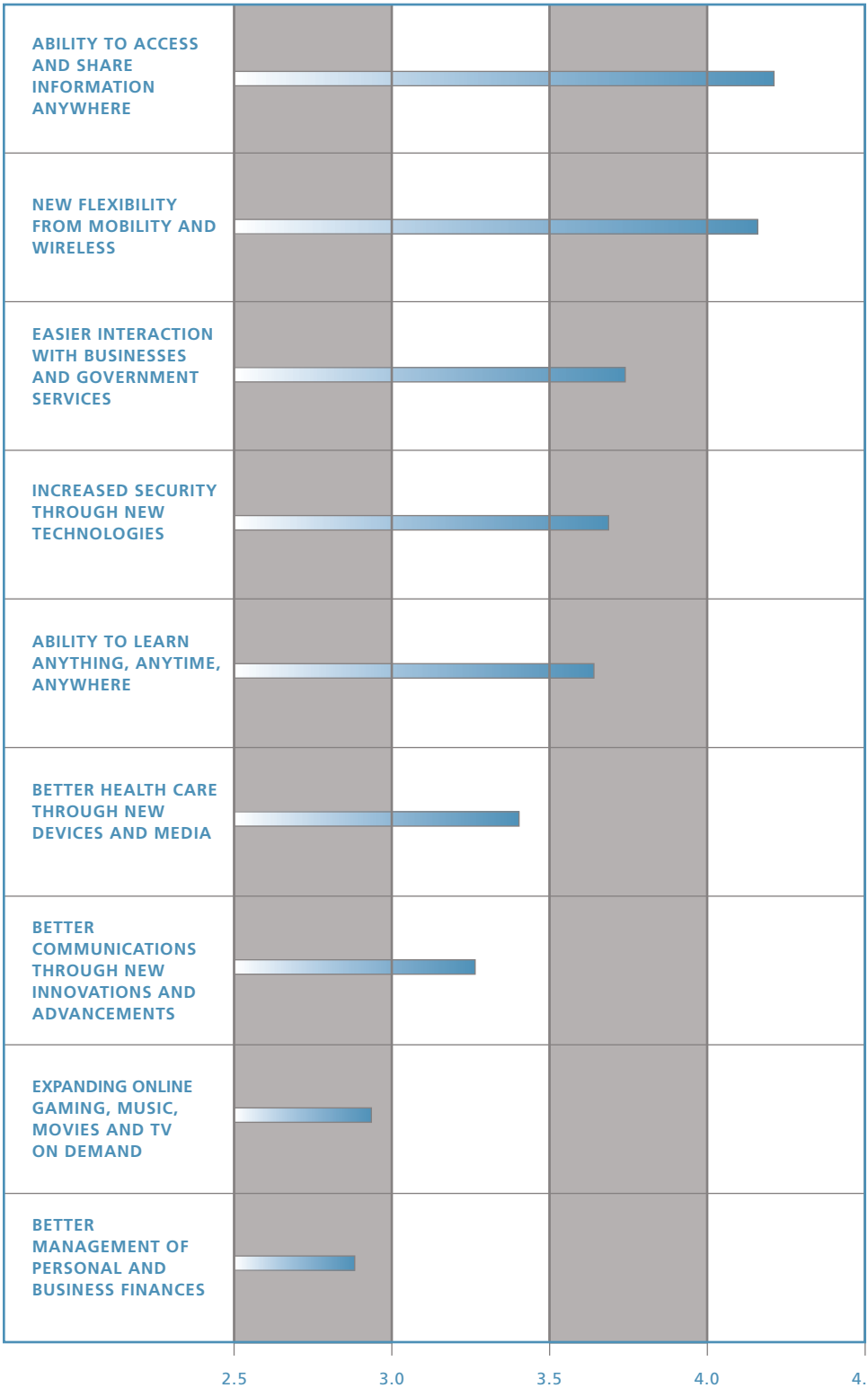
These are just a few of things to come. Yet the story of software innovation is not only about what it enables technology to do, but also about what software allows our economy, businesses and people to do.

BSA's CEOs believe consumers and businesses will benefit from technological advances in a variety of ways, but chiefly from developments that promise to enhance and enrich our lives. Of all of the future benefits that technology can deliver, BSA CEOs were asked which would have the *most* impact on society over the next decade (see figure 3). The most significant benefits include:

- **The ability to access and share information, regardless of location.** Whether it's sharing medical information with a doctor, schedules with a colleague, data between businesses or home movies with relatives around the world, the CEOs identified this as technology's key benefit for the future.
- **More personal flexibility and efficiency through improvements in wireless and mobile computing.** The second leading benefit will come from cutting the cord that tethers technology to the Internet. The importance of wireless mobility is backed up by IDC's research on Web usage: by 2007, IDC predicts that 65 percent of the expected billion-plus Web users around the globe will access the Web at least some of the time from cell phones and other Internet-enabled handheld devices.
- **Easier interaction with businesses and government through online services.** Although Internet commerce is flourishing, the best is still ahead. While an astounding $1 trillion in goods and services were purchased over the Internet last year, IDC predicts Internet commerce will grow a full six times by 2006. New software, hardware, services and business processes will all be involved in making it possible.
- **Increased security through new technologies.** Security is a key enabler for e-commerce and e-government, as well as for important services like health care and online banking. New security technologies also promise to help keep our homeland secure — through integrated intelligence systems, airport facial recognition technologies and identity theft protections.
- **New educational opportunities through technologies that allow people to learn anything, anytime, anywhere.** In the classroom, technologies are already transforming the way teachers teach and students learn. New software learning tools have the potential to increase educational opportunities and allow workers to tailor their own education.
- **Better health care through new innovations, advancements and delivery options.** Health care costs have grown to about 8 percent of GDP internationally and 14 percent of GDP in the United States. But as costs have risen, productivity growth in health care has actually declined over the last decade. Software will play a critical role in bringing productivity gains to health care administration through advances in patient scheduling, accounting, claims

FIGURE 3: SOFTWARE ADVANCES CAN DELIVER SIGNIFICANT NEW BENEFITS

Top impact on people's lives over the next 10 years
(Rating of 1-5, with 5 highest)



SOURCE: IDC BSA CEO OPINION POLL

processing and records management. And software will advance medicine itself by reducing the time it takes to find life-saving cures, providing better diagnosis through new imaging systems and cutting down trial-and-error in doctor training through virtual reality simulations.

- **Expanded entertainment and enjoyment through online games, music, movies and TV on-demand.** Consumers are poised to enjoy new forms of entertainment through software-driven technologies. In the United States alone, IDC expects the number of people who play games online to swell to more than 100 million by 2007. Software-driven personal video recorders that allow people to time-shift their programming will lead to new on-demand cable services, including concerts, sports and TV shows — not just movies.

Economy a Key Beneficiary

While innovation will benefit consumers, it will drive even greater benefits to businesses and the economy in the years ahead. Since World War II, an estimated half of all economic growth is attributable to technology advances. The global economy needs another boost from innovation to create the next wave of economic benefits, new industries and new high-paying jobs.

As Federal Reserve Chairman Alan Greenspan told Congress in February 2001, *"The past decade has been extraordinary for the American economy. The synergies of key technologies markedly elevated prospective rates of return on high-tech investments, led to a surge in business capital spending and significantly increased the underlying growth rate of productivity."*

Going forward, BSA's CEOs foresee major economic and business gains from further software innovation.

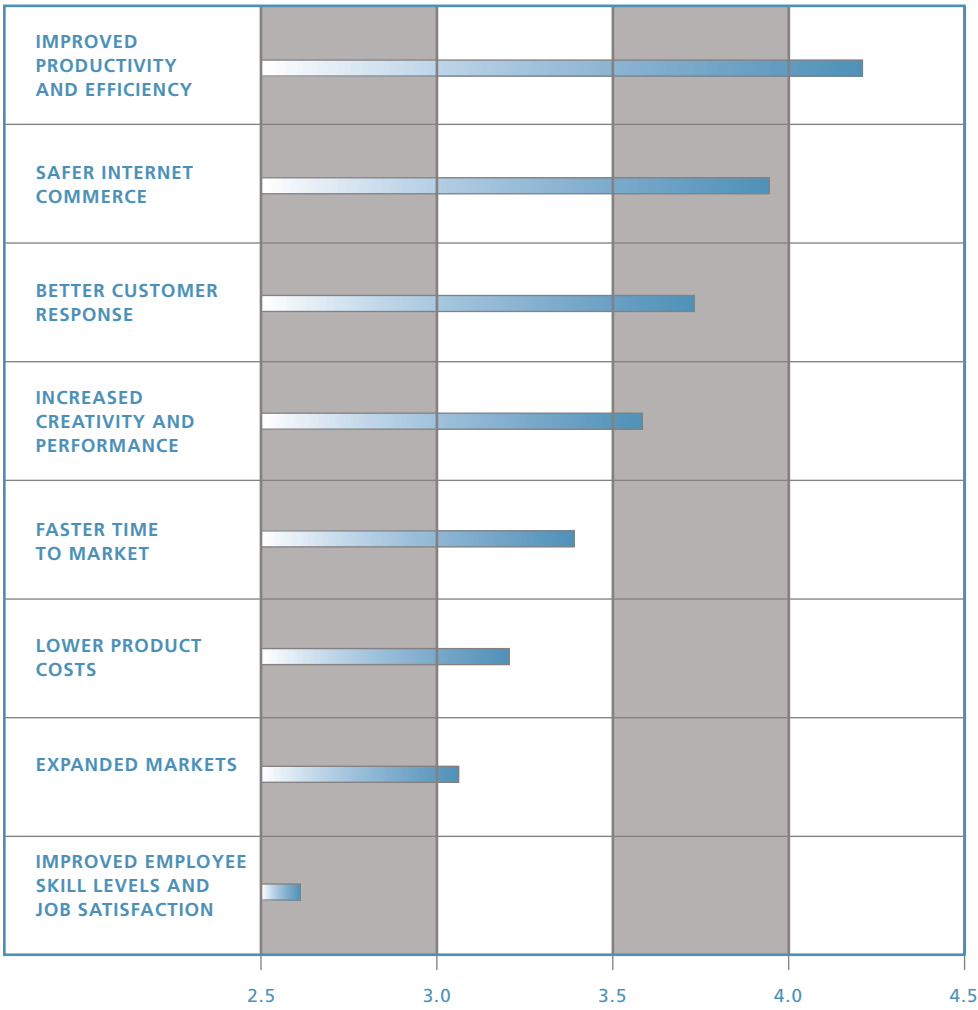
The greatest benefit to the economy from software will come from productivity growth. BSA CEOs found the No. 1 benefit to the economy isn't a specific technology or application, but technology-driven productivity gains that lift the economy and standards of living.

Other trend watchers concur. According to the U.S. Department of Commerce, information technology fueled roughly two-thirds of the productivity growth that appeared in the latter half of the 1990s. Now, economic sectors like health care, education and government, which have traditionally lagged in this area, are poised to experience major productivity improvements from new software investments. According to an August 2003 *Business Week* analysis, technology investments in the next five years could yield $140 billion in annual cost savings from productivity gains in six industries alone.

These gains will stem from software's ability to make it easier and faster for workers to perform their jobs. A June 2003 IDC survey of 400 business executives from non-IT companies found that 54 percent expected breakthroughs or new waves of innovation in their own industries in the next 10 years. These expected developments will both create demand for and be dependent on software-driven technology advances.

FIGURE 4: SOFTWARE-DRIVEN ADVANCES CAN DELIVER MAJOR BENEFITS TO THE ECONOMY AND BUSINESSES

Benefits for businesses and the economy over the next 10 years
(Rating of 1-5, with 5 highest)



SOURCE: IDC BSA CEO OPINION POLL

Some of the transformational examples predicted by these business executives include:

- New voice command and recognition enabling customer self-service
- Wholesale revamping of insurance claims processing, with much more focus on claims tracking by customers
- Virtual reality as a commonplace mechanical design tool
- The ability to run more businesses from the home
- Remote viewing of medical diagnostics and images

Software that makes the Internet safe for commercial transactions will also drive dramatic economic benefits. This ranked second among BSA CEOs for its impact on the economy and businesses. BSA companies are at the forefront of

developing products to combat the constant and rapidly evolving threats to information security. As these technologies are more widely deployed, businesses and consumers will develop more trust in Internet commerce and take advantage of its convenience, efficiency and ability to deliver greater cost savings.

BSA CEOs also expect innovation to focus on enabling companies to be more responsive to customer needs, unleashing greater human creativity and performance, bringing products and services to markets faster, lowering product and service costs and expanding markets through the Internet.

Software Is a Proven Force Behind Dramatic Economic and Societal Benefits

Software is harnessing and enhancing the productive capacity of technology — helping grow the economy, create jobs and keep inflation low. Although the commercial software industry itself is a $175 billion economic engine, it is also an enabler of much broader technological innovation. Software drives the communication switches at the heart of the Internet, runs automated factories turning out widgets, enables life-saving breakthroughs, powers the digital entertainment revolution and zaps dollars and data around the globe at the speed of light.

Indeed, software has become so embedded in today's business world that most executives see it as a critical imperative. In the June 2003 poll of business executives from non-IT companies, IDC found that:

- Four out of five executives believe software is integral to the success of their businesses (either very important or mission critical)
- Two-thirds believe software can give them a competitive edge
- Half expect another major wave of software innovation in the next 10 years

Software and the related IT services industries are the twin drivers behind IT sector growth. Commercial software generates jobs for 2.3 million people with wages that are higher than other private sector jobs. The software industry's increasing growth rate, combined with its ability to add value to the services sector, has propelled it into a new position of prominence as a primary driver of IT growth and benefits.

At the heart of this economic dynamo lies a competitive commercial software market that is vibrant, innovative and ever-changing.

Since its infancy, the software industry has evolved new software techniques along with its technologies. Software applications were initially developed and bundled with specific proprietary hardware and mainframe computers in mind. The emergence of the PC set off an unprecedented wave of new software development, creating markets for everything from word processing to spreadsheets to databases, and launching a whole new infrastructure for selling computers to the public. As technology has progressed, the software sector has developed even more diverse options and choices for obtaining software, including commercial sales, shareware and freeware. At the same time, it has developed more diverse development models — from one individual writing code for an entire program to teams, small groups and even hundreds working on elements or modules of the same program to community-based development.

Marketplace competition can be expected to drive even more diverse development, distribution and business model choices for consumers and businesses. Already there are hints at what could come. For example, software is now being developed and deployed as a service. In another example, distributed software components across the Internet can act as one integrated application to solve complex challenges.

While the software sector continues its evolution, economists agree that the commercial software sector creates economic benefits that translate into real jobs, real wages and real tax revenues.

For instance, if the software industry grows 7 percent to 8 percent a year over the next four years, as IDC predicts, it will: (see figure 5)

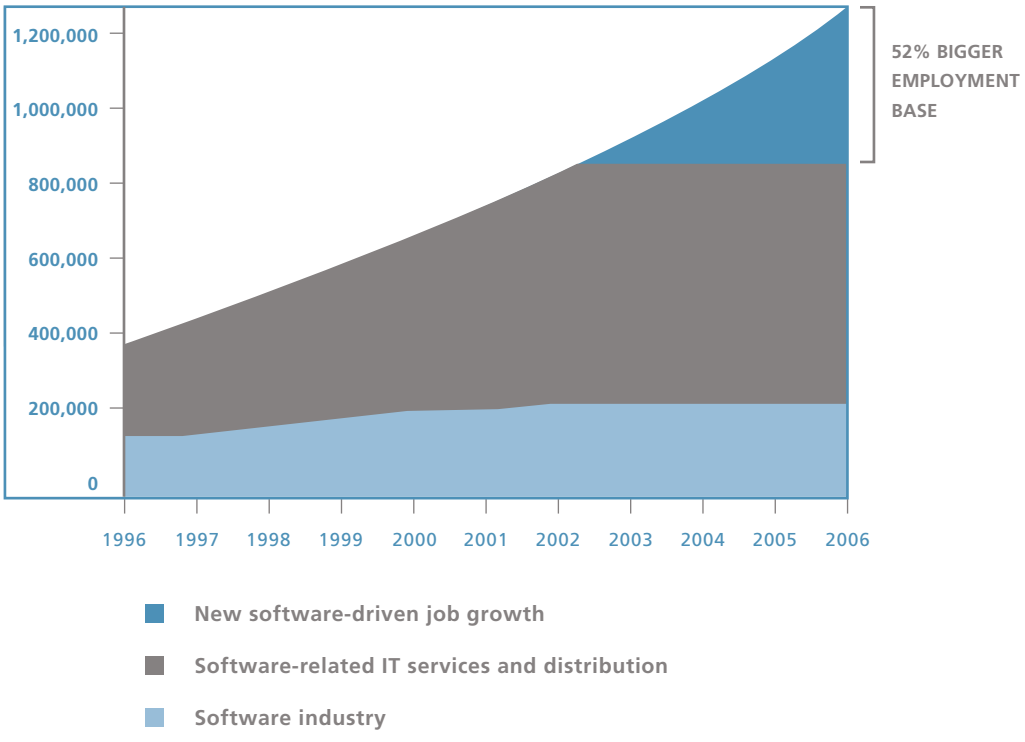
- Create more than 1.5 million additional high-paying jobs globally (nearly 500,000 in the United States alone)
- Generate nearly $300 billion in new tax revenues globally to fund vital public services ($140 billion in the United States)

These benefits are on top of the $330 billion in tax receipts ($200 billion in the United States) that IDC estimates will be generated from software employment and sales in 2003.

To enable the software sector to create jobs, fuel productivity gains and deliver the benefits that lie ahead, a number of emerging challenges must still be addressed.

FIGURE 5: SOFTWARE INNOVATION CAN CREATE ANOTHER 500,000 NEW JOBS

Which emerging technologies will have the greatest impact over the next 10 years?
(Rating of 1-5, with 5 highest)



SOURCE: IDC BSA CEO OPINION POLL

ALONG WITH PROMISE, CEOs FORESEE CHALLENGES

The rapid advance of new technologies is bringing with it a new set of challenges and opportunities. Even as technology and innovation are creating a brighter future, BSA's CEOs provide insight into a number of critical economic, regulatory and technological hurdles on the horizon (see figure 6).

Security, privacy, spam and identity theft threaten to restrain the spread of commerce on the Internet. User confidence and lack of familiarity with technology can prevent them from taking full advantage of innovation's benefits. Investor memories of the dot-com bubble's collapse and limited intellectual property protection could hamper the financing of another round of startups. A lack of skilled workers, or the compensation incentives to attract them, could prevent the next wave of innovators from entering the workforce and inventing the next "new thing."

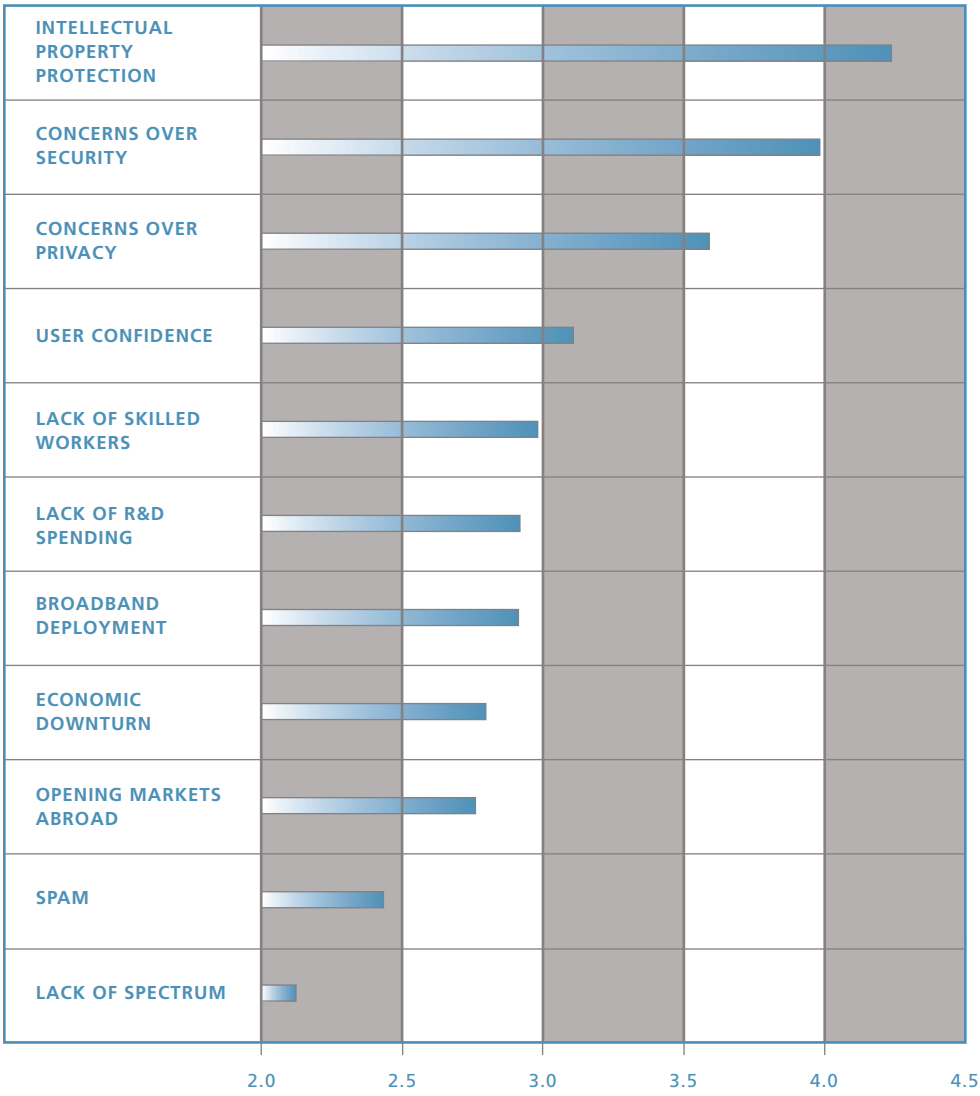
BSA's CEOs provide insight into these crucial challenges that will determine how quickly the benefits of technological advances can be extended to more people.

Top six challenges to innovation:

1. **Intellectual Property Protection.** In an industry in which the standard investment in research and development is close to 10 percent of sales (see page 19, R&D), it's not surprising that intellectual property protection tops the list of BSA CEO concerns. If commercial software companies can't protect their work, investors won't invest, innovators won't invent and the IT sector won't be able to achieve its full economic potential. Globally, four out of 10 softtware programs are pirated. In order to achieve broader gains, governments will need to take comprehensive and concrete steps to protect intellectual property and reduce software piracy (see page 20, Piracy).
2. **Security.** The CEOs identified information security as a critical enabler of greater Internet commerce and e-government. Study after study indicates that businesses and government still have a lot to do to defend against threats to critical information networks. Strengthening information security should be an important international priority. As builders of the products that power and protect the world's information networks, BSA members are dedicated to developing a safe and legal online world with new technologies and industry-developed standards to combat the ongoing and rapidly evolving information security challenges.
3. **Privacy.** The CEOs also found that for Internet commerce to flourish, consumers must be able to trust that their personal information and transactions will be protected. Industry efforts to promote privacy have been essential to increasing trust and empowering individuals with the tools to manage their own personal information.

FIGURE 6: CHALLENGES EXIST THAT CAN SLOW THE DELIVERY OF BENEFITS TO MORE PEOPLE

What are the challenges to achieving the benefits of technological innovation?
(Rating of 1-5, with 5 highest)



SOURCE: IDC BSA CEO OPINION POLL

4. **User Confidence and Familiarity With Technology.** As technology drives deeper into the fabric of daily life, users need confidence that the online world they enter is both safe and legal. They also need better understanding of and familiarity with the technologies they use. As technology becomes increasingly more sophisticated and complex, it must also become easier to use.
5. **Skilled Workers.** Software innovation today depends on 2.3 million highly skilled workers around the world who develop, sell or service packaged software. With only modest future growth, IDC estimates the industry will need another 1.5 million skilled workers worldwide over the next four years.

In order to fill these jobs, companies need an educational system that can produce world-class innovators, continued access to the best minds in the world and the ability to attract and retain qualified employees.

6. **Research and Development Spending.** According to the National Science Foundation, the technology sector invests more than twice the national average in R&D. Innovation and ingenuity are at the core of the software industry. But lack of federal investments in R&D, restrictions that prevent the commercialization of technologies developed with federal R&D funds, lack of a permanent R&D tax credit or industries that fail to invest in the future could inhibit innovation's full potential (see page 19, R&D).

CEOs LAY OUT CONCRETE STEPS FOR UNLEASHING TECHNOLOGY'S POTENTIAL

In order to unlock the vast new productivity, economic growth and consumer benefits that lie ahead, governments need to help overcome these emerging challenges and nurture future innovation.

Figure 7 details the critical role that BSA CEOs believe governments must play in fostering innovation. BSA CEOs believe governments can help ensure access to skilled workers, encourage intellectual property protection, increase intellectual property enforcement, invest in children through educational technology, support long-term, cutting-edge R&D and lead by example in their own use of technology.

Governments help drive innovation in three distinct ways: (1) through rules directly affecting the technology industry's own ability to invest, innovate trade and grow; (2) through the government's own use of technology (governments are the world's largest technology users); and (3) through policies affecting other industries that drive technological investment.

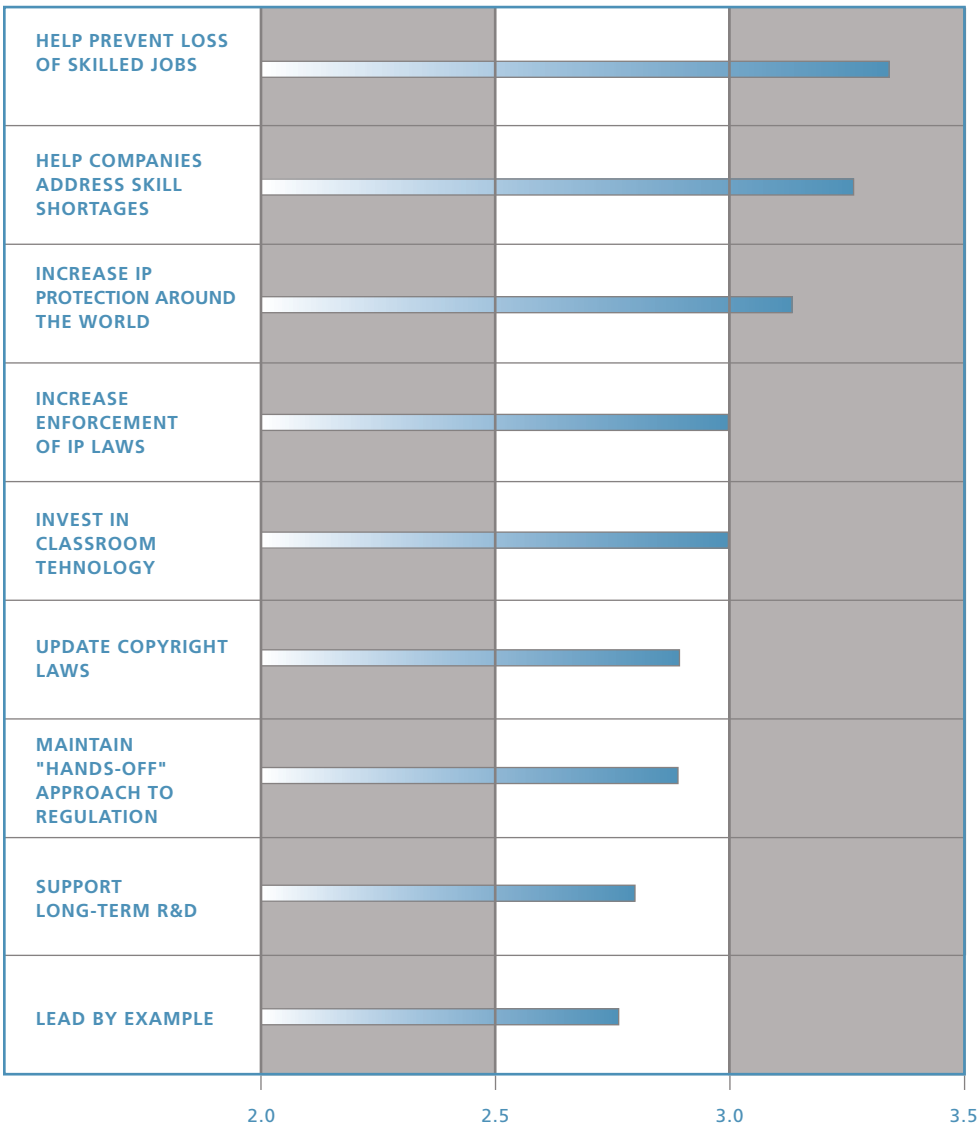
The impact of government decisions can be seen all around us. For example, in IDC's June 2003 survey of non-IT business executives, one in three expected to acquire new software this year as a result of government compliance requirements. Likewise, Congress' decision to impose a moratorium on discriminatory taxes on the Internet has arguably helped U.S. Internet commerce grow from a few billion dollars a year to more than $600 billion this year (including business-to-business Internet commerce).

Government investments and choices have played a critical role in technologies past and present: they have helped spark the Internet, create broadband innovation and competition, launch e-commerce, reduce software piracy, unleash new technologies like wireless networking and connect classrooms to the Internet.

Of course, sometimes doing nothing is the best policy. For instance, the CEOs in the IDC poll said that maintaining a hands-off approach to regulating the Internet and technology development is of paramount importance.

FIGURE 7: GOVERNMENTS CAN FOSTER EVEN GREATER INNOVATION

What are the most important things governments can do to foster innovation?
(Rating of 1-5, with 5 highest)



SOURCE: IDC BSA CEO OPINION POLL

CALL TO ACTION

The potential for a vast new wave of technological innovation is here. In order to achieve the full promise of the 75 percent of benefits that BSA's CEOs believe lie ahead, businesses and governments need to take five specific and concrete steps:

ONE: Invest in Innovation. Even in an economic downturn, innovation must be fueled by continued public and private investments in basic research. Investment in research and the commercialization of technologies developed with public R&D funds accelerates the development process and speeds the benefits to businesses and consumers.

TWO: Protect Intellectual Property. Strong intellectual property protection is essential to the health and growth of the software industry. Without such protections, investors won't invest and software developers and computer makers won't be able to create the cutting-edge products that will be needed to fuel economic productivity.

THREE: Focus on Users. Software companies need to continue increasing consumer and business confidence in information technology. This means creating easy-to-use, secure and reliable software that can be optimized to a particular business environment.

FOUR: Advance Business Models as Well as Technology. Business models must continue to be adjusted, advanced and evolved. The software industry is already developing alternate ways for users to acquire software — from straight license purchases to software as a service or software on demand. New delivery, development and deployment techniques promise new choices and options for businesses and consumers alike.

FIVE: Invest in a Skilled Workforce. With as many as 1.5 million new software-related jobs expected to be created in the next four years alone, companies need access to the best educated workers. Achieving software's full potential will require a world-class education system, access to the best minds and the ability to attract and retain skilled workers through compensation linked to company performance.

TECHNOLOGY AND INNOVATION

TECHNOLOGY THAT KNOWS NO BOUNDARIES, INNOVATION THAT KNOWS NO LIMITS

Three powerful innovations on the horizon, as identified by BSA's CEOs, will help extend the limits of the Internet, stretch the bounds of current software applications and push back the confines of innovation: wireless mobility, Web services and XML.

Wireless mobility — doing anything, anywhere. Wireless technologies are prying open the great bottleneck in communications — the last mile — and extending technology's reach into every nook and cranny of our homes, offices and communities.

- Wi-Fi's exponential growth shows potential. One sign of the potential of wireless technologies can be seen in the growth of wireless "hot spots" or public access points based on the 802.11 industry standard for local area networks, nicknamed Wi-Fi. In 2001, wireless hotspots numbered in the hundreds. By the end of last year, IDC estimated there were 20,000. In the next four years, IDC expects 140,000 local hotspots.
- Emerging wireless innovations show possibilities. But Wi-Fi is only a small precursor of the promise that still lies ahead. Another wireless technology just over the horizon, Wi-Max, boasts a range of up to 30 miles and the ability to transfer data, voice and video at speeds of up to 70 Mbps. And yet another technology, mesh networking, grows in capability with each successive device that is connected — assisting each other in transmitting packets like a peer-to-peer wireless network. The more nodes that are connected to the decentralized mesh network, the higher the network throughput.
- Computer and communications convergence shows promise. Wireless' greatest potential, however, may lie in the convergence of computing and communications. IDC forecasts the number of "converged devices" — or devices that combine communications and computing like PDAs that are also cell phones — will grow from under 4 million units in 2002 to more than 80 million in 2007. By 2007 there will be 3 billion cell phones on the planet, most with Internet capability. At the same time, millions of other consumer electronics, automobiles, appliances and embedded systems will also be connecting wirelessly to the Internet.

Web Services — transforming software into a service. The single most important productivity investment a company can make is the integration of business processes. Emerging Web services technologies not only allow companies to offer software as a service, they allow them to integrate their business processes and create integrated Web-based applications in a fraction of the time. Web services provide a standard way for software applications to work together over the Internet. IDC expects Web services to become the dominant distributed computing architecture within 10 years. In 2002, only 5 percent of U.S. business had completed a Web services project; by 2008, more than 80 percent should have projects underway or completed. These Web services

efforts can be the business accelerator for new opportunities and lead to significant productivity improvements throughout the economy.

XML — interconnecting intelligent systems. Extensible Markup Language, or XML, is a key enabler for future innovation, especially in connecting intelligent systems within and between businesses, computers and devices. XML can bridge the gap between applications that cross company boundaries and span legacy data architectures. In a May 2003 study of more than 300 U.S. enterprises, IDC found that XML was now the second most popular software infrastructure standard after database standard SQL. More than 55 percent of respondents said they had settled on XML as a key standard for their organization. In another study, IDC found that only one in 10 Web sites was highly connected to other internal business systems, and only one in 50 was highly connected to systems in other companies. XML can bridge much of that gap between these divergent intelligent systems over the next decade.

RESEARCH AND DEVELOPMENT

THE RESEARCH AND DEVELOPMENT EDGE

For any economy competing on the world stage, R&D is a critical indicator of the potential for growth through innovation.

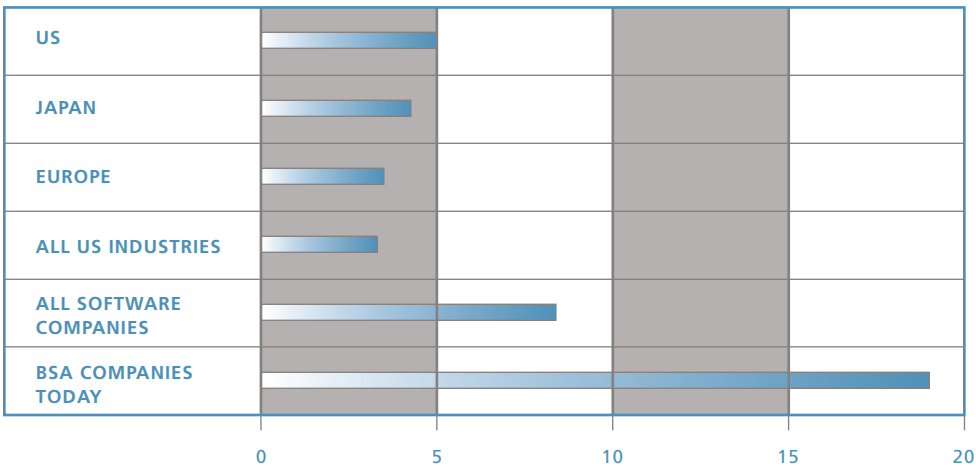
Research accelerates the innovation process. Two out of every five R&D dollars in the world are generated in the United States. Of that, three quarters come from U.S. companies. This commitment to R&D is one of the reasons the United States continues to be considered the center of innovation — whether measured by raw R&D funding, venture capital activity or government investment.

The thousands of software companies that exist today invest, on average, 9 percent of their sales on R&D — more than twice the business average. BSA member companies, however, invest even more, a full 19 percent (see figure 8). As their commitment to R&D demonstrates, software companies, especially BSA member companies, are engines for innovation. They spend almost as much on basic research as U.S. companies as a whole spend on research *and* development. Even pharmaceutical companies spend less as a percent of sales.

Federal R&D and the advances that the government itself develops are critical to future commercialization of new products and enabling the next wave of innovations. And, fostering a vital and dynamic commercial software industry within the global economy is a critical component for enabling that next wave as well.

FIGURE 8: INVESTMENTS IN R&D ACCELERATE INNOVATION

BSA companies invest more in R&D as a percent of sales



SOURCE: IDC BSA CEO OPINION POLL, UK GOVERNMENT, NATIONAL SCIENCE FOUNDATION, AND IDC ESTIMATES

PIRACY

THE HIGH COST OF SOFTWARE PIRACY

In an industry where the standard investment in R&D is close to 10 percent of sales, it's not surprising that intellectual property protection to guard those investments tops the list of CEO concerns.

Every year the BSA conducts a study of software piracy in 90 countries (www.bsa.org/usa/research). In 2003, 19 countries had piracy rates above 70 percent, meaning that of the software running on PCs in those countries, more than seven of 10 copies were obtained illegally.

While that piracy cost the worldwide software industry $12 billion in lost revenue last year, it cost the worldwide economy hundreds of billions of dollars. An April 2003 IDC study of the economic impact of software piracy in 57 countries (www.bsa.org/idcstudy) found that piracy cost jobs, GDP growth and tax revenues. Countries with high piracy rates were also losing productivity as the work force dealt with out-of-date and unsupported software, and the lack of economic flexibility from not having a vigorous local commercial software industry.

For the 57 countries studied, which account for all but 2 percent of global spending in IT, IDC found that lowering the global piracy by 10 percentage points over four years would:

- Create 1.5 million jobs
- Create $400 billion in economic growth
- Add $63 billion to government tax receipts

The IDC study showed that those benefits touch everyone. For example, that $63 billion in additional tax revenues from commercial software companies could provide more than 50 million computers to schools around the world or provide an additional 32 million people with health care.

Other benefits from lowering piracy include:

- More choices for consumers and businesses
- More opportunities for entrepreneurs
- More high-paying jobs for workers
- Productivity improvements that support higher standards of living

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