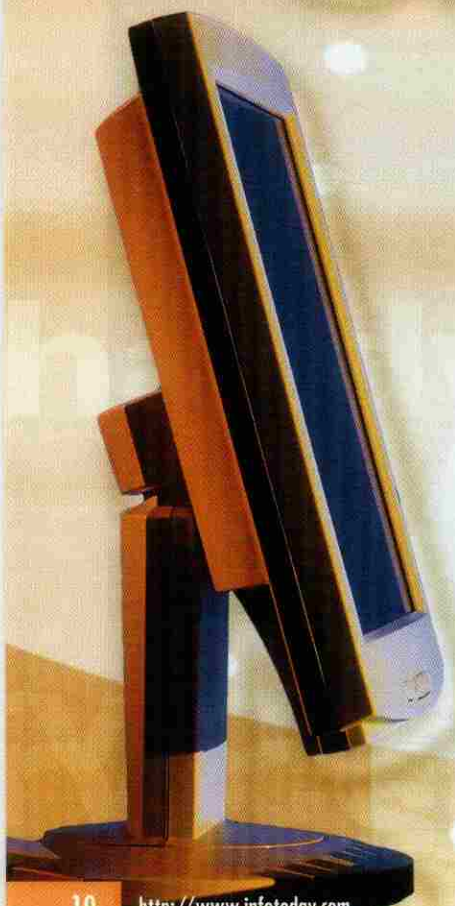
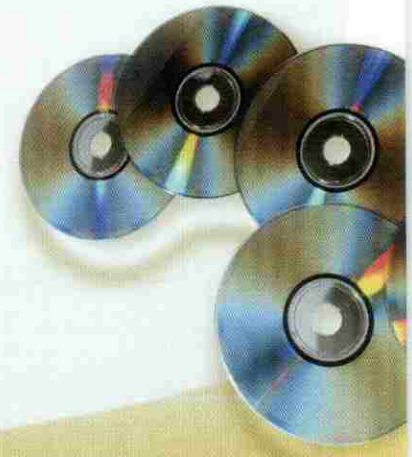
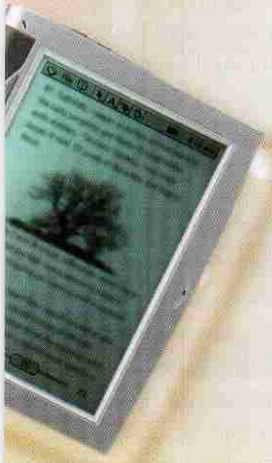
Corporate Visions of Personal Computing Space

by Eric Flower







We're approaching Microsoft's, Sun Microsystems', and Apple's mid-'90s visions of ubiquitous, secure, and seamless access to data—and here are the companies and systems getting us there.

Welcome to the 2002 version of the *Computers in Libraries Buyer's Guide* Windows/Intel (Wintel) industry review. Last year we began by noting that we were moving away from personal computers, operating systems, and applications that mainly generate printed pages while heading toward a future filled with the tools needed to create a high-bandwidth, Net-centric, media-rich environment. The article continued with a forecast that extreme ultraviolet (EUV) lithography technology would permit the manufacture of processors with billions of transistors in the 10-, 20-, or 30-GHz speed range by 2005. Later, when these processors become widely available, real-time high-definition video creation, manipulation, and presentation; natural speech recognition; and idiomatic language translation will be possible on the desktop. The article concluded with a prediction that combinations of these high-speed, multibillion-transistor processors eventually would become the heart of artificial agents and machines that think.

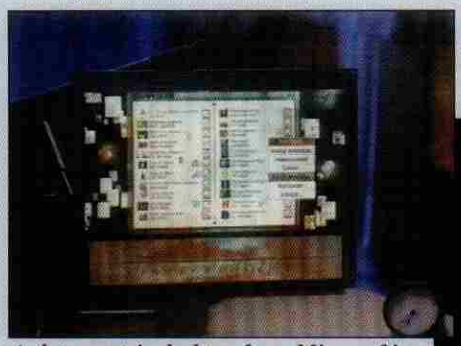
Early Corporate Visions

The most common reader response to this vision was, "If you're right, what will this look like?" For once the answer was easy. First, check out three forward-looking corporate videos that have become the star charts of computing space—Apple's "Knowledge Navigator" (1987), Microsoft's "Information At Your Fingertips: 2005" (1994), and Sun Microsystems' "Starfire: A Vision of Future Computing" (1995). All had the same purpose: first, to show what personal computing space might look like in the future—the year 2004 for Sun, 2005 for Microsoft, and 2011 for Apple; and second, to follow the development of office environment design experiments like the IBM/Steelcase collaboration called BlueSpace.

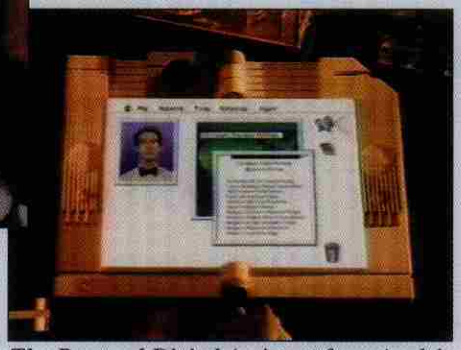
These corporate visions are remarkably similar in that they describe fixed-location personalized immersive workspaces as well as powerful mobile devices that are tied to no particular location. In all three, operating systems and applications are virtually invisible, or at least unobtrusive. You have no sense of how they work, but it's obvious that they are powerful and Net-centric. It's hard to see where the hardware ends and the software begins. Interfaces are natural. Many devices are invisible or embedded. Networks and network services are ubiquitous, secure, fast, reliable, wired, and wireless. Access to data and movement around network resources is seamless. Privacy is protected. Software is graphical, data-centric, and voice- or touch-activated. Everything is personalized. Collaboration is effortless and distance is no barrier. Point-to-point and multi-point videoconferencing and streaming video work so well, they are taken for granted.

More Recent Developments

More recently, IBM and Intel have been outlining and implementing their corporate visions in the same computing space. IBM is "... exploring exciting ubiquitous computing challenges and new user interaction paradigms to create future workspace environments that address user requirements including a need for greater control and personalization of the work environment, increased productivity through the use of context-aware applications, pervasive access to workspace resources and the transparent integration of mobile devices." See http://www.research.ibm.com/MobileComputing/BlueSpace.html for basic information on the BlueSpace project, and Aaron Ricadela's "New Way To Work" (*InformationWeek.com*, January 28, 2002, http://www.informationweek.com/story/IWK20020124S0028) for a much longer discussion. Watch a



A data-centric desktop from Microsoft's 'Information At Your Fingertips: 2005'



The Personal Digital Assistant from Apple's 'Knowledge Navigator'

The boardroom videoconferencing scene from Sun Microsystems' 'Starfire'

streaming video clip about BlueSpace called "Workplace of Tomorrow" on the TechTV.com Web site at http://www.techtv.com/news/culture/story/0,24195,3372794,00.html.

On August 28, 2001, Intel executive vice president Paul Otellini outlined his company's future directions at the Intel Developer Forum in San Jose:

> As the computing industry has grown and new technologies have evolved, purchasing criteria are changing. While processor speed is of primary importance, buyers now look to features such as style, form factor, security, power consumption, reliability, communications functions, price and overall user experience. Combinations of these features and others are driving end-user technology requirements in individual market segments. Intel plans to develop technologies that will help address these changing requirements in each of the key market segments.

See Intel Outlines Future Technology Directions: Technologies to be Tailored to User Needs and Market Segments at http://www.intel.com/pressroom/archive/releases/20010828corp_a.htm for the full report.

You can see Intel's 2003 desktop initiative on the Lecta Concept Platform site at http://developer.intel.com/design/motherbd/cv. It says, "The Intel Lecta Concept Platform is an Intel Pentium 4 processor-based concept platform that showcases multiple, integrated, high-speed I/O and other technologies in a working platform—all in a MicroATX chassis." According to Intel, "Developers should begin designing platforms and applications which take advantage of these leading-edge technologies today." The system includes the following:

- Intel Pentium 4 Processor Performance with Dual Data Rate SDRAM
- Wireless connectivity with Intel's 802.11a LAN adapter
- Multiple high-speed I/O connections, including both USB 2.0 and IEEE 1394a
- Next-generation storage I/O, utilizing Serial ATA
- Integrated graphics and performance-quality audio

Follow future developments on the Intel 2003 Desktop Platform Vision site at http://developer.intel.com/platforms/desktop/vision. Here you'll find the three elements of the "Intel 2003 Desktop Platform Vision": The Platform Vision Guide, The Concept Platform (Lecta), and the Reference Platform.

Meanwhile, to promote pervasive computing, Intel is making mobile computing a key development area:

> When you think about what makes mobile computing valuable to PC users, four items stand out: the ability to run the most sophisticated and processing intensive applications, the ability to be connected to a network anytime, anywhere, the ability to stay mobile for extended periods of time, and the ability to carry and store the mobile PC easily. For designers and developers, and the manufacturers that support them, these items are being referred to as the "four vectors of mobility": high performance, seamless wireless connectivity, long battery life, and innovative form factors.

See "The Future of Mobile Computing—Four Vectors of Mobility" in the *Intel Developer Update Magazine*, March 2002, at http://www.intel.com/update/contents/mb03021.htm for the whole story.

What's Happening Today

It's clear that we're not ready to implement all parts of these corporate visions yet, as illustrated by two events that took place in mid-January of 2002. On January 15 Bill Gates sent his "Trustworthy Computing" e-mail to Microsoft employees, shifting corporate focus away from application features and to "computing that is as available, reliable and secure as electricity, water services and telephony." Gates wrote that, "In the past, we've made our software and services more compelling for users by adding new features and functionality, and by making our platform richly extensible. We've done a terrific job at that, but all those great features won't matter unless customers trust our software. So now, when we face a choice between adding features and resolving security issues, we need to choose security." In short, trust-

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worthy computing is about availability, reliability, security, and privacy—all those things implied back in 1994 in "Information At Your Fingertips: 2005."

Two days later, on January 17, technology research and consulting company Gartner, Inc. released its preliminary estimates of personal computer shipments for the year 2001, and it wasn't pretty. "For just the second time in the history of the PC market, year-end shipment totals show the worldwide and U.S. PC industries experienced a decline in shipments. Worldwide PC shipments totaled 128 million units in 2001, a 4.6 percent decline from 2000. PC shipments in the United States reached 44 million units, an 11.1 percent decline from 2000. The PC industry has not experienced such a difficult year since 1985 when worldwide PC shipments declined 2.3 percent, and U.S. PC shipments dropped 21.8 percent." (From "Worldwide PC Shipments Fall for Only Second Time in History," Gartner First Take, FT-15-3029, January 18, 2002.) Gartner attributed the downturn to bad global economies and saturated markets.

"In short, trustworthy computing is about availability, reliability, security, and privacy...."

Part of that saturated market is made up of people like you and me. Many of us have PCs that are powerful enough for everyday work with Microsoft Office or similar suites, and we're not excited by equipment, operating systems, or applications that offer little more than marginal improvements in performance or in what we can do. We're biding our time, waiting for the media-rich Net-centric environment we've been promised, but haven't yet seen. We're not going to spend a lot until some major breakthrough in applications or hardware occurs. In the meantime, we move toward the larger vision by working at the edges, setting up a wireless network here, a videoconferencing station there.

While we wait, we read. One of the better articles published this year was "20/20 Foresight" by Daniel Tynan in the January 2002 issue of *PC World*, which outlined 20 products, trends, and technologies that will change PCs in 2002 and beyond. (See the complete article online at http://www.pcworld.com/features/article/0,aid,68795,pg,1,00.asp.) A sidebar titled "Future PC Specs 2004: Your Next PCs" at http://www.pcworld.com/features/article/0,aid,68795,pg,5,00.asp outlines hardware that will likely be available for desktops and notebooks in the year 2004. Some of the specifications look like this:

- 4- to 5-GHz microprocessor with 512 MB of RAM
- 300- to 400-GB hard disk
- Rewritable DVD
- 3-D graphics with 128 MB of video RAM
- 18- to 21-inch flat-panel LCD screen capable of 1600 x 1200 resolution
- USB 2.0 and IEEE 1394 ports
- Windows OS
- 802.11b wireless network
- Price: $1,500 to $2,000

The predictions look very much like straight-line extrapolations of specifications we've seen before from Intel and Microsoft, first in the now-discontinued "PC Design Guide: A Technical Reference for Designing PCs and Peripherals for the Microsoft Windows Family of Operating Systems" (see the last one at http://www.pcdesguide.org/pc2001), and later in Microsoft's "Consumer Desktop PC Design Checklist" at http://www.microsoft.com/hwdev/platform/pcdesign/checklist.asp. The "Checklist" provides manufacturers with a list of capabilities and components that deliver the best performance and reliability with Windows XP. The "PC Design Guide" and the "Checklist" specifications call for mainstream business desktop computers to include the following:

- 667 MHz-plus CPU
- 128 MB RAM minimum, 256 MB-plus RAM preferred
- 40 GB-plus 7200-RPM hard disk formatted with NTFS file system
- 32 MB minimum (64 MB preferred) graphics memory; 4X AGP support
- Flat-panel monitor with a minimum of 1280 x 1024 resolution
- 10/100 Ethernet adapter with support for Wake-on-LAN; if wireless, support for IEEE 802.11 protocol
- 4 USB 1.1-compliant ports; 2 IEEE 1394 ports
- DVD/CD-RW capability

Any desktop manufactured over the past 12 months to be sold in the mainstream business environment will meet the key processor, RAM, and networking requirements. And now there are no problems meeting them even in the budget or notebook market segments.

A Look at the Marketplace

Chip giant Intel divides the market into six segments, or platforms: performance PCs built around the Pentium 4, mainstream PCs (Pentium III), value PCs (Celeron), workstations (Xeon and Pentium 4), mobile hardware of all kinds (mobile Pentium 4, Pentium III, Celeron), and servers (Pentium III and Xeon). For more information on these platforms look at http://www.intel.com/platforms. Our main focus is on the Pentium 4 (performance) and Celeron (value) lines.

- **Pentium 4 (performance and mainstream):** "The Intel Pentium 4 processor is designed to deliver performance across applications and usages where end users can truly appreciate and experience the performance. These applications include Internet audio and streaming video, image processing, video content creation, speech, 3D, CAD, games, multi-media, and multi-tasking user environments." For complete information on the Pentium 4 processor, see http://www.intel.com/design/Pentium4/prodbref.

- **Celeron (value):** "The Intel Celeron processors at speeds ranging from 800 MHz to 1.30 GHz expand Intel processing performance into the value-priced PC market segment. The Intel Celeron processors provide power to handle the Internet, educational programs, interactive 3D games and productivity applications." For complete information on the Celeron processor, see http://www.intel.com/design/celeron/prodbref.

Regardless of Intel's carefully crafted market segments, buyers are acting quickly to define their own markets. No one is going to purchase a desktop PC built around the Pentium III today, even if Intel labels it as the mainstream PC. Prices of Pentium 4-based systems are just too attractive. Indeed, you would be hard pressed to find an advertisement that mentions the Pentium III except in a notebook.

"Value-conscious buyers will concentrate on systems that trade off performance and features in favor of price. They can recapture some of the performance by installing more RAM."

The other major processor company in the Wintel computing space is Advanced Micro Devices, better known by its initials, AMD. A longtime also-ran, AMD has done well recently with its lower-cost, high-performing lines. Despite the poor industry showing in 2001, AMD was able to increase its market share by more than 4 points, to over 20 percent. AMD follows a three-track product strategy: personal computers, including desktops and mobile systems; servers and workstations; and personal connectivity devices such as PDAs, Web tablets, and portable and wired Internet access devices and gateways. Three processors are of particular interest to us:

- **Athlon XP (performance market):** "The AMD Athlon XP processor offers fast results when working with digital media like audio, video, and image files. The AMD Athlon XP processor provides for outstanding near real-time voice, video, and CAD/CAM as a result of features like larger cache memory, 3DNow! Professional technology, and the innovative QuantiSpeed architecture which includes the industry's most powerful fully pipelined x86 floating point engine." (From the AMD Athlon XP Processor Product Brief at http://www.amd.com/us-en/Processors/ProductInformation/0,,30_118_756_3734^3736,00.html.)

- **Athlon (mainstream market):** "The AMD Athlon processor provides exceptional processing power on real-world, mainstream Microsoft Windows compatible software, as well as computation-intensive applications for high-end desktops. These high-end workstation applications include digital photo editing, digital video, commercial 3D modeling, image compression, soft DVD, CAD, and speech recognition." (From the AMD Athlon Processor Product Brief at http://www.amd.com/us-en/Processors/ProductInformation/0,,30_118_756_759^1151,00.html.)

- **Duron (value market):** "The AMD Duron processor provides practical performance for everyday computing. With core technologies based upon those found in AMD's award-winning ultimate performance AMD Athlon processor family, the AMD Duron processor is an excellent processor solution for your PC. The AMD Duron processor provides superb performance on applications like multimedia, Internet browsing, and business management suites. AMD Duron processors also deliver great performance for digital entertainment like games and DVD playback." (From the AMD Duron Processor Product Brief at http://www.amd.com/us-en/Processors/ProductInformation/0,,30_118_1200_1202^1938,00.html.)

Other AMD processors include mobile Athlons and Durons, and the Athlon MP for workstations and servers. It has been reported in the computer press that the Duron will be phased out by year-end and its niche filled by Athlon processors.

All of these processors are used mainly to run Windows, so it would be prudent to note key future directions as identified by Microsoft. CNET News staff writer Joe Wilcox reported in "Microsoft's Crystal Ball" (CNET News, April 18, 2002, http://news.com.com/2100-1001-885743.html) on comments by Chris Jones, vice president of the Windows client team that, "Topping the list of trends over the next five or more years is the growing popularity of digital media, the establishment of global networking, a shift to software services delivered over the Web, and the development of smaller, more efficient microprocessors that could lead to consumers owning multiple, powerful, yet low-cost PCs."

One hint as to how Microsoft might bring all of this together on the desktop may be found in the TaskGallery, first developed and shown back in 1999. According to Daniel C. Robbins, a 3-D User Interface Designer working at Microsoft Research, the TaskGallery is a research prototype that was intended to demonstrate how a 3-D user interface for managing large numbers of documents and applications might work. Limited in scope, the project "was never meant to produce production code. As implemented, the TaskGallery was a stand-alone application built on top of a modified version of the Windows 2000 operating system." Read more about the TaskGallery and download a video clip at http://research.microsoft.com/ui/TaskGallery/new_page_1.htm.

Performance/Specifications

The CPU Scorecard at http://www.cpuscorecard.com benchmarks CPUs from different manufacturers and across product lines. The scores are based on a combined rating of integer, floating-point, and multimedia performance. Just as important as the scores are their qualifiers. As the CPU Scorecard page notes in "A Word of Caution About CPU Benchmarks" at http://www.cpuscorecard.com/benchmarks.htm, "When you get right down to it, computer processor benchmarks are an imprecise and transitory method of comparing how fast/well/suitably a given list of computer systems will perform for you. They are prone to error, skew, and hype. They are highly dependent upon the specific test configuration from which they result. And the various speeds and capabilities of the individual computer hardware components (hard drive, bus, memory, video, et al.) in a system can be at least as important to overall performance as is the speed of the CPU. But flawed as they are, CPU benchmarks can arguably provide the most important information about how fast a computer will ... well, compute!" That said, the best benchmarks are those run with the applications you will be using.

On May 1, 2002, the CPU Scorecard value leader (overall performance vs. typ-

ical pricing) was an AMD 1.4-GHz Athlon with an A+ grade. An Athlon XP 1700+ was rated B while a 1.3-GHz Intel Celeron earned a C. All other processors scored D or below. The most powerful processor was a 2.4-GHz Pentium 4. The next most powerful chip was an Athlon XP 2100+. Both were rated D for value. What's most important here is that the best deals are a step or two back from the leading edge, where performance is still more than acceptable and the price is right. Unless you need the most powerful processor on the market for a specific task, the place to look for desktop purchases is below the 2-GHz CPU speed range. Where cost is a critical concern, look at the faster Celerons and Durons.

System purchases should always be tied to advancing the organization's mission. If we combine knowledge of our organization's current tasks and forecasts of future activities with Microsoft's "PC Design Checklist," Intel's Lecta Concept Platform, the CPU Scorecard listings, and systems components and prices from computer vendors in magazine ads and online, then writing key mainstream desktop hardware specifications for most users becomes relatively easy:

- CPU: 1.3 GHz to just under 2 GHz speed
- RAM: 256 MB minimum; 512 MB preferred
- Hard disk: 40 GB minimum; much larger capacity for image or video work

Some PC Acronyms

SDRAM—Synchronous dynamic random-access memory
LAN—Local area network
I/O—Input/output when transferring data between the CPU and a peripheral device
USB—Universal Serial Bus
IEEE 1394a—aka FireWire, a high-speed serial bus
ATA—(AT Attachment), the specification for IDE drives
NTFS—(NT File System), a file system used in Windows NT
AGP—Accelerated Graphics Port

- Video subsystem: 32–64 MB of video RAM; 4X AGP support
- DVD playback and CD-RW capability (DVD write capability soon)
- 10/100 NIC
- USB, IEEE 1394 ports

Systems with most or all of these features (including high-resolution monitors) from a third-tier vendor like ABS Computer Technologies (http://www.abspc.com) built around an AMD 1.3-GHz Duron processor (the ABS Duron Special) sell for about $850. Second-tier Gateway (http://www.gateway.com) offers a system with a 1.8-GHz Pentium for $1,199 (the Gateway 500S). First-tier vendor and world market leader Dell (http://www.dell4me.com) has the Dimension 8200 with a 1.8-GHz Pentium 4 for $1,499. (Note: All comparisons are from the May 2002 issue of *Computer Shopper*.) Value-conscious buyers will concentrate on systems that trade off performance and features in favor of price. They can recapture some of the performance by installing more RAM.

On the other hand, what if a notebook, not a desktop, is the right tool? My most recent personal buying considerations were entirely notebook-based. I never considered a desktop and gave little thought to the CPU, RAM, or hard disk capacity. I knew that any notebook with a 1-GHz-plus CPU would be fast enough, that 512 MB of RAM would be plenty, and that 15 GB would be more than enough storage capacity for what I wanted to do. The task list included e-mail, Web browsing, word processing, and working with simple spreadsheets in addition to classroom, meeting, and conference presentations with PowerPoint and/or streaming video playback. (The PowerPoint and video content creation would be done on another machine.) What I spent my time on was connections. Was there a network interface? Was 802.11b wireless access built in? How many PC Card slots did it have? How many USB ports? Any IEEE 1394 ports? What about external video and TV out? How about a modem for when I'm traveling? Other considerations were DVD/CD-RW capabilities, screen size and quality, weight, and,

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of course, price. The list looked a lot like the specifications on the Intel Lecta site, and I don't think that's just a coincidence.

We're Getting Closer

We're still a few years away from implementing the visions of ubiquitous, secure, and seamless access to our data along with the powerful hardware and software shown in "Knowledge Navigator," "Information At Your Fingertips: 2005," and "Starfire." On a macro level however, we are making some progress, most notably in developing the network infrastructure—bandwidth, reliability, and quality of service required to make it work. We're also making progress at the micro level. For instance, at home I have four computers linked together in a networked Windows environment. Two desktops are on a wired switch, while a pair of notebooks connect through an 802.11b wireless access point. The local area network and the Internet are available anywhere in the house, on the lanai, or out in the yard. In a small way, I'm trying to build a personalized workspace with the desktops, while also having ubiquitous access to my data and network resources with the wireless portion of the network. All I want to add is something like the TaskGallery 3-D environment.

Eight years ago Bill Gates showed us what a media-rich Net-centric environment might look like in "Information At Your Fingertips: 2005." This year, in January of 2002, he directed Microsoft employees to build software that focuses on availability, reliability, security, and privacy—software that can make it happen. As both a systems manager and a user, I hope his vision soon becomes my reality.

After 10 Years, It's Time to Say Aloha

Ten years ago I wrote my first Wintel industry overview for the *Computers in Libraries Buyer's Guide*. This one will be my last. I'd like to thank the editors, designers, and publishers, first at Meckler-Media and then at Information Today, Inc., for their support over the past decade. It's been a pleasure to work with them and a joy to receive reader comments. The best to you all. Aloha.

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