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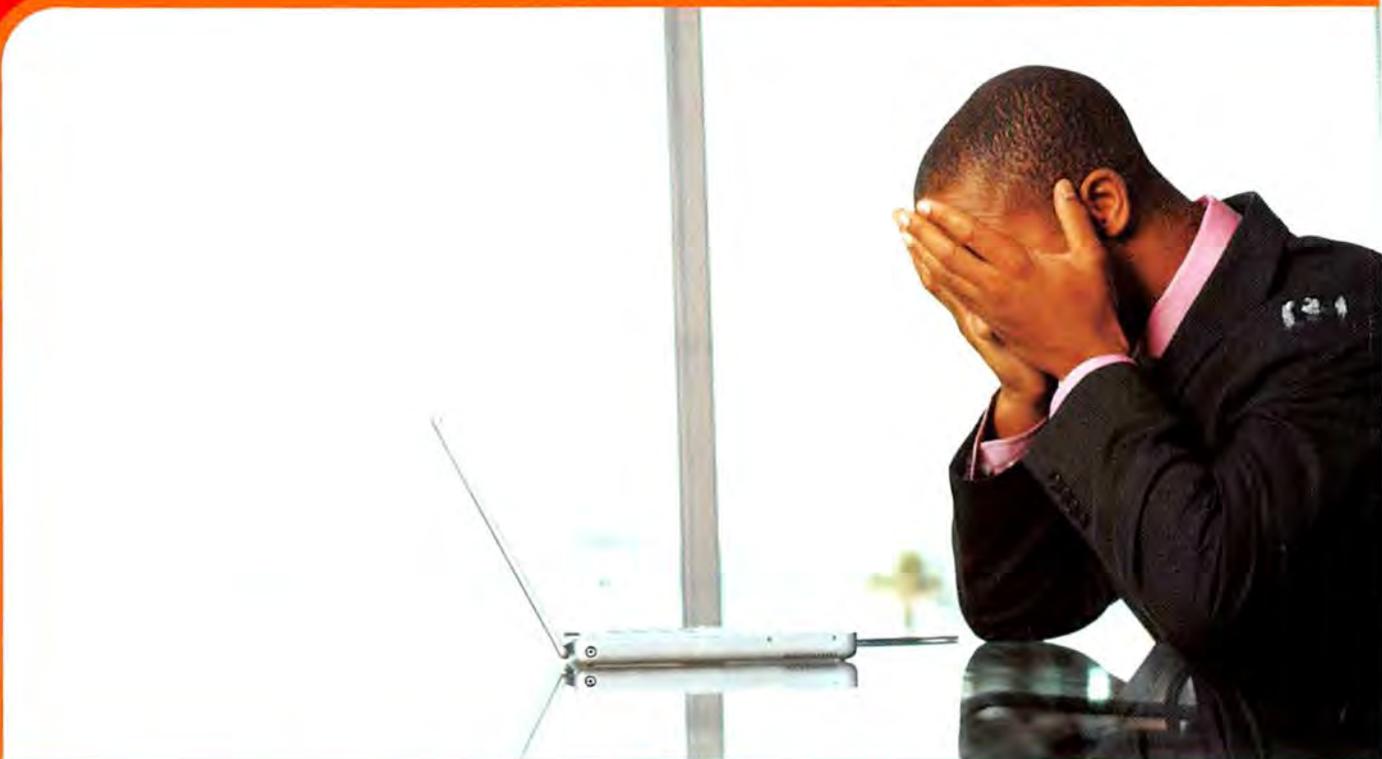
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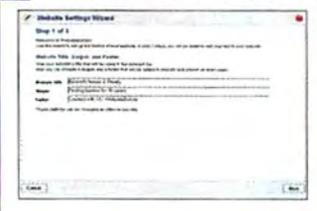
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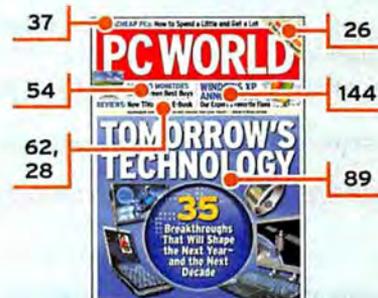


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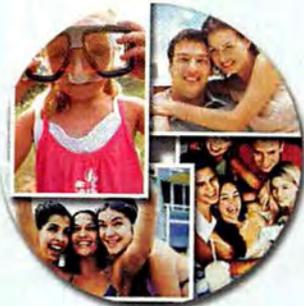
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The Future of Technology: A Look Back

Warning! Past predictions are not a guarantee of breakthroughs to come.

JOURNALISM MAY BE, as the *Washington Post's* Phil Graham famously put it, the first rough draft of history. For a technology publication like *PC World*, though, it's more often a first rough draft of the future—and never more so than in this special issue, the first we've ever devoted to

tomorrow's tech products and services. Spearheaded by Senior Editor Eric Dahl, our ambitious package, starting on page 89, examines an array of incremental advances and major breakthroughs coming your way.

It's an exciting, wide-ranging preview, but like I said, it's a rough draft. We've covered the future beat since 1983—when phrases like “flat-screen monitor” had a ring of sci-fi about them—so we know that even today's best guesses may not map to tomorrow's realities. But whether we were uncannily accurate, bizarrely off-base, or somewhere in between, it's fun to look back at our past stories on the technological road ahead...

1983: We devote a meaty seven-page



feature story to an exotic, pricey peripheral that we fearlessly predict “will someday fade into familiarity.” The mouse proceeds to do exactly that.

1984: We enthuse about Microsoft's upcoming DOS enhancement, Windows

1.0, which we say is scheduled for release in April 1984. It's MIA until November.

1984: IBM's PCjr graces our cover; we predict that the computer “will revolutionize the way we live and learn.” Instead, it becomes a legendary flopper—number 13 on our 2006 list of the worst products ever.

1987: A display exec tells us that within 15 years, LCD monitors will be common, and may reach 1000 lines of resolution. Good call. He also says they'll be monochrome. Oops.

1994: In a cover story on the next version of Windows, we keep calling it Windows 4.0 and say that it should be out by early 1995. When it makes its debut in late August of that year, it's known as Windows 95.

1997: We say that Windows 97, expected in mid-1997, should be “a significant release.” It is. But when it slips to mid-1998, it's inevitably called Windows 98.

1998: We hazard a guess that executive types of the future may dump traditional laptops for PDA-like Windows CE-based mininotebooks. Wrong, wrong, wrong.

1999: Device Bay, a standard that would allow you to hot-swap PC components by simply popping them in and out, like “a removable car radio,” gets our attention. Nifty idea; never amounts to anything.

2002: We rate 802.11 wireless networking—which we don't yet call Wi-Fi—as one of the most significant upcoming technologies, and explain how access points—not yet known as hotspots—are beginning to be installed in hotels, airports, and cafés. Hard to believe that a technology so indispensable today felt so futuristic so recently. ▶

NOW ONLINE

More Techlog at PCWorld.com

HEREWITH, POINTERS TO a few recent ramblings from my Techlog blog, which lives at blogs.pcworld.com/techlog:

▶ **DEVELOPMENTS IN AUDIO PLAYERS:** Apple upgrades its iPods, and Microsoft offers details about its Zune family of devices. find.pcworld.com/55184

▶ **GOOGLE DOES BOOK DOWNLOADS:** PDFs of a bevy of classic (and forgot-

ten) public-domain volumes, no charge? Cool! find.pcworld.com/55183

▶ **WINDOWS VISTA PRICING:** Why it's not as “comparable” to XP as Microsoft claims. find.pcworld.com/55182

▶ **AOL'S FREE FUTURE:** Can a once-mighty online service reinvent itself as a network of free Web sites and tools? find.pcworld.com/55185

2002: Once again, we look at the next upgrade to Windows (code-named Longhorn, later dubbed Vista). Once again, we say when it's due to ship (late 2004 or 2005). And once again, it slips, slips, and slips. (Latest word: Early 2007. Maybe.)

Will the products, trends, and technologies we discuss in this issue show up on schedule, in the form we expect? That remains to be seen. But here's one prediction I can make with utter confidence: The future of technology will be full of

surprises—and helping you make sense of them will remain one of the most important things we do here at *PC World*. ■

Harry McCracken is editor in chief of PC World. Contact him at mageditor@pcworld.com.

GEEK CRUISE

PC PARADISE: PC WORLD HITS THE HIGH SEAS

WE'RE A MAGAZINE and a Web site. We've done books, TV, radio, and trade shows. But adventuresome, educational travel? That's a new one for *PC World*.

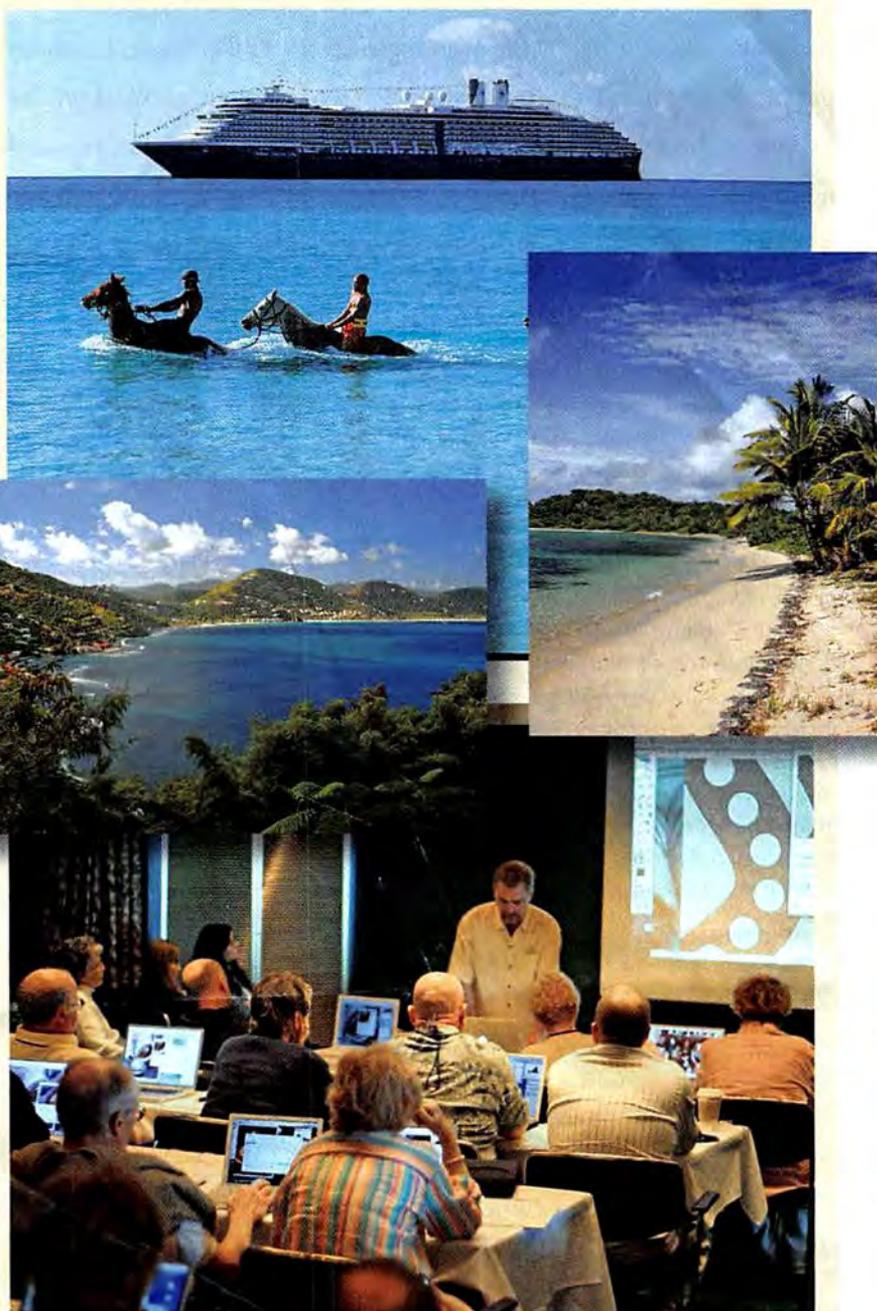
Enter PC Paradise, a cruise we're co-sponsoring from February 3 through 10, 2007. Produced by our friends at Geek Cruises—who have set sail with our sister publication *Macworld* on multiple popular Mac Mania voyages—the excursion will head to the eastern Caribbean, including Grand Turk (Turks and Caicos Islands), Tortola (British Virgin Islands), St. Thomas (U.S. Virgin Islands), and Half Moon Cay (Bahamas).

As the "Geek" in Geek Cruises indicates, this trip won't just be about sea life and beautiful ports of call. When on board, technology-loving cruisers will get the chance to hang with kindred spirits and choose from hours of instruction on PC topics. A few examples of the seminars that are planned:

- Who Needs Windows Vista?
- The Undocumented Vista
- Introduction to Office 2007
- Linux for Windows Users
- Extreme Googling
- Best Freebies of 2007
- Windows Gems

Whom might you meet onboard? Well, I plan to be there as a seminar leader; so do the *New York Times*' David Pogue, Leo Laporte of TechTV and *This Week in Technology*, and graphics guru Deke McClelland, among others.

For the full details on PC Paradise and other Geek Cruises—including Photoshop Fling, which will run concurrently with PC Paradise on the same ship—visit www.geekcruises.com.



A FEW PHOTOS of highlights from previous Geek Cruises, which combine voyages to exotic destinations with classes and lively conversation about the world of technology.

NEWS & TRENDS

EDITED BY EDWARD N. ALBRO

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E-Voting: No Fix Yet

ELECTRONIC VOTING HAS IMPROVED SINCE THE 2004 ELECTIONS. HOWEVER, MANY PROBLEMS WITH SECURITY, RELIABILITY, AND OPERATION STILL EXIST. **BY KIM ZETTER**

IN 2004, WHEN touch-screen voting machines were widely deployed for the first time in a national election, concerns about the security and reliability of the machines—and therefore, the integrity of election results—abounded. Since then, some election officials have adopted voter-verified paper audit trails to improve the reliability of election results. Security holes continue to be discovered, however; and of the 33 states that use touch-screen machines, only 17 require that the machines produce paper trails.

Moreover, the paper trails themselves pose new and unexpected problems, says David Dill, a Stanford University computer science professor and the founder of Verified-Voting.org, one of the leading proponents of mandatory



paper trails for e-voting machines. Paper-trail systems may fail for mechanical reasons or through human error, as they did in Ohio this year.

TROUBLED PAST

IN 2002, CONGRESS provided \$300 million to states to replace troublesome punch-card and lever machines with new voting systems. Many states chose touch-screen voting machines, which vendors claimed were faster, easier to

use, and more reliable than other voting methods.

Then in 2003, reports surfaced criticizing machines made by Diebold Election Systems for numerous security problems, and arguing that testing and certification procedures for evaluating all voting machines were flawed. For example, according to security researchers who viewed the Diebold source code, the database of votes in the Diebold tabulation software was

not password-protected, so a hacker could have manipulated the vote totals and altered the log to erase evidence of fraud. Such a problem could be discovered if more-stringent certification methods were used.

Though touch-screen machines have worked well in many places, there were widespread reports of mechanical problems with the machines prior to and on election day, and delayed delivery of results. Also, in some cases, employees of e-voting machine makers upgraded software or otherwise modified the systems on election day, which could have introduced bad code that changed the results, either accidentally or on purpose.

In a few instances, election officials even allowed employees of e-voting machine vendors to help process vote totals

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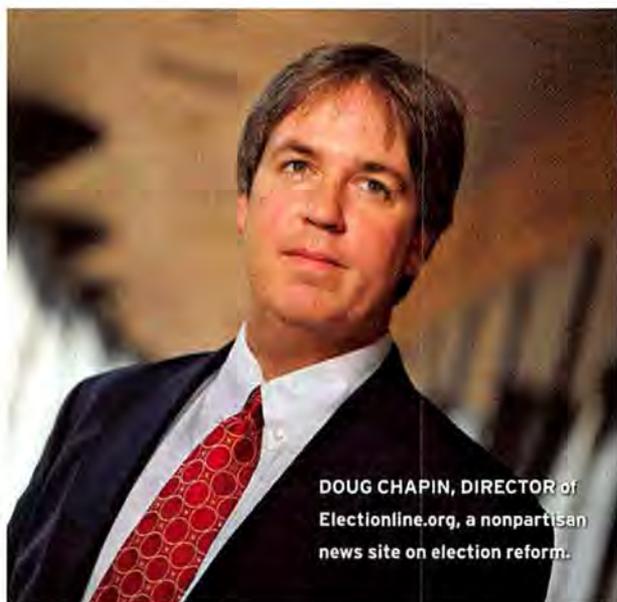
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¹ Actual battery life may vary based on product settings, usage patterns and environmental conditions. ² Subscription to Cingular Wireless required. See www.sony.com/cingular for complete offer details, price plans, service terms and conditions, and coverage map. Call 1-888-739-VAIO (6246) for service activation. Coverage is not available in all areas and is subject to transmission and other limitations. Display image simulated. ©2006 Sony Electronics Inc. All rights reserved. Sony, Sony logo, VAIO, VAIO logo and like.no.other are trademarks of Sony. Intel, Intel Inside, the Intel Inside logo, Intel Centrino, the Intel Centrino logo are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Cingular Wireless is a registered trademark of Cingular Wireless LLC 2006. Windows is a registered trademark of Microsoft Corporation.





DOUG CHAPIN, DIRECTOR of Electionline.org, a nonpartisan news site on election reform.

on election night. Criticism of such practices is forcing officials to rethink their relationship with e-voting firms. Doug Chapin, director of Electionline.org, a nonpartisan group that provides news of election reform, says, "I think you're starting to see state and local governments say... 'Wait a minute. We've given up too much control, and we know too little about these systems that we, as election officials, are on the hook for at the end of the day.'"

In 2004, public outcry against touch-screen machines and calls for paper trails to bolster the integrity of voting results reached their height. That led many states to mandate paper trails or to adopt optical-scan systems, which use a paper ballot that voters mark, instead.

Each kind of system continues to be deployed. And at least 30 percent of U.S. counties have changed voting equipment since 2004, so this year's election marks the first use for lots of new hardware on a large scale. That is not good

news, according to Kimball Brace, director of Election Data Services, which tracks voting-machine use. "History has shown that the first time you implement new voting equipment, you're much more likely to have a problem."

Maryland's September primary was a case in point. Problems

One study tallied over 120 security problems with e-voting systems.

with the new e-voting systems due to human and mechanical errors were so severe that the governor called for a return to paper ballots in November's general election.

Also, the security of touch-screen machines—and even of optical-scan units—remains a significant concern.

SECURITY STRIFE

IN MAY, FINNISH computer security expert Harri Hursti working on behalf of voting activist group Black Box Voting, announced his discovery

of a new security vulnerability in Diebold's touch-screen machine; some security experts subsequently deemed this the most severe hole yet found in an electronic voting machine.

The vulnerability involves a feature in Diebold's system that allows election officials or company workers to update software on a machine. Hursti and others argue that anyone who has even brief access to a machine could upload malicious code to it. Voting machines are often left unattended in polling places or at poll workers' homes for days before elections. Diebold, in a statement, described the vulnerability as "theoretical" and low-risk. Still, the firm said it would fix the problem.

Then in June the Brennan Center for Justice released results of a year-long study of voting systems that recorded more than 120 security problems involving voting systems

made by the top three vendors—Diebold, Election Systems and Software, and Sequoia. The study, conducted by election officials and computer security experts, concluded that

the easiest way to tamper with an election would be to introduce software that switched votes from one candidate to another. It found that few states had effective methods for detecting such rogue code.

The report surprised few people, since previous studies had cited many of the same security problems, but it did provide a comprehensive look at security issues across all voting systems, not just beleaguered Diebold. Voting machine makers have responded to this report and to previ- ▶

IN BRIEF

Product Pipeline



APPLE NEWS: A spiced-up line of iPods featuring full-size MP3 players (see page 72) includes a matchbook-size Shuffle, too. The \$79 1GB Shuffle, measuring 1.07 inches by 1.62 inches, holds 240 songs and has a battery life of 12 hours, the company says. Apple has also updated its iTunes Store to sell movie downloads for video-capable iPods and computers. iTunes Store 7 is now offering movie titles from Miramax Films, Pixar, Touchstone Pictures, and Walt Disney Pictures for \$10 to \$15 each.

FLASH DOUBLES UP: Samsung Electronics says it has developed technology to double the capacity of NAND flash memory chips for digital cameras, MP3 players, and smart phones. Samsung credits a manufacturing technology that halves the size of the NAND chip circuits for the higher capacity. The technology will support 64GB flash cards that are capable of storing about 20 DVD-resolution movies each. Samsung expects the new chips to appear in products by 2008.



ous ones by asserting that the probability of someone hacking a machine is low and that procedural safeguards act as a check on malicious activity. But Stanford's Dill argues that the integrity of elections shouldn't rely on procedures' being followed perfectly, in view of human fallibility and of past elections in which poll workers often didn't follow prescribed procedures.

Researchers also found that several voting systems incorporated wireless communication devices that made them especially vulnerable to remote attack by someone using a PDA. Disabling the wireless component wouldn't secure the machine, researchers said, because an attacker could design software to re-enable the wireless component.

As is the case with traditional hacks, an attacker would have to know the line code to crack a system in this way, but a knowledgeable perpetrator could do it quickly. That makes an insider working for the voting machine's manufacturer the likeliest attacker.

Even if all of these flaws are fixed, no computer can be 100 percent secure—that's where verified paper trails come in.

HAPPY TRAILS?

AS VERIFIED VOTING'S Dill (among others) asserts, a paper trail alone is not a panacea. Legislation mandating that the paper trail, and not the electronic ballot, be treated as the official ballot in a recount is essential as well. But only 13 of the 22 states requiring a paper trail adopt this rule, according to Electionline.org.

VerifiedVoting is also fighting to have states with paper-trail laws on their books con-

E-VOTING LANDSCAPE

PAPER TRAILS GAIN ACCEPTANCE NATIONWIDE

MANY STATES NOW require voter-verified paper audit trails to back up e-voting systems. Not all states use their paper trails in case of recounts, however. Check your state's policy below.

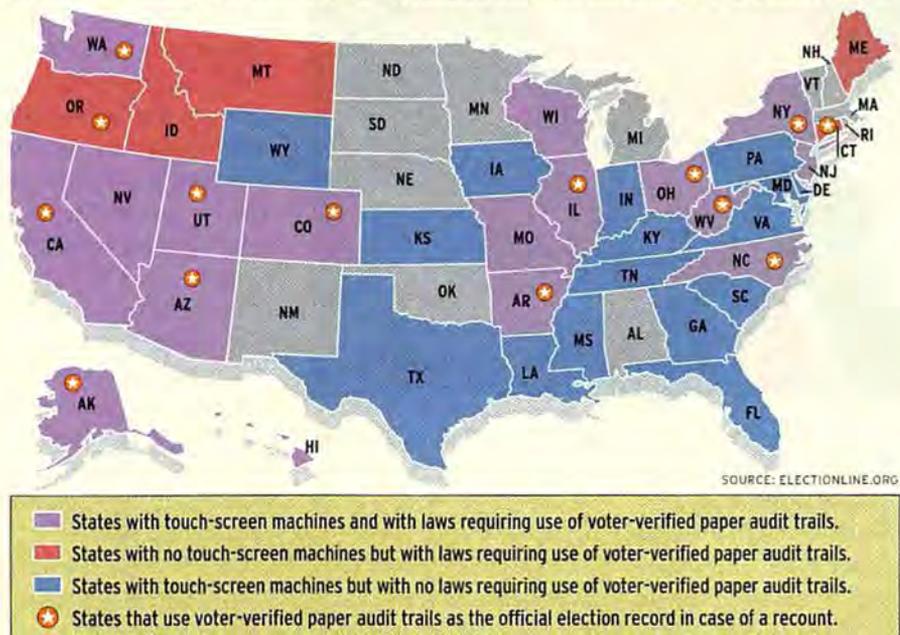


CHART NOTE: Gray states lack touch-screen machines; five states (MI, NM, NH, MN, VT) require paper-based systems.

duct mandatory hand audits of paper ballots after each election, to help authorities verify the accuracy of the electronic votes and detect malicious or malfunctioning code. Currently only 13 states require mandatory random hand counts.

The May primary in Cuyahoga County, Ohio's most populous, illustrates what might occur as states roll out new equipment. During a three-month investigation of the election, researchers found disturbing discrepancies in the vote totals between paper-trail ballots and electronic ballots. In addition, 10 percent of the ballots were classified as "destroyed, blank, illegible, missing, taped together, or otherwise compromised."

Some paper-trail rolls lacked ID numbers, so researchers couldn't match them to the

right machines. And evidently some poll workers tried to resolve printer problems either by shutting down and restarting voting machines or by removing and replacing their memory cards. Such interference can result in votes' being erased from the card or otherwise lost if poll workers fail to preserve the chain of custody of the cards. It can also disrupt the vote summaries on a machine, making it more difficult to reconcile vote totals with the number of voters listed as having cast ballots.

Diebold has said that the study used improper methods and that votes were not lost, because officials still had the electronic records from the machines. County election officials said that they could provide explanations for some of the discrepancies, but investi-

gators have yet to verify them.

Michael Vu, director of the Cuyahoga County Election Board, says he is generally happy with the machines and paper trails. The problem, in his opinion, was the inadequate training of poll workers in how to set up the machines and to address glitches with machines and paper rolls before and during the election.

Slowly, some of the problems with electronic voting systems are being corrected; and as election officials gain experience, errors caused by inadequate training may decrease. But the sporadic, temporary nature of the job makes any increase in the needed level of poll workers' training problematic. Issues with security holes remain as well, and still-new paper trails can do only so much to help.

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NOTEBOOKS

Mobile Core 2 Duo: Only Slightly Faster

INTEL'S NEW LAPTOP DUAL-CORE CHIPS DON'T MATCH THEIR DESKTOP SIBLINGS' STAR PERFORMANCE.

EIGHT MONTHS AGO Intel rocked the mobile processor world with its first dual-core CPUs, which in our tests outpaced a similarly configured laptop running on a single-core processor by 30 percent when performing two tasks simultaneously. Now comes Core Duo's successor, Core 2 Duo, with claims of even better performance plus 64-bit support. Should you be kicking yourself for jumping the gun and buying a Core Duo notebook earlier this year?

TEST REPORT

CORE 2 DUO LAPTOPS MAKE MODEST GAINS

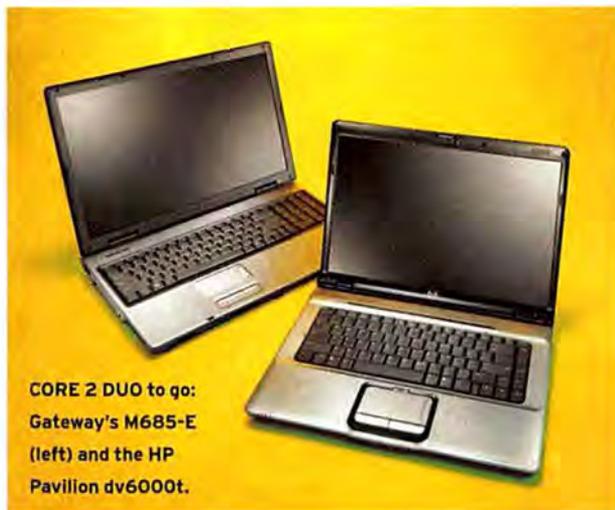
NOTEBOOKS WITH INTEL'S new CPUs don't merit a big price premium over Core Duo versions.

TEST SYSTEM	Processor	WorldBench 5 Faster	TEST COMPLETION TIME (SECONDS)				Battery life (hours: minutes)
			Multitasking test	Windows Media Encoder 9	Roxio VideoWave 1.5	Adobe Photoshop 7.0.1	
Dell XPS M1210	2-GHz Core 2 Duo T7200	102	486	270	251	293	4:23
Gateway M685-E	2.16-GHz Core 2 Duo T7400	109	400	272	237	286	3:41
HP Pavilion dv6000t	1.83-GHz Core 2 Duo T5600	101	473	286	264	318	2:10
COMPARABLE NOTEBOOK PCs							
Average of three systems	2-GHz Core Duo T2500	96	480	310	276	345	3:27
Average of three systems	2-GHz Pentium M 760	90	694	425	420	341	3:48

TEST CHART NOTES: All units came with 1GB of RAM and Windows XP Professional, except the Dell M1210, which came with Windows XP Media Center Edition 2005. For WorldBench 5 scores and battery test times, higher is better. In application tests, lower is better. Bold denotes best score.

PC World tests indicate that you don't need to sweat it too much. Whereas Core 2 Duo desktops racked up dramatically higher test scores than their Pentium D-based counterparts (see find.pcworld.com/55150), notebooks got only a small performance boost from the mobile Core 2 Duo (formerly code-named Merom). Battery life for comparable products was similar.

The latest descendants of Intel's Centrino-CPU-and-wireless-chip-set combination, Core 2 chips fall into two lines: the T5000 line, which includes the 1.66-GHz T5500 and the 1.83-GHz T5600; and the T7000 line, which features 2-GHz (the T7200), 2.16-GHz (the T7400), and 2.33-GHz (the



CORE 2 DUO to go: Gateway's M685-E (left) and the HP Pavilion dv6000t.

T7600) models. Intel says that it will produce low-voltage and ultra-low-voltage Core 2 Duo CPUs for the smallest ultraportables by summer 2007 and the end of 2007, respectively.

CORE DUO VS CORE 2

LIKE THEIR CORE Duo predecessors, Core 2 Duo processors have a 667-MHz front-side bus, a 945 chip set, and a 3945ABG wireless chip set. The two most significant improvements are the doubling of Level 2 cache to 4MB (in the

T7000 line) and support for 64-bit processing. The latter brings Intel's Core 2 Duo up to par with AMD's Turion 64 X2.

We tested three Core 2 Duo-based notebooks: a \$1906 Dell XPS M1210 equipped with a 2-GHz T7200 chip (the Best Buy in our ultraportable chart, page 60); a \$2164 Gateway M685-E desktop replacement with a 2.16-GHz T7400 chip; and an all-purpose \$1499 HP Pavilion dv6000t with a 1.83-GHz T5600 chip. The biggest performance increase over laptops with same-speed Core Duo CPUs was 7 percent—enough to shave a few seconds off day-to-day business operations, but nothing more.

NO BIG BATTERY GAIN

IN OUR TESTS, Core 2 Duo didn't affect battery life much. The Dell, carrying a 12.1-inch wide-screen LCD and a nine-cell battery, did best here, running for 4 hours, 23 minutes.

Core 2 Duo chips cost the same as Core Duos used to, so you can expect fire sales as Intel begins to discount the older Core Duo chips. In view of the modest performance gains, shoppers should think long and hard before paying a premium for a Core 2 laptop.

—Carla Thornton

FANTASY WIRELESS TEAM

Are You Wireless Yet?

Draft Pick #1

2006 STATS

NAME: Wireless-G MIMO
Performance Router

SPECIALTY: Share your internet
connection and create a high
performance wireless network.

PERFORMANCE: Ideal for those who
need increased coverage and blazing
speed for large spaces. This router is
equipped with a built-in
signal amplifier that
virtually eliminates
"dead spots".



Draft Pick #2

2006 STATS

NAME: Wireless-G 125* High
Speed Router

SPECIALTY: Share your internet
connection and create a high
performance wireless network.

PERFORMANCE: Ideal for most
homes and small offices. Combining
speed, security and easy setup, this
router is the perfect
choice for your
wireless network.



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PORTABLE DEVICES

Is Your Laptop's Battery a Fire Hazard?

TWO RECORD-SETTING RECALLS HIGHLIGHT THE RISKS OF LITHIUM ION TECHNOLOGY.

WHEN PICTURES OF flaming laptops blaze across the Internet, and Dell and Apple recall nearly 6 million lithium ion batteries, it's natural to wonder whether we can trust our portable devices. Billions of these batteries power everything from cell phones to cameras to Segways. And the push is invariably to pack more power into less space, increasing the severity of the damage in a worst-case scenario.

INCIDENTS ARE RARE

ALL 4.1 MILLION Dell lithium ion batteries and 1.8 million Apple batteries in the recalls contained cells made by Sony Energy Devices of Japan. A manufacturing defect (see the diagram) led to rare instances where batteries overheated and even caught fire (Dell reported six confirmed cases, and Apple nine).

If you're looking askance at your portable device, relax. Experts say the batteries, which

can generate two to three times as much continuous power as other rechargeable battery types, are not unsafe. The battery packs incorporate multiple layers of internal safety monitoring that rely on CPUs and sensors, along with control technologies such as vents and chemical fuses. Normally, a problem battery will power down automatically when a short circuit occurs, before any serious overheating or fire can develop.

Of course, if these precautions worked perfectly, Dell wouldn't have undertaken what the Consumer Product Safety Commission says was the largest consumer electronic device recall in history (Apple's was the second largest). Sony says other batteries, including some in Sony VAIO notebooks, use the defective cells too; but safety measures present in those batteries eliminate the risk, it says, and no further recalls are planned.

TIPS

PORTABLE POWER SAFEGUARDS

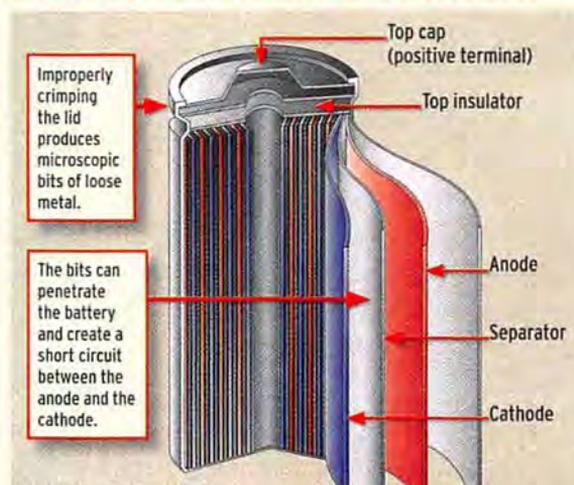
- TO SEE IF your laptop is affected, go to find.pcworld.com/55147 (Dell) or find.pcworld.com/55148 (Apple). If it is, pull the battery and use the power cord until you get a replacement.
- Cheap third-party batteries may skimp on safety, so be careful where you buy. A laptop's manufacturer is normally the best choice.
- Use only the type of charger designed for your specific battery.
- Don't leave your device or battery in the hot sun or some other toasty spot. High ambi-

ent heat can increase the risk of overheating.

- Impact and pressure are bad, too. A faulty latch that could damage the battery if the laptop were dropped prompted a recent (but much smaller) Panasonic battery recall.
- Never carry a battery pack—whether it's charged or dead—in a bag that contains loose change, car keys, or other metallic items; doing this could result in a short between the battery's terminals. Instead, put the battery in its own bag or other container first.

FIRE RISK

DEFECTIVE CELLS OVERHEAT



A TYPICAL LAPTOP battery pack contains 9 to 12 distinct cells.

Though any battery carries some inherent dangers, Sony has changed its manufacturing process to fix the defect.

THE ODDS AGAINST

WILL YOUR LAPTOP explode? The odds against are extremely high. Even if 50 times more

incidents (or 300 total) happened than were reported to Dell or the CPSC, that would translate into only about a 1-in-1000 chance that any Dell laptop battery shipped during the recall period (not just the ones being recalled) would overheat. Dell calculates that it shipped a total of 24.9 million batteries during the recall period (from April 2004 to July 2006). Apple's problem batteries shipped between October 2003 and August 2006.

Given the sheer numbers of lithium ion batteries being cranked out every day, future recalls seem inevitable, despite manufacturers' work on safer designs and technologies. But if you follow basic safety precautions (see box), you can probably leave the fire extinguisher at home.

—Stuart J. Johnston



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ELECTRONIC BOOKS

New E-Book Reader Is Worth Looking At

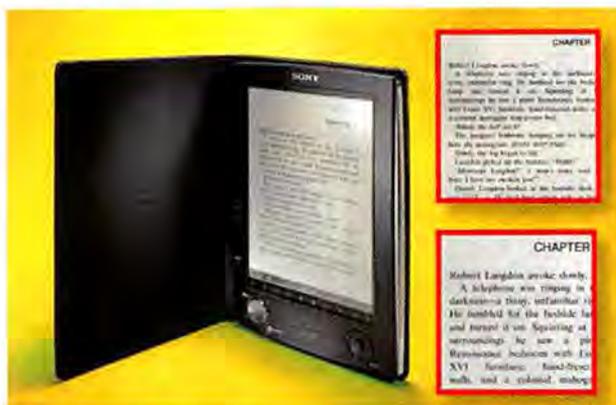
HIGH-RES, NO-GLARE E INK IS EASY ON THE EYES, BUT ONLY SONY'S E-STORE SELLS BOOKS FOR IT.

NEARLY NINE MONTHS after showing off a prototype, Sony is gearing up to sell its innovative Sony Reader for electronic books (see find.pcworld.com/55283)—and to open the iTunes-like Sony Connect online store, which will be the only purveyor of commercial book titles in the device's proprietary file format. For the most part I was impressed by the preproduction unit I tested, but the Reader's \$350 price tag will likely discourage most mainstream users.

The e-book reader's praiseworthy attributes begin with its understated good looks and modest size. It's slightly taller and wider than a standard paperback—and significantly skinnier at half an inch thick; plus, it weighs less than 9 ounces. During the week I used it, I dropped it into my midsize purse and—between uses—forgot it was there.

SVELTE DESIGN

THE FRONT OF the Reader's soft, cloth-covered case (attached via a snap on the back) flips open sideways to reveal a grayish 6-inch screen, set in a silvery frame. A concave button on the left front turns pages, a black rocker button on the right front handles screen menu navigation, and another black button on the left lets you toggle through



THE SONY READER'S E Ink technology approximates printed paper, but with a choice of font sizes as much as 150 percent of standard.

three font sizes, scaling the type up to 150 percent of standard (important for vision-impaired readers). The bottom edge has ports for the included USB cable (which connects the Reader to a PC to load content), the device's AC adapter, and a docking cradle and headphones (both optional). You can store and play music and other audio files on the Reader.

The device's response isn't very snappy; but a second or two after you power it on, the page that the Reader was displaying when you turned it off will reappear. This happens because—unlike with LCD-based e-books, which go blank when shut down—the Sony device's E Ink technology doesn't change until you tell it to.

E Ink uses millions of tiny positively charged white and negatively charged black microcapsules that are "printed" on plastic film atop the circuitry; depending on what type of charge is applied to a specific capsule, the white or black particles move to the surface

of the capsule to form type and images. Since the Reader consumes power only when you turn a page, its battery life depends on how much reading you do: Sony estimates that the unit's lithium ion battery will support 7500 page turns between charges.

NO EYESTRAIN

SONY SAYS THAT the Reader's E Ink display can produce four scales of gray at a resolution of about 170 pixels per inch—more than twice the pixel density of most conventional LCDs, and on a par with the resolution of newsprint. In my tests, both type and half-tone images looked extremely clear; and because there's no backlighting, you don't suffer eyestrain as you might when reading text on an LCD. Also, whereas LCDs generally wash out in bright light, the opposite is true of the Reader: The brighter the ambient light, the better the display's contrast.

The Reader's 64MB of user-accessible memory can hold approximately 80 average-

length (800KB) books. If you need more space, you can store content on an SD Card or Memory Stick slipped into an expansion slot on the upper left edge of the device.

The only way to add content is via the Sony Connect desktop software. Aside from handling Sony's own BBEB (Broad-Band electronic Book) format for electronic books, the Reader supports PDFs, JPEG images, unencrypted MP3 files, Word documents (converted transparently to RTF format), HTML files, and RSS feeds.

The Sony Connect software wasn't ready to test in time for this story, but in the demo I saw, it looked like a virtual iTunes clone. As with iTunes, you create an account to pay for e-books, then download them to your desktop and transfer them to your Reader. (You can also use the program to read BBEB files on your PC.) The software imports other content types from your hard drive, much as iTunes imports music you've ripped in supported formats.

Sony expects to offer 10,000 titles at launch. In line with other e-books, Sony titles will cost slightly less than printed hardcover editions. You can authorize up to six devices (either Readers or PCs with Sony Connect software installed) to read each book, and redownloads are free.

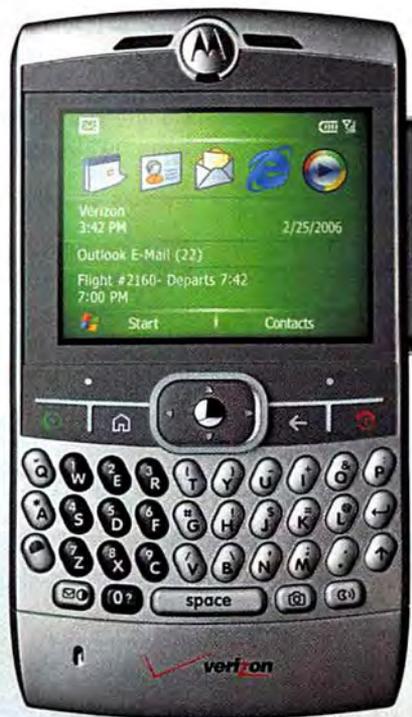
Is the Reader worth \$350? Only if you want to trim your luggage, stop collecting dead trees, or use the large-font feature for easier reading.

—Yardena Arar

E-mail, calendar, contacts,
even family pictures.
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© 2006 Microsoft Corporation. All rights reserved. Connected devices, connectivity, and over-the-air synchronization solutions may require separately purchased equipment and/or other wireless products (e.g., Wi-Fi card, network software, server hardware, or redirector software). Service plans are required for Internet, Wi-Fi, and phone access. These products and services may need to be purchased separately. Features and performance may vary by service provider. See device manufacturer, service provider, and/or corporate IT department for details. Available programs (such as Microsoft Office Word Mobile, PowerPoint Mobile, Biz2 Mobile, and Outlook Mobile), features, and functionality vary by device and Windows Mobile operating system.

PLUGGED IN

ERIC DAHL

Phishers Cast a Mobile Net

PLUS: GOOGLE APPS FOR YOUR SITE, AND HP'S PRETEXTING DEBACLE.

SMS PHISHING

The Buzz: Chalk up another victory in malware writers' quest to transform every electronic device into a way to harvest your personal data. The latest distribution vector: cell phones and SMS messages. For instance, you might get an SMS message saying you've signed up for a new service and will have to pay \$2 a day unless you hit a URL and unsubscribe. What happens next is predictable—Trojan horses, data harvesting, you name it. SMS-based phishing attacks (regrettably dubbed SMiShing) are on the rise, according to McAfee Avert Labs; early attacks targeted users in Iceland, Australia, and Spain. Clearly it's only a matter of time before SMiShing comes over here.



Bottom Line: It's not paranoia if they really are out to get you. Avoid this new scam by treating SMS messages with the same healthy skepticism you bring to unsolicited e-mail.

GOOGLE OFFICE?

The Buzz: Ever wish you could trade in your office e-mail system for Gmail? Well, small offices and Web site administrators should soon have that option, thanks to a new beta offering called

Google Apps for Your Domain. Set your domain up with this service, and you'll have access to Google's mail, Calendar, Talk, and Page Creator apps, all through your own domain (and if you get in on the beta, it's free, with future caveats). The service is a boon for small or one-person IT staffs, but it could get even better: The real buzz is about what will happen if Google decides to add its Writely and Spreadsheets applications to the mix.

Bottom Line: If this keeps up, Google will be everywhere soon—like tomorrow, maybe.

PRETEXTING PROTEST

The Buzz: A tried-and-true spying technique is back in the news, as a result of some truly boneheaded behavior by HP's top brass. And

HERE\NOW

1 AMAZON UNBOX:

Early customers were plagued by downloading issues on this movie service. amazon.com/unbox

2 THISNEXT:

Socially driven advice site looks for the next hot products. thisnext.com

3 FAST GRAPHICS:

The \$279 ATI Radeon X1900 XT 256MB graphics board should hit the price/performance sweet spot. find.pcworld.com/55271

4 LIVE DOCUMENTS:

Beta service helps you sync and share Office docs. live-documents.com

5 USB SURROUND:

Plug Sondigo's \$79 Calisto adapter into a USB port to pipe out 5.1-channel digital sound. sondigo.com

though you may have heard about pretexting (the illegal practice of obtaining phone records, credit card data, or other information under false pretenses) before, its use by a major corporation—on reporters and its own board of directors, no less—is a new wrinkle. It's a big mess. And it could become messier if the rush to stamp out pretexting with new legislation gains traction.

Bottom Line: Let's not fly off the handle here. Pretexting is already illegal. It's fraud. I'd rather see smart people get together to beef up identity authentication methods. Better security would make it harder for pretexters to steal data by pretending to be you. ■

You can contact PC World Senior Editor Eric Dahl at eric_dahl@pcworld.com; visit find.pcworld.com/31643 to read additional Plugged In columns.

FUTURE TECH

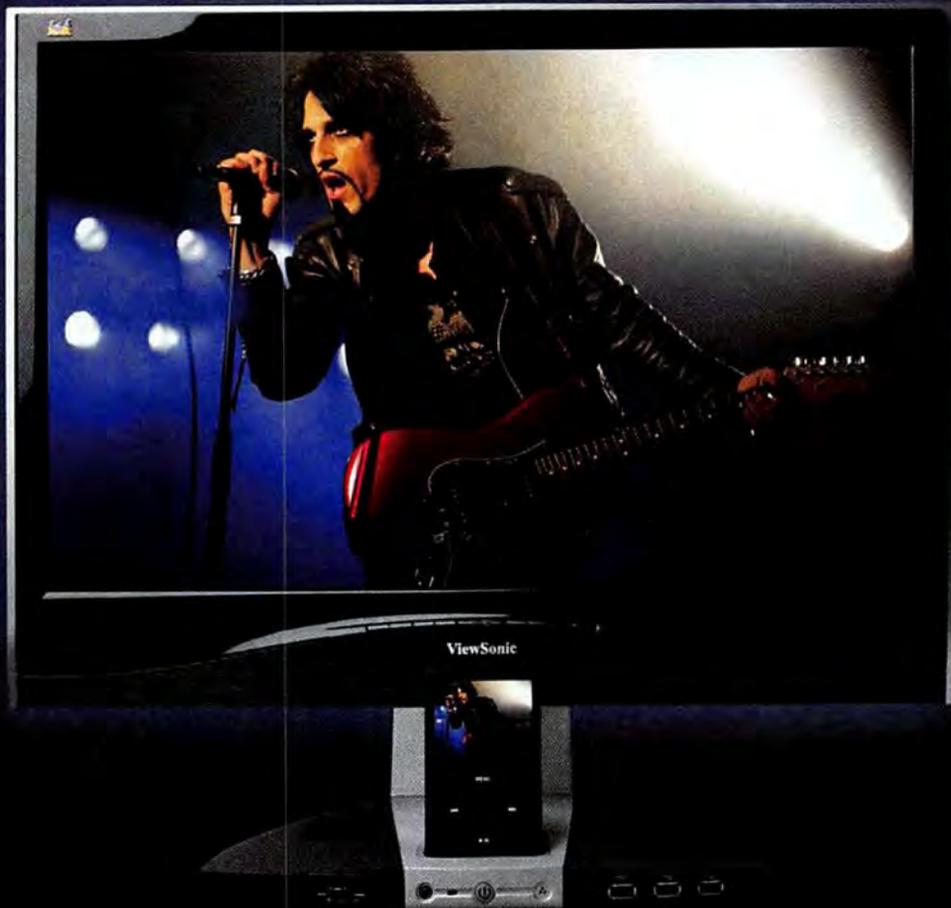
FASTER THAN FLASH RAM: ENTER PRAM

HYBRID HARD DRIVES, thumb drives, cameras, massive SSDs—flash memory seems to be everywhere these days. But smart tech companies are already working on its replacement. Enter Phase-change Random Access Memory, a new type of nonvolatile storage that Samsung hopes will address several drawbacks associated with flash. One key benefit: It's fast. Unlike flash memory,



PRAM doesn't have to be erased before new data is written to it, which Samsung claims helps make it up to 30 times faster than conventional flash memory. It should also

last ten times longer. Samsung expects to begin producing the first 512-megabit PRAM modules in 2008, thus giving rival nanotech-enabled NRAM a few months' head start (see "The Future of Nanotech," page 131).



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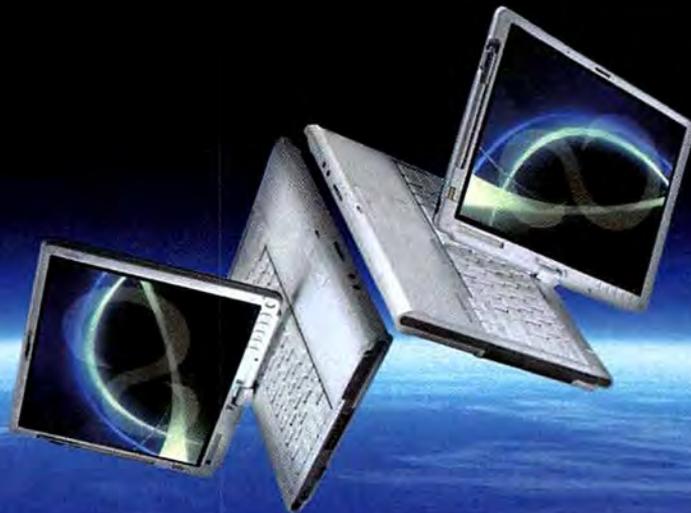
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LETTERS

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**NEW: A PEEK
AT OUR FORUMS**

**RATING CAMERA
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**WIDE SCREENS
NOT WANTED**



COLUMNIST LIGHTS A FIRE

AS A COMPUTER user since way before digital PCs (I built and taught analog computers), I agree totally with Stephen Manes's "Three Steps to a New, Improved Microsoft!" [*Full Disclosure*, September].

I have two laptops and two towers on which I spend as much as 5 hours a day for my home business, and much of that time is spent trying to recover from Windows crashes. No more: I am going to convert all my machines to Linux.

Alton Higgins, Hiwassee, Georgia

HOT TOPICS IN FORUMS

Buying PCs, Trying Vista, Site's New Look

HERE ARE SOME of the hot topics going on now in our forums. You can take part in our community discussions by heading to find.pcworld.com/55165.

► **DESKTOPS:** "You may be in a rush to get another computer...[but] be careful. I have heard of people selling computers that do not have a genuine Windows operating system, which means Microsoft will not provide updates for it unless..."
—*SpiritWind*

► **LAPTOPS:** "My advice is to buy...the most advanced...components you can afford....Laptops are difficult and ex-

pensive to upgrade, and some upgrades are impossible, so get the most you can from the get-go. That's what I did..."
—*battleborn*

—*Ray Ostrowski, Danvers, Massachusetts*

I HAD A good, throat-clearing laugh from the second paragraph, to wit, "It'll be easy! Just insist that Microsoft adopt this mantra: 'Stop Making Crap.'"

It's statements like this, and the frank and informative columns from Manes, that are the primary reason I keep subscribing to *PC World*.

Lawrence Gould, Auburn, New Hampshire

WGA: A POISON PILL?

THE ARTICLE "WINDOWS Genuine Annoyance?" [*News and Trends*, September], with its information on how to get rid of WGA, does little good, because the

prototype will eventually be replaced by a permanent WGA one cannot delete.

—*Michelle Percy*

► **WINDOWS (VISTA):** "[Beta release] doesn't mean they have worked the bugs out....I would still wait at least a year to upgrade to Vista...and let Microsoft fix their problems; don't be a test dummy."
—*dacohenz*

► **WEB SITE REDESIGN FEEDBACK:** "I'm still debating the [new] look of the site overall, but the addition of the forums is great."
—*Jon2525*

prototype will eventually be replaced by a permanent WGA one cannot delete.

I was an early victim of this scheme, which came in the guise of an urgent security update. I discovered that my version of WGA cannot be dislodged without damaging my drive beyond repair.

This is no prototype. It is a poison pill. I immediately bought an iMac.

Microsoft ought to be ashamed of itself for planting what is, in essence, spyware on my computer.

*Anthony F. Janson
Wilmington, North Carolina*

MICROSOFT SHOULD BE sued for telling customers that they are guilty of piracy unless they prove and constantly prove their innocence.

It was hard enough before the Windows Genuine Advantage program to get your license transferred to a new hard drive if your old drive crashed. Now this step appears to be impossible.

Lisa Merchant, Marshfield, Massachusetts

AVOIDING PC GUNK: DELL RESPONDS

IN THE RECENT *Consumer Watch* column "New-PC Gunk: Extras You Don't Want" [September], Dell was noted for having multiple software icons on its older systems. However, since February 2006 Dell has made significant progress in reducing the number of applications.

For example, customers purchasing XPS desktops and notebooks can configure their system without preinstalled software, and all other consumer systems have experienced a greater than 50 percent reduction in the number of icons installed at setup.

*Michelle Percy
Dell Senior Manager
Worldwide Client OEM Software* ►

WHO NEEDS WIDE SCREENS?

YOUR SITE'S *Top 5 Power Laptops* chart [find.pcworld.com/55128] states, "These laptops are on the heavy side, but they're ideal replacements for desktop PCs."

When I checked, these laptops used wide-screen displays, and all but one had Windows Media Center Edition; this tells me the vendors consider them entertainment units, not desktop replacements. The smaller screen height means smaller type and smaller people in photos.

I do not believe I am the only one who is frustrated by the wide-screen-only laptops in the marketplace today.

Roy Busdiecker, Overland Park, Kansas

CAMERA RATINGS

YOUR SEPTEMBER ARTICLE "Sophisticated Shooters" rated the Casio Exilim EX-Z600 number one, even though it was the lowest-rated camera on your chart for image quality, getting only a Fair score. I

think most people would agree that the most important job of any camera is to produce a high-quality image.

I realize your rating formula includes price, performance, image quality, and battery life. (With the Exilim, I could take tons of "fair" shots. No thanks.)

My suggestion: Consider starting instead with image quality as the initial screening characteristic, and omitting any camera with image quality less than Good from your Top 10 lists.

Dan Lattrell, Lincoln, Vermont

Editor's response: We acknowledge that our camera ratings may need reweighting. We are doing a regularly scheduled review of our ratings and believe readers will like the changes that should result.

-Ramon G. McLeod

WORD'S CALCULATOR

THE TIP ABOUT Microsoft Word's calculator function ["59 Ways to Make Software Do More," September, page 89]

didn't disclose just how powerful that function is. It can add (algebraically) numbers scattered in text, ignoring anything not a number, and it can add all the numbers in a selected column, no matter how long the column. If math function characters are present, it does as they instruct. And the calculation result appears in the Clipboard for pasting, as well as on the status bar.

Kenneth H. Fleischer, Los Angeles

25 GREATEST PCs

I READ WITH much interest the online article "The 25 Greatest PCs of All Time" [find.pcworld.com/55129]*—I lived through that entire revolution.*

In 1971 I went to work at the Naval Electronics Laboratory Center in San Diego. I joined a group building "mini-computers" for military projects. These were tiny, bipolar logic machines (even dual-processor) smaller than 1 cubic foot; "microcomputers" took almost 30 years to get some of the same functionality.

When IBM introduced the PC in 1981, many engineers and technologists felt that this machine had set the industry back. As far as new innovations, it had none. What it did have was the IBM name, and to many, that was what was important, even though very little software was initially available for the PC.

Philip E. Evans, Palmdale, California

PC World welcomes letters to the editor. We reserve the right to edit for length and clarity. Send e-mail to letters@pcworld.com. ■

RATE THIS ISSUE

TELL US WHAT you think about the current issue by going to www.pcworld.com/pcwininput—you could win a \$300 gift certificate from Amazon.com. The site explains the official rules and offers an alternate method of entry into the prize drawing.

CORRECTION

OCTOBER'S GADGET FREAK should have referred to a WiLife executive as COO Grant Beckmann.

PC World regrets the error.

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CONSUMER WATCH

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**MOVE-'EM-OUT PRICES
ON PRE-VISTA PCs**

**PODSLURPING: STEALING
DATA WITH A BIG STRAW**

**REBATE PROCEDURE
VOIDS WARRANTY**

Coming Soon: Hot Deals on Closeout PCs

Prices will be very friendly this holiday season, but know what you're getting.

WE'RE FAST APPROACHING the home stretch of the busiest PC buying season, and that means retailers and e-tailers will be throwing out lures—all sorts of shiny new machines priced to move. This year more than most, the range of choices should be impressive, with new Core 2 Duo systems poised to duke it out with PCs based on older (but still quite serviceable) Intel and AMD chips. As a result, bargains should abound, experts say.

"I think there will be deals across the board," Roger Kay, founder and president of the technology research firm Endpoint Technologies, declares. "Prices will become very aggressive this holiday season," IDC analyst Richard Shim says.

Yet the abundance of options makes it more important than ever for you to know what you're buying. Dirt-cheap computers are nothing new, but this season many vendors will be trying to unload obsolete PCs alongside more modern hardware. Here are a few things to think about before signing the credit card slip.

Consider waiting for Windows Vista: *PC World* will review the final version as soon as it's available, but I suspect many of you have already decided whether you want to have the new operating system sooner, later, or not at all. Where you stand on that question should play a big part in your shopping plans.

If you're bound and determined to get Vista as soon as you can, I would advise postponing a PC purchase until the OS

launches in the early part of next year, when vendors should begin selling PCs with Vista preinstalled. I don't care how Vista-ready a Windows XP system is: Performing system upgrades just isn't much fun. And are you ready to bet that Vista drivers will be immediately available for

"I wouldn't get a machine after October that didn't have a [Vista] coupon," Endpoint's Kay says. Even if you aren't in a big rush to get Vista, you might still want it eventually—preferably on the PC vendor's dime, of course—so factor coupons into your buying decision.

And pay attention to which version of Vista the coupon is for. Microsoft says only the top two (out of three) consumer editions—Vista Home Premium (suggested upgrade price: \$159) and Vista Ultimate (suggested upgrade price: \$259)—will support the OS's snazzy Aero graphics, which feature semitransparent window frames and other visual tricks. You won't get the flashy stuff with the low-end Vista Home Basic (suggested upgrade price: \$100).

Be ready to be Vista-ready: The corollary to not buying a computer unless it comes with a Vista upgrade coupon is that you shouldn't buy a system that can't handle Vista—or that, at the very least, can't easily be upgraded to handle Vista. And by "handle,"

I don't mean merely tolerate. If you want Vista at all, you want a system that can work smoothly with its Aero graphics and all of its enhancements—and one that won't choke if you decide to run a couple of applications simultaneously. In short, you'll want your new computer to be able to meet Microsoft's Vista Premium Ready requirements, rather than the puny Vista Capable requirements.

It's actually hard to find a new system containing a CPU that doesn't meet ▶



all your components? I didn't think so.

"But," I can hear some of you grumbling, "I really want to buy now, and I'm ready, willing, and able to do the upgrade." Two words to remember before you buy: *upgrade coupon*. Most experts expect that by mid-fall, to encourage immediate PC purchases, many vendors will offer coupons for a free or discounted copy of Windows Vista (when it ships) to people who are buying Windows XP systems.

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the Vista Premium Ready requirements (1 GHz for 32-bit CPUs or any 64-bit processor). True, you might have trouble tracking down a system based on Intel's red-hot Core 2 Duo chip priced at under \$1000, "but there are other processors out there that are just as functional, and Intel is putting in some pretty deep price cuts for them," IDC's Shim says.

If you're trying to keep your purchase under \$600 or \$700, look for desktops based on older dual-core technology—perhaps one of Intel's Pentium D chips. Make sure, however, that you're paying less than you would for a system based on a Core 2 Duo chip, because even the low-end Core 2 Duo systems we've seen beat all but the fastest Pentium D systems on our WorldBench 5 tests (see find.pcworld.com/55150). You should also be able to find deals on systems based on AMD's dual-core Athlon 64 X2.

Buy sufficient RAM and graphics: It's somewhat more common to find PCs—especially notebooks—that don't have quite the system RAM or graphics hardware to run Vista at its best quality set-

tings: Vendors sometimes skimp on these items to keep their costs down on a cheap system. To run Vista with all its bells and whistles, you need a minimum of 1GB of RAM and a DirectX 9-capable graphics processor equipped with at least 128MB of graphics memory and support for Pixel Shader 2.0 and 32 bits per pixel.

Also, don't rule out systems that have only integrated graphics: Some do meet the Vista requirements, and Microsoft says even the ones that rely on shared system memory will do just fine with 1GB of RAM (although you might want to add a little more just in case).

If you're not planning on upgrading to Vista right away, you won't need all that hardware—immediately. But if you think there's any possibility that you'll eventually spring for the upgrade, get a system with at least 1GB of RAM. In fact, to be Vista-ready down the road you should make sure you can upgrade to more than 1GB of RAM if your bargain machine has integrated graphics.

If you do purchase a computer with integrated graphics, also make sure its

PRIVACY WATCH

Are You Plugging USB Data Leaks?



ONE WEAK SPOT on any modern PC is the humble USB port. Tiny portable storage devices,

like an iPod, can use the port to suck down massive amounts of valuable data, an activity called *podslurping*.

Some companies install software on their PCs that can prevent podslurping. These programs give administrators the power to decide which devices an employee can connect to a PC, and enforce the restrictions even when a company laptop goes home or on the road with an employee. SmartLine's DeviceLock 6 (\$35, www.devicelock.com) additionally provides control over what those devices can do. For instance, the administrator could allow you to

charge your iPod by hooking it to the USB port, but not let you use it to copy files. DeviceLock can also lock down CD and DVD drives, Bluetooth connections, FireWire ports, even the parallel port. And it can log the file names of every document you copy to a drive, or it can make what SmartLine calls "shadow copies" of everything you drop onto the drive. If an employee is later suspected of stealing data, the shadow copies provide the hard evidence.

Safend's USB Port Protector (\$32 per user, www.safend.com) can encrypt files copied to a portable drive so someone who finds it on the floor of a taxi or hotel room can't open those files.

If you're annoyed that your company restricts USB access, consider this: It's better than being the person who allows company data to be stolen.

—Andrew Brandt



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CONSUMER WATCH

graphics subsystem meets the other specifications—the DX9 capability and the Pixel Shader 2.0 and 32-bits-per-pixel support—that Vista requires.

However, if your budget has any room for it, buy a system with a discrete graphics card. Doing so may even turn out to save you money: Ponying up for the card may cost less than buying additional RAM, and you'll certainly get better graphics performance.

Consider a notebook: If you're in the market for a laptop, IDC's Shim says you're in luck this year. "There's always been this price obstacle that kind of deterred the average consumer and forced them into the arms of the desktop makers," Shim says. "That's going away." Shim says the market should see a lot of attractive notebooks, even ultraportables, in the \$1000-to-\$1200 range.

Again, Core 2 Duo notebooks will command top dollar, but you should find a lot of attractively priced notebooks with older Core Duo processors from Intel or with AMD Turion 64 CPUs. And that's good news: In our tests, notebooks based on Core 2 Duo delivered only modest (at best) performance improvements over their similarly configured Core Duo-

based predecessors (see *News and Trends* on page 24). So don't pay a fat premium for a Core 2 Duo-based portable. (But again, make sure not to skimp on RAM or graphics if you're planning a Vista upgrade sometime in the future.)

And what if you could not care less about Vista? Even if you prefer to stick with a familiar operating system (Microsoft says it will be supporting Windows XP for another three years), you probably still want decent performance. "I still think dual core's a good idea, even if you have XP," Endpoint's Kay says, noting that the technology will benefit anyone who multitasks, regardless of OS.

Whatever you buy, do your homework. With so much going on sale, you need to make sure you're getting a real deal. ■

Yardena Arar is a senior editor, Andrew Brandt is a contributing editor, and Amber Bouman is an editorial assistant for PC World. E-mail them at consumerwatch@pcworld.com, privacywatch@pcworld.com, or onyourside@pcworld.com. To read previously published Consumer Watch, Privacy Watch, or On Your Side columns, visit find.pcworld.com/31703, find.pcworld.com/31706, or find.pcworld.com/31709, respectively.

ON YOUR SIDE

Rebate or Warranty: Pick Just One

I PURCHASED AN EVGA 7900 GT graphics card and had an unpleasant surprise when I began to fill out the rebate coupon. This coupon required that both it and the original UPC sticker off the package be mailed together to EVGA. However, conspicuous under the UPC sticker on the box was the statement, "Warranty VOID if sticker removed."

I called the telephone number listed on the rebate coupon and spoke to a customer service representative as well as a supervisor, and both of them confirmed that if the UPC sticker is removed from the product's box the warranty is void, but also that the UPC sticker is required to get the rebate.

Jay Sherman, Houston

On Your Side responds: We contacted the graphics card manufacturer, EVGA, about this paradox, and a company representative told us that the rebate and the warranty would both be honored as long as the UPC from the box is sent in for the rebate and the UPC on the video card itself remains intact. Apparently, the wording on the rebate was incorrect, and it has since been changed.

In situations such as this one, you'll usually have more success by contacting the originator of the rebate—in this case, the equipment manufacturer—directly, instead of the rebate center, which may not have the ability to alter the offer. However, note that in some cases the originator may be a retailer.

-Amber Bouman

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The Hassle: *I've had DSL for a year, but at times it still feels poky.*

The Fix: OpenDNS offers faster Internet access (e-mail and FTP, too), and it's free (see find.pcworld.com/54908). Domain Name Servers (DNS) translate site names, such as pcworld.com, into IP addresses that PCs employ to locate one another on the Net.

Most people use their ISP's DNS services by default, and some providers are slow. Switching to OpenDNS has advantages. First, it's faster because it stores requests in a large cache; if you ask for the same IP address that other users have requested, OpenDNS doesn't need to look elsewhere—it has it. Make a typo—say, “netfliks.com”—and you're delivered to the correct site. Not only that, a warning appears if you reach a phishing site.

Setting up OpenDNS is a snap (see find.pcworld.com/54910 for instructions).

TOOL OF THE MONTH

Sort and Move Files More Easily

DO YOU REGULARLY need to organize and move a hodgepodge of files from hither to yon (or just to another folder)? For my files, I use FileSort (download it at find.pcworld.com/54915). I have a folder that contains my daily, incoming e-mail attachments—Word documents, videos, and images. In FileSort I've cre-

ated rules to move specific files from that folder to others; for instance, it shuttles 15MB or larger video files to one folder and puts JPEGs in another. I've set the program to run every 30 minutes. Some rules can use wild cards, too: For example, the expression *.jpg moves every file that ends in .jpg.



The Hassle: *My free ad blocker isn't keeping up with the ads. And I still get a few pop-ups despite using Google's pop-up blocker.*

The Fix: Ads? Where? I don't see any, not even on *PC World's* site. My secret weapon is Ad Muncher, the most effective (and simple-to-use) ad and pop-up blocking utility I've seen. Granted, the tool is \$25 (with a 30-day trial; get it at find.pcworld.com/54912), but it works great and blocks almost all banner, Flash, floating, and text ads I've encountered. When you try it, be sure to uninstall or disable

your existing ad and pop-up blocker.

If a Web site doesn't work correctly, or if you want a site's pop-up to pop up, the fix is easy. Right-click Ad Muncher in the system tray, choose the *My Filters* tab, click *New*, cut and paste the address into the *Keyword* field, choose *No Filtering* in the *Filter Category*, and click *Close*.

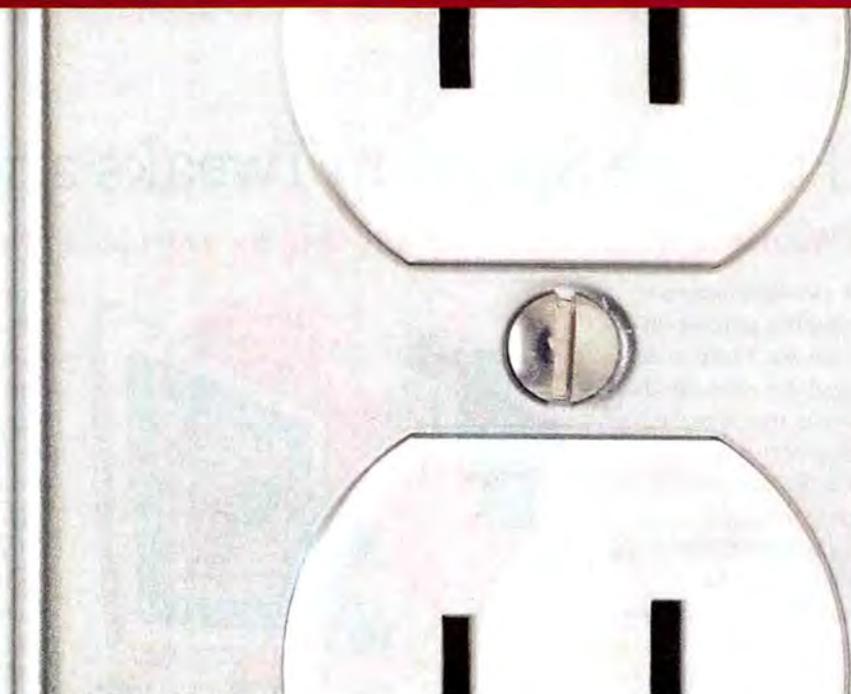
The Hassle: *Windows Explorer has 355 assorted menu items when I right-click a file, and the list takes forever to appear. (Okay, I'm joking; there are only 100.) How can I get rid of some, especially those from long-deleted programs?*

The Fix: I saw one PC whose monitor tilted to the right because it had so many items in the context menu. Seriously, though, many programs add menu items with or without permission. Getting rid of unused ones can range from easy to exasperating. Start by opening the corresponding program to see whether it allows you to remove the menu item (look for something like ‘Shell integration’). In WinRAR, for instance, choose *Options•Settings*, and uncheck *Integrate WinRAR into shell*. WinZip puts its removal option in *Options•Explorer Enhancements*.

For what's left, I would bring out the big guns. NirSoft's free ShellExView program (find.pcworld.com/54913) lists virtually all menu items (my PC had 300) and lets you disable them so that they don't appear when you right-click. ■

Contributing Editor Steve Bass writes the Tips & Tweaks blog (find.pcworld.com/50264) and is the author of PC Annoyances, published by O'Reilly (find.pcworld.com/43818). Contact him at hasslefreepc@pcworld.com. To read his previous columns and newsletters, go to find.pcworld.com/50268.

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GADGET FREAK

DAN TYNAN

The Lowdown on High-Definition TV

Five-and-a-half things you should know before you buy your first HDTV.

"YOU'RE DROOLING AGAIN," my wife said as she attempted to drag me away from the row of flat-screen HDTVs gracing an aisle of our local warehouse store.

"But they've got 50-inch plasmas for less than \$2000," I whined. "Can I please have one? Can I, can I?"

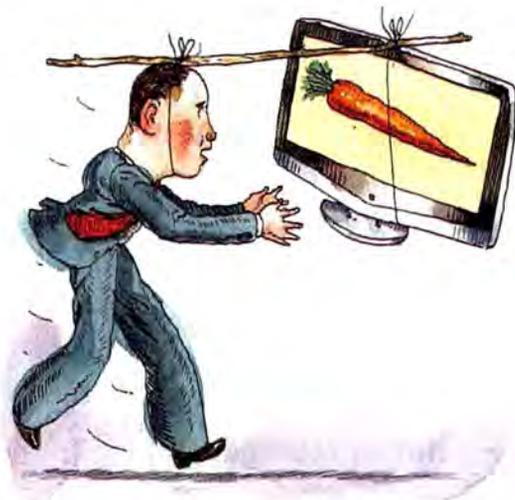
Needless to say, we have not made the jump to HDTV yet, but it's only a matter of time. According to a survey by Parks Associates, nearly 50 percent of U.S. households plan to buy one in the next year. (I'm guessing that mostly men answered the survey.) But when it comes to buying an HDTV, you have to know its speeds and feeds. So I talked with experts and learned some new things.

Know your resolutions: The HD spec includes two resolutions: 1280 by 720 (used for 720p broadcasts) and 1920 by 1080 (used for 1080i and 1080p). But you may also find HDTVs with other resolutions like 1024 by 768 and 1366 by 768.

Depending on the signal and your set, an HDTV either scales the picture to fit the screen or leaves some pixels unused. At 720p, a set uses a progressive scan, in which every line of the picture is painted in each pass—that's better for fast-motion video. At 1080i (1080 interlaced), the set paints only half of the lines on each pass but offers better detail for static images. The bigger the set, the more important high resolution becomes. If the screen is less than 40 inches diagonally or sits across a big room from you, you may see little difference between 720p and 1080i—but you could pay a premium of \$500 or more for the higher resolution.

Buy 1080p for tomorrow, not today: So-called "True HD" sets display 1080p im-

ages. That translates into sharper images and a higher level of detail—plus a higher price. The problem? You'll get 1080p in some high-definition DVD movies, but in few other video sources, says Mark Kersey, founder of BuyingHDTV.com. "A 1080p set will scale up a 1080i picture to make it look better, but that may not be reason enough to buy one," he says; 1080p



"is good when you want to future-proof your purchase for the next ten years."

Buy with your eyes... Comparing sets side-by-side as they show the same content—especially fast-motion video images such as sports—is still the best way to pick a good one, says Kris Peterson, vice president of strategy and brand development for Magnolia, a high-end home-theater retailer owned by Best Buy. If the soccer ball looks like a blur on its way to the goal or the football field's yard lines seem to bend, the set's probably using a cheap video processor or lower-quality screen.

...But don't be fooled by retail displays: Some big-box stores crank up the bright-

ness and contrast settings on models they want to move quickly, says Kersey. To avoid deception, ask your salesperson to step you through the different display modes on each set before you buy.

Not all HDMI ports are equal: You'll need at least one High Definition Multimedia Interface (HDMI) port for attaching an HD tuner or movie player. Make sure the port is built to the HDMI 1.3 specification; otherwise, you might have to 'reboot' the TV when you switch inputs, says Christopher Baker, senior technical training director for online retailer Crutchfield. Look for HDMI ports that accept 1080p input natively, since that will be the standard for next-generation Blu-ray and HD DVD players. Even sets that display 1080p may not accept 1080p; instead, they may take 1080i and scale it up. The movie will still look great, just not as great, according to Baker. These specs may be hard to find, especially in retail stores, so troll for them online.

Look at the big picture: A temptingly inexpensive set will feel like a bad investment if it breaks and its manufacturer has disappeared. "I would avoid 'mystery brand' products," says Joe Hart, a design specialist for HiFi House. "They may not survive what's increasingly become a dog-eat-dog market." In other words, don't be suckered in by mouth-watering deals that could leave you high and dry later on. Just like my wife told me. I hate it when she's right. ■

Contributing Editor Dan Tynan is the author of Computer Privacy Annoyances (O'Reilly Media, 2005). You can send him e-mail at gadgetfreak@pcworld.com.

ILLUSTRATION: BARRY BLITT

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BUGS & FIXES

STUART J. JOHNSTON

Critical Fixes for Windows, IE, Office

Plus, help for Spysweeper 5.0 headaches and a new e-mail threat.

THE SURGE IN critical updates that Microsoft has been issuing shows no sign of weakening. The company just shipped 12 bug patches—9 of them critical—affecting everything from Windows to Internet Explorer to Office apps. And unfortunately, things have not gone smoothly.

In keeping with what is now a regrettably familiar pattern, hackers launched a zero-day attack on a hole that one of the fixes addressed, before the patch could be released. This exploit was designed to target the Windows "Server service," which handles file and printer sharing in Windows 2000 Service Pack 4 through Windows Server 2003 as well as in Windows XP SP1 and SP2.

Because the Server service typically runs on PCs that are waiting for connections, clever crackers figured out how to send bogus commands over the Internet to infect vulnerable machines. The attack uses a buffer overflow strategy and can take over your PC without

your having to surf the Web, read e-mail, or click anything. It proved scary enough to spur the Department of Homeland Security to release an alert of its own asking everyone to install the relevant patch as quickly



A bug spooks the Department of Homeland Security.

as possible—something the DHS has never done before.

Fortunately, you can lessen your risk by activating a firewall, which blocks unknown incoming Internet connections. Windows XP SP2 has its firewall on by default, as do most broadband routers. This is still a dangerous hole, though, so be sure to obtain and install this patch through

Automatic Updates. Alternatively, you can get it—along with additional information—from find.pcworld.com/55143.

A BROKEN IE FIX

SHORTLY AFTER releasing a cumulative update for Internet Explorer 6.0 SP1 that patched six critical holes, Microsoft discovered a problem. The new patch introduced a bug that crashed IE under certain circumstances—such as when running CRM (customer relationship management) applications like PeopleSoft and Siebel. At about the same time, eEye Digital Security, a security research firm, discovered that an attacker could take advantage of the crashes to commandeer a computer running Windows 2000 SP4 or XP SP1 (though not SP2). Two weeks later, Redmond released an updated patch.

Grab the fixed fix, which includes the cumulative updates of the previous patch, over Automatic Updates or from find.pcworld.com/55144.

This latest batch of critical Microsoft patches corrects a number of additional security holes in Windows dial-up connections, Outlook Express HTML e-mail, and more. Also included are two more patches for Microsoft Office. To get the complete rundown, see find.pcworld.com/55146.

When Microsoft releases In-

IN BRIEF

Word 2000 Flaw

HACKERS RECENTLY SENT out poisoned e-mail attachments to hit a critical Word 2000 security hole before a patch was available. As usual, you should be extremely suspicious of unsolicited attachments. Microsoft will distribute the patch, once it's ready, via Automatic Updates. For more information and for a link to a free workaround that involves using Word Viewer 2003, browse to find.pcworld.com/55168.

ternet Explorer 7 for Windows XP this quarter, the company will mark the new browser as a "high-priority" update via Automatic Updates because of new security features such as better ActiveX handling. But according to the company, you can decide whether to install it when prompted to do so by an initial welcome screen. For more details, go to find.pcworld.com/55145. ■

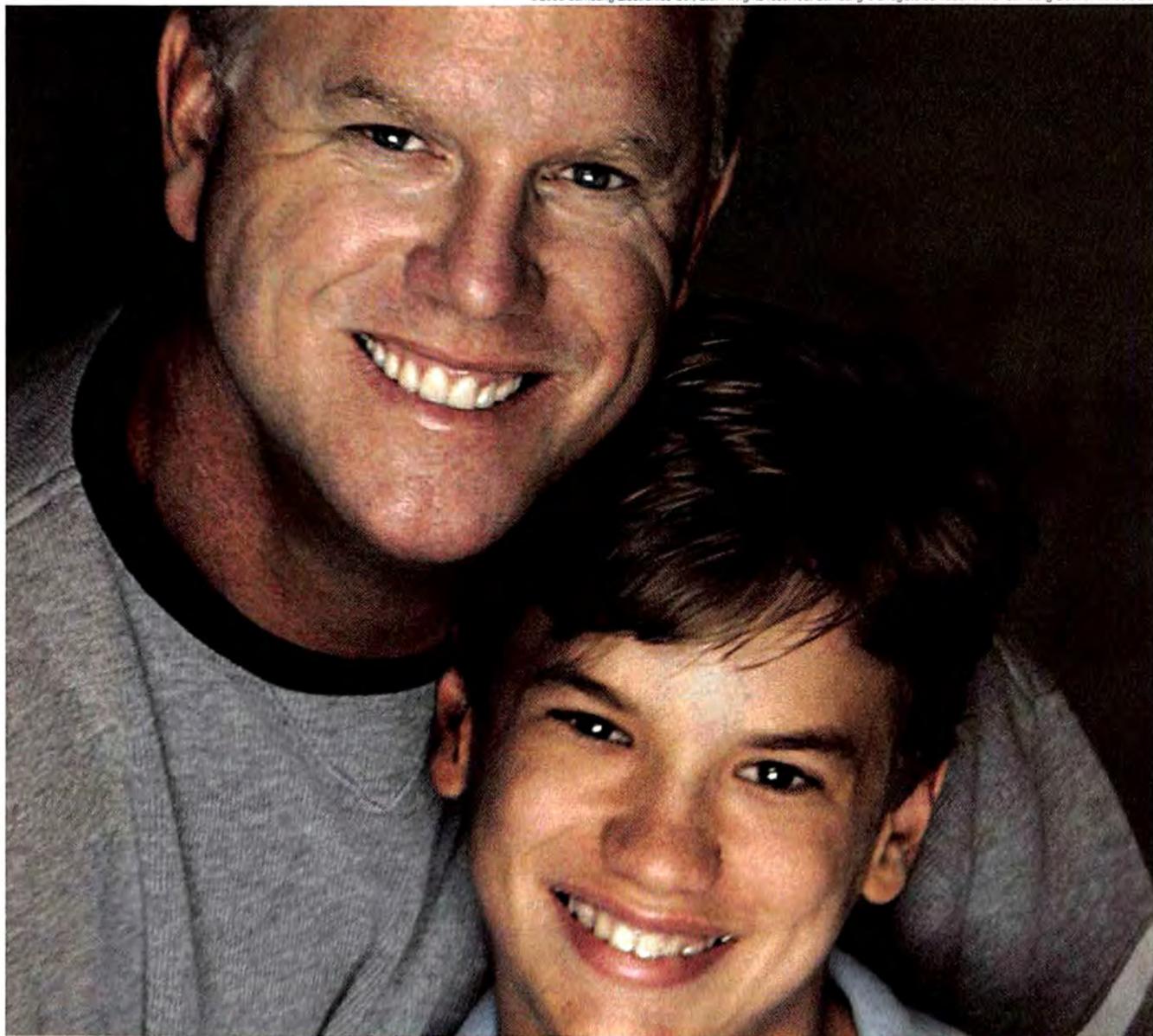
Stuart J. Johnston is a contributing editor for PC World. Visit find.pcworld.com/31580 to see more Bugs and Fixes columns.

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SPYSWEOPER UPDATE DRAWS COMPLAINTS

ALTHOUGH MANY ONLINE reviews rate it highly, some users of Webroot's Spysweeper 5.0 complain that the new version slows down their PC. Webroot's Support Q&A says that such problems may be due to 5.0's need for more RAM. To improve performance, the company recommends installing version 5.0.7, build 1608, and turning off the Keylogger Shield. Get the update and more info at find.pcworld.com/55149. As a worst-case solution, Webroot recommends rolling back to version 4.5.



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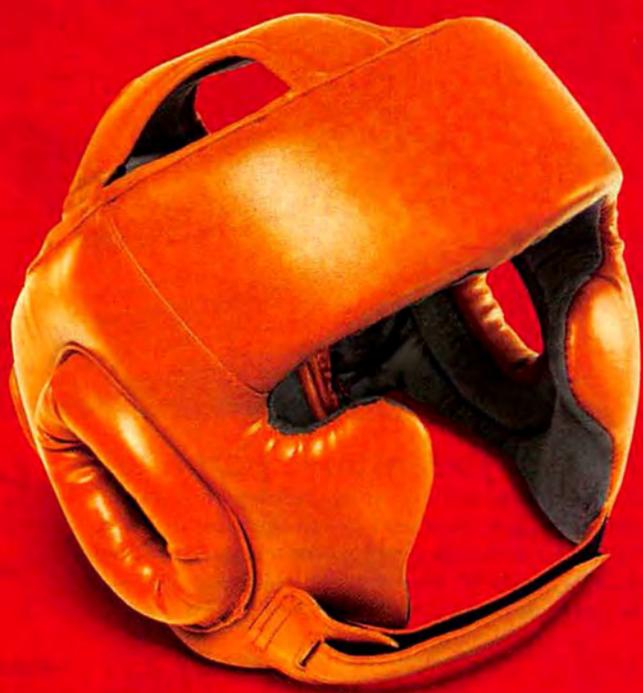
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REVIEWS & RANKINGS

EDITED BY DANNY ALLEN AND LAURA BLACKWELL

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- 66 INTUIT QUICKBASE
- 72 APPLE IPOD

Wide Screens for Work and Play

These 23- and 24-inch LCD monitors offer sprawling screens—and the potential for greater productivity.

LCD MONITORS

TEST IF YOU'RE TIRED OF your square-looking monitor, it may be time to grab a wide-screen one. The panoramic screen of a 23- or 24-inch monitor offers simultaneous views of two or three office documents or Web pages, which could catapult your multitasking into a different realm. As a side benefit, these bright and wide monitors may significantly reduce the strain on your glazed eyes and your mouse-weary fingers. The PC World Test Center evaluated eight models, from the tried-and-true to the brand-spankin'-new, to help you find the one that's best suited to your use.

If you're tired of frequent toggling, you may find these wide screens a welcome relief. And because many common



SAMSUNG'S SYNCMASTER 244T (left) is tops in performance, but the well-appointed Dell UltraSharp 2407WFP earns Best Buy honors.

applications—instant messengers and media players, for instance—take up just a small area, you can squeeze more of them onto the screen without obtrusive and confusing window layering or overlap. In addition, wide-screen monitors can minimize the horizontal scrolling associated with large spreadsheets. Data crunchers and other analysts

who depend on constantly changing data may find that the wider views aid their grasp of big-picture trends, giving them a perceptible edge in fast-paced industries.

Often height-adjustable, pivoting, and swiveling, these displays can conform to your work patterns and work area. Many supersize LCDs also cram in a slew of other use-

ful features. What were once separate peripherals or desktop PC accessories have migrated onto LCDs. It's not uncommon to find USB hubs built into them, allowing you expanded configurations of even more computer peripherals on and around your desk. Both picture-in-picture (PIP) and picture-by-picture (PBP) capabilities—once marginally

- 72 LOGITECH WIRELESS DJ SYSTEM
 76 CANON CANOSCAN 8600F, EPSON PERFECTION V350
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 80 ZIMBRA COLLABORATION SUITE 4.0
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- 60 TOP 10 NOTEBOOK PCs
 68 TOP 5 ADVANCED DIGITAL CAMERAS
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attractive features in small LCDs but standard in large TVs—now become distinctly usable possibilities in a big, wide-screen monitor. PIP and PBP allow you to establish a secondary screen within the main display, the input for which may come from a different source, such as a television signal. Depending on the model, various connectors—including those for S-Video and composite—support the introduction of such signals. They're welcome features for people who work in industries such as finance and journalism, where the staffer needs a constant television or other auxiliary feed while working.

PANORAMIC PERFORMERS

WE TESTED THESE big and wide LCD monitors under our latest procedures. Our panel of judges agreed that whether you use them for business or for pleasure, they generally give you a lot—not just in screen space, but also in quality. Though expensive and geared toward professionals (or hobbyists with money to burn), they yielded consistent and pleasingly viewable graphics and text in our tests.

	23-/24-INCH WIDE-SCREEN LCD	PCW Rating	Performance	Features and specifications
1	Dell UltraSharp 2407WFP Best Buy \$719 find.pcworld.com/54150	88 Very Good	<ul style="list-style-type: none"> Graphics quality: 84.5 Very Good Text quality: 82.6 Very Good DVD motion quality: Very Good 	<ul style="list-style-type: none"> Inputs: Analog and digital Adjustments: Multiple adjustments 6ms gray-to-gray response time
▶ Bottom line: Highly adjustable 24-inch monitor features good image quality, numerous connectivity options, and support for HDCP.				
2	Samsung SyncMaster 244T \$1000 NEW find.pcworld.com/54932	87 Very Good	<ul style="list-style-type: none"> Graphics quality: 86.1 Very Good Text quality: 86.1 Very Good DVD motion quality: Very Good 	<ul style="list-style-type: none"> Inputs: Analog and digital Adjustments: Multiple adjustments 16ms response time
▶ Bottom line: Powerful graphics performance, bundled features, and an attractive design set this 24-inch wide-screen LCD apart.				
3	HP LP2465 \$829 find.pcworld.com/54152	83 Very Good	<ul style="list-style-type: none"> Graphics quality: 84.7 Very Good Text quality: 84.8 Very Good DVD motion quality: Very Good 	<ul style="list-style-type: none"> Inputs: Digital only Adjustments: Multiple adjustments 6ms gray-to-gray response time
▶ Bottom line: This 24-inch business unit delivers excellent image quality and a highly adjustable stand at a low price—but it has few features.				
4	ViewSonic VP2330wb \$1099 NEW find.pcworld.com/54931	82 Very Good	<ul style="list-style-type: none"> Graphics quality: 82.8 Very Good Text quality: 83.2 Very Good DVD motion quality: Very Good 	<ul style="list-style-type: none"> Inputs: Analog and digital Adjustments: Multiple adjustments 16ms rise-and-fall response time
▶ Bottom line: Thin-bezeled 23-inch wide-screen model enables users to perform its broad range of screen and physical adjustments easily.				
5	Acer AL2423WDR \$699 NEW find.pcworld.com/54989	82 Very Good	<ul style="list-style-type: none"> Graphics quality: 84.3 Very Good Text quality: 85.5 Very Good DVD motion quality: Very Good 	<ul style="list-style-type: none"> Inputs: Analog and digital Adjustments: Multiple adjustments 6ms gray-to-gray response time
▶ Bottom line: A bargain-hunter's dream, this spartan 24-incher makes text and graphics look great. But the speakers are no great shakes.				

CHART NOTES: Prices and ratings are as of 8/18/2006. Response times and response time types are as reported by the vendor.

Since 23- and 24-inch wide screens use the same 1920 by 1200 resolution, we tested them together. While some showed particular strengths, all earned a rating of Very Good for performance.

The retested Dell UltraSharp 2407WFP achieved impressive scores overall and garnered Best Buy honors. This attractive 24-inch moni-

tor produced highly readable text and great graphics that edged out other monitors' output. Dell's offering comes with many desirable built-in features, too, such as pivot function and an array of connectors. In a nod to photography enthusiasts, Dell includes a nine-in-two media card reader that supports the major formats, such as SD Card and

Compact Flash. It also supports PIP and PBP, a major boon to aficionados of multiple screens. And it gets points for style, with its sleek black-and-silver surfaces and bold industrial design. Carrying a comparatively modest street price of \$719, it's a steal.

Samsung's new 24-inch SyncMaster 244T came in a very close second. In our ▶

lab tests, it led the pack in text scores and finished just slightly behind the Apple 23-inch Cinema Display in graphics, where it excelled at showing both vivid colors and the subtle nuances of flesh tones. In fact, the 244T achieved the highest overall performance score of any LCD on the chart. Moreover, the monitor comes packed with features not available in many other LCDs of the same size. Indeed, the 244T rivals our Best Buy Dell's raft of connectors and extras, although it also costs more, at \$1000. It doesn't have a media card reader, but it does possess PIP and PBP functions, and its thin silver bezel is sure to turn heads at the office.

EXCELLENT IMAGE QUALITY

THE 24-INCH HP LP2465—previously reviewed, but new to our chart—maintains its position as a jury favorite, garnering consistently enviable marks. Though this \$829 corporate model is light on non-computer connectivity features (it has dual DVI ports), it offers great screen quality and an adjustable panel at a budget-conscious price.

Similarly, ViewSonic's 23-inch VP2330wb (\$1099) won over our panel with its image quality. And its bundle of on-screen adjustments built into the monitor will give goose bumps to color control freaks.

ONLINE

FOR MORE INFORMATION about the 23- and 24-inch LCD monitors that we reviewed this month, including details on how we tested them, please browse to find.pcworld.com/55180.

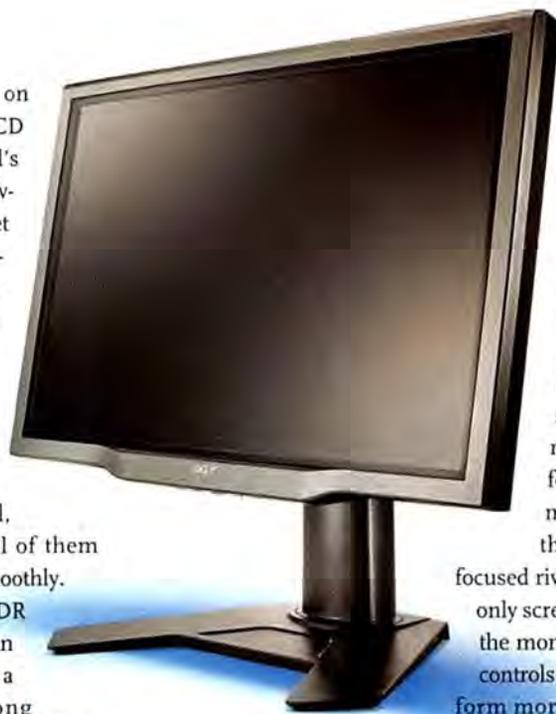
Software included on an accompanying CD activates the model's automatic screen pivoting and adds asset management, sophisticated color tweaking, and theft deterrence. This model also supports a full range of mechanical adjustments—tilt, height, swivel, and pivot—and all of them work admirably smoothly.

Acer's AL2423WDR backs up its bargain price of \$699 with a surprisingly strong showing in our tests. This LCD's glossy panel may not be for everyone, but it elicited praise from some of our jurors, who found that it showed crisp text, a nice balance of colors, and uniform brightness. (Glossy-screen monitors often perform quite well in *PC World's* juried tests, but some users consider them too glare-prone.) Although its ho-hum stand and drab titanium bezel didn't win it any design accolades, this 24-incher's price/performance ratio may appeal to budget-conscious buyers who want a wide-screen view without bells and whistles.

OFF THE CHART-BUT WORTH A LOOK

MODELS FROM PHILIPS and Eizo also racked up solid performance numbers with our judges; other factors, however, pulled their ratings down.

Philips's 23-inch 230WP7NS provides scads of on-screen and physical adjustments, but its graphics/text score landed it at the lower end of our Very Good scale—not bad by any means, but below most other



THE ACER AL2423WDR, with its glossy screen, performed well; but it scrimps on extras.

units rated in this article. Its lower-end ranking, its rather bland design, and finally its middle-of-the-pack price of \$950 kept the monitor from rising onto our Top 5 chart.

Eizo's very expensive \$1650 ColorEdge CE240W, on the other hand, is made for graphics professionals and is priced accordingly. This 24-inch LCD includes full calibration software, which is very unusual in a monitor of this size, but a necessity to graphics and design professionals. (The Eizo does not, however, include the calibration hardware necessary to run the software.)

A few members of our jury panel commented on the monitor's dim default settings (which are easily adjustable with either presets or correction software). Performance at those default settings, plus the steep specialty-product price tag, dragged down this LCD's rating and prevented it

from becoming one of our top display choices for general use.

The 23-inch, \$999 Apple Cinema HD Display held its own in our performance tests, but because it's designed to connect mainly to Macs, we found that it lacked many of the features that its newer, PC-

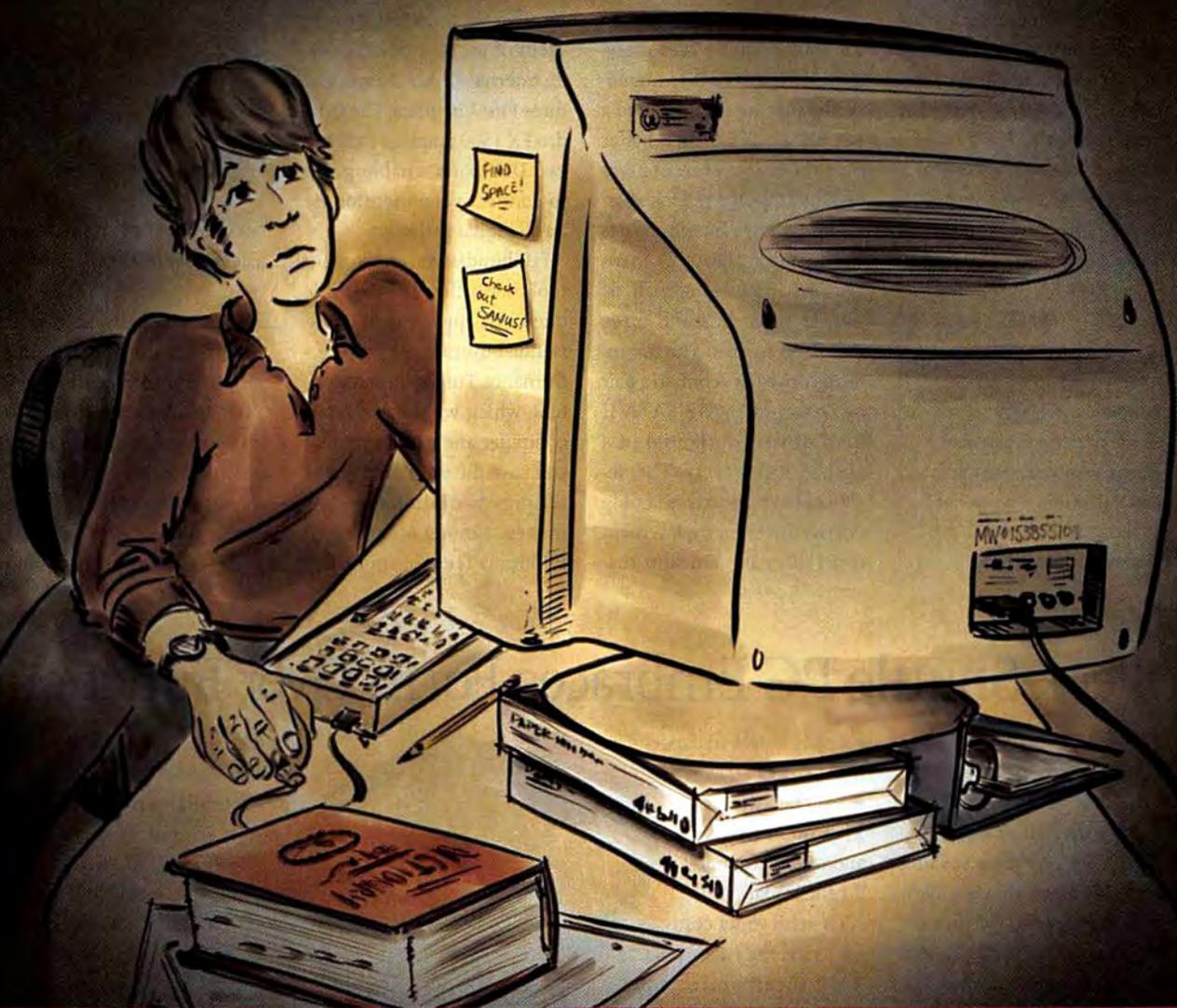
focused rivals now boast. The only screen adjustments on the monitor are brightness controls; Mac users can perform more-complex screen tweaks via Mac OS X.

Physically, however, the Cinema HD Display is one of the best-designed LCDs around. The beauty of its anodized aluminum bezel is second to none. And it minimizes unsightly cable clutter by using a single cord connected to the back of the panel to provide power, video signal, USB, and FireWire. Since the Cinema HD Display's overall image quality is still pleasing, style mavens who don't need adjustments or extras may gravitate toward this sleek model.

All in all, the wide-screen monitors in our latest tests displayed very eye-pleasing, even stellar performance. Pick any of the top units and you'll likely get well-saturated graphics and sharp, readable text. Choosing the right model for you is going to be a matter of evaluating bundled features, considering your tastes, and sizing up your budget. In the end, however, it will be hard to beat the combination that the beautifully designed Dell UltraSharp 2407WFP offers.

—Roy Santos

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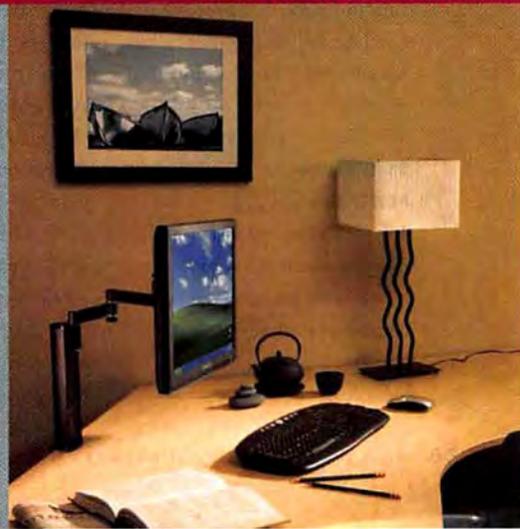
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HP's Pricy, Powerful Workstation

D E S K T O P

TEST CENTER IF YOU'RE LOOKING for a computer that will help you get critical work done, and you need superior graphics power, you may want to forgo a standard desktop in favor of a different class of system, such as HP's **xw4400 Personal Workstation**. We evaluated a \$3395 configuration that offers many familiar PC parts but adds professional-

xw4400 Personal Workstation

HP
PCW Rating **78 Good**
 Strong performance and good expansion options make this workstation worth considering.
 Street: \$3395
find.pcworld.com/55120

level graphics and extensive software certification.

With the aid of its Intel Core 2 Duo E6700 processor, 2GB of RAM, and nVidia Quadro FX 1500 graphics card carrying 256MB of GDDR3 memory, the unit we tested scored a 161 on WorldBench 5, better than the marks of most high-end desktops we've looked at.

The system's interior boasts six drive bays (four of them external and two internal), as well as three PCI and three PCI Express slots. The two internal drive bays contain a pair of 7200-rpm 160GB SATA II hard drives configured in a striped RAID array. The design of the bays makes sliding out the drives for replacement especially easy. Our test ma-

chine came with a multiformat DVD burner and a brilliant 19-inch HP L1955 LCD.

The xw4400 also offers gigabit ethernet and a full complement of ports, including seven external USB 2.0 ports and three FireWire ports. The Quadro FX 1500 graphics card has two DVI ports, enabling you to connect your monitor via an all-digital pathway.

HP bundles several system tools with the xw4400. The one most appealing to workstation buyers may be the Performance Tuning Framework tool, which will analyze your computer and make sure that you have the right drivers and settings to optimize performance. Among other useful utilities is HP's Insight Diag-



THE XW4400 OFFERS tool-less access to its tidy interior.

nostics, which can scan your system for malfunctioning parts and corrupted drivers.

For smaller businesses that are seeking a powerful system and need professional-level graphics, the xw4400 Personal Workstation deserves a look.

—Anush Yeghazarian

Sleek Shuttle PC Embraces Form Over Function

D E S K T O P

TEST CENTER SLIM AND STYLISH, with its matte-black and brushed-silver finish, the Shuttle **XPC X100** is a striking attention-getter that would fit well in your office or your living room. This \$1323 system (based on our test configuration) is more about form than functionality, however.

When laid flat, the PC takes up about the same amount of

XPC X100

Shuttle Computer
PCW Rating **71 Good**
 This supersmall system will look great on your desk, but don't expect to perform power-hungry graphics operations on it.
 List: \$1323
find.pcworld.com/55153

space as a stack of paper—it measures a scant 8.3 inches wide by 11.8 inches deep, and it stands a mere 2.1 inches tall.

To achieve its compact size, the superquiet X100 incorporates notebook components instead of larger desktop PC parts. Our test model came with a 1.6-GHz Intel Core Duo T2050, ATI's Mobility Radeon X1400 GPU, a 250GB hard drive, and a slot-loading, multiformat, double-layer DVD burner (with a maximum single-layer DVD write speed of 8X).

Not surprisingly, the small case has little real estate to spare for connectivity and components; and as such it



THE XPC X100 is about the same size as a stack of paper.

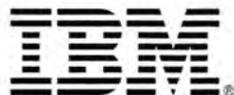
has only a handful of ports—namely, one front-mounted USB 2.0 port, four rear USB 2.0 ports, one FireWire port, gigabit ethernet, S-Video, audio inputs and outputs, and DVI-D (digital only).

As much as the X100's design impressed me, the system's performance did not: In our WorldBench 5 tests, the unit scored a 92, slightly below the current average mark of 95 for value desktop systems. Its graphics performance was at the low end of our range of average results for value desktops as well.

If you simply want a desktop system that will take up minimal space, the XPC X100 will suit you well. But if space isn't an issue, you can spend less money on a slightly larger desktop PC that will provide you with a lot more power.

—Melissa J. Perenson

PHOTOGRAPHS: MARC SIMON



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TOP 10 LAPTOPS

Merom-Based Ultraportable Lands on Top

TEST Center DELL'S XPS M1210, running Intel's latest dual-core CPU, the Core 2 Duo (formerly code-named Merom), snags this month's Best Buy nod on the ultraportable list. The notebook excelled in our WorldBench 5 performance tests in comparison with the rest of the ultraportable pack. For more details on our tests of new Merom-based notebooks, see our *News and Trends* report, "Mobile Core 2 Duo: Only Slightly Faster," on page 24.

The all-purpose side of the chart hosts new entrants as



THE SLEEK DELL XPS M1210 includes a built-in Webcam.

well. Lenovo's ThinkPad R60, a follow-up to the ThinkPad R52, lands in the fourth spot, with great battery life. HP's Pavilion dv2000t has a dazzling look thanks to Nissha film imprinting, an advanced molding technique that incorporates attractive patterns into an object's surface.

—Kalpana Ettenson

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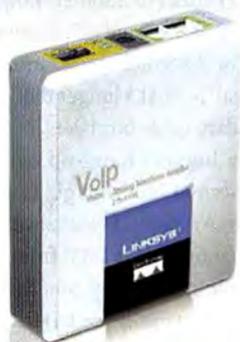
FOR MORE INFORMATION on the laptops reviewed in this month's chart, including testing details, go to find.pcworld.com/55176.

	ALL-PURPOSE NOTEBOOK	PCW Rating	Performance	Features and specifications
1	HP Pavilion dv5000t Best Buy \$1274 find.pcworld.com/53606	83 Very Good	<ul style="list-style-type: none"> WorldBench 5 score: 98 Very Good Overall design: Very Good Tested battery life: 7:07 	<ul style="list-style-type: none"> 2-GHz Core Duo T2500 15.4-inch wide screen 7.35 pounds DVD+R DL/DVD±RW
▶ Bottom line: Long battery life and a great screen make this speedy notebook a good desktop replacement.				
2	HP Pavilion dv5000z \$1350 find.pcworld.com/51597	80 Very Good	<ul style="list-style-type: none"> WorldBench 5 score: 86 Good Overall design: Very Good Tested battery life: 5:58 	<ul style="list-style-type: none"> 2.2-GHz Turion 64 ML-40 15.4-inch wide screen 7.4 pounds DVD+R DL/DVD±RW
▶ Bottom line: This well-priced and very portable Media Center notebook benefits from thoughtful design plus very good performance.				
3	Lenovo 3000 C100 \$873 find.pcworld.com/52768	79 Good	<ul style="list-style-type: none"> WorldBench 5 score: 77 Fair Overall design: Good Tested battery life: 4:56 	<ul style="list-style-type: none"> 1.73-GHz Pentium M 740 15.0-inch screen 6.3 pounds DVD±RW
▶ Bottom line: This affordable notebook has a basic design, but offers good battery life and fairly robust features for the price.				
4	Lenovo ThinkPad R60 \$1319 NEW find.pcworld.com/55117	79 Good	<ul style="list-style-type: none"> WorldBench 5 score: 98 Very Good Overall design: Good Tested battery life: 6:02 	<ul style="list-style-type: none"> 2-GHz Core Duo T2500 15.0-inch screen 6.8 pounds DVD+R DL/DVD±RW
▶ Bottom line: With long battery life but a staid design, the R60 overall is a solid choice for mainstream users on a budget.				
5	HP Pavilion dv2000t \$1789 NEW find.pcworld.com/55175	78 Good	<ul style="list-style-type: none"> WorldBench 5 score: 110 Superior Overall design: Very Good Tested battery life: 7:08 	<ul style="list-style-type: none"> 2.16-GHz Core Duo T2600 14.1-inch wide screen 6.1 pounds DVD+R DL/DVD±RW
▶ Bottom line: Offering stunning looks and great battery life, the dv2000t is an excellent home and small-business notebook.				
ULTRAPORTABLE				
1	Dell XPS M1210 Best Buy \$1906 NEW find.pcworld.com/55174	83 Very Good	<ul style="list-style-type: none"> WorldBench 5 score: 102 Superior Overall design: Very Good Tested battery life: 4:23 	<ul style="list-style-type: none"> 2-GHz Core 2 Duo T7200 12.1-inch wide screen 5.0 pounds DVD±R DL/DVD±RW
▶ Bottom line: A decked-out ultraportable, the XPS M1210 packs in the features and offers good battery life.				
2	Lenovo ThinkPad X60s \$2299 find.pcworld.com/52694	82 Very Good	<ul style="list-style-type: none"> WorldBench 5 score: 83 Very Good Overall design: Very Good Tested battery life: 8:21 	<ul style="list-style-type: none"> 1.66-GHz Core Duo L2400 12.1-inch screen 3.5 pounds DVD-ROM/CD-RW
▶ Bottom line: Strong performance, very long battery life, and superb keyboard make this expensive business notebook a winner.				
3	Fujitsu LifeBook P7120 Notebook \$2099 find.pcworld.com/52028	79 Good	<ul style="list-style-type: none"> WorldBench 5 score: 60 Poor Overall design: Very Good Tested battery life: 6:26 	<ul style="list-style-type: none"> 1.2-GHz Pentium M ULV 753 10.6-inch wide screen 2.8 pounds DVD+R DL/DVD±RW
▶ Bottom line: Cleverly designed, stylish laptop makes a fine ultraportable package. Its high price is a significant drawback.				
4	HP Compaq tc4400 \$2118 find.pcworld.com/54194	78 Good	<ul style="list-style-type: none"> WorldBench 5 score: 88 Very Good Overall design: Very Good Tested battery life: 4:11 	<ul style="list-style-type: none"> 2-GHz Core Duo T2500 12.1-inch screen 4.6 pounds CD-RW
▶ Bottom line: Bulky but easy-to-use tablet has good battery life but omits an integrated optical drive (ours came with an external CD-RW).				
5	Lenovo 3000 V100 \$1599 find.pcworld.com/54191	77 Good	<ul style="list-style-type: none"> WorldBench 5 score: 93 Superior Overall design: Good Tested battery life: 4:02 	<ul style="list-style-type: none"> 2-GHz Core Duo T2500 12.1-inch wide screen 4.4 pounds DVD+R DL/DVD±RW
▶ Bottom line: Stellar performance and solid specs—including ExpressCard and instant-on multimedia—but the mouse buttons are too stiff.				

CHART NOTES: Prices and ratings are as of 9/8/06. For each model, weight does not include AC adapter, power cord, or optical drive.

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As for Vonage, well, their song is cute.



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EarthLink

TiVo Series3 Sees the World in High Definition

DIGITAL VIDEO RECORDER

WHEN I SIT down in front of the TV, the few high-definition programs playing at that moment never seem to appeal to me. For people with the opposite problem, though, the new **TiVo Series3 HD Digital Media Recorder** can record two high-def programs at once to create a rich library of HD programming. If that sounds good to you, be prepared: The Series3 is a pricey \$800, so you may have to be rich to afford one.

The Series3's most important upgrade from its predecessor, the Series2, is its ability to record in HD, thanks to the addition of two CableCard slots. Previously, to record in HD, you had to use your cable company's DVR; now, however, with two CableCards from



THE TIVO SERIES3 box and remote sport a shiny plano-black finish.

your cable company, the TiVo Series3 can decrypt scrambled cable programming (to which you subscribe). Without CableCards, third-party recorders such as TiVos must work with a cable company's set-top box, which always exports HD signals through either component or HDMI connections; because no DVRs have these types of connections as inputs (only outputs), they can record

high-definition programming only in standard definition.

The Series3 does an excellent job of recording both HD and SD programming. I connected the device to a 50-inch Samsung plasma display via HDMI, which is a new port for TiVo (it also has component outputs). I set the unit to record two programs simultaneously, nonstop, over a couple of days, and it performed like a champ. On the whole, I think, most people would be reasonably satisfied with the Series3's recording quality. The company says the unit will record up to 52 hours of standard-definition programming at its best-quality setting (thanks to the 250GB hard drive), or 25 to 35 hours of HD programs. You can't vary the quality setting for high-def content, though you still can for SD programming.

The box carries THX certification, which is supposed to indicate that it can generate high-quality sound. It will output 5.1-channel sound via its HDMI port or its new optical-out port. We did not have a surround-sound system available for testing this feature, so I can say only that programs sounded very nice through the Samsung set's speakers.

The peanut-shaped remote

control has been restyled, but I don't like the update. With its backlit buttons, it looks swankier, but the rubberized buttons require much greater force to activate than those on the previous version of the remote. The Series3 box itself sports an update, too, with an OLED display that looks pretty sharp; some of the remote's buttons are now duplicated on the front of the box. But the unit doesn't respond very quickly to commands issued from the remote or the front-mounted buttons. I had hoped that the use of CableCards would speed the operation, because the tuners are inside the box. Changing from one live HD channel to another, however, took 3 seconds (TiVo says a 1- or 2-second lag is "more typical")—that's longer than a standard cable box takes.

My biggest hang-up over the Series3 HD, though, is its price: At \$800, it costs...well, \$800 more than a DVR from a cable company. Sure, you have to pay a monthly fee to rent a DVR, but TiVo charges roughly the same amount (\$13 per month) for its guide data (and buying a TiVo is pointless without it). I'd be willing to pay a premium for the Series3 HD, but the price is far more than I want to fork over.

—Alan Stafford

GOTCHA!

Projector Resolutions

FOR YEARS, XGA resolutions have dominated both notebook displays and digital projectors, making it easy for mobile presenters to use a laptop with their office projector. Now, however, with both business and consumer notebook displays shifting from the 4:3 aspect ratio to 16:9 (and as such,

from XGA resolution to WXGA), projectors have failed to keep up: Only a handful of projector models sold today are WXGA.

If your notebook's resolution and your projector's native resolution differ, your image will be interpolated, a process that can introduce unsightly artifacts and distortion, especially in text documents. If your wide-screen laptop lacks a way to toggle among

resolutions via a single button, at least make sure that you can adjust the notebook's resolution downward in software to match the native resolution of the projector you're using.

—Melissa J. Perenson



Series3 HD Digital Media Recorder

TiVo

PCW Rating **82** Very Good

Well-equipped device records two HD programs at once, but its price seems far out of line.

Street: \$800

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Corel Snapfire Plus Offers Easy Photo Fixes

PHOTO EDITING

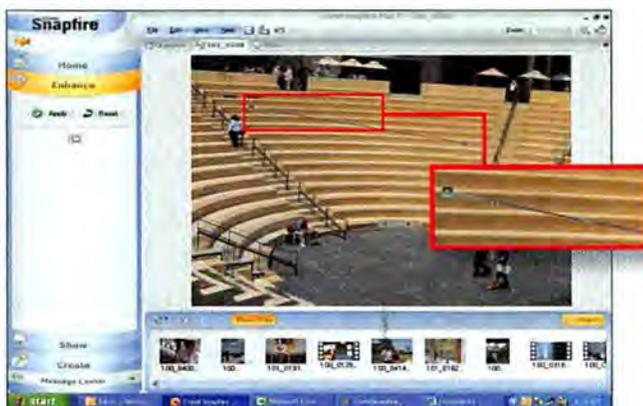
CASUAL PHOTOGRAPHERS will appreciate the straightforward organization and editing tools in Corel's \$40 **Snapfire Plus**, but they may be left wishing that its editing functions were a bit more flexible.

Snapfire's user interface is well laid out and easy to navigate. You can accomplish your basic editing with just a few

clicks, but only if you work on one image at a time. Snapfire doesn't offer batch processing for such tasks as resizing; as a result, working with multiple photos will take you longer.

Corel provides some of the enhancement features, including straightening and make-over, that are found in its more expensive Paint Shop Pro application. Both tools worked well, but fine-tuning or erasing effects can be difficult.

Sharing a slide show over e-mail is easy; Snapfire automatically applies transitions and provides a handy preview. But recipients must download a copy of Snapfire in order to view your slides. (The free ver-



SNAPFIRE'S STRAIGHTENING TOOL easily fixed slanted shots.

Snapfire Plus

Corel

PCW Rating **79 Good**

Offers just enough photo organizing and editing tools to get the job done quickly.

List: \$40

find.pcworld.com/55130

sion that they can use lacks features for backup, resizing, adding text, image straightening, and video editing.)

Snapfire definitely offers a quick way to manage and edit

photos. But if you're looking to save money, consider a free app such as Google's Picasa, which trumps Snapfire with its speed and lower price.

—Grace Aquino

The Microsoft-Centric Windows Live Toolbar 3

BROWSER ADD-ON

LATELY, EVERY time you turn around Microsoft seems to be releasing—or rechristening—a Web service with the Windows Live moniker. To date, seeing how all of these Windows Live tools work together has been difficult, but in the new **Windows Live Toolbar 3** for Internet Explorer 6 we finally get an inkling of that integration. The toolbar offers easy access to other Windows Live services, but accessing non-

Microsoft services is more difficult than it should be.

At 1.3MB, the free Windows Live Toolbar is quick to download and simple to set up. It includes a shortcut to the Windows Live Gallery, where you can select from dozens of buttons to import from categories such as search, shopping,

mail, and contacts. You simply click 'Add' to download a button to your toolbar.

Not surprisingly, the default search engine is Windows Live Search, but you can enter a new default search engine in the Options dialog box. Accessing other, non-Microsoft services is not as straightfor-



WINDOWS LIVE TOOLBAR 3 offers easy access to Microsoft's search services through pull-down menus.

Windows Live Toolbar 3

Microsoft

PCW Rating **79 Good**

This toolbar offers easy access to many Windows Live services; unfortunately, finding non-Microsoft content isn't simple.

Free

toolbar.live.com

ward, though. The new 'Make a Button' option on the toolbar's Gallery menu allows you to create a button to reach a non-Microsoft service, but it's not simple. The form that you are required to fill out is unintuitive, and the first attempt I made to create a shortcut to PCWorld.com failed.

One of the Windows Live Toolbar features I found most useful was actually first available in the previous release: the Onfolio RSS aggregator and information manager, which you use to create collections of Web information on a single subject.

The only real investments you have to make in this toolbar are the time and effort necessary to configure it. If you're an avid user of Microsoft's Windows Live services, Windows Live Toolbar 3 is for you. If you're not a heavy Microsoft user, however, you'll discover that it isn't nearly as friendly.

—Dennis O'Reilly

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- 1.3 Megapixel Camera

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- 1.3 Megapixel Camera

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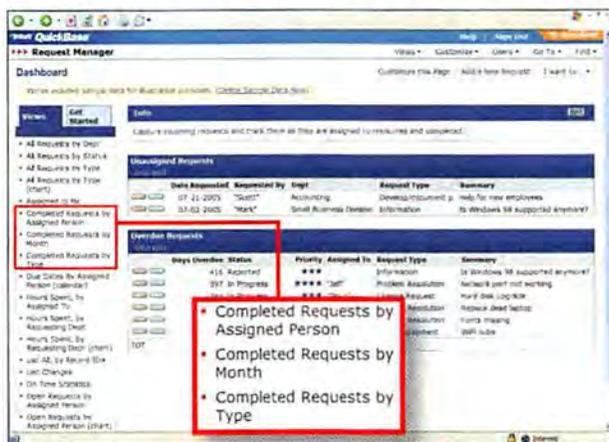
Core™2 Duo
inside™

QuickBase Helps Workgroups Collaborate

GROUPWARE

WORKGROUPS IN NEED of help managing their projects will appreciate Intuit's **QuickBase**. This Web-based program offers a flexible means of coordinating sales, marketing, customer service, and other business projects. I looked at the final version of the recently revamped application and discovered that, while larger companies requiring QuickBase's power will find a lot to like, smaller shops will likely deem the program too costly.

To get you up and running rapidly, QuickBase includes several prebuilt applications—covering project management, sales and customer management, IT management, legal/real estate/professional services, and more—



THE DASHBOARD ALLOWS users to monitor a project's progress.

that you can customize to suit your specific requirements. You can import your existing data into QuickBase from a spreadsheet, database, or Microsoft Project. If one of QuickBase's prebuilt apps satisfies all or most of your

needs, you could be all set within a few hours. If none of them seems appropriate, you can design your own application from scratch—a process that isn't too difficult for a reasonably tech-savvy user.

Once the application is ready to go, the administrator can quickly set up user groups and assign permissions from the program's easy-to-understand drop-down menus. Users can then access the app from their Web browser, either Internet Explorer version 6.0 or later or Firefox. Depending on their permissions, users can assign tasks, view their tasks, and monitor the progress of projects with reports and charts. Users can also consult the applications overview screen—the Dashboard—which has been redesigned in this version for easier access to tasks that require action, including unassigned tasks and those overdue for completion.

The latest release of QuickBase also includes dynamic forms that change depending on the information entered. In addition, the program has more types of display charts,

and allows users to drill down in the charts so they can easily examine data in greater depth.

Since QuickBase is hosted online, updates are automatic. You access your application via a secure 128-bit SSL Web browser; to get the best performance, you should have a broadband Internet connection. Intuit says data is backed up nightly and also mirrored to a second data center.

QuickBase costs \$249 per month—including storage for 5MB of data and 100MB of file attachments—for up to ten users. Additional users cost \$3 each per month; volume pricing is available for groups of 100 or more. Extra data storage is available as well.

QuickBase's price seems prohibitive for smaller groups of just two or three. A less expensive alternative is Alexsys Team 2, which, unlike QuickBase, is a packaged application that installs on your PC or Web server. It costs about \$155 per user and has many of the same collaborative features, though it isn't quite as flexible as QuickBase.

If your business needs to better track and coordinate work, QuickBase is adaptable enough to let you develop just the application you need to accomplish the tasks at hand.

—Richard Morochove

QuickBase

Intuit

PCW Rating **75 Good**

This pricey but powerful app offers handy tools for managing collaborative business projects. List: \$249 per month for groups of up to ten users
find.pcworld.com/55121

TECH TREND

Camera Dust Busters

MANY DIGITAL SLR users have long lamented the headaches caused by dust particles getting onto the camera's sensor. Three years ago Olympus was first to market with a solution: its sensor vibration technology, which knocked dust off

the sensor. Sony's recently introduced Alpha digital SLR possesses a similar mechanism.

Now Canon is jumping into the fray with the most comprehensive weaponry yet: the EOS Integrated Cleaning System (see find.pcworld.com/55132), introduced in the EOS Digital Rebel XTi in September. Canon redesigned the low-pass filter to separate it into two physical parts (to keep dust

away from the sensor), added vibration technology to shake dust from the sensor, and inserted a feature that maps any remaining particles to remove them with software. For tips on battling digital SLR dust, visit find.pcworld.com/55133.

—Melissa J. Perenson



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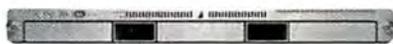
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†Storage Magazine, February 2005.

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TOP 5 ADVANCED CAMERAS

Take Better Photos Using Advanced Features

TEST Center THERE ARE SEVERAL reasons these days to buy an advanced camera instead of a point-and-shoot or single-lens reflex (SLR) camera. The advanced features give you more manual control than most point-and-shoots offer, and some models even cost less. When compared to digital SLRs, more-expensive advanced cameras offer a similar glut of manual controls—minus the option to use specialized lenses. But if you're likely to stick with the zoom lens that accompanies your camera, an advanced model is worth a serious look.

Three new advanced models capture positions on our chart, but the top spot goes to the returning Fujifilm FinePix S5200. Proving that you can

get high-quality photos at 5-megapixel resolution, the S5200 scored well in color and exposure tests despite being the least-expensive camera on our chart.

Equaling the S5200's exposure score, the 8-megapixel Olympus SP-350 debuts at number two on the chart and is our strongest performer. The SP-350 is also the most compact model on the chart, lacking the large protruding lens barrel of the other models. Unfortunately, its design leaves little room for control buttons, so adjusting settings and changing scene modes almost always requires a trip to the on-screen menus.

The Pro815 from Samsung,



THE OLYMPUS SP-350 is exceptionally small and light; its top-notch image quality and low price make it a bargain.

on the other hand, is anything but compact—it almost feels as if you're holding a Hummer in your hand. Everything about it is huge. The Pro815 has a massive 15X zoom, an

enormous 3.5-inch LCD on the back, and an array of configurable settings aimed at seasoned photographers. Like an SLR, the Pro815 displays current settings in a second color LCD up top, and it has plenty of control buttons for making quick adjustments without consulting an on-screen

menu. Almost the only thing the Pro815 doesn't have is image stabilization, which you may long for when shooting with the powerful zoom and at low light-sensitivity settings. (The Pro815's highest light-sensitivity setting is ISO 400).

The fifth-ranked Canon PowerShot S3 IS has many features, too. It boasts a 12X zoom, optical image stabilization (hence the "IS" in the name), and plenty of control buttons to let you change settings quickly. And it's the only model here with a swiveling, rotating LCD for shooting at odd angles—say, at yourself. Also, the S3 IS lets you take stills while shooting a movie. Its battery life wasn't tops, however: The S3 called it quits after 331 shots on four AA nickel metal hydride batteries. In contrast, the Fujifilm FinePix S5200 lasted through our maximum of 500 shots on the same set of batteries.

—Eric Butterfield

ONLINE

TO SEE REVIEWS of all of the advanced cameras we have evaluated, go to find.pcworld.com/55106.

	ADVANCED CAMERA	PCW Rating	Performance	Features and specifications ¹
1	Fujifilm FinePix S5200 Best BUY \$285 find.pcworld.com/50942	84 Very Good	<ul style="list-style-type: none"> • Image quality: Superior • Battery life: Superior • Overall design: Very Good 	<ul style="list-style-type: none"> • 5 megapixels • 38mm to 380mm zoom • 5 scene modes • 16.8 ounces
Bottom line: A snappy autofocus and great image quality make the S5200 hard to beat. It shoots at ISO 1600, but images looked noisy.				
2	Olympus SP-350 \$325 NEW find.pcworld.com/52054	83 Very Good	<ul style="list-style-type: none"> • Image quality: Superior • Battery life: Superior • Overall design: Good 	<ul style="list-style-type: none"> • 8 megapixels • 38mm to 114mm zoom • 24 scene modes • 8.2 ounces
Bottom line: The compact SP-350 delivered top-notch image quality and long battery life at a good price, though it has few control buttons.				
3	Samsung Pro815 \$700 NEW find.pcworld.com/54918	83 Very Good	<ul style="list-style-type: none"> • Image quality: Very Good • Battery life: Superior • Overall design: Very Good 	<ul style="list-style-type: none"> • 8 megapixels • 28mm to 420mm zoom • 11 scene modes • 30.0 ounces
Bottom line: The bulky Pro815 lives up to its name, with many controls, a huge 3.5-inch LCD, and a massive 15X zoom—but no image stabilization.				
4	Olympus SP-500 Ultra Zoom \$350 find.pcworld.com/50946	81 Very Good	<ul style="list-style-type: none"> • Image quality: Very Good • Battery life: Superior • Overall design: Good 	<ul style="list-style-type: none"> • 6 megapixels • 38mm to 380mm zoom • 21 scene modes • 13.6 ounces
Bottom line: The comfortable SP-500 impresses, with high-quality images, long battery life, and a powerful zoom. It lacks image stabilization.				
5	Canon PowerShot S3 IS \$500 NEW find.pcworld.com/54917	79 Good	<ul style="list-style-type: none"> • Image quality: Very Good • Battery life: Poor • Overall design: Good 	<ul style="list-style-type: none"> • 6 megapixels • 36mm to 432mm zoom • 12 scene modes • 14.5 ounces
Bottom line: Many control buttons, a 12X zoom, image stabilization, and a swiveling LCD make the S3 IS fun to use despite its poor battery life.				

CHART NOTES: Prices and ratings are as of 8/25/06. ¹Zoom range (focal length) is identified as 35mm equivalent; weights include batteries.



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PC Magazine
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July 2006

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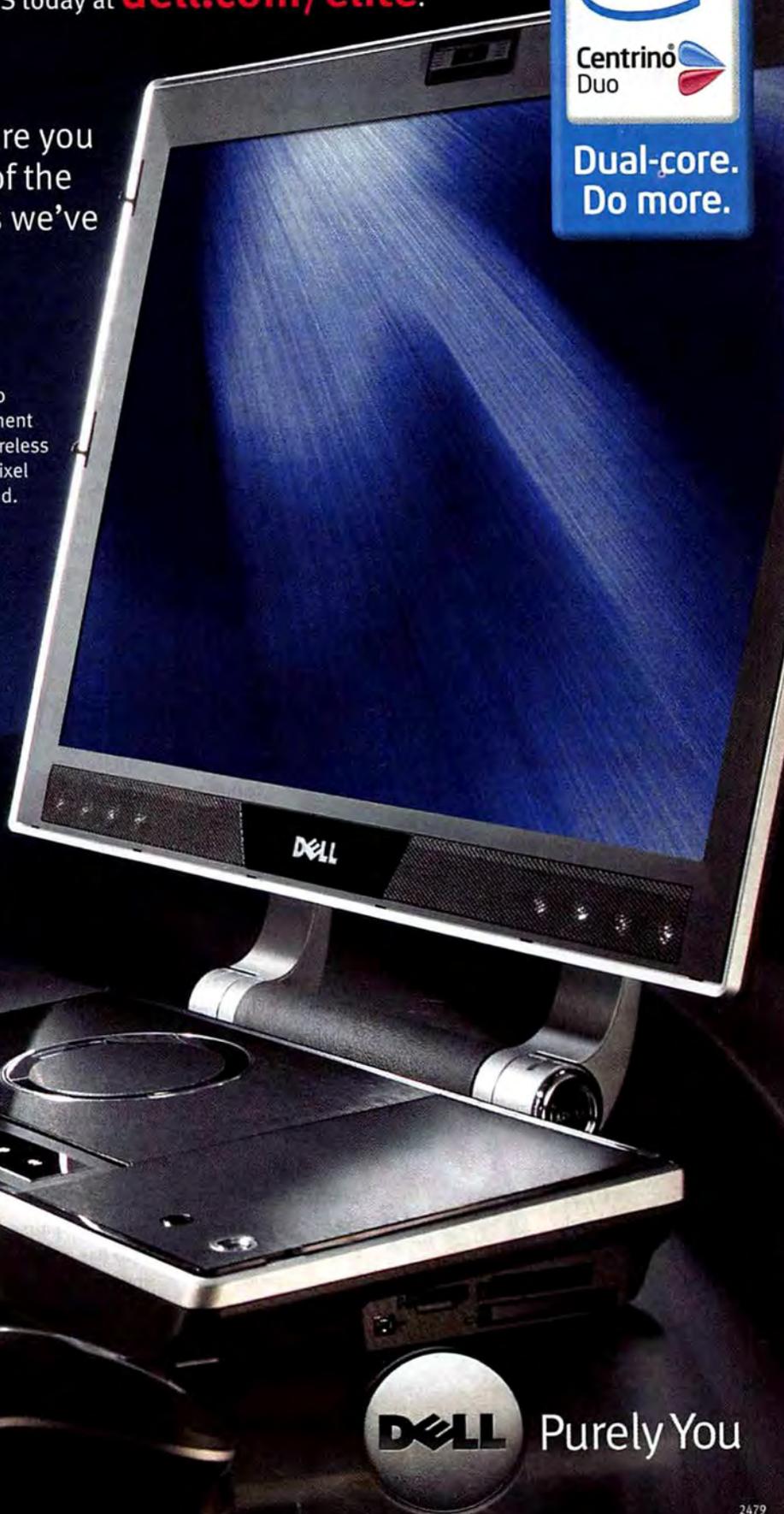
LAPTOP *LAPTOP Magazine*
EDITORS' CHOICE Editors' Choice
August 2006

The XPS M2010 features a stylish portfolio design that deploys into a total entertainment solution. This system is outfitted with a wireless mouse, Bluetooth®* keyboard, 1.3-megapixel webcam and eight-speaker surround sound. Systems start at \$3199.

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Apple's New and Improved iPod

MP3 PLAYER

REFINEMENT: THAT'S WHAT you get out of Apple's latest iPod, which comes with a brighter screen and an extra 20GB of storage. I tested the \$349 iPod—the 80GB flagship of the revamped line—and found a music player that's about as good as there is.

For music playback, not a

iPod (80GB)

Apple

PCW Rating **79 Good**

Apple's latest iPod may cost a lot, but it boasts a great screen and tons of storage.

List: \$349

find.pcworld.com/55248

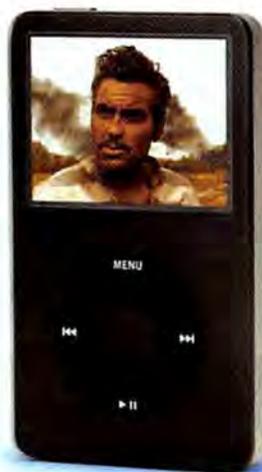
lot has changed. The iPod remains an excellent MP3 player, and its sound quality continues to be among the best around. The latest version adds gapless playback, which eliminates the pauses between tracks for a smoother listening experience. In our lab tests, its audio quality earned very good scores. I did notice a slight hiss when listening to the iPod through a pair of Shure's high-end E500PTH headphones, however.

Apple's familiar Click Wheel lets you navigate your music library with ease, scrolling through individual items and then through letters of

the alphabet as you accelerate. A new search feature lets you scroll to select a few letters to pick out a song, artist, or album, a welcome feature since with 80GB of storage, this device features 20GB more space than most competitors.

The unit's enhanced 2.5-inch, 320-by-240-pixel screen looks great. Videos were very watchable on the display—and they're easier to get. The new iTunes 7 features a movie store with an impressive array of releases available for \$10 each, in addition to its growing library of TV episodes.

Unfortunately, at press time iTunes 7 was having prob-



VIDEO LOOKED CRISP and clear on the iPod's improved display.

lems: I experienced occasional crashes on both a PC and a Mac. That and the small but noticeable hiss I picked up were the only blemishes I could find with the new iPod.

—Eric Dahl

Logitech's Wireless DJ System Falls Short

AUDIO

HERE'S A DEVICE—the \$250 Logitech **Wireless DJ System**—that promises an easy way to play the tunes stored on your PC through your stereo speakers, with no wireless network required. I looked at a shipping version of the product, and while I appreciated the easy setup and the fact that I didn't have to spring for a router, it didn't quite live up to my expectations.

The joy of the Wireless DJ System is its simple setup: Install the included software on your PC, attach

its wireless transmitter to a USB port on your computer, and then connect its wireless receiver to your stereo with the included RCA cables.

Once you install its StreamPoint software on your computer, it identifies which audio players your machine has; the device plays any files that are associated with iTunes,

LOGITECH'S WIRELESS DJ System includes an easy-to-use remote control.



Musicmatch, or Windows Media Player. The system also will stream music from the Rhapsody and Yahoo Music Unlimited services, as well as from Internet radio stations.

The hardware includes a remote control with a 2-inch display that shows a menu for artists, albums, songs, Internet radio stations, and playlists created with your desktop music apps. The remote has a clickable scroll wheel for quick navigation through long lists; volume controls; and the standard fast-forward, rewind, and play/pause buttons. It also has a button for accessing the remote's own playlist.

Where the Wireless DJ System stumbled most in my tests was on audio delivery. Though the sound quality was fine, frequent dropouts occurred, probably due to wire-

less interference in my urban neighborhood. Most dropouts lasted only a fraction of a second, but a few occasionally occurred in quick succession, severely impacting my enjoyment of the music.

If you can steer clear of wireless interference, the Logitech Wireless DJ System presents an easy way to enjoy your digital music collection. But if you want seamless audio delivery, keep looking.

—Eric Butterfield

Wireless DJ System

Logitech

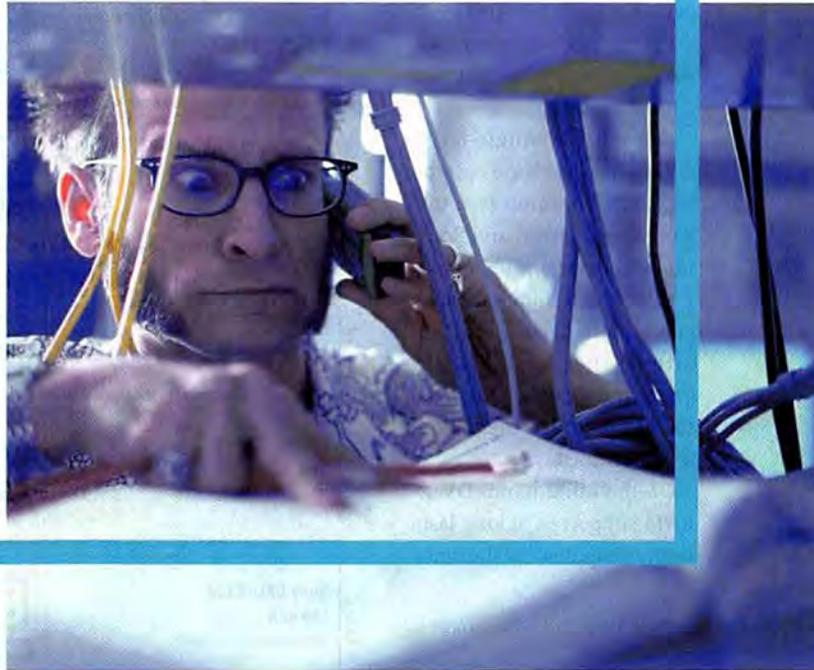
PCW Rating **78 Good**

Device offers an easy way to stream music from a PC to your stereo without a wireless network, but it suffers from frequent audio dropouts.

List: \$250

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TOP 10 DVD DRIVES

DVD Burners Gain LightScribe, DVD-RAM

TEST CENTER DVD BURNERS continue to evolve. For evidence, peruse our latest DVD drives chart, where we welcome nine new feature-packed models.

Though 18X single-layer DVD write speeds are becoming more common (see the Samsung, Plextor, and Sony internal drives), the benefit at this point is minimal, especially considering that no official spec for 18X DVD exists and that the prospects for 18X-branded media are undetermined.

On the other hand, DVD-RAM support is, at long last, nearly ubiquitous; of the units



SWIFT AND RICH in features, LG's GSA-H10L is a great value.

ranked here, only the Plextor PX-760A and the LaCie d2 lack DVD-RAM capability. DVD-RAM can be a handy rewritable format for data backup and video recording. Another trend is the inclusion of LightScribe Direct Labeling—this feature is available on two internal models and three external drives on our chart.

—Melissa J. Perenson

ONLINE

FOR MORE INFORMATION about the DVD drives reviewed in this chart, including details on how we tested them, browse to find.pcworld.com/55163.

	INTERNAL DVD DRIVE	PCW Rating	Performance	Features and specifications
1	LG Electronics GSA-H10L 16x Internal Super Multi DVD/CD Rewriter Best Buy \$85 NEW find.pcworld.com/54936		<ul style="list-style-type: none"> • Double-layer +R: 14:17 • Single-layer +R: 6:37 • DVD+RW: 8:38 	<ul style="list-style-type: none"> • 10X DVD+R DL, 6X DVD-R DL • 16X DVD+R, 16X DVD-R, 8X DVD+RW, 6X DVD-RW, 12X DVD-RAM, 48X CD-R • Nero Express 6.6, CyberLink PowerProducer 3
▶ Bottom line: Terrific performer has top-flight specs, includes LightScribe labeling, and provides up to 12X DVD-RAM write speeds.				
2	Samsung SH-S182D \$70 NEW find.pcworld.com/54942		<ul style="list-style-type: none"> • Double-layer +R: 20:34 • Single-layer +R: 6:33 • DVD+RW: 12:06 	<ul style="list-style-type: none"> • 8X DVD+R DL, 8X DVD-R DL • 18X DVD+R, 18X DVD-R, 8X DVD+RW, 6X DVD-RW, 12X DVD-RAM, 48X CD-R • Nero Express 6.6
▶ Bottom line: Affordable drive lacks frills and has basic software; it writes to DVD-RAM and offers a quiet mode for reading CDs.				
3	Lite-On SHM-165H6S \$55 NEW find.pcworld.com/54945		<ul style="list-style-type: none"> • Double-layer +R: 18:33 • Single-layer +R: 6:14 • DVD+RW: 9:38 	<ul style="list-style-type: none"> • 8X DVD+R DL, 4X DVD-R DL • 16X DVD+R, 16X DVD-R, 8X DVD+RW, 8X DVD-RW, 5X DVD-RAM, 48X CD-R • Nero Express 6.6
▶ Bottom line: Inexpensive, and provides strong performance and well-rounded features—including LightScribe Direct Disc labeling and DVD-RAM.				
4	Plextor PX-760A \$110 find.pcworld.com/53850		<ul style="list-style-type: none"> • Double-layer +R: 14:10 • Single-layer +R: 6:51 • DVD+RW: 6:09 	<ul style="list-style-type: none"> • 10X DVD+R DL, 6X DVD-R DL • 18X DVD+R, 18X DVD-R, 8X DVD+RW, 6X DVD-RW, 48X CD-R • Roxio Easy Media Creator 7 Basic Edition
▶ Bottom line: Fastest drive here at writing to double-layer DVD+R media, with speedy performance across the board; but it lacks DVD-RAM.				
5	Sony DRU-830A \$90 NEW find.pcworld.com/54941		<ul style="list-style-type: none"> • Double-layer +R: 19:52 • Single-layer +R: 6:35 • DVD+RW: 12:58 	<ul style="list-style-type: none"> • 8X DVD+R DL, 8X DVD-R DL • 18X DVD+R, 18X DVD-R, 8X DVD+RW, 6X DVD-RW, 12X DVD-RAM, 48X CD-R • Nero Express 7 Essentials
▶ Bottom line: Second-fastest single-layer DVD writer tested includes the latest Nero software. However, its DVD+RW performance lagged.				
EXTERNAL DVD DRIVE				
1	Samsung SE-S164L Best Buy \$75 NEW find.pcworld.com/54943		<ul style="list-style-type: none"> • Double-layer +R: 19:20 • Single-layer +R: 6:03 • DVD+RW: 12:58 	<ul style="list-style-type: none"> • 8X DVD+R DL, 4X DVD-R DL • 16X DVD+R, 16X DVD-R, 8X DVD+RW, 6X DVD-RW, 5X DVD-RAM, 48X CD-R • Nero Express 6.6
▶ Bottom line: Bargain-priced external drive has a pleasing aesthetic, can stand vertically, and supports LightScribe labeling.				
2	Lite-On SHM-165P6SX \$90 NEW find.pcworld.com/54946		<ul style="list-style-type: none"> • Double-layer +R: 18:41 • Single-layer +R: 6:22 • DVD+RW: 7:27 	<ul style="list-style-type: none"> • 8X DVD+R DL, 4X DVD-R DL • 16X DVD+R, 16X DVD-R, 8X DVD+RW, 6X DVD-RW, 5X DVD-RAM, 48X CD-R • Nero Express 6.6
▶ Bottom line: Inexpensive external model lacks the slick design of competing drives; supports writing to DVD-RAM, but only at up to 5X.				
3	LaCie d2 DVD±RW Double Layer with LightScribe \$120 NEW find.pcworld.com/54935		<ul style="list-style-type: none"> • Double-layer +R: 19:20 • Single-layer +R: 6:21 • DVD+RW: 8:34 	<ul style="list-style-type: none"> • 8X DVD+R DL, 4X DVD-R DL • 16X DVD+R, 16X DVD-R, 8X DVD+RW, 6X DVD-RW, 48X CD-R • Roxio Easy Media Creator 7, Toast Lite 6.0
▶ Bottom line: Hefty, contoured external unit sports USB and FireWire interfaces, offers LightScribe labeling, and has PC and Mac software.				
4	Plextor PX-750UF \$130 NEW find.pcworld.com/55162		<ul style="list-style-type: none"> • Double-layer +R: 21:23 • Single-layer +R: 6:16 • DVD+RW: 7:31 	<ul style="list-style-type: none"> • 8X DVD+R DL, 8X DVD-R DL • 16X DVD+R, 16X DVD-R, 8X DVD+RW, 6X DVD-RW, 5X DVD-RAM, 40X CD-R • Roxio Easy Media Creator 7 Basic Edition
▶ Bottom line: Flexible external drive has USB 2.0 and FireWire interfaces; however, the bundled Roxio software offers only the basics.				
5	HP DVD840e \$150 NEW find.pcworld.com/54934		<ul style="list-style-type: none"> • Double-layer +R: 19:29 • Single-layer +R: 6:59 • DVD+RW: 8:49 	<ul style="list-style-type: none"> • 8X DVD+R DL, 4X DVD-R DL • 16X DVD+R, 16X DVD-R, 8X DVD+RW, 6X DVD-RW, 5X DVD-RAM, 40X CD-R • Nero Express 6.6, SureThing SE
▶ Bottom line: A middling performer, this external model has the latest LightScribe labeling, for improved label-etching speeds.				

CHART NOTES: Prices and ratings are as of 8/21/06. Performance times are in minutes:seconds. DL means dual-layer.

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High-Quality Scanners Offer Easy Image Fixes

SCANNERS

THE NEW \$180 Canon **CanoScan 8600F** and \$149 Epson **Perfection V350 Photo** provide excellent tools for creating high-quality scanned images, even from bad originals. Both of these flatbed scanners are worthwhile, but the Canon's faster performance and greater versatility (including more software and larger-capacity film holders) give it an edge over the Epson model.

Both units scan photos and film at a maximum optical resolution of 4800 dpi, feature easy-to-use push buttons, and come with assorted software for image editing, optical character recognition (OCR), and other scanning tasks.

Although the 8600F costs a bit more than the V350, it's also bundled with more soft-



THE **EPSON (RIGHT)** features an automatic film loader, but the Canon is more versatile.

ware, including two image editors (Adobe Photoshop Elements 4 and ArcSoft PhotoStudio 5) instead of only one (the V350 has ArcSoft PhotoImpression 5), plus a useful document manager (Presto PageManager 7), something the V350 lacks.

In addition, the 8600F has Canon's FARE Level 3 (Film Automatic Retouching and

Enhancement) technology, which helps to correct the effects of dust, scratches, and fading. I was especially impressed with the 8600F's ability to reduce dust and scratches from old 35mm slides. The unit performed admirably in scanning photo prints, too, and it accurately reproduced colors with fine details in shadows and highlights.

The V350 also earned good scores for its image quality, producing colorful scans that contained sharp and accurate details. The scanning software now does a better job of removing defects without losing image elements you want to keep. The V350, however, was not as good as the 8600F at cleaning up dirty film.

RIGHT FOR THE JOB

CHOOSING THE right scanner will depend on your priorities. If you have stacks of 35mm filmstrips that you want

to digitize with a minimum amount of effort, the V350 is the better choice due to its easy-to-use built-in Auto Film Loader, which can scan 35mm filmstrips from two to six frames in length. For scanning 35mm slides, though, the 8600F is more productive because it can scan up to four slides at a time, while the V350 can handle only two.

Both scanners performed well at digitizing paper documents and turning pages into PDF files or editable text files. However, the 8600F has more scan-to-PDF push buttons than the V350, and I appreciated the convenience of using them to create final PDF documents without having to reach for my mouse (as I had to with the V350). In overall performance, the 8600F was also the faster of the two scanners. For example, it scanned a 2-by-2-inch color photo (at 1200 dpi) in 23 seconds, while the V350 took 36 seconds to complete the same task. If your top priority is speed, the 8600F is the one to select.

All told, the Canon 8600F's greater versatility, faster performance, and larger software bundle justify its higher rating over the Epson V350. But the V350's lower price and automatic film loader make it a worthwhile alternative.

—Richard Jantz

ASK OUR EXPERTS

JPEG Quality Loss?

IS IT TRUE that I lose image quality every time I rotate or resave JPEG images from my digital camera?

Scott Edelman, via e-mail



Senior Associate Editor Melissa J. Perenson responds: The JPEG format uses lossy compression, so whenever you change an image and resave it as the same file, it will be recompressed, which in turn can lead to noticeable image degradation. Not all imaging apps support lossless JPEG rotation; those that do—including ACD Systems' ACDSee, Apple's iPhoto, and Breeze Systems' Breeze-Browser—generally save a copy of the unrotated image so you can revert to the original as needed. If you shoot in JPEG, I suggest saving your edited or rotated files with a new file name. See Dave Johnson's *Digital Photo Tips* from August (find.pcworld.com/55166) for more details.

Need information or advice about a buying decision? Drop us a line at askourexperts@pcworld.com.

CanoScan 8600F

Canon

PCW Rating **80** Very Good

Scanner offers fast performance and an impressive ability to clean up bad originals.

Street: \$180

find.pcworld.com/55119

Perfection V350 Photo

Epson

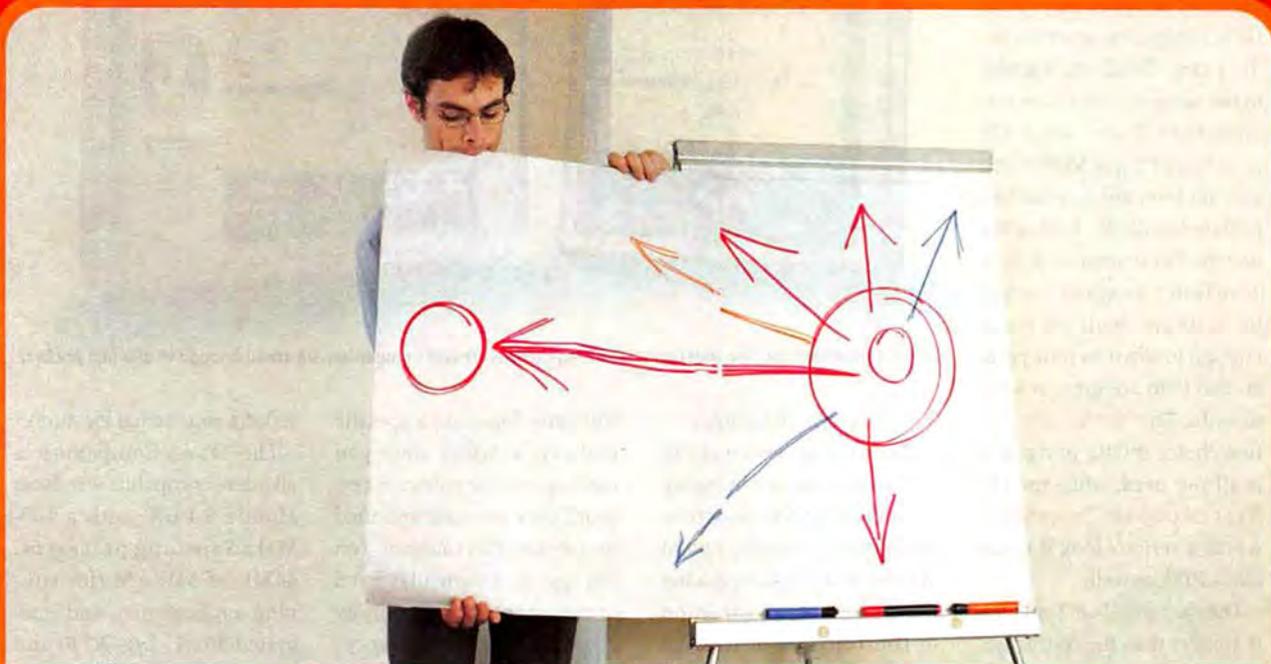
PCW Rating **77** Good

Flatbed model includes a handy automatic film loader, but it's not as versatile as the 8600F.

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TomTom, HP Offer Sleek, Simple GPS Devices

GPS DEVICES

GOOD NEWS FOR travelers in search of compact, easy-to-use GPS navigation systems for their cars: TomTom, a leader in the category, has a new portable \$499 device, while HP is introducing a \$599 GPS- and Wi-Fi-enabled Windows Mobile handheld. Both units use the latest version (6.0) of TomTom's excellent Navigator software, both are svelte enough to slip into your pocket, and both are great at what they do. The **TomTom One** is a fine choice if GPS navigation is all you need, while the HP **iPaq rx5000 Travel Companion** is worth a serious look if you'd like a PDA as well.

The shipping TomTom One is smaller than the company's previous entry-level product, the Go 300. The One isn't a lot taller or wider than its 3.5-inch touch-screen LCD, and is about 1 inch thick. Because it's so small, you can easily take it along when you exit the car (instead of leaving it behind, where it could make a tempting target for thieves or be damaged by heat or cold).

The One ships with maps preinstalled on a 1GB SD Card that slides into a slot on the device (the maps cover all U.S. states and Canada). Unpacking and setting up the unit, and getting going with it, took



BOTH THE TOMTOM One (left) and HP's iPaq rx5000 Travel Companion are small enough to slip in a pocket.

one of us only 20 minutes.

You have several ways to select a destination: by typing an address on the on-screen keyboard; by choosing a point of interest (POI) such as a hotel, restaurant, or attraction in TomTom's extensive database; by selecting a previous destination stored on the device; or by tapping a point on a map (which you can scroll in any direction by dragging it with your fingertip).

TomTom's software previews its calculated route for your approval, and then it switches to a 3D view that shows upcoming turns along with the distance and estimated travel time remaining until you reach your destination. In our tests the TomTom One proved accurate from a good 35 miles out.

Our only gripe with the

software: Entering a specific POI can be tricky since you can't access the software keyboard once you have specified the city and POI category. You can type in a particular hotel or restaurant in a city only by choosing 'Any POI Category', as opposed to going through the logical 'Hotels' or 'Restaurants' categories—not an easy or intuitive approach.

GPS AND PDA

WE LOOKED AT a preproduction version of HP's iPaq rx5000 Travel Companion. Though nearly an inch wider than the TomTom One, it's still pocketable, as it's the same height, about half as thick (0.6 inches), and, at 6 ounces, one-third lighter. Like the One's, its touch-screen LCD measures a nice 3.5 inches.

TomTom's Navigator software and maps are stored in the HP's 2GB of ROM (leaving about 50MB for other programs and data, unless you expand storage via the SD Card slot); but as navigation tools, the TomTom unit and the HP share the same easy-to-use interface and snappy position tracking (your map

reflects your actual location).

The Travel Companion is also a very capable Windows Mobile 5 PDA, with a 400-MHz Samsung processor, 64MB of SDRAM (for running applications), and integrated 802.11 b/g Wi-Fi and Bluetooth. HP has added some useful hardware controls, as well: A square rocker button to the right of the screen sets both voice volume and zoom level when you're in one of TomTom's map views; you can also use this button to scroll between and select menu options. Smaller buttons below it shut down Windows Mobile apps and launch the OS's main menu.

Unlike the TomTom One, the Travel Companion is on the pricey side compared with other devices in its class. But for only \$100 more than the One, it adds quite a bit of functionality, and it gets extra points for sleek design.

Depending on whether you need a Windows Mobile handheld as well as an in-car navigation system, either product is well worth considering.

—Yardena Arar and
Dennis O'Reilly

iPaq rx5000 Travel Companion

HP

PCW Rating **90** Superior

The pricey Travel Companion combines sleek design, PDA features, and TomTom GPS tools into a versatile package.

List: \$599

find.pcworld.com/55123

TomTom One

TomTom

PCW Rating **91** Superior

GPS navigation system stakes out new territory with its compact form, easy-to-use software, and sub-\$500 price.

List: \$499

find.pcworld.com/55124

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IMPORTANT CONSUMER INFORMATION: Subject to Customer Agmt, Calling Plan & credit approval. \$175 early termination fee. Requires compatible PC card (purchased separately). Speed claim based on our network tests with 5 MB FTP data files without compression. Actual throughput speed varies. If more than 5 GB/line/month, we presume use is for non-permitted uses and will terminate service; see brochure for details. BroadbandAccess is available in 181 major metropolitan areas in the U.S. Offers and coverage not available everywhere. Network details & coverage maps at verizonwireless.com. ©2006 Verizon Wireless. Verizon Wireless received the highest numerical score among wireless providers in the proprietary J.D. Power and Associates 2006 Business Wireless Customer Satisfaction Study.™ Study based responses from 2,737 total responses, measuring 5 providers and measures opinions of wireless service decision makers at businesses of all sizes. Proprietary study results are based on experiences and perceptions of business wireless users surveyed in January and February 2006. Your experiences may vary. Visit jdpower.com.

Web Mail Service Offers Easy Mobile Access

MESSAGING

THE **Zimbra Collaboration Suite** is full of clever tricks. The latest version (4.0) of this online e-mail, calendar, and address book system adds the ability to easily access your account from certain cell phones.

Zimbra Collaboration Suite 4.0

Zimbra

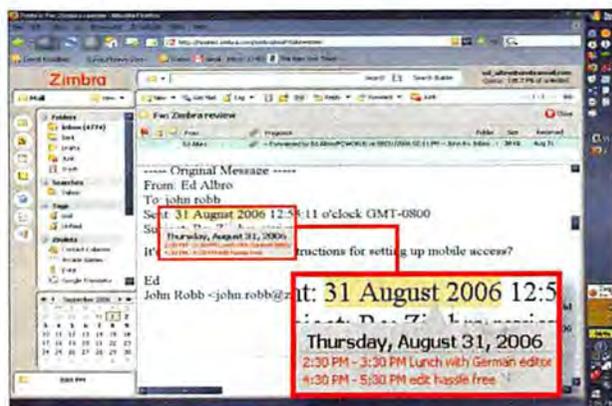
PCW Rating **84** Very Good

Innovative online e-mail system adds impressively easy—but limited—mobile support.

List: Free without technical support; \$25 per mailbox per year with technical support
find.pcworld.com/55152

The Zimbra suite includes both the online client (which displays your e-mail messages, appointments, and contacts) and the server that client runs on. You can download and run the software for free if you like. (Zimbra charges \$25 per mailbox per year for technical support and extras like mobile access, with a minimum of 25 mailboxes.)

Perhaps the most impressive new feature in version 4.0 is its simple mobile setup—if you have the right phone (any Treo, the Symbian-based Nokia E61, or any phone that runs Windows Mobile OS 5 or above). I plugged my user



MOUSE OVER THE date in an e-mail, and see your appointments.

name, password, and server information into a Treo 700p, and a couple minutes later I was viewing my messages, calendar, and contacts.

Despite the suite's sometimes rough edges, Zimbra offers an innovative and inexpensive e-mail alternative.

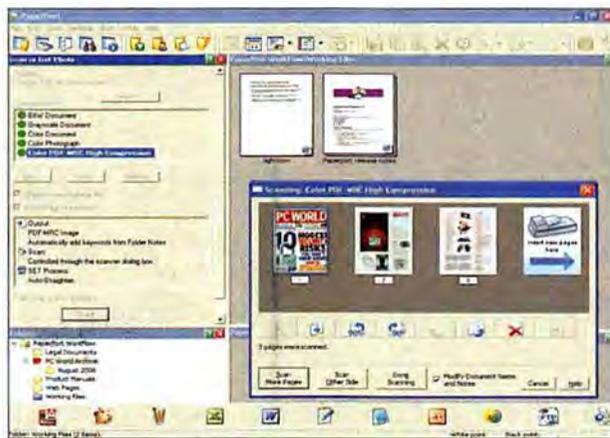
—Edward N. Albro

Latest PaperPort Offers More Robust Features

DOCUMENT MANAGEMENT

IF YOU HANDLE a lot of paperwork and need to manage it more efficiently, Nuance Communications' **ScanSoft PaperPort Professional 11** should interest you. Paired with a scanning device such as a multifunction printer or a networked copier, this \$200 program lets you organize, search, and share large volumes of digitized documents. Version 11 adds a range of appealing features, but new users will need plenty of learning time.

PaperPort's primary workspace presents you with a customizable list of your PC's existing folder structure on the left; your files are shown on the right. From this workspace, you can access many of PaperPort's tools, such as those that allow you to search through your documents or



PAPERPORT LETS YOU see thumbnail previews of your documents.

combine multiple documents or pages into one PDF file.

In version 11 you can now assign a button on your scanning device to do capture using one of PaperPort's custom profiles. Other new features include a capture assistant, high-compression color PDF creation (for files up to

eight times smaller), and a tool called DesktopDelivery. This feature can, among other things, automatically monitor e-mail attachments and network folders for new files, import any new files, and make them searchable. PaperPort's built-in All-in-One search tool and bundled Wat-

son document/Web search utility are great for quickly finding something in a long document without riffling through a stack of paper.

Your first call to tech support is free, but, as is becoming common, Nuance charges a fee—\$20—for subsequent questions. What's more unusual is that e-mail queries cost \$10 each, a policy that many users will likely resent. Still, PaperPort Professional 11 remains a powerful package.

—Danny Allen

ScanSoft PaperPort Professional 11

Nuance Communications

PCW Rating **78** Good

PaperPort will increase the productivity of many a paper pusher, but it can be hard to use.
 Street: \$200 (\$150 to upgrade)
find.pcworld.com/55127

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Acer recommends Windows® XP Professional.

October/November 2006

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- Optical mouse
- One-year limited warranty⁴



Ferrari 5005WLMi

\$2,299

(LX.FR506.119)

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(ET.L380B.063)

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- Optical mouse
- One-year limited warranty⁴



Ferrari 1004WTMi

\$1,999

(LX.FR606.041)

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- Integrated ATI® Radeon® Xpress 1100 graphics
- 802.11b/g WLAN, 10/100 LAN, V.92 modem
- One-year limited warranty⁴



Acer Aspire 5102WLMi-MCE

\$749



AMD Turion™ 64 X2 Mobile Technology TL-50
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(LX.ABH0J.011)



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- One-year limited warranty*



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(LX.ABK0J.009)



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(ET.L6102.018)

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(ET.2216B.0D0)

Acer AL2216Wbd

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- Black color

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- 700:1 contrast ratio
- 150° horizontal viewing angle
- 135° vertical viewing angle
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- 2ms gray-to-gray response time
- Internal power adapter
- Black color



\$229

(ET.1916B.0DF)

Acer AL1916W Ab

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- 150° horizontal viewing angle
- 135° vertical viewing angle
- VGA signal connector
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- 5ms response time
- Internal power adapter
- Black color



\$209

(ET.1916B.W08)

Acer AL1717 Bbmd



\$199

(ET.1717B.MD8)

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- 700:1 contrast ratio
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- 135° vertical viewing angle
- Two 1.0W integrated speakers
- VGA, DVI-D signal connectors
- 300 cd/m² brightness
- 8ms response time
- Internal power adapter
- Black color

Acer AL1706 Ab



\$189

(ET.1706B.008)

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- 1280 x 1024 native resolution
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- 8ms response time
- Internal power adapter
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(EY.J2901.012)



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- 16.7 million displayable colors
- PC and Mac compatible
- 4.8 lb. (2.2kg)

(EY.J2201.012)



Acer PD311 Portable Projector

\$732

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- SXGA (1280 x 1024) maximum resolution
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- PC and Mac compatible
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(EY.J3401.006)



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Acer recommends Windows® XP Professional.

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 - AMD PowerNow!™ Technology
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- 5-in-1 card reader
- 15.4" WXGA (1280 x 800) TFT display
- Integrated ATI® Radeon® Xpress 1100 graphics
- 802.11b/g WLAN, 10/100 LAN, V.92 modem
- One-year limited warranty⁴



Acer Aspire 5102WLMi

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Genuine Windows® XP Professional
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(146.AD077.002)

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¹ Depends on availability of PC-supported connections and location.

² Enhanced Virus Protection (EVP) is enabled by Microsoft® Windows® XP Service Pack 2. By default, EVP will protect the user's Windows operating system only. Users must enable the protection of their applications and associated files to be protected from memory buffer overrun attacks. AMD and Microsoft strongly recommend that users use third-party anti-virus software as part of their security strategy.

³ When referring to storage capacity, GB stands for one billion bytes and MB stands for one million bytes. Some utilities may indicate varying storage capacities. Total user-accessible capacity may vary depending on operating environments.

⁴ For a free copy of the standard limited warranty end-users should see a reseller where Acer products are sold or write to Acer America Corporation, Warranty Department, P.O. Box 6137, Temple, TX 76503.

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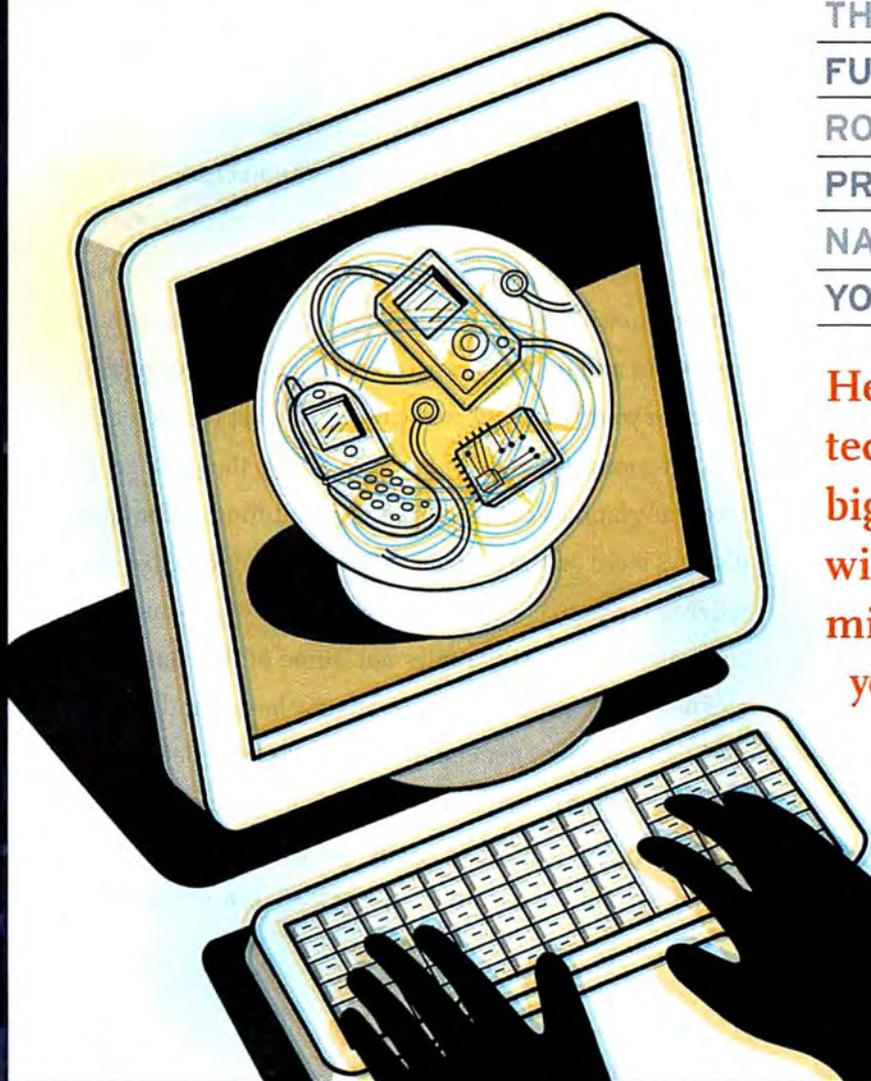
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Here's what's next for technology: when the biggest breakthroughs will appear, how they might change the way you work and play, and why the future won't be trouble-free. ▶

SECTION EDITOR:
ERIC DAHL

ILLUSTRATION BY
HARRY CAMPBELL



Power Makes a Comeback

With breakthroughs such as faster multicore processors on the way, raw PC muscle is about to return with a vengeance. And it will come in more shapes and sizes than ever.

THE PC OF tomorrow will have more competition than ever in winning a place at the heart of your technological universe. But that doesn't mean that the PC will wither away into irrelevance—far from it. Computers are shaping up to become ever more specialized, and although they'll appear in innovative new forms, even the traditional desktop system will be with us for years to come, say the senior executives and industry experts we spoke to. Nevertheless, a peek at your future PC may not reveal what you expect.

Eight-core processors, huge hard drives, the prospect of external graphics cards, and bigger and more affordable displays loom on the horizon. While some of the most tantalizing elements, like 20-terabyte drives or flexible full-color displays, are still a ways out, some of the must-have technology you've had your eye on may be closer than you first thought: Next-generation notebooks with detachable mini displays, for instance, are just around the corner. ▶

BY CHRISTOPHER NULL
ILLUSTRATION BY HARRY CAMPBELL



40% of readers say they'll mostly use a device other than a PC in five years. —SOURCE: PCWORLD.COM POLL

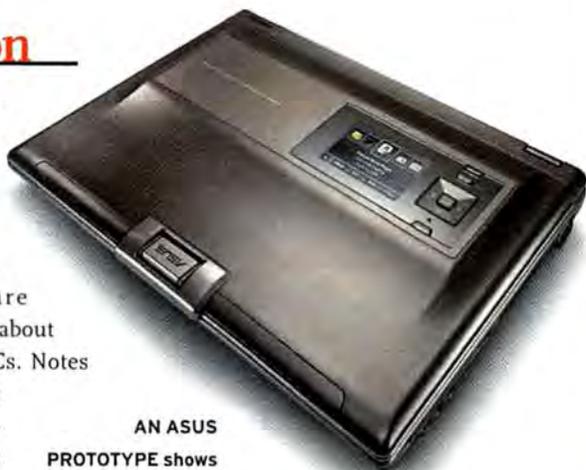
PCs: Form Follows Function

COMPUTERS HAVE BEEN evolving into some radical designs—such as Media Center PCs and pint-size Shuttle systems—that only a few years ago would never have left the lab. From Acer's 20.1-inch "laptop" (weighing 17.3 pounds) to Dell's XPS M2010 (a 20.1-inch notebook/desktop hybrid), oddball systems are beginning to look, well, a little less odd.

Still, Dell chief technology officer Kevin Kettler says that while designs like the M2010 are interesting exercises, they aren't quite the future. "[Traditional] desktops aren't going away any time soon," he notes. With emerging markets like China, demand for inexpensive PCs should stay strong.

Despite efforts like Intel's Viiv initiative, which seeks to standardize media PC components, few observers are especially bullish about entertainment PCs. Notes Kettler, "The next couple of generations of wireless [standards] will allow you to access any type of media, anywhere in the house." You simply won't need an entertainment PC stuck beside a TV.

Steve Kleynhans, vice president of



AN ASUS PROTOTYPE shows off SideShow.

client computing at analysis firm Gartner, says that mobile PCs will continue along the two current primary design trends: ultraportables under 4 pounds, and 15- to 17-inch desktop replacement notebooks pushing 8 to 10 pounds, and mostly meant to be used while plugged in.

Scheduled for early 2007, Intel's fourth-generation Centrino notebook platform includes up to several gigabytes of fast NAND flash memory, which is expected to deliver faster boot times and application loading.

And don't forget the dazzle: Vista's SideShow technology will allow laptop makers to include a display on the lid of the notebook, much like the external display on a clamshell cell phone. Want to check if you have an e-mail waiting? You won't even have to flip open the computer. PortalPlayer's Preface technology, expected in the first half of 2007, will work along with SideShow to provide a detachable display/PDA that you can use independently of the notebook.

Beyond the next few years, fanciful designs rule. Jerry Bautista, director of technology management at Intel's Microprocessor Technology Labs, thinks chips could be built into furniture or even woven into fabric: Imagine a PDA or cell phone that's part of your shirt sleeve.

DATA DEVICES

ONE DEVICE TO RULE THEM ALL?

THE PC HAS been the window to the digital world for 25 years. But as ways of accessing information continue to evolve, we've taken an admittedly arbitrary crack at laying odds on which device will be your go-to gizmo in 2011.



SMART PHONES

3-2 short odds

Attraction: Universally used already; QWERTY keypads becoming commonplace; wide high-speed network coverage; choices in operating system

THE MOTOROLA Q, T-Mobile Sidekick III, and Palm Treo phones have shown the possibilities of these devices. But tiny screens and keyboards can frustrate.



ULTRA MOBILE PCs (UMPCs)

6-1 odds

Attraction: A Windows XP PC in a format the size of a hardcover book

THE SAMSUNG Q1 (pictured with its portable keyboard) and similar devices are gorgeous, but they have been lackluster in early reviews. For many people, they're currently underpowered, costly, and poor on battery life.



MEDIA PLAYERS

15-1 outside option

Attraction: Geek chic; improving battery life; expanding media capabilities; lots of choice; Archos's forthcoming 604 and Microsoft's Zune will have Wi-Fi

TODAY'S APPLE IPODS rule all in music, but few people use them as PDAs. Future devices will need better data entry and networking for broader utility.



PORTABLE GAME CONSOLES

50-1 long shot

Attraction: Built-in Wi-Fi; storage options abound; large screen (or two)

THE NINTENDO DS and Sony PlayStation Portable prove that game handhelds can do more than play Tetris, but such features as a Web browser have been afterthoughts. On the PSP, data entry is next to impossible with the joystick.



THE PC

More than even chance

Attraction: The machine you know and love

IT MAY LOOK a little different or contain innards completely foreign to you today, but chances are you'll continue to use a desktop, a laptop, or even a tablet PC as your primary device for work and play.

Operating Systems: Vista Arrives...and Evolves

WINDOWS VISTA IS now expected in early 2007. How will it change the way the Windows world works?

David Siroky, a Microsoft veteran and the group product manager for Windows, says that Vista's enhancements fall into three major categories. The first, and most visible, is graphics. Unlike XP, Vista can use a computer's GPU for multiple tasks simultaneously. That's key, because Vista's Aero user interface is graphics intensive, and developers—for the first time—will be more easily able to use advanced graphics outside of games.

Vista will likely change information management and data storage, as well. Says Siroky, "Now that there's no cost associated with taking a snapshot, people have a lot more photos to deal with." XP's lack of tools gave rise to a bustling market for photo software, but Vista indicates that Redmond has started to catch up. Users can tag photos with keywords or other metadata, and Vista's photo gallery simplifies locating your pictures.

Elsewhere, Vista's integrated "reliability monitor" can show you a chart of how stable your system has been

over time. If you experience a sudden spike in reliability problems, you can check what happened during those days and react appropriately.

On the Linux front, the XGL and Compiz windowing systems, GUIs that can give Linux a pretty face, may outdo Mac OS X's Aqua interface in sheer awe factor. In Compiz, the windows stretch and skew as you move them, and you can view mul-

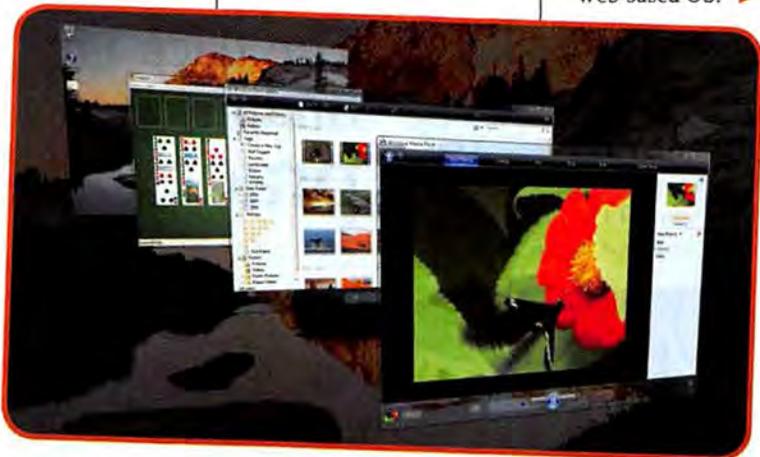
iple desktop environments in 3D as the cube-like workspace rotates.

Apple's Leopard revision of OS X, due out next spring, will make incremental but steady improvements to the Mac operating system, adding such features as an automated backup utility and multiple workspaces. According to Gartner, both Linux and Mac OS will gain in user support, while research continues on the Web-based OS. ▶

THE FUTURE NOW

WINDOWS FLIP 3D:

This feature of Vista's Aero interface lets you use the <Windows> and <Tab> keys to manage open windows in style.



WINDOWS TIMELINE

AFTER VISTA, WHAT'S NEXT?

MICROSOFT CEO STEVE Ballmer has said that the company "won't ever take five years to develop another version of Windows." If that's true, and if the time between

previous major consumer versions of Windows is any gauge, that places the successor to Windows Vista, code-named Vienna, on course for a 2010 or 2011 release.



Readers' most anticipated interface improvement: More touch screens. —SOURCE: PCWORLD.COM POLL

By 2010, less than 20% of all monitors will be smaller than 17 inches. —SOURCE: ISUPPLI

CPU: The More Cores the Merrier

WITHIN A FEW short years, AMD Athlon X2 and Intel Core 2 Duo CPUs will feel decidedly quaint, because multicore technology is just getting started. Jerry Bautista, director of technology management at Intel's Microprocessor Technology Lab, says he has already built prototype chips with eight cores. "Up to eight works well for productivity applications. But thousands of cores are possible. The trick is finding what's practical," he says. While dual-CPU Xeons (with a total of four cores) have been around for a while, this kind of power is finally coming to the masses. Both Intel and AMD plan to introduce quad-core chips. Intel's Kentsfield chip will arrive by year-end, while AMD's, known as K8L, is slated for mid-2007. AMD's 4x4 technology promises a dual-socket system using two Athlon 64 FX chips that will be available in time for the holidays.

The limit for multicore technologies is really a software issue, as programs must be fundamentally redesigned to take advantage of parallel processing on a large scale. In other words, splitting a task across two or even four processor cores is relatively easy, but splitting it into dozens or

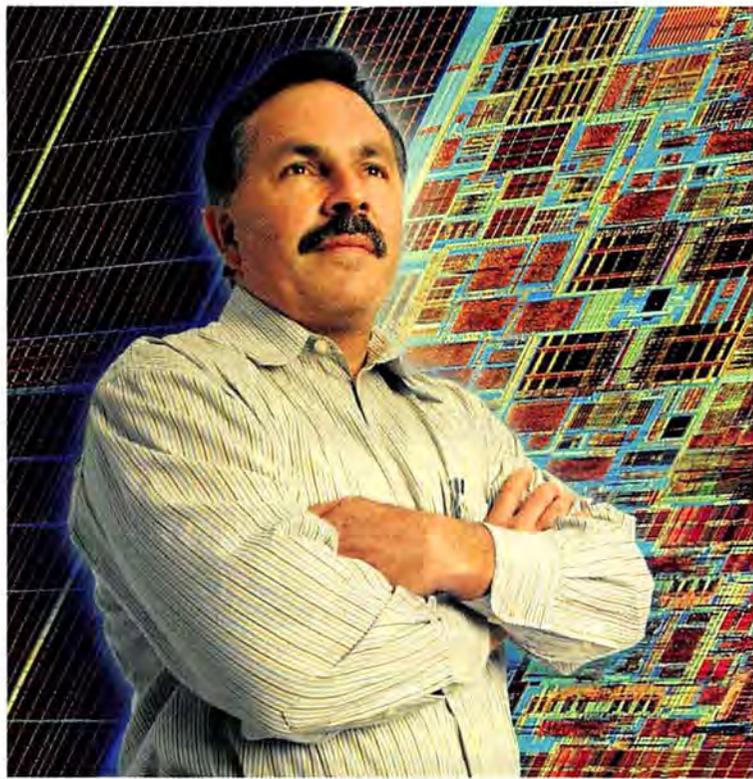
hundreds of pieces is most definitely another thing altogether.

Still, even with eight cores, expect to see dramatic performance improvements in complex programs, from games to search technologies. Simon Hayhurst, Adobe's director of product management for digital video and audio, says that most of Adobe's video applications already have elements that can make use of many cores, because previous work optimizing programs for hyperthreaded CPUs also works on multicore CPUs. Says Hayhurst, "The beauty of this approach is that we can write one piece of code that is hyperthreaded, which will scale up or down to multiple cores. We can soak up many more cores than are available today."

The great leap in simultaneous processing capability is also likely to improve artificial intelligence. According to Intel's Bautista, "A video game's AI will be indistinguishable from what a person would do," forcing the player to take cover and track opponents organically rather than following an established script. He adds that such intelligence will extend to other applications, as well: "You will be able to search through thousands of photos and videos for people, certain backgrounds, or even specific facial expressions," he says.

...Thousands of cores are possible. The trick is finding what's practical.

—JERRY BAUTISTA, INTEL



SPEED BARRIERS

OF COURSE, SUCH performance advances will have to be achieved within realistic parameters. Intel's single-core CPUs experienced increasingly serious power-consumption and heat problems, speeding the demise of that architecture. Smaller, more efficient cores will continue to provide a better overall power profile than a single megachip. That's certainly positive news for notebooks, which have historically lagged behind ▶



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desktop machines in performance due to heat and power constraints.

AMD chief technical officer Phil Hester notes that mobility will be a major driver for the company over the next several years, and that the company's acquisition of graphics purveyor ATI will be key to this strategy. "In the 1980s, the 286 and 386 had math coprocessors separate. Eventually that was integrated into the CPU. The same thing will happen to 3D graphics...in the post-Vista time frame," he says. According to Hester, we can also expect that power management will be improved to the point where someday a device the size of a PDA should be capable of producing a PC-caliber graphics experience.

The major stumbling blocks to more powerful computers, says Bautista, are elsewhere on the motherboard: Memory bandwidth must grow dramatically to keep up with the CPU, and even hard-disk input/output will have to handle faster data transfers. If you want more-realistic online gaming, "even your broadband connection may need to scale," says Bautista.

And what of Moore's Law, which states that the number of transistors on a chip doubles every 18 months (along with CPU processing power)? "It's still alive and well," says Bautista. He also thinks that parallel processing, which splits a workload among many cores, makes it more likely to continue. "Multiple, smaller cores are

FUTURE TECH

WIMAX WIRELESS Though WiMax (Wi-Fi combined with the universal signal of cellular) has been slow to gain traction, Sprint Nextel for one has now chosen it as the basis for a "4G" network. The company plans to launch on a trial basis by 2007 with download speeds of up to 4 megabits per second, and to give service to 100 million people by 2008.

easier to build, and there's no end in sight as the manufacturing process continues to shrink. All the stars are aligned right now," he says.

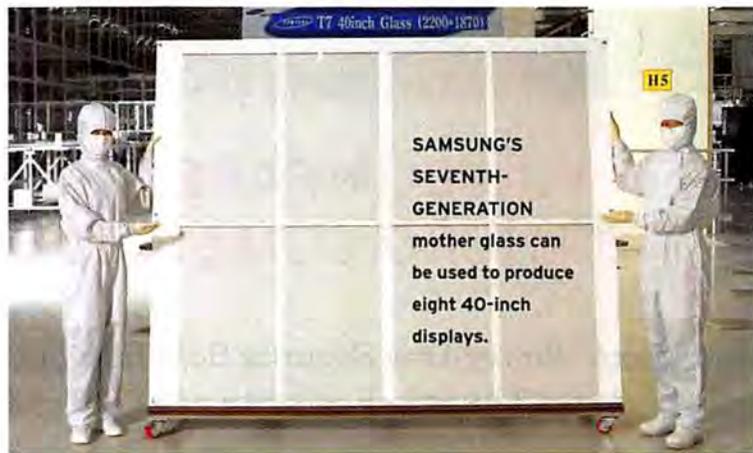
LCDs: Bigger, Brighter, and Priced to Move

BY YEAR'S END, wide screens will be on 10 to 12 percent of desktops, with up to 20 percent share by the end of 2007, according to Chris Connery, vice president of market research for analysis firm DisplaySearch.

The other big trend: bigger, brighter, and cheaper LCDs. Rhoda Alexander, director of monitor research at iSuppli, says that 78 percent of monitors were 17 inches or smaller in 2005, but she projects that by 2010 less than 20 percent of monitors will be that small. Resolution will improve as screens grow: Though only 4 percent of today's monitors feature resolution higher than SXGA (1280 by 1024), Alexander says that figure will grow to 23 percent by 2010.

Screens 25 inches and larger should also become common, says Connery. In addition, thanks to LED backlights (which are hitting the market now only in superpremium displays), buyers who are willing to pay a little extra will have a brighter monitor that displays colors more accurately.

What about emerging technologies



like organic LED (OLED) and liquid crystal on silicon (LCoS)? Both will find homes in certain niches—OLED on tiny displays like those of MP3 players and cameras, and LCoS on projector TVs—but neither is likely to make a dent on the desktop. Expect LCD products to rule for at least the next five years because of their availability and affordability.

Flexible displays that can be bent or rolled, as well as electronic-ink products (see our hands-on look at Sony's

Reader on page 28), will also find a piece of the market, starting in areas like grocery-store shelf price tags that can be instantly and easily updated.

Touch screens will also likely become more popular for niche uses. NYU researcher Jeff Han demonstrated an impressive advancement of the technology earlier this year, in the form of a multi-touch-screen, partially gesture-based interface. Visit find.pcworld.com/55156 to watch a video of Han's demonstration. ▶



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Graphics: Not Just for Gamers

THERE'S NO END in sight to the PC's increasing hunger for more graphical power. As nVidia chief scientist David Kirk says, "We're years and years away from being able to do everything we'd like to be able to do."

GPU manufacturers are busy preparing for DirectX 10 and its promised 8X performance improvement

FUTURE TECH

THE RAM BOTTLENECK CPU performance improves by about 50 percent per year on average, but RAM access times haven't kept pace. Magnetoresistive RAM (or MRAM) is one potential solution: The promising nonvolatile form of memory uses magnetic instead of electrical storage components. Research by Freescale, IBM, and NEC is continuing.

over DirectX 9. Expect nVidia and ATI to transition to GPUs that use unified shader architectures featuring general-purpose pipelines that can process pixels, geometry, or even physics code. Future GPUs will pile on more and more of these pipelines, enabling some truly amazing effects. Dedicated physics cards (like the Ageia PhysX accelerator), which supplement your regular graphics board, may also become more prevalent. The market will soon decide whether the GPU or a secondary processor is the best way to handle physics processing.

Products like the nVidia Quadro Plex may also be a sign of the way the market is headed: The \$17,000-plus device is an external graphics system that can perform up to 80 billion cal-



NVIDIA'S QUADRO PLEX graphics system.

culations per second, about ten times what today's top high-powered PC graphics cards can manage. Experts believe that the next generation of cards could consume up to a blazing 200 watts of power and require external components.

Another emerging graphics technology, general-purpose GPU, uses the custom computing capabilities of a graphics card in a nongaming environment. Adobe has been using GPGPU for functions such as video transitions in some form since 1995.

Storage: Terabytes and Beyond

HITACHI SENIOR VP Bill Healy says that if current trends hold, by 2025 a standard 3.5-inch hard drive (if any manufacturer still bothered to make models in that format) could contain up to 20 terabytes of data.

Driving the immediate surge of capacity is perpendicular magnetic recording technology, which overcomes the limitations of traditional longitudinal magnetic recording and packs much more data into a far smaller physical area. The first hard drives using PMR reached market last year. Seagate's chief technology officer, Mark Kryder, informed us that all of his company's

upcoming hard drives will employ it.

Heat-assisted magnetic recording (HAMR), which allows platters to be made from materials that can support a denser number of bits, is expected early

next decade. Even more of a long shot is patterned media, which forgoes a uniform layer in favor of "islands" of material that do not physically touch each other.

The future of optical storage is far less certain. The current battle between Blu-ray Disc and HD DVD, two competing and

incompatible blue-laser formats, has no clear winner in sight. "As long as there are two solutions battling it out, there will never be a critical mass established, and that will keep prices high," Gartner's Steve Kleynhans says. "You need a single standard in order to get economies of scale and broad public acceptance."

Meanwhile, one potential upgrade to flash media could come in the form of ultradense probe storage, which is being developed by Seagate, among others. It's based on technology borrowed from electron microscopes, and it could well cram 10GB into a device the size of an SD Card. ■

Christopher Null is a San Francisco-based journalist. He covers technology daily on his blog at tech.yahoo.com.



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CELL PHONES

Handsets get even thinner, more versatile. BY YARDENA ARAR

Tomorrow's Phone: Fold It and Go

TOUCH AND TALK

Frog Design's Ubik is a conceptual music/video/game player and videophone with data capabilities. Its touch-sensitive icons and controls change depending on the app.



BEND IT, FOLD IT

The Ubik's flexible display needs no bulky backlighting, so the open handset is only a quarter-inch thick.

THINK THIN

Folded, the Ubik looks like a cosmetic compact.



WHAT'S NEXT

SPEED IS JUST THE BEGINNING

PHONES WILL become all-purpose, always-connected devices.

NETWORKS: In the next few years, cell phone networks will move data at several megabits per second, and will coexist with WiMax, Wi-Fi, and, for TV, DVB-H or MediaFLO. IMS (see below) will let them work together.

HANDSETS: Look for sleek designs (such as Frog Design's Ubik, left), better battery life, e-payment support, and graphics muscle for true TV and console-style video gaming.

CAMERAS: Expect not just high resolutions (8 megapixels and beyond), but also the same image-processing capabilities found in current digital still and video cameras.

NETWORK HOPPING

ENABLING SEAMLESS INTERNET ACCESS

GSM, CDMA, WI-FI, WIMAX: Can't we all just get along? With IMS (IP Multimedia Subsystem), we just might. Now in trials, IMS network technology will allow any type of packet data—voice calls, video, music, HTML, you name it—to move seamlessly between IMS-enabled networks. With IMS, you'll be able to start a call on your cell phone and end it on a VoIP landline, watch pay TV on either a handset or a big screen (smart-card technology identifies you), and access your contacts from any connected PC or handset. But the benefits will kick in only once IMS is widely deployed, which will take several years.

“Our kids will tell their children how the only way you used to be able to get TV was in a box in the living room.”

—ROB SCHEIBLE, IMS/MULTIMEDIA DIRECTOR, NORTEL

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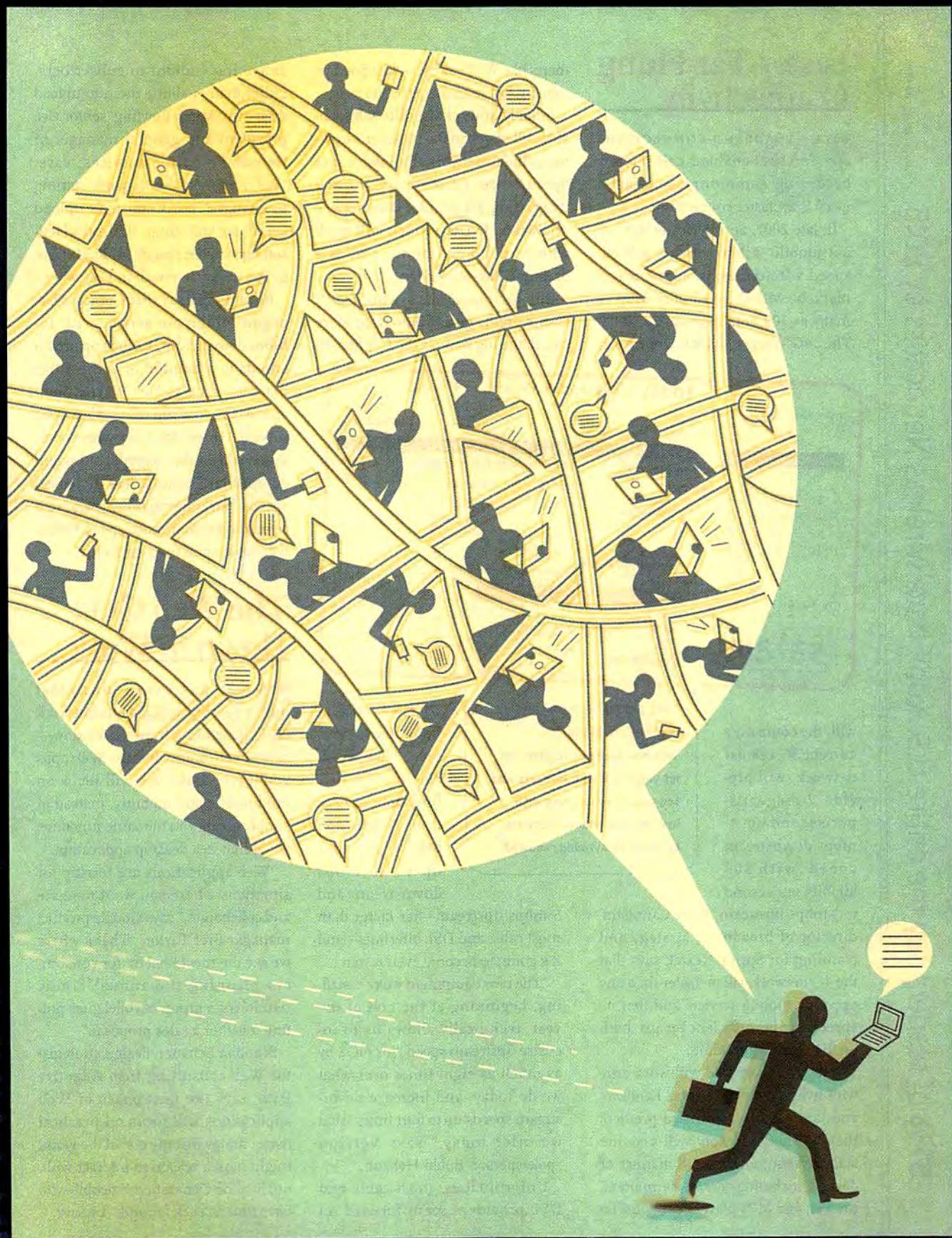


Internet Unleashed

The next-generation Net won't just be more portable and personal. It'll also harness the power of people, making it even easier to zero in on precisely what you're looking for.

THE WEB'S MOST common method of interaction is the tried-and-true link: "Click here and we'll show you a different page." But the future of online will be fast, two-way communication, the roots of which are beginning to take hold. New technologies will soon give us speedy, uninterrupted access to the Web wherever we wander. We'll see innovative Web applications that allow us to access information anywhere and work seamlessly with colleagues around the globe. People will gain more power online—rather than simply reading the news, they'll be able to go out and uncover some stories of their own. And new sites and services will offer information targeted precisely to your needs, rendering one-size-fits-all sites obsolete. ▶

BY ALAN STAFFORD
ILLUSTRATIONS BY HARRY CAMPBELL



Faster, Far-Flung Connectivity

WITH BROADBAND CONNECTIONS and Internet-enabled cell phones becoming commonplace, what's next? Even faster connections.

In late 2007, Sprint/Nextel will roll out mobile WiMax service (a high-speed wireless technology) in test markets, with the goal of serving as many as 100 million people in 2008. The "4G" service, which will coexist

there, like Wi-Fi today, or like 56-kbps modems were in the past," he says.

Initially, your phone calls will probably still travel on the provider's existing cellular network. Cannistra says Sprint/Nextel will continue to expand its existing 3G cellular data service (known as EvDO), which will work with certain applications and as a backup to the 4G service.

But for consumers who aren't always on the go and who want more speed, the big news is the fast growth

delivering content to subscribers, rather than enabling them to upload their own. Mitch Bowling, senior vice president and general manager of Comcast's online services, says, "We're aware of that dynamic starting to change," but Comcast's upload speeds are still stingy. Verizon's Henson says higher speeds for its DSL are in the works, but wouldn't say when.

Bowling did say that Comcast has begun rolling out service with 16-mbps downstream/1-mbps upstream speeds in a handful of competitive markets, such as Fort Wayne, Indiana, where Verizon offers fiber-optic service. He wouldn't say when other areas will get the upgrade, but pointed out that Comcast has increased speeds four times in three years, so it seems likely that more speed boosts will show up in the near future.

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Smaller tags separated by a space or choose from existing tags below by clicking.

with the company's current 3G cellular network, will provide 2-megabits-per-second to 4-mbps downstream speed, with 500 kilobits per second to 1 mbps upstream. Peter Cannistra, director of broadband strategy and planning for Sprint/Nextel, says that the 4G network will be faster than any previous mobile service, and that its speed may be sufficient for use both on the road and at home.

To start, the service will work only with hybrid cellular/WiMax handsets and laptops, but Cannistra predicts that WiMax chip sets will become standard equipment in all manner of devices, including desktop computers, routers, and MP3 players. "It'll just be

THE FUTURE NOW

WESPENDMONEY:

This new Web application will let you track your budgets and tag your transactions with instant, live access from any browser, no syncing required.

of fiber-optic broadband service. Now available in 17 states, fiber-optic service from Verizon and others provides up to 50 mbps downstream and

5 mbps upstream—far faster than most cable and DSL offerings—and it's going to become even faster.

"The new equipment we're installing, beginning at the end of the year, technically allows us to increase upstream speeds for FiOS by as much as eight times over what we do today, and increase downstream speeds up to four times what we offer today," says Verizon spokesperson Bobbi Henson.

Unfortunately, most cable and DSL providers seem focused on

The Web Gets Down to Work

NEW WEB SERVICES—ONES that mimic desktop applications but work entirely within a browser window—appear constantly. But the Web apps you'll eventually use will focus on productivity and mobility, instead of simply giving you the same functions you'd find in a desktop application.

"Web applications are terrific for situations where you want to share and collaborate," says Google product manager Bret Taylor. "That's where we see the most benefit: for consumers planning the annual family reunion or a group of colleagues putting together a sales proposal."

Brandon Schauer, design strategist for Web consulting firm Adaptive Path, says the next phase of Web applications will focus on practical uses: "things that the rest of the world might have a reason to interact with, not just the Generation Y people who have time to click around," he says.

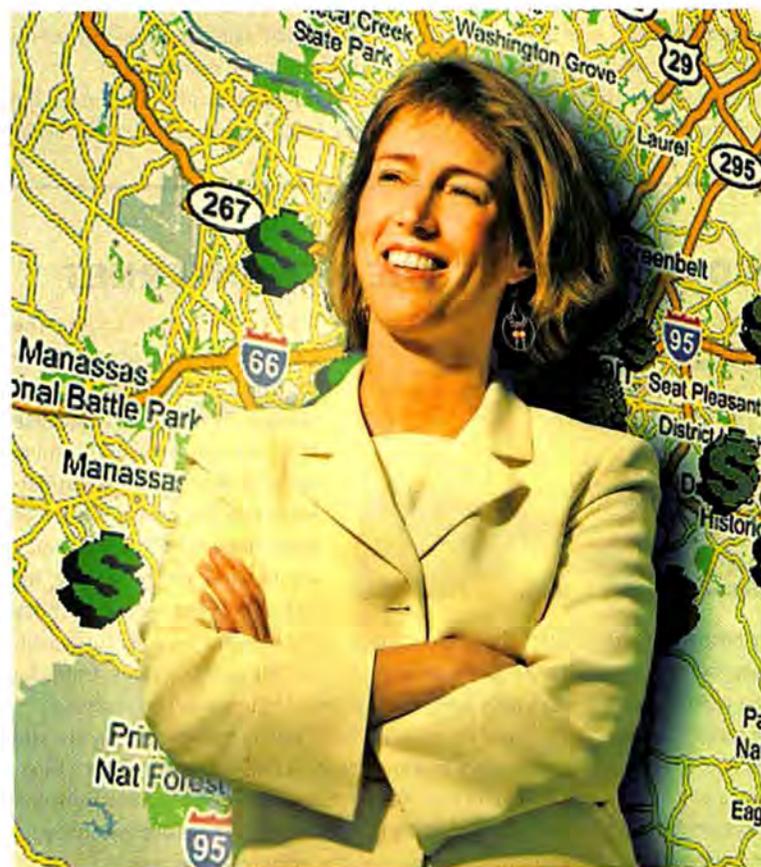
One business-focused Web application, Coghead, has been in development since 2003 but will launch about the time you read this. It's a beefy-looking app that allows nonprogrammers to build their own custom applications for tasks like inventory control, with data stored entirely online. Coghead CEO Paul McNamara says the application will be aimed at small to medium-size businesses, and at people who have some level of technical ability—"people who do macros in Microsoft Excel, work in Microsoft Access, or Adobe Dreamweaver," explains McNamara.

Another Web application that reflects that trend toward productivity is weSpendMoney. Due to launch in October, it's one of the first offerings to store users' financial data exclusively online, unlike more traditional desktop applications such as Intuit

Quicken or Microsoft Money. Pedro Sousa, one of the developers, says that future versions of the application will allow users to view their data on the tiny screens of Web-enabled cell phones, too.

“The ultimate goal is to turn K Street upside down.”

—ZEPHYR TEACHOUT, SUNLIGHT FOUNDATION, WHICH USES WEB APPS AND SOCIAL NETWORKS TO KEEP TABS ON CONGRESS.



A focus on mobility is a common theme among Web apps. "At some point, applications as advanced as Google Earth will be able to run on devices as small as a cell phone," says Google's Taylor. "Users will be able to search and collaborate more effectively no matter where they are."

Another category that will gain in popularity is what Adaptive Path's Schauer calls "workarounds." Examples include Kayak.com, a site that uses a Web app to help people deal with the aggravation of shopping for airline tickets, and VideoEgg, which compresses video via a plug-in, thereby skirting poky uploads caused by slow upstream connections.

Social networking sites like MySpace are huge, but sites that aren't purely social will use people connections to solve problems. Schauer says sites that use social networks in this way "plug into what the Web has always been great at, which is getting you together with people who share the same interests but may be miles away." Examples include Last.fm and Pandora, which ascertain your musical preferences and play songs from additional artists you might like. These sites also let you find and play "stations" that have been created by others. Another similar site, Soundflavor, has yet to launch.

Search Engines With Real Savvy

TODAY MOST SEARCH engines depend primarily on algorithmic processing: results that are ordered by popularity. But better systems are beginning to supplement the blunt-force approach. "We want to do a better job of understanding the user's intent and the content provider's intentions," says Peter Norvig, director of research for Google. "We mostly rely on matching keywords, but ▶

Working mostly on the Web by 2010? 40% of readers say it's unlikely. —SOURCE: PCWORLD.COM POLL

54% of readers say security/privacy attacks will be the Web's biggest threat. —SOURCE: PCWORLD.COM POLL



we'd like to get closer to matching the intent."

Microsoft is another company investing heavily in research on search technology. "We're working

on all kinds of things that will go away from 'here's ten links on a page,'" says Adam Sohn, a director in Microsoft's online services group, which is responsible for the Windows Live portal. "If someone is searching for 'Jaguar,' he explains, "the smarts to distinguish between 'he's looking

THE FUTURE NOW

PANDORA: This site uses very sophisticated tagging and your reactions to music to create personalized "stations" you can share with friends.

for a car and 'a big cat in the jungle'—that's coming."

Search engines can also deliver improved, more personalized results by adding better sources of

information. "A search engine would be very good at telling me who won the 17th World Series, but bad at telling who's the best nanny in the neighborhood," says Sohn. So search engines are adding social networking features for sharing information within small groups.

to other people's video. Then you get this sort of community-reinforced set of searchable attributes."

Soliciting input will also help provide searchers with more personalized results. Norvig says Google should do a better job of helping people use the search engine the way it is by offering proactive suggestions—for example, "It looks like you're trying to do this kind of search; here's how you do it." Sohn says Microsoft is building two-way feedback mechanisms that will ask users how useful they found the search result.

Both Norvig and Sohn agree that one issue search engines will be ▶

FUTURE THREATS

FOUR TRENDS THAT COULD CRIPPLE THE NEW INTERNET

THE WEB'S POTENTIAL is limitless, but these four issues could really mess things up.

NO NET NEUTRALITY: Congress is evaluating whether to give big telecom companies the right to charge companies for a guarantee of faster access. But once Big Telecom gets its way, critics fear, small, innovative

new companies could be crowded out by the Microsofts and Googles, which can afford to pay for good access.

COPYRIGHT COMPLAINTS: In August, the reporter who caught the Rodney King beating on tape sued YouTube because someone uploaded the video to the site. Universal Music Group may sue YouTube and MySpace over users uploading copyrighted video. Kill the messengers, and we could lose vital outlets for public opinion and discourse.



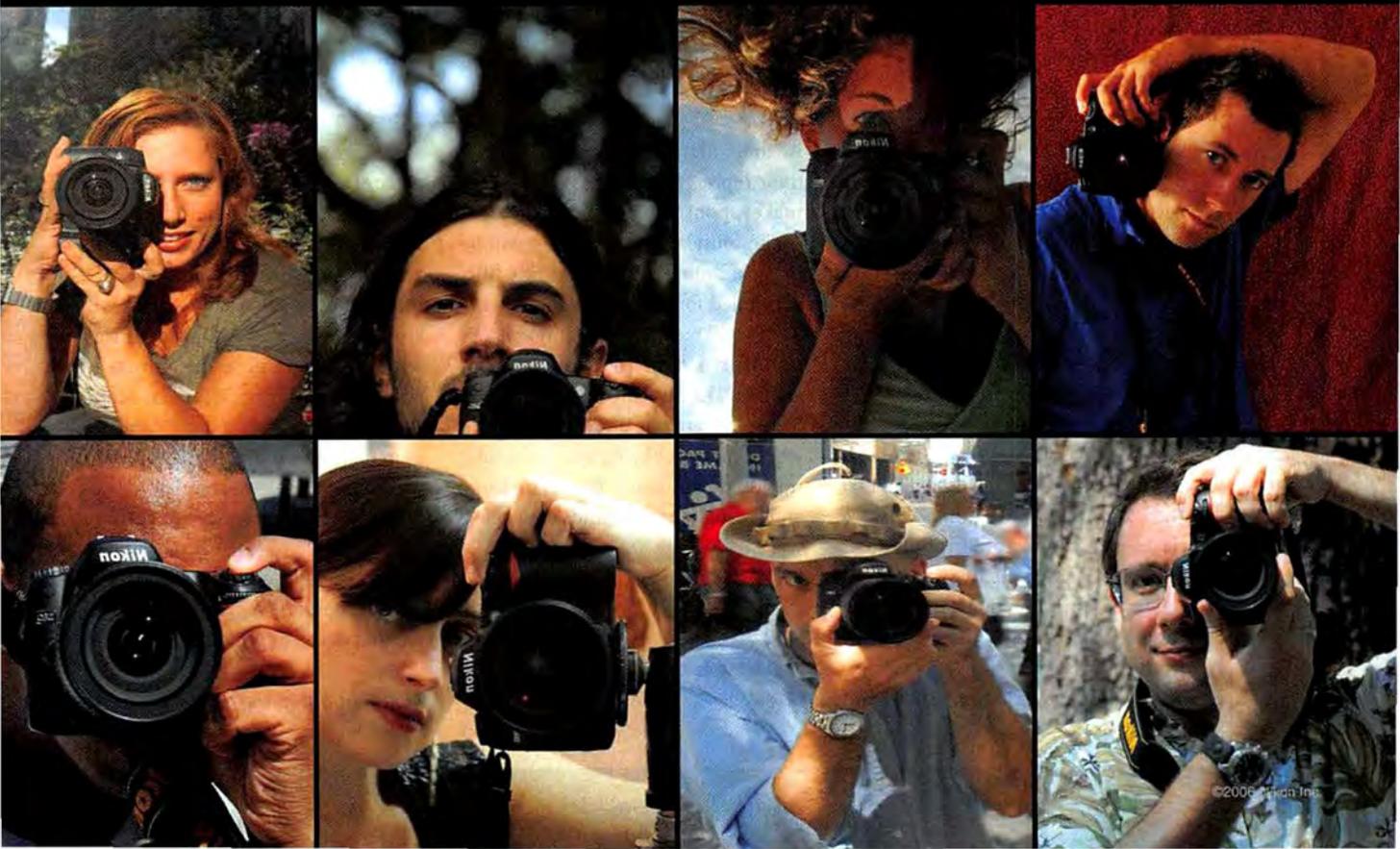
SECURITY CONCERNS: The pace at which customers are moving to online banking has slowed, in large part because they are worried about online security. Banks have investigated interesting concepts such as using secure RSS feeds, which would allow you to receive, for example, credit card activity

alerts in a feed—though banks have their own security concerns to worry about if they add such services. Until the Web gets safer, these kinds of issues won't be resolved.

CRAPPY CONNECTIVITY: Upstream bandwidths are still constricted, making uploading things like video files a time-consuming task. Furthermore, usable mobile bandwidth still costs an arm and a leg, and some carriers impose annoying limitations on how you can employ Web access.



We gave them the new Nikon® D80.™ What they gave back was stunning.



addressing is how to present search results. Most search sites have many sections drawing on separate databases. “[We have] one look for Web sites, one for news, one for images,” Norvig says of Google’s site. “We want to find a way to combine all of that information.” Microsoft’s Sohn uses the example of combining results from Windows Live’s QnA (question and answer) section with its main search section. “We need to build the connection between the two services. It’s not a multiyear thing; it’s in the next 12 to 18 months.”

New Clout for Everyday People

EVEN WITH THROTTLED bandwidth, people are uploading 65,000 new videos to YouTube each day. More than 52 million blogs are covering everything from the best burger in Boise to the latest campaign finance scandal. Think that’s impressive? Amateurs will find new venues that will give them even greater influence.

Look for some venues to attempt to steer public opinion. GIYUS.org, a coalition of Jewish and pro-Israel organizations, is the first group to use Megaphone, a free system-tray utility that, in GIYUS.org’s implementation, delivers alerts about online articles that it says are anti-Israel. The utility’s more than 20,000 users can click on the alerts and be taken to the site that published the article so they can voice their objections to the piece. GIYUS.org does not own the Megaphone technology, but confirmed that the currently anonymous software developer who created it will soon allow other groups to use it.

One organization that has its eye on the political process is the Sunlight Foundation (sunlightfoundation.com), which is enlisting an army of volunteers to expose the practice of

earmarking, wherein senators and representatives anonymously attach funding requests for pet projects to congressional bills. The foundation plots on Google Maps the locations of projects funded by some 1800 earmarks, in all worth more than \$500 million and contained in a single appropriations bill. Volunteers click on this map to find earmarks

THE FUTURE NOW

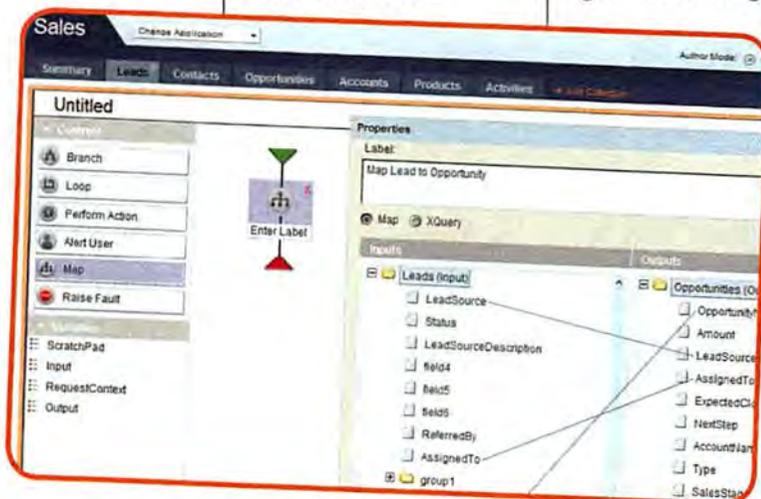
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Keeping your custom application and data online allows you to collaborate not just within a workgroup, but with outsiders as well.

according to Zephyr Teachout, national director of the foundation.

Jay Rosen, an associate professor of journalism at New York University and writer of the PressThink blog (find.pcworld.com/55171), says that

amateur and professional journalists can work together to produce something greater than either could produce separately. “Bloggers are good at filtering



in their district; they then contact their representative to ask if the lawmaker sponsored that earmark.

The foundation’s next step will be to tackle other appropriations bills scheduled for this fall; eventually the group will create a central repository of information that anyone can access. “The ultimate goal is to turn K Street [the area in Washington, D.C., where many lobbying groups reside] upside down, using the technology and creativity of thousands of people,”

WEB APPS

MORE ONLINE: Our editor in chief tries to work solely on the Net. find.pcworld.com/55170.

and organizing information,” he says. “Sometimes they get involved in [reporting on] things, but often it’s accidental. They’re collating what’s out there.” Next April, Rosen will launch a site, NewAssignment.Net, which will combine the efforts of amateurs and professionals. Members will suggest, debate, and research stories; professional reporters will complete selected stories.

The Web will continue to reshape itself to serve not just professionals and geeks but everyone, whether they have an opinion, a gripe, or simply a job that needs to be done. ■

Alan Stafford is the senior writer for PC World.



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THE OS WARS

Windows? Linux? Mac OS? One day it won't matter. **BY ERIK LARKIN**

The Multiple-Personality PC



TODAY, YOUR CHOICE of operating system is a critical one; for tomorrow's computer it won't matter nearly as much.

Rapidly improving virtualization technology allows you to run multiple OSs simultaneously on one computer as "virtual machines," each with its own selection of programs. In five or ten years, your choice of oper-

ating systems could become as mix-and-match as your choice of Web browsers is right now.

One key factor driving that trend will be hardware innovations that make existing virtualization run smoother and faster. AMD and Intel are shipping CPUs with hardware support for virtualization. Apple's adoption of Intel CPUs points

the way to a multi-OS future as well, and the company's BootCamp software permits dual-booting into Windows. Parallels virtualization software lets Macs simultaneously run Windows (and other OSs), much as VMWare and Xen do under Windows and Linux. One day, virtualization could free us to run any app in any OS, at any time.

IN VIEW

COMING SOON TO AN OS NEAR YOU

AN IN-DEPTH LOOK: Count on 3D interfaces becoming commonplace as PC graphics improve. Early third-party 3D desktops like those listed at find.pcworld.com/55211 could become a standard, productivity-boosting OS feature, especially if coupled with new file systems.

TREES ARE FOR SHADE: Next-generation file systems could finally shed the decades-old directory tree storage structure and act more like databases, says analyst Tony Iams, who covers operating systems for Ideas International. Windows Vista's WinFS file system died, but its ideas—such as network searches—live on.

THE WEB HARD DRIVE: Online storage is getting cheaper and more plentiful every day. In a few years your OS will be able to interact seamlessly with the troves of online storage you've spread around the Web.



YOUOS, EARLY WEB OS prototype

THE WEB OS

YOUR PC IN A BROWSER

WANT TO AVOID maintaining even one operating system? YouOS.com hints at the promise of a fully online desktop, as do the growing number of everyday online programs that run within a browser and require no installation. You could go from work to home, or notebook to desktop, and look at the same online layout for all your programs and files.

“We’re moving to an era of virtual machines.”

—ROB ENDERLE,
EMERGING PERSONAL TECHNOLOGIES ANALYST
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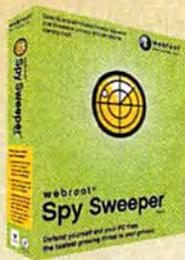
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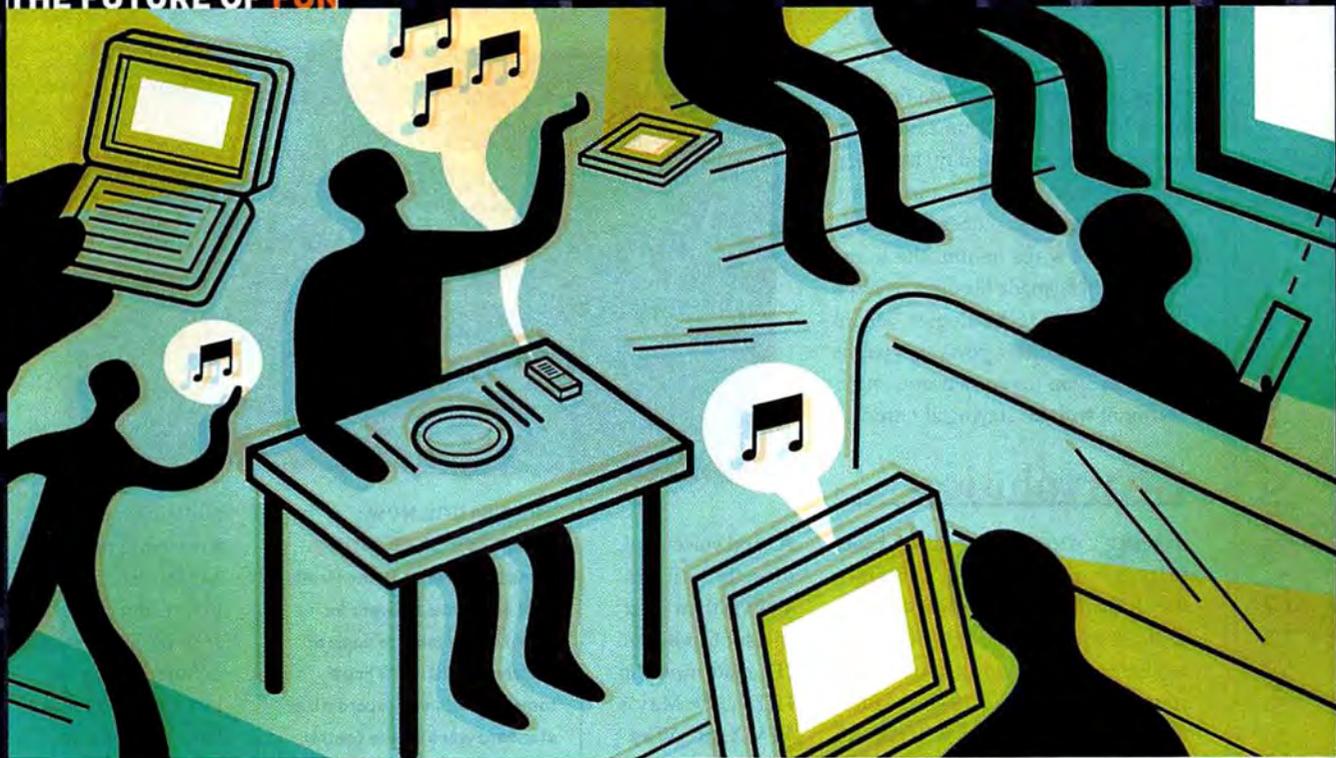
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BY DAN TYNAN

ILLUSTRATIONS BY HARRY CAMPBELL

The hodgepodge of single-function black boxes that make up a home entertainment center today, however, may be subsumed into a media center or set-top box that does it all, while the snarl of wires behind the home theater will be made obsolete by high-speed wireless technologies. Meanwhile, a raft of new portable gizmos will allow you to enjoy home entertainment without staying at home.

Gearvolution

BEFORE LONG, TVs will be more than just entertainment centers—they'll also be communications hubs that let you manage all the media whizzing around your house, plus your voice mail and data such as text messages and RSS feeds. While AT&T and Verizon are slowly rolling out IPTV services combining video, voice, and data, some regional cable firms—Knology in the southeast and Everest in the midwest, for example—already offer such services, including caller

DOOMED DEVICES

REST IN PEACE: STILL CAMERAS



BORN: 1975 **DIED:** 2012?

THE DIGITAL STILL camera succumbed at the age of 37 after a long illness. It is survived by the digital camcorder, which can take moving pictures or still ones with equal ease, and the cell phone camera, once used primarily by obnoxious people at concerts. No funeral services are scheduled.

ID and voice mail, directly to users' TVs via their existing set-top boxes. (To read more on IPTV, see May's "TV Your Way" at find.pcworld.com/55137.)

By the close of 2007, we'll see an assortment of multifunction PC-like living-room media centers that play DVDs, rip CDs, and let you stream content throughout the home, says Axel Fuchs, vice president of business development for SimpleDevices. Apple's coming iTV is a case in point, as is Verizon's Home Media DVR (see "Smarter Streaming" above). Ultimately, such media centers will connect with every device in the home, including the lighting and heating systems, your cell phone/media player, and the infotainment center in your car. For example, Motorola has shown a set-top DVR that can send content to Razr V3x phones, though the service is not yet available.

HOME THEATER HELPERS

AS THE HDTV replaces the analog set—research firm Park Associates forecasts nearly 100 million HD sets in U.S. homes by 2010—you may want to make room for at least one



THE FUTURE NOW

SMARTER STREAMING:

Think of Verizon's Home Media DVR as a home network for your TV. Available to some of Verizon's FiOS (IPTV) customers, it lets you record HD or standard video on the central DVR and then serve shows to up to three set-tops in your home. It also links to your PC for playback of photos and music.

additional box in your living room: a high-def movie player. Blu-ray and HD DVD players debuted this year, but many buyers have steered clear, fearing a repeat of the VHS-Betamax debacle that left thousands of people with dead-end technology. Ricoh

has developed a laser that can read both formats, but vendors have yet to announce plans to ship a dual player.

Surround sound will also receive a boost, but not from new speakers. Though Dolby has demonstrated surround sound employing 22 discrete speakers and 2 subwoofers, 5.1 or 6.1 systems should remain the home theater standard for the near future. Instead, smarter audio receivers will use "psycho-acoustics" to trick your ears into believing that sounds are coming from places where you have no speakers—above your head, for example, says Jack Busser, worldwide technology evangelist for Dolby Labs.

Future couch potatoes will also need a smarter way to control their gear, such as Universal Electronics' NevoSL, a Wi-Fi-enabled universal remote featuring an LCD touch screen, or Hillcrest Labs' The Loop, a donut-shaped doodad with built-in

motion sensors. The Loop works with Hillcrest's Freespace software like a mouse without a pad, letting you navigate set-top box menus through hand gestures (see find.pcworld.com/55158 for a picture and details). Products using The Loop should ship next year. Such remotes will also support more types of devices than today's models.

NETWORKED NEWS

THE HEART OF the next-generation living room will be a network that lets you move content easily from one device to another. Today, products such as the Philips Streamium WACS700 and the Sonos Digital Music System stream music over Wi-Fi networks. Tomorrow's products could be shuttling bandwidth-intensive HD video, surround-sound audio, and more. But how they'll accomplish it, whether gadgets from vendor A will be on speaking terms with gizmos from device maker B, and whether they all will be able to stream copy-protected content remain to be seen.

Berardino Baratta, general manager of Freescale Semiconductor's multimedia applications division, envisions three wireless networks in the home. The first, based on the emerging 802.11n Wi-Fi standard, would bring Web content to every room. But your DVR could bypass the Wi-Fi network, transmitting bulky video files to your HDTV over Ultra-Wideband (UWB) connections, says Baratta. And every device from your TV to your toaster would be controlled via a third network based on Freescale's ZigBee standard, a low-power wireless technology that transmits small bits of data over short distances.

Several roadblocks exist. First, two UWB technologies are locked in combat: the Wi-Media Alliance's Wireless USB and Freescale's UWB. Plus, the 802.11n standard remains in flux, with a second draft not due before January. Makers are already churning

out draft-n devices, but these products may not be compatible with other draft-n gear or the final standard. Some good news: The Wi-Fi Alliance says it will begin certifying draft-n products by mid-2007; certification will guarantee a degree of interoperability between devices.

Some consumer electronics firms may opt for power-line networks that use a home's existing wiring to move data and to control devices—but here, too, several standards are duking it out (for more on the battle, see find.pcworld.com/55138). Still others may look to FireWire cable for moving sound and pictures between boxes, or to Bluetooth for controlling gear.

Also needed: an easy way to manage media files across disparate devices, says Al Delattre, a managing director for the consulting firm Accenture. "It's easy enough to move music files from a computer to an iPod or your home stereo, but it's much harder to manage them across cell phones, memory sticks, or other devices."

Solutions are beginning to appear, though. For example, SimpleDevices' SimpleCenter software enables you to view content stored on any networked device and play it back on any other compatible networked device, Fuchs says. For instance, you could take a photo with a

Wi-Fi phone and display it on your TV via a set-top box, or use a universal remote to beam an MP3 from your computer to your stereo. At press time SimpleCenter worked with Nevo remotes, Philips Streamium devices, and Nokia N80 phones, but Fuchs says it will eventually work with myriad devices expected next year.

Content Is King

BUT THE HOME is merely the beginning. Over the past year entertainment has been steadily moving out of the living room and onto iPods, Chocolate cell phones, and other portable devices. (See September's "Video Everywhere," find.pcworld.com/55139.)

Just as TiVo and ReplayTV brought time shifting to a grateful nation of couch potatoes, Sling Media introduced "place shifting" to those folks tired of being tethered to the sofa. Using a Slingbox, anybody can access their own cable TV feeds from any ▶

THE FUTURE NOW

JACK-OF-ALL-TRADES:

It may look like a PlayStation Portable, but Sony's Mylo is more like a BlackBerry for the anticorporate crowd. This Wi-Fi-enabled dinkus allows you to send and receive text messages, browse the Web, see videos, or listen to MP3s anywhere your Keds will carry you.



Most exciting new option to readers: IPTV with a huge database of video. —SOURCE: PCWORLDCOM POLL

broadband-connected device, including Pocket PCs. TiVo's TiVo2Go provides a similar service for shows recorded using TiVo gear. And a new slew of Wi-Fi-connected music players such as the MusicGremlin, Sony's Mylo, and Microsoft's upcoming Zune may push place shifting even further into the mainstream.

These are the first steps toward a future where we can watch anything, on any device, at any place or time, notes Geoff Allen, chair and founder of Anystream, which sells systems that allow firms like CNN and MTV to stream live video to the Net.

"In five years you'll be able to spend your money and time on a vast amount of content from different outlets, simply because that's what consumers want. And if the supply chain won't legally provide it, consumers will find a way to steal it," says Allen.

For the short term, what we can watch on our portable gizmos may be constrained more by Hollywood than by hardware. But Hollywood's attitude is rapidly changing, says Simon Blake-Wilson, manager of DRM products for SafeNet, which provides security and rights management services for content providers.

"In part that's due to improvements

DOOMED DEVICES

REST IN PEACE:
DVDs

BORN: 1995 **DIED:** 2015?

LIKE THE VCR, the 20-year-old DVD player has joined the choir invisible, replaced by HD DVD and Blu-ray high-def discs. But not for long. One day, the idea of playing movies on shiny platters will seem as quaint as playing music on 78s, thanks to cheap, fast broadband and new video services.

in DRM and the success of iTunes," he says. "But that's also because they realize Net distribution is out of the box and there's no way to stop it."

However, studios that have historically made consumers pay each time they purchased the same content in a new format are now struggling to come to terms with customers who

want to pay once and play anywhere. And though the success of Apple's video download service has changed how studios view digital content, you still can't listen to the Coldplay single you downloaded off iTunes on your LG Chocolate phone—or even stream it across your Sonos music system—because of proprietary digital rights management schemes.

Allen believes the problem will ultimately be solved, but only after Hollywood's old guard retires and content owners and technology firms collaborate on open standards. It may not quite require that, but it likely will take a corporate shift to people who have a greater understanding of the potential of the technology, and who may not be as reluctant to shed old ways of doing business. In the meantime, consumers may be facing a series of so-called walled gardens—content sites such as iTunes that support only certain devices and/or formats, forcing customers to go to multiple sources in order to enjoy the same content on different devices.

User-generated content from sites like Revver and YouTube may fill the gaps left by studios and service providers. And that in turn will lead to completely new forms of entertainment, says Steven Starr, CEO of Revver, which is negotiating with several wireless carriers to offer the site's videos to mobile subscribers.

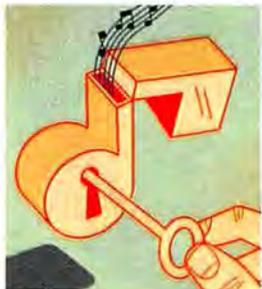
"We always love a well-told story—that's why *Desperate Housewives* is so popular," notes Park Associates principal analyst Kurt Scherf. However, "the other aspect of entertainment is the story you want to tell the world. At some point, all of our living rooms may become the set for *America's Funniest Home Videos*." ■

Contributing Editor Dan Tynan writes PC World's Gadget Freak column. He is also author of *Computer Privacy Annoyances* (O'Reilly Media, 2005).

ONLINE EXTRA

DIGITAL RIGHTS GET MORE FLEXIBLE

WITHOUT DIGITAL RIGHTS management schemes that both content owners and consumers can live with, the dream of accessing any content on any device at any time will never become a reality. Today's DRM schemes, like Apple's FairPlay, authorize playback on specific devices. But what if a song's digital rights were attached not to the device but to your identity, so you could log in to any device you wanted and enjoy your content?



Several companies are working on just such a system. For more details on these and other DRM developments, go to find.pcworld.com/55213.

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ROBOTS

Tomorrow's domestic help, at your service. BY ERIC BUTTERFIELD

The Next Steps in Robotics



ARTIFICIAL INTELLIGENCE Today's AI allows robots to answer simple questions; unscripted conversations are a ways off.

VISUAL RECOGNITION

This capability must improve if robots are to become more useful at retrieving objects and tidying up messy rooms.

VOICE RECOGNITION

If robots are to do your bidding, this will be a critical skill. Today's prototypes respond to few voice commands.

FASTER PROCESSORS

The sensors in a robot's body generate vast amounts of data, making faster chips necessary.

SMALLER POWER SOURCES

Miniature fuel cells could reduce pollution as well as the number of pit stops needed.

TIMELINE

RISE OF ROBOTS

NEED SOMETHING DONE? Soon you may be turning to one of many "service and personal" robots. These machines perform domestic chores or tasks such as milking cows or handling toxic waste, or serving in fields like emergency medical support.

2006 Roomba sales top 2 million.

2007 Sales of pool-cleaning and window-washing robots rise significantly. A new, bipedal Honda Asimo unit that can run (at 4 miles per hour) debuts in United States.

2009 In just three years, 4.5 million domestic robots have been sold.

2010 Service and personal robotics sales exceed \$17 billion.

2025 Sales of service and personal robots near \$52 billion.

2040 Most households now own a robot or are considering buying one.

SINGLE-DUTY ROBOTS

ALL WORK, NO PLAY

CURRENT ROBOTS TEND to look like regular machines, and most—such as the vacuuming iRobot Roomba—perform only one task. For example, Friendly Robotics' RL1000 Robomower (pictured at right, with docking station) will cut your lawn while you watch TV. The autonomous mower costs \$1800.



“Honda hopes that within **ten years** we'll see the first real-world application of its truly humanoid robot.”

—STEPHEN KEENEY, ASIMO PROJECT LEADER,
AMERICAN HONDA

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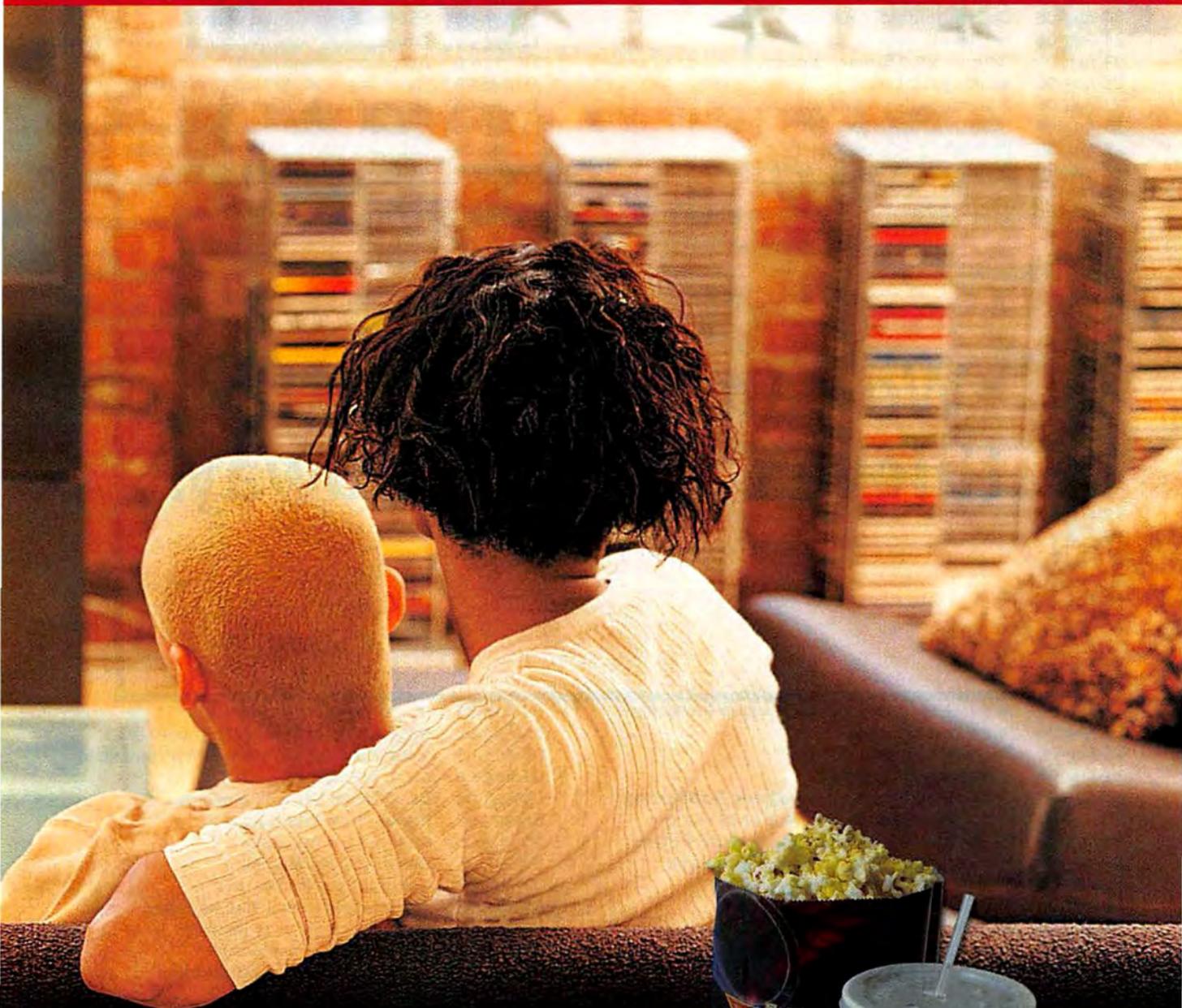
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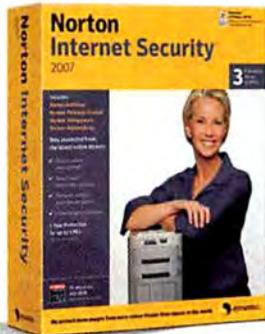


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25-Aug-06	Question from Member	13-Aug-06	Online Monthly Security Upgrade Notification
25-Aug-06	Five Question Survey from Central Minnesota	13-Aug-06	Bank Survey
24-Aug-06	Security Advisory Alert	13-Aug-06	New Unpaid Item Message #160006233575
24-Aug-06	mesange - please update your account	13-Aug-06	Online Account Expires Soon
24-Aug-06	Update Your Information.	12-Aug-06	SSL Security/account update.
24-Aug-06	Important Notice	12-Aug-06	Coming soon - improvements to Online Service
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23-Aug-06	A Message Regarding Your Account!	11-Aug-06	Update Your Account Records
23-Aug-06	"CONGRATULATIONS !!!"	11-Aug-06	***FIRST NOTICE*** Billing Center 204.202
23-Aug-06	Verified By Activation	11-Aug-06	Software Upgrade, Read this message
23-Aug-06	A Message Regarding Your Account!	10-Aug-06	Account Verification Notice

We can smell identity thieves a website away.

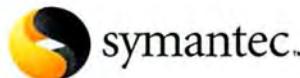
17-Aug-06	Activate Security Alert for Account Protection	05-Aug-06	illegal Transfer Notification
16-Aug-06	Important Message	05-Aug-06	Notification of gold account update !
16-Aug-06	Security Update	05-Aug-06	Listing confirmed. Sell another item now!
16-Aug-06	message from member	04-Aug-06	Alert: Account Locked!
15-Aug-06	Online Monthly Security Upgrade Notification	04-Aug-06	Bank Online Security Measures
15-Aug-06	We've improved the secure area of our site	04-Aug-06	Review Your Credit Report
15-Aug-06	Verify Your Internet Banking Account Details	04-Aug-06	Update Your Account
15-Aug-06	Please Update Your Account Information	03-Aug-06	Question from Member
14-Aug-06	Your Account Has Been Flagged!	03-Aug-06	Credit Union Notification !
14-Aug-06	Your Account Has Been Flagged!	03-Aug-06	Alert Unpaid Item Strike Received
14-Aug-06	Question about Item -- Respond Now	03-Aug-06	** Bank One Security Notice **
14-Aug-06	Your Info #5350287398 *	03-Aug-06	Question from member
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Where Data Goes, Trouble Follows

New online services could make you an even more inviting target for privacy attacks. Here's how.

WHAT ARE THE dangers of storing more and more e-mail, documents, photos, and financial account information online? We talked to experts and then designed several scenarios that depict what could happen in the next few years if technological innovation and public policy trends in three hot tech categories—online storage, location tracking, and biometrics—remain on their current course. ▶

BY RYAN SINGEL

ILLUSTRATIONS BY HARRY CAMPBELL

THE
FUTURE
OF
PRIVACY

60% of readers polled think Web sites shouldn't keep records of their visits. —SOURCE: PCWORLD.COM POLL

Web OS Meltdown

THE SCENARIO: You receive a series of e-mail notes. The first attaches a compromising photo from your college days. The second excerpts an interoffice e-mail message containing confidential details of your company's merger negotiations. The third replicates a nostalgic letter that you recently sent to an ex-flame, whom you ran into at your high school reunion.

The fourth e-mail demands that you send \$50,000 to an offshore account within 48 hours or your spouse, your kids, and your boss will get copies of the other three messages. You have no idea how you got targeted, but someone with the keys to your online life is trying to use your past against you.

What started in 2005 with Google and Microsoft Windows Live suites of Web-based consumer applications later evolved, toward the end of the decade, into online business applications that made having anything but a Web browser on an office workstation unnecessary. Soon afterward, a multiplatform operating system appeared that synced to your TV, car, cell phone, and digital video recorder. Its instant access and ease of use soon had you storing a lifetime's worth of messages, media, shopping lists, photos, notes, and books on third-party servers.

Like countless others, you trusted big-name developers of new OS and Web apps to secure your data. But the volume of valuable information they house has attracted organized criminals who specialize in online data theft. They always seem to find a way to evade the latest security technologies.

You tell your company's chief security officer about the leaked merger e-mail, and she quickly initiates an FBI-led investigation.

The good news: The FBI will soon apprehend a low-level member of the gang, and your company's CTO will work on bringing hosted data services

back inside the company firewall. (Wiki collaboration software provider JotSpot started offering this option back in 2006 for firms uneasy about third-party hosting.) The bad news: Your toga party photos are destined to be a big hit on the interoffice e-mail.

WHY IT MIGHT HAPPEN: "The biggest worry, which covers everything from Web mail to search to spreadsheets to

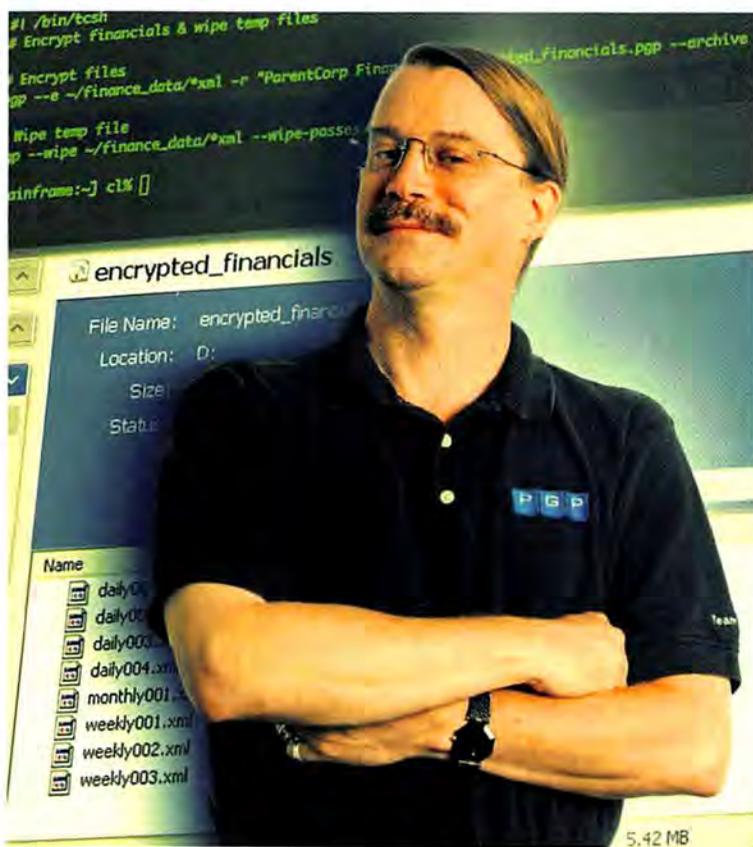
“Your data is in someone else's hands.”

—PGP CORPORATION CTO JON CALLAS

Web OS, is how much of your data is in someone else's hands and therefore is not really yours,” says PGP Corporation CTO Jon Callas. “The entire thing is running on their servers. How do you know what is going on? How much of it is yours? How much do you get to back up or delete? A awful lot of this is insecure.”

Even if a company such as Google offers ironclad guarantees never to snoop into or sell your data, you're at risk from hackers, rogue coworkers, and even subpoenas or civil lawsuits filed against your company. Federal privacy laws afford less protection to data held on a third party's server than to data stored on a private hard drive.

“If [government investigators] need a warrant for your house but not your car, then certainly they don't need it for your Web mail,” says Callas.



Convenience vs. Surveillance

THE SCENARIO: The police are at your house on official business, your inbox is flooded with pornographic ads—and all you did was drive to the mall to buy an anniversary gift. Welcome to wireless location tracking in the year 2020.

On Saturday morning, you jumped into your car and plugged in your new high-speed Internet phone. The phone downloaded data to the car's real-time holographic traffic map and guided you to the mall along the route with the least traffic. To find the jewelry store, you downloaded a map of the mall to your phone. The turn-by-turn directions took you past a new lingerie shop, so you wandered inside for a few seconds. Then you proceeded to the jewelry store, and in 15 minutes your shopping was done.

A little later, you started receiving raunchy multimedia messages hawking sex toys. While you were inside the lingerie shop, the store's data reader pinged your phone via Bluetooth and then automatically bought your contact information from commercial data brokers. Now its affiliate, which sells novelty adult items, can legally market to you via e-mail, claiming an ongoing business relationship.

Next, two police officers show up at your home, explaining that your route to the mall took you past a liquor store at about the time of a holdup there. The culprit escaped in a white car, and in-road sensors flagged yours as one of ten such vehicles then in the area.

Though the police visit is for routine questioning only, and though you'll be able to unsubscribe from the adult-toy marketing list fairly easily, your wireless devices now seem less attractive than they did before. You wish that, when purchasing them and their accompanying services, you had hunted for the opt-out privacy check

boxes (required by law) that restrict or prohibit sharing of your sensitive data.

WHY IT MIGHT HAPPEN:

Your visit to the lingerie shop could allow its owners to e-mail you. "Anti-spam, junk fax, and telemarketing laws all have established-business-relationship loopholes," says Chris Hoofnagle, a privacy expert at the University of California–Berkeley School of Law. "If you simply drive your car into the parking lot of Sports Authority, the company might argue that you have a business relationship."

The groundwork for tracking a car's



location is already in place. Automatic toll-payment systems such as E-ZPass equip cars with RFID transponders that can transmit information about the vehicle, and in 2005 the UK began testing RFID-equipped license plates. Sensors collect only anonymous data right now, but what happens if—in the spirit of an Amber Alert—law enforcement is allowed access to vehicle data to investigate violent crimes?

The Dark Side of Biometrics

THE SCENARIO: You were trying to get a good deal on a 20-megapixel camera. Instead you ended up with an empty bank account and a ruined credit history. The culprit was your biometric debit card, which was designed to thwart identity theft but instead let a thief impersonate you.

By 2010, after leaks of millions of credit card numbers, financial companies rolled out biometric credit and ATM check cards, which required that a card user's fingerprint (examined by a fingerprint reader) match the account holder's fingerprint (stored on the card). The seemingly foolproof technology took off, and within a few years new PCs came equipped with software-enabled fingerprint readers that allowed users to authorize financial transactions over the Internet.

When you used your biometrically enabled ATM check card to purchase the camera, you sent your IP address,

card number, and digital fingerprint over the Internet to a credit card server. But your information got intercepted in transit and then sold on a message board. Now someone has depleted your checking account, and you can't prove it wasn't you because your fingerprint is all over the transactions.

Eventually the problem will be resolved in your favor. But for the time being, you'll have to rely on an almost extinct form of payment: cash.

WHY IT MIGHT HAPPEN: "It's the classic 'The computer can't be wrong' scenario," says PGP's Callas. "The opportunities for a criminal in the middle are huge, and the risk for the person who has the card is very high because people tend to believe what the biometric says." ■

Ryan Singel is a freelance writer based in San Francisco.

80% surveyed say the government shouldn't view noncriminals' Web records. —SOURCE: PCWORLD.COM POLL

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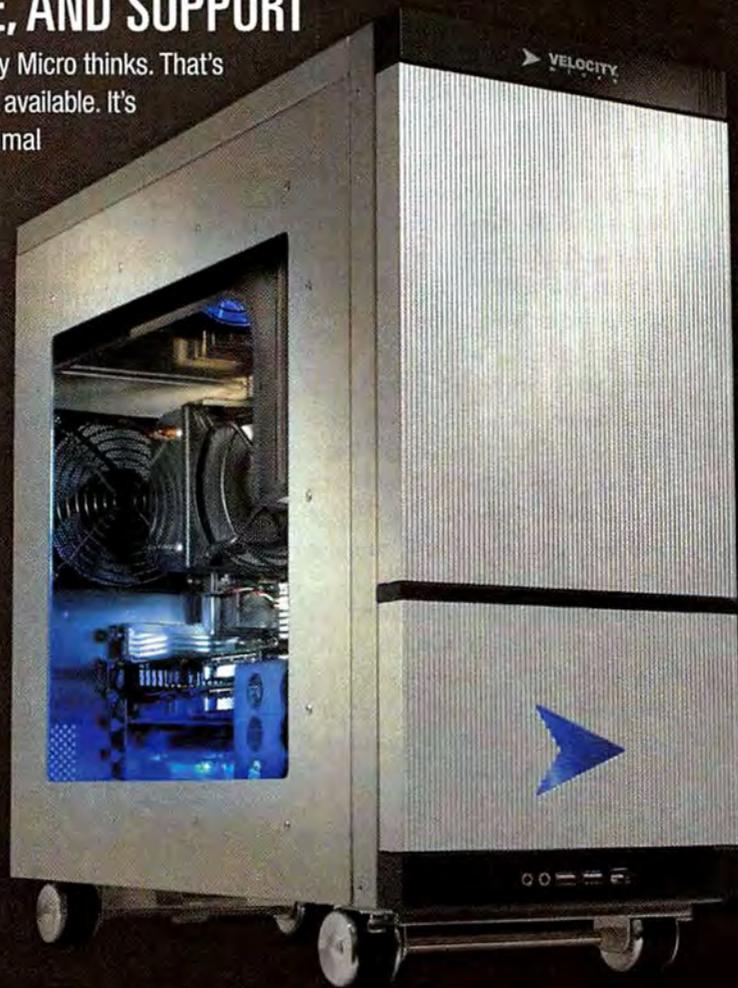
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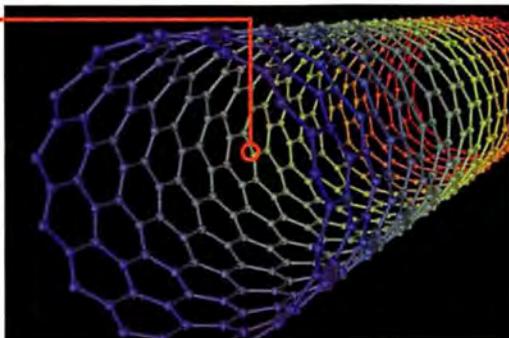
NANOTECH

Ultrasmall technology, revolutionary impact. **BY ERIC BENDER**

Tech Enabler: The Carbon Nanotube

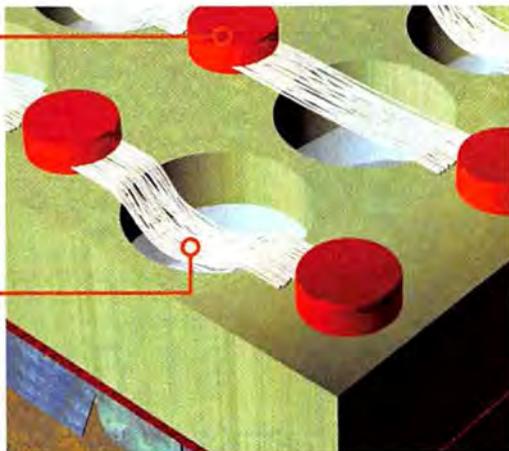
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are vastly stronger than steel, and conduct heat and electricity superbly. They will appear in everything from CPUs to batteries to heat sinks. They're molecules formed from a single layer of carbon atoms. Single-walled nanotubes range from 1-billionth to 3-billionths of a meter in diameter.



NANTERO'S NRAM

uses carbon nanotubes and combines the speed of SRAM, the density of DRAM, and the nonvolatility of flash memory. The company hopes to begin shipping products in late 2007.



NRAM STORES DATA

by changing each carbon nanotube's proximity to an electrode; current flows to the electrode only when the nanotube is in its on state.

PRACTICAL APPLICATIONS

HERE TODAY, MORE TOMORROW

CHIP FABRICATION: Extreme ultraviolet lithography will use mirrors to direct light with a wavelength of 13 nanometers to print features at the 32-nanometer scale. The smaller scale will yield chips that run much faster.

BATTERIES: Already on the market, lithium ion batteries using multiwalled nanotubes are safer and more effective,

with up to ten times the life and five times the available power, according to some makers. Other dramatic battery enhancements are on the way as capacitors improve exponentially.

DVD: Quantum dots—semiconductor crystals that are just a few nanometers wide—provide the needed precision for Blu-ray and HD DVD blue lasers.

NANOTECHNOLOGY

WHY IT MATTERS

INTEREST IN NANOTECH is strong because standard silicon techniques have nearly reached their limit—CPUs and similar products can't get much smaller with current technology because makers can't keep stuffing more and more transistors in the same space. With nanotech, they can.

Materials shrunk to a few billionths of a meter go crazy. Magnets demagnetize, and conventional techniques of semiconductor information processing—used for everything from storing data to moving bits and bytes around your PC—no longer work. But though the rules change, they can be exploited in ways that offer more, not less, functionality and speed. And it will all eventually cost less, too.

The new chips will communicate with everything around them, says Nantero CEO Greg Schmergel. "Everything in your home and office and car will have intelligence and the information you need."

“Look at a PC or handheld device in five years, and nanotech will be everywhere.”

—MATTHEW NORDAN,
PRESIDENT OF LUX RESEARCH



Xtreme Gear

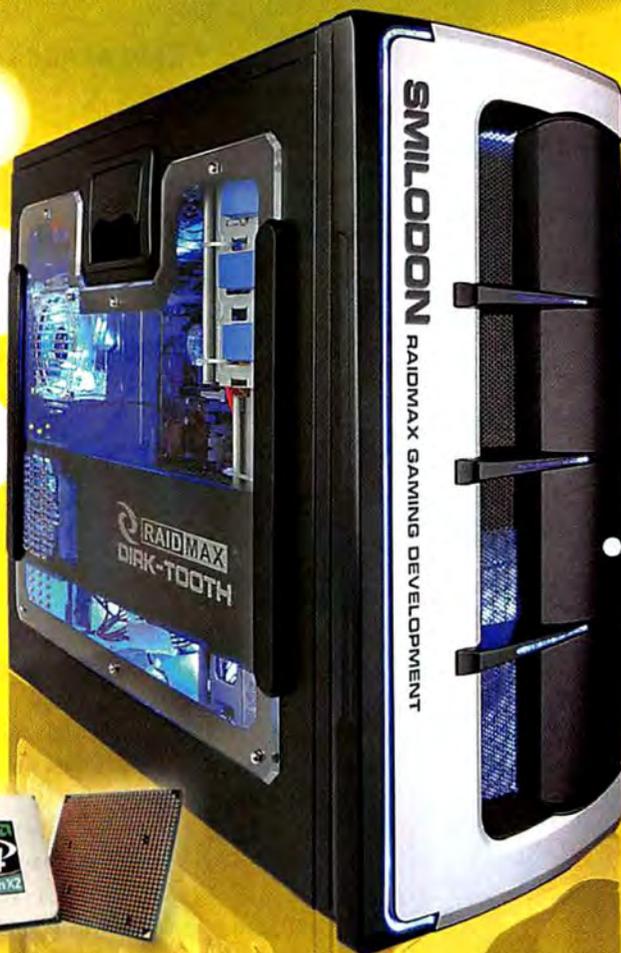
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Virtual Worlds, Virtual Lives

Think the Net has changed your life? Wait until it becomes an immersive 3D environment.

AN ONLINE GAME is an odd place to have your reputation precede you. But that's exactly what happened to me not long ago in the massively multiplayer universe of EVE Online. My character there, a spaceship pilot named Walker Spaight, was minding his own business one day when I got a message from ►

BY MARK WALLACE • ILLUSTRATION BY HARRY CAMPBELL



43% of readers polled have experienced a virtual world like Second Life. —SOURCE: PCWORLD.COM POLL

another player, who wanted to know if I was “the same Walker Spaight from Second Life,” another 3D online world.

Indeed I was, I told him. And the response I got back was curious. My interlocutor was excited to meet a “virtual celebrity.” In EVE I may simply be a midlevel combat pilot, but in Second Life I am among the best-known figures in a community of 250,000 or more. As editor of the Second Life Herald, an online newspaper covering events in Second Life, I have been digging up stories for the last two years, profiling players and their creations (and not infrequently, their crimes), reporting on the businesses emerging there, and taking to task the company that runs the world.

While it may seem as though I’m reporting on a game, 3D virtual worlds like Second Life are becoming a very real component of people’s lives, and

over the next ten years they will begin to shape the way we work, play, and define our identities. To Philip Rose-dale, founder and CEO of Linden Lab, the creator of Second Life, online worlds constitute nothing less than “a new means of human expression.”

Interest in virtual world research has really exploded in 2006.

—RON BLECHNER, AKA “HIRO PENDRAGON”

MORE THAN A GAME

THOUGH PERHAPS ONLY 800,000 people have ever dipped their toes into Second Life, massively multi-player games are going strong. Game worlds such as Ultima Online, EverQuest, World of Warcraft, and EVE Online are regularly visited by anywhere from 20 million to 40 million people around the world, and that number continues to grow.

But persistent worlds like Second Life are more than just games. In Second Life, players don’t get points for slaying orcs or blowing up spaceships. Instead, users are given a framework to create whatever they please—from houses, cars, and clothing to anything else they can dream up.

In fact, the entire landscape is composed of such creations; the company that runs the world provides only the virtual real estate that residents occupy. In that sense, worlds like Second Life function more as platforms than as games—they’re places where both outlandish fantasies and useful tools can be constructed. Residents rely on the same spirit (and much of the data) underlying Web 2.0 sites to freely borrow, build on, and mash up each other’s ideas in an environment with unparalleled expressive powers.

Aficionados often refer to this intersection between 3D worlds and networked data as the “metaverse,” a term coined by Neal Stephenson in his prescient 1992 novel *Snow Crash*. And the impact of that combination can already be felt today.

“Entertainment, education, art, and business are throwing spaghetti at the metaverse to see what sticks,” says futurist Jerry Paffendorf, who convened a Metaverse Roadmap Summit this summer to plot the course of such technologies. “Over the next several years, we’ll see this kind of technology mature to the point where it will not be uncommon to follow



hyperlinks from the Web into immersive virtual spaces filled with other people."

Constructing those virtual spaces has already yielded some interesting opportunities. In early 2006, 26-year-old Ron Blechner quit his job as a cellular network technician to set up shop in Second Life. The small company that he founded, Out of Bounds Software, specialized in creating a virtual presence for nonprofit agencies and educational institutions, and developed a "3D wiki" that is being used to collect community feedback for the multi-

million-dollar redesign of a public park in Queens, New York. The pay wasn't great, but Blechner's business steadily grew; and by the end of the year, he had merged his virtual-world services shop with a larger one. "This has been the best decision I've made in my life," says Blechner.

More significantly, Queens will soon have a park designed, in part, within a virtual world.

Though they're just beginning to take hold, such online "places" are increasingly becoming a part of real-world business, marketing, and design plans. Architects now use Second Life to create design prototypes for clients. Emergency-services departments use it to develop crisis response strategies. Starwood Hotels uses it to design and advertise its new Aloft properties. And the entertainment industry has caught on big-time. MTV built a virtual version of its hit television show *Laguna Beach* in There.com, where fans can meet and socialize in a digital re-creation of the show's locations. And next August, Duran Duran will open a "futuristic utopia" in Second Life, where the band will give concerts and chat with fans. Nick Rhodes, the band's keyboardist and songwriter,



says it's "the most substantial move forward in entertainment technology that I've seen almost going back to MTV."

Following hot on the heels of the entertainment industry are major banks, public relations firms, auto manufacturers, and other companies that have virtual-world projects already in the works. Small firms like Blechner's—and larger counterparts such as Millions of Us, Rivers Run Red (the company responsible for bringing Duran Duran to Second Life), and the Electric Sheep Company—are helping to turn those projects into realities. (Full disclosure: The Sheep are among the sponsors of my blog, 3pointD.com.)

A NEW MEANS OF HUMAN EXPRESSION

FOR TRUE BELIEVERS, the metaverse represents an opportunity to get in on the ground floor of what promises to be a world-changing technology: an easy-to-use interface with immense expressive power, through which

THE FUTURE NOW

THERE.COM

Focusing more heavily on such activities as chat and avatar creation than users of Second Life do, the inhabitants of There.com use its space to interact, play, and meet people.

people can share new kinds of information and interact in new ways. Though the metaverse is unlikely to replace the Web in its entirety—after all, reading a newspaper is easier on a flat computer

screen than in a 3D world—it will expand the Internet's usefulness in ways that may revolutionize people's lives no less radically than the Web has over the past 15 years. Imagine reading a news story, clicking through to a 3D recreation of the place where the event occurred, and then walking around it in the company of other people who are reading the same story at the same time.

Of course, the pirates, pranksters, and thieves who currently plague the Web will eventually make their way to this new medium. Second Life events are regularly "griefed" by users who delight in building cages around others' avatars, for instance, or who release self-replicating objects in an effort to choke the world's servers into shutting down. Designers of virtual worlds must develop tools to deal ▶

31% of respondents would make their avatar look the way they wish they did. —SOURCE: PCWORLD.COM POLL

with these issues and to make their worlds' environment more conducive to harmony than to hostility.

Sites such as MySpace, Flickr, and CyWorld (a 3D MySpace clone) demonstrate the strength of people's desire to express themselves online easily and richly, and to share what they have to say with friends and family, and with other observers.

Linden Lab's Rosedale believes that 3D worlds online are destined to play a critical role in extending that power of ex-



pression and interaction. "The real world is not as malleable as we would like it to be," Rosedale says. "Because of the degree to which Second Life is alterable, it is likely in a few years that everyone will have an identity in 3D worlds. Your identity there—the representation that will be your body, your persona in Second Life—will probably be a more accurate depiction of who you are mentally than the body that you walk around in."

HARNESSING 3D WORLDS

E-MAIL, INSTANT MESSAGING, chat, VoIP, and videoconferencing connect people with varying degrees of richness. But none of these possess the power of even the simplest interac-

tions in a virtual world. Duran Duran's Nick Rhodes was fascinated to see a group of avatars in Second Life all look in the same direction at something happening nearby. That never happens on a chat channel. And it's just the beginning.

THE FUTURE NOW

THE WORLD OF WARCRAFT

One of the most popular online games, World of Warcraft hosts millions of players connected on hundreds of servers worldwide. Its scenarios often encourage team play and the formation of "guilds"—groups of gamers who play and chat together.

Online worlds like Second Life let you observe, collaborate, and interact at a new level. There, you can attend a talk by Kurt Vonnegut or a live concert by Suzanne Vega. You and your team can build a venue for similar talks, and track the project's status on a virtual whiteboard. Once your shows begin, you can track who attends and how long they stay, and upload the data to a Web site for analysis.

Web-based tools and 3D online spaces are already beginning to converge. A group of Amazon.com employees have built an interface for searching Amazon's inventory from within Second Life. American Apparel's recently opened Second Life presence allows you to browse and buy products in much the same way. Social software, shopping sites, Web applications, and even search and wikis have begun to take on new and more powerful three-dimensional forms.

Imagine a Google Earth that you can not only zoom into but also walk around in with other people. And think of all the useful ways your favorite Google Maps mash-ups could be extended into three dimensions.

As more and more online data extends itself into the real world, it too will become part of the metaverse. Many of the attendees at the Metaverse Roadmap Summit envisioned a future in which the objects around us stream data to handheld devices.

What I'm describing is more than just a portable World Wide Web. It's a way to collect and access information that changes depending on where you go and who you're with—whether those places and people are real or virtual. It may sound a bit sci-fi, but the advances of the past 15 years suggest that we'll continue to integrate our physical selves more and more tightly with the informational processes going on around us.

There are lots of questions to answer, and many hurdles to overcome, but none are insurmountable. As millions of people experience virtual worlds, technologists, legislators, and developers will face new challenges. It's not too early to start thinking about these issues. The online world of the future is already here. ■

Freelance writer Mark Wallace is the editor of the Second Life Herald and writes about virtual worlds at 3pointD.com.



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Cures for Lost and Damaged Data

Newly released **R-Studio 3.5** and other business continuity solutions from **R-Tools** lead the charge in restoring Windows-based data

IN A CLIMATE WHERE USERS MUST GET access to business-critical data to serve customers and stay ahead of the competition, **R-Studio 3.5** from R-Tools is proving to be the ideal solution for recovering vital data lost to viruses, attacks, hardware failures, or operating system crashes.

This affordable undelete and data recovery software features an algorithm that lets users increase the quality of file recovery and recover files not recognized in the file system metadata. Besides FAT, NTFS, Ext2FS, and Ext3FS, R-Studio 3.5 supports both UFS1 and UFS2 file systems as well as enhanced remote host scanning procedures



that analyze data on the remote host rather than on the local host to speed up

data recovery and get users the information they demand.

Bundled with R-Studio 3.5 is **R-Studio Emergency Version**, allowing users to recover data even when Windows cannot be booted due to system file corruption or deletion.

R-Studio 3.5 is one product on a fast-growing list of business continuity solutions from R-Tools, a list that now includes **R-Mail for Outlook**. This handy utility restores deleted information and repairs damaged Microsoft Outlook files when Outlook cannot open them, allowing users to first preview recovered messages before recovering the information completely.

Meanwhile, R-Tools also offers



R-Mail for Outlook Express, which reconstructs accidentally deleted email messages or damaged .dbx files. Other exceptional business continuity solutions from R-Tools include **R-Word** to recover damaged Microsoft Word files; **R-Excel** to reconstitute valuable Microsoft Excel files that are corrupted or attacked; and **R-Wipe &**

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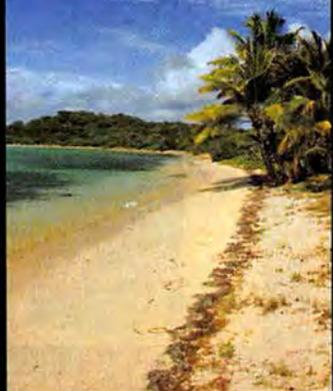
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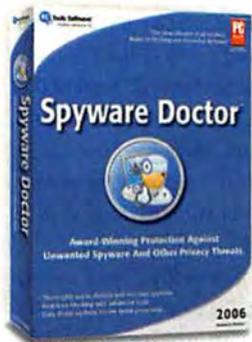
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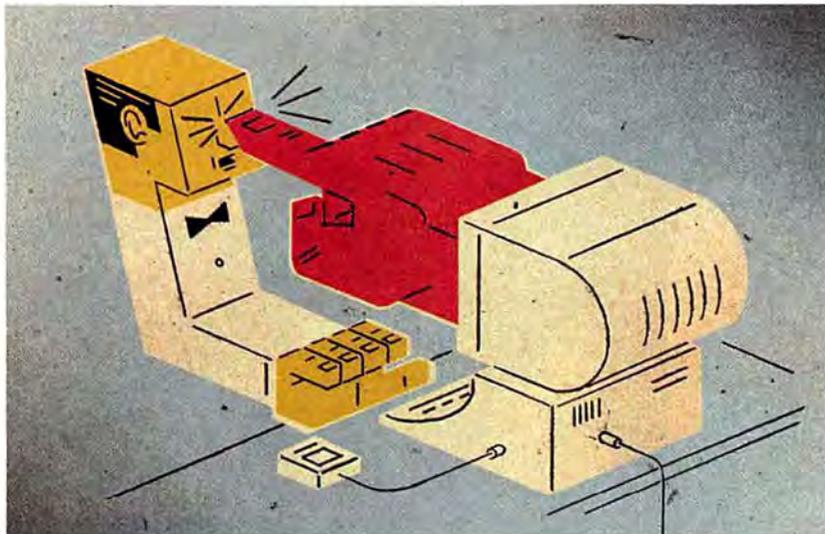
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HERE'S HOW

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WINDOWS TIPS

SCOTT DUNN

Vanquish Still More Windows Annoyances

THE MORE TIME and effort Microsoft spends "improving" Windows, the more annoying the OS becomes. These eight tips will exorcise some of the gremlins vexing Windows XP and 2000.

DON'T LOSE YOUR FOCUS

The Annoyance: So there you are, minding your own business, typing a document, e-mail, or instant message on your computer. You glance away from the screen for a moment. When you look

back, you realize you haven't really entered your last lines of text. Without your knowledge, a new window or dialog box has popped up, and some of your text has been entered there—or nowhere.

Applications that steal your PC's focus are more than just annoying: They can be disastrous if the focus-stealing dialog box asks to perform a potentially harmful operation and you happen to press <Enter> or type *y*, which the dialog takes as a "yes" before you even see the request.

You may also have dismissed an important scheduling alert without realizing it. **The Fix:** No bulletproof solution exists, but the following may help you maintain your focus in Windows XP and 2000.

If it isn't already on your system, download and install Microsoft's free Tweak UI utility (find.pcworld.com/54026). In Windows XP, open Tweak UI (either by clicking its shortcut on the Start menu or by choosing *Start•Run*, typing *tweakui*, and pressing <Enter>), and use the tree pane on the left to navigate to *General•Focus*. In Windows 2000, double-click the *Tweak UI* icon in Control Panel and click the *General* tab. In both versions, make sure 'Prevent applications from stealing focus' is checked (see **FIGURE 1**). You can also specify whether the taskbar button should flash (and how many times) when the would-be focus grabber wants your attention. Click *OK*.

Some Tweak UI settings get changed back when a program subsequently modifies the Registry. To make sure the focus lock is in effect every time you start Windows, start Notepad or another text editor. On the first line, type **Windows Registry Editor Version 5.00** and press <Enter> twice. Type `[HKEY_CURRENT_USER\Control Panel\Desktop]` and press <Enter>. Finally, type `"ForegroundLockTimeout"=dword:00030d40` (no spaces) and press <Enter>. Select *File•Save As*, name the file with the .reg extension (for example, **focus.reg**), and save it to a location of your choice. Make a note of the path to the file.

Next, choose *Start•Programs* (or *All Programs*), right-click the *Startup* menu, and choose *Open*. In an empty area of the Startup folder, right-click and choose *New•Shortcut*. In the Create Shortcut wizard, browse to your .reg file, select it,

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FIGURE 1: USE TWEAK UI to prevent apps from jumping in front without first asking permission.

and click *OK*. Place quotes before and after the entry, and then press **<Home>**. Type `regedit.exe /s` followed by a space in front of the first quotation mark in your entry. When completed, the entry should read something like this: `regedit.exe /s "C:\Registry files\focus.reg"` (your path may differ). Click *Next*, type a name for your shortcut, and click *Finish*. Now every time you log on, this shortcut will reinstate the anti-focus-stealing setting.

Regrettably, even this technique won't stop all the focus stealing. If you find that one application in particular is doing most of the attention grabbing, consider replacing it with an equivalent program.

PREVENT POP-UPS

The Annoyance: A text balloon repeatedly pops out of the system tray on Windows XP's taskbar to warn you that an update is ready to install, or to provide some other nugget of information you don't really need to address at that instant.

The Fix: This is another job for Tweak UI (see the previous tip). Open the program and select *Taskbar and Start menu* in the left pane. Then uncheck *Enable balloon tips* on the right, and click *OK*.

tab and right-click the executable file that corresponds to the poky application. Click *Set Priority*, and choose a level—for instance, *AboveNormal* or *High* (see **FIGURE 2**). Click *Yes* when you see the warning. Note that changing the priority of one process can affect the speed of others. The Realtime choice, for instance, gives your application the highest priority of all, but it can bring the rest of your system to a standstill, so it's best to avoid this option. Regardless, if you're having problems burning CDs, for example, you may want to increase the priority of your CD-burning software. And if you have an app doing some low-urgency work in the background, you might consider setting it to a lower priority. The changes you make will apply only to the current session; the priorities will return to their former state the next time you start Windows.

To see the priority of all processes currently running on your system without having to right-click each one, choose

GIVE AN APP OOMPH

The Annoyance: Out of nowhere, the application you're working with slows to a crawl because some other less-important app or background process has gobbled up Windows resources.

The Fix: In Windows XP, you can allocate more resources to the program by changing its priority in the Task Manager applet. Right-click the taskbar and choose *Task Manager*. Click the *Processes*

View>Select Columns in the Task Manager window. Check *Base Priority* and click *OK*. You will then see a column that lists each process's priority information.

SEE THE DETAILS YOU NEED

The Annoyance: Windows Explorer's Details view (choose *View>Details*) lists much information about your files, but sometimes you have to scroll to see it, or what you want may not be there at all.

The Fix: To get the details you need, right-click anywhere in the column headings and uncheck items to remove their col-

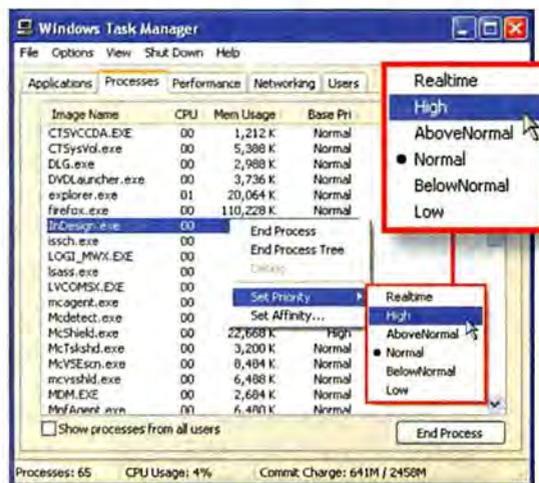


FIGURE 2: RAISE THE PRIORITY of your processes on the fly to help an important application run a bit faster.

umns, or check items to add them. Click the *More* button to see additional choices. To reorder your columns, drag a column heading (for example, *Date Modified*) left or right to drop it on a column boundary. To resize a single column, double-click the right boundary of its column heading. To resize all columns to the best fit for the Explorer or folder window, press **<Ctrl>+>** on the numeric keypad. ▶

CUT FOLDER CLUTTER

The Annoyance: When you open a folder in Thumbnails view (choose *View•Thumbnails* in Explorer or any folder window), Windows XP creates a Thumbs.db file in that folder to cache the thumbnail images for quicker viewing next time. You won't see it unless your folder options are set to reveal hidden files (see find.pcworld.com/55136 for instructions). But this cache file may be doing little more than adding unnecessary clutter to your hard drive.

The Fix: Once you've reset your folder options, search for and delete Thumbs.db files you don't want. To keep the files from coming back, open any Explorer or folder window and choose *Tools•Folder Options*. Click the *View* tab, and then check *Do not cache thumbnails* (see **FIGURE 3**). Click *OK*.

AVOID MENU DISORDER

The Annoyance: When you use the Start menu in any version of Windows, you may accidentally—and frequently—drag

WINDOWS TOOLBOX

Keep an Eye on Your File Processes With FileMon

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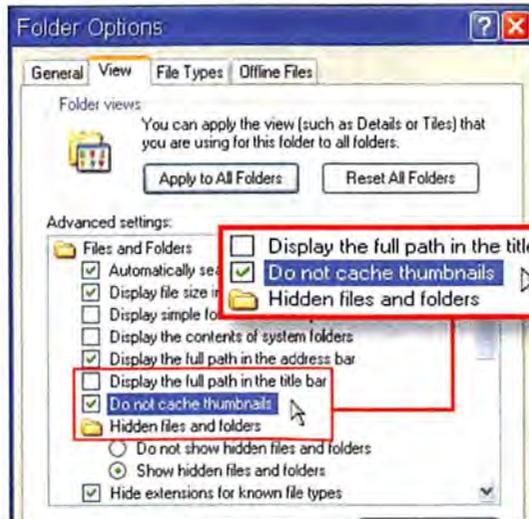


FIGURE 3: THWACK THUMBAIL CLUTTER by turning off the cache option in Windows that creates Thumbs.db files.

items out of the positions you prefer.

The Fix: If you're a little sloppy with your clicks and drags in the Start menu, you can turn off the ability to drag and drop menu items. First, make sure items on the menus are in the order you want. Then right-click the *Start* button (XP) or the taskbar (other versions) and select *Properties*. In XP, click the *Customize* button next to either the 'Start menu' or 'Classic Start menu' option. Uncheck *Enable dragging and dropping* in the scrolling list of options (you may need to click *Advanced* to see this option). Click *OK* twice.

LIST MORE DOCUMENTS

The Annoyance: In XP Pro, you access recently opened documents by choosing *Start•My Recent Documents* (or *Start•Documents* in the Start menu's Classic view)—but the list shows only 15 files from all the many programs you may have used recently.

The Fix: Click *Start•Run*, type `gpedit.msc`, and press **<Enter>**. In the tree pane on the left, navigate to and select *User Configuration\Administrative Templates\Windows Components\Windows Explorer*. Double-click *Maximum number of recent documents* in the right pane. Select *Enabled*, and then set the 'Maximum number of recent documents' to something higher than the default of 15 (see **FIGURE 4**).

In versions of Windows other than XP Pro or 2000, you'll have to settle for a

slightly less elegant solution. See find.pcworld.com/54138 for instructions from Steve Bass's "50 Fixes for the Biggest PC Annoyances" feature from the October 2003 issue (you'll need to scroll down a bit to the "Show All Recent Docs" section).

CAN THE CLEANER

The Annoyance: Every couple of months, Windows XP pops up a message stating that you haven't used some of your desktop icons in a while. The OS even offers to put these icons in a separate desktop folder for you.

The Fix: I have news for Microsoft: If I'm not using shortcuts that are in plain sight on my desktop, sticking them in a folder sure isn't going to make me any more likely to click them. If they're really useless, I'd rather just delete them. Either way, maybe Windows should mind its own business, good intentions aside.

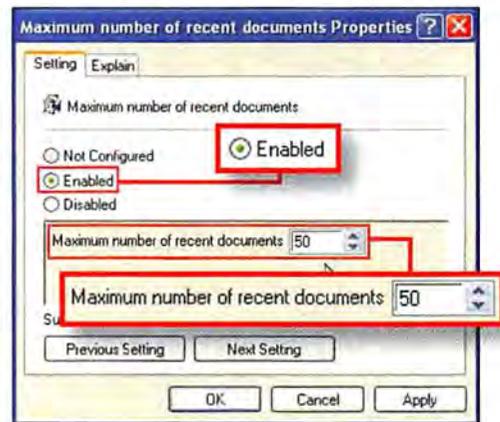


FIGURE 4: PLACE MORE RECENT files on your Documents menu via XP Pro's Group Policy tool.

To turn off the unused-icons nag, right-click the desktop and click *Properties*. Select the *Desktop* tab and click *Customize Desktop*. At the bottom of that dialog box, uncheck *Run Desktop Cleanup Wizard every 60 days* and click *OK* twice. ■

Send your Windows-related questions and tips to scott_dunn@pcworld.com. We pay \$50 for published items. Visit find.pcworld.com/31607 for more Windows Tips. Scott Dunn is a contributing editor for PC World.

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INTERNET TIPS

SCOTT SPANBAUER

Self-Publish Your Books, Songs, and Movies Online

IT USED TO be that, to get your book published and in the hands of readers, you needed an agent and a publisher, each of whom would gobble up a significant portion of the profits. But the times they are a-changin', thanks to a bevy of recent online publishing resources that cater to renaissance persons who are overflowing with creativity and underflowing with cash. Here's a snapshot of the services available to starving artists.

Books: If all you want to do is send a printed version of the family cookbook to Sis, Mom, and Grandpa, you can. Blurb (www.blurb.com) lets you create one-off hardbound print copies of your book—complete with dust jacket—for between \$30 (for up to 40 pages) and \$80 (topping out at 400 pages) each, with discounts for bulk orders. You start by downloading Blurb's free Book-Smart book-design and publishing program (see **FIGURE 1**). When your tome is ready, you upload it for printing and receive your copy within a week or so. Blurb also offers your book for sale, but you get nothing out of the deal—the service's onerous contract grants Blurb all rights to redistribute your work.

Lulu (www.lulu.com) gives authors a fairer shake. This online publishing service imposes no up-front costs. In fact, if you don't need a copy of the book for yourself, you'll never pay anything to publish through Lulu. The downside of the service is that you have to do all the book-editing and layout legwork, using

your own software; you then submit your manuscript in layout form as a PDF, .doc, or .rtf file. You set the cover price and the royalty rate you wish to receive, and Lulu



FIGURE 1: BUILD A BEAUTIFUL BOOK with Blurb's free Book-Smart program, but keep in mind that all revenue flows to Blurb.

offers the book through Amazon, Borders, Barnes and Noble, and its own Web site. The service's extensive tutorials guide you through the whole process.

Audio: Lulu also lets you create and sell CDs, but a better place to sell them online is at CD Baby (cdbaby.net). For a \$35 setup fee, CD Baby will copy your CD, make

a Web page for you, accept credit-card orders for CDs, and ship the discs to customers. CD Baby keeps \$4 per CD, or 9 percent of digital download sales, and it also partners with record stores and online services such as iTunes.

Video: Video-hosting services are all the rage these days—we analyzed several in September's "Video Everywhere" (find.pcworld.com/54168)—but finding one that lets you sell your audiovisual production isn't easy. Google Video is structured to allow sales, but that feature is off-limits to ordinary users while the service remains in beta testing. By the time you read this, Blip.tv will likely allow users of its service to charge for video downloads, taking a small per-transaction fee of 10 to 15 cents, as well as a single-digit percentage of your selling price.

Charging for your video will greatly reduce its viewership. One way to keep your opus free and yet still cash in is by selling ads. Blip.tv lets you arrange for post-roll advertising—video ads tacked onto the end of your video—and splits the resulting revenue with you 50-50 (the proceeds are deposited to your PayPal account). If you're getting serious about publishing your creative endeavors, revenue sources like these can help defray the costs. ■

Send your questions and tips to nettips@spanbauer.com. We pay \$50 for published items. Go to find.pcworld.com/31523 for more Internet Tips. Scott Spanbauer is a contributing editor for PC World.

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HARDWARE TIPS

KIRK STEERS

The Right Hardware Keeps VoIP Calls Loud and Clear

WONDERING WHAT NEW hardware you will need to make money-saving Voice-over-IP (VoIP) phone calls? If you have a broadband Internet connection, as well as speakers and a microphone attached to your PC, you have all the basics (a headset with a mic—starting at less than \$7—will give you more privacy). Here's the equipment I've found useful after getting acquainted with VoIP over the last few months.

Qualify your connection: Sending your voice out over the Internet isn't much different from sending e-mail: Software records the message, carves it up into small packets, and delivers the packets to their destination, where they're re-assembled. Unlike with e-mail, however, for VoIP your connection must be fast enough to avoid interruptions in the flow of packets. Check your PC's VoIP readiness by measuring your upload and down-

load speeds with VoIPReview.org's VoIP Speed Test online bandwidth analysis at find.pcworld.com/54646 (see **FIGURE 1**).

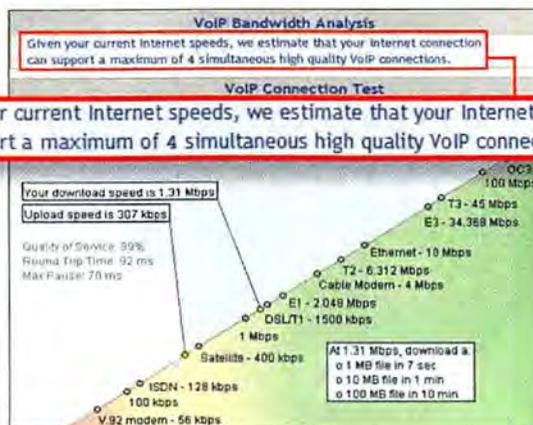


FIGURE 1: DETERMINE WHETHER your PC's broadband link supports VoIP calls at VoIPReview.org's VoIP Speed Test site.

A speedy Internet connection alone isn't always enough to provide clear VoIP calls, especially if a single network connection serves a number of callers. Some routers now come with their own built-in QoS (Quality of Service) capability, which gives priority to the delivery of VoIP packets over such network traffic as e-mail and Web page requests. If you want the advantages of QoS but don't want to replace your current router, D-Link's \$75 DI-102 Internet Broadband VoIP Accelerator lets you add QoS to an existing network (find.pcworld.com/54648).

To make VoIP calls without using the computer's speakers and microphone, you need a VoIP phone attached to an ethernet or USB port, or a standard analog phone connected to a VoIP adapter. Regardless of the hardware setup you choose, you'll need to sign up with a VoIP

service provider. For more details, see Tom Spring's "Web Phone Woes" in our August issue (find.pcworld.com/54650). Ask your service provider about compatibility before buying any VoIP hardware.

Choose your hardware: Inexpensive PC speakers may do, but a voice-canceling USB microphone is a must. I use Andrea Electronics' \$90 Superbeam Microphone and Stereo USB Audio adapter bundle (find.pcworld.com/54652).

As for a suitable headset, both Plantronics (www.plantronics.com) and Logitech (www.logitech.com) offer stereo models that are great for listening to music as well as for making phone calls, but my

pick is Plantronics' convenient—albeit higher-priced—CS50-USB wireless single-ear headset (\$190 online; find.pcworld.com/54654).

For more on using your PC with voice-recognition applications, see my *Hardware Tips* column from last November (find.pcworld.com/54656).

Think small: IP phones come in all shapes and sizes; but when you're traveling, smaller is almost always better. Few phones of any type are as small as Mplat's \$40 Flash Phone F4K, which resides in a 128MB USB flash memory drive

and works with any broadband connection (find.pcworld.com/54658). The F4K, which is also available with 256MB and 512MB of memory, supports Bluetooth; to make your calls, you can use either a wireless Bluetooth headset or a wired headset attached to the host computer.

Plantronics' \$120 Voyager 510-USB Bluetooth headset complements the F4K very nicely. One of my favorite Voyager features is its ability to switch seamlessly between my cell phone and my VoIP calls (find.pcworld.com/54660). ■

Go to find.pcworld.com/31511 for past Hardware Tips columns. Send your tips and questions to kirk_steers@pcworld.com. We pay \$50 for published items. Kirk Steers is a PC World contributing editor and the author of *PC Upgrading and Troubleshooting Quicksteps* from McGraw Hill/Osborne Press.

DOUBLE-DUTY DESKTOP

LOOKING FOR AN easy way to share a desktop PC's monitor and keyboard with a laptop? Belkin's wireless Flip KVM switch permits your notebook—or a second desktop—to use not only your PC's monitor, mouse, and keyboard, but its speakers as well. A cordless remote about half the size of a mouse lets you toggle between computers. The \$60 wireless version supports only USB keyboards and mice, but wired models support PS/2 connectors (find.pcworld.com/54668).

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ANSWER LINE

LINCOLN SPECTOR

Will My CD-R and DVD±R Discs Still Work in 10 Years?

? AN IBM INFORMATION storage expert has said that CD-Rs and DVD±Rs typically last only two to five years. Is that true?

Walter Sekula, Greensburg, Pennsylvania
KURT GERECHE OF IBM Deutschland GmbH caused quite a stir in January when he stated that "unlike pressed original CDs, burned CDs have a relatively short life span of between two to five years, depending on the quality of the CD." Since then, I've seen his estimate quoted as established fact.

What I haven't seen is real-world evidence. I have yet to receive a single *Answer Line* letter about an aged disc. I checked with Ontrack (www.ontrack.com) and DriveSavers (www.drivesavers.com), the two leading data recovery services, and neither reports that age is causing CD-R failures. When I tested some of the oldest CD-Rs I own, I found no errors on them (and most of those discs were the cheapest I could buy at the time). CD-Rs have been common for much longer than

five years; if their shelf life was that short, we'd have known it long ago.

But that doesn't mean these discs will last forever, or even as long as the pressed CDs and DVDs on which we buy music, movies, and software. The jury is still out



FIGURE 1: ARCHIVAL CDs AND DVDs such as those from Delkin Devices are generally gold in color, but not all gold discs are long-lasting, nor are they scratch-resistant.

on whether the discs will last for years or decades. However, you can increase the longevity of your optical media.

First, use high-quality discs, preferably ones made with stable dyes and gold

backings (see **FIGURE 1**). KMP Media sells such discs under the Kodak name (www.kmpmedia.com). Delkin Devices also sells a line of such discs (find.pcworld.com/54670). Make multiple copies of important data, and store them in another location (preferably in a different city).

To write on the label side of the disc, use a nonsoluble, felt-tip marker designed specifically for writing on CDs and DVDs. Store discs upright, and in good cases intended for that purpose. Keep them away from heat, light, and moisture.

Check the discs every few years by copying files off of them to make sure they're still readable. In addition to storing your archival data on CDs or DVDs, keep it on your hard drive and back it up regularly.

A BETTER PC NAG

? HOW DO I make my PC nag me at designated times?

Glen Dresser

North Hollywood, California

YOU CAN DO that with Windows' Task Scheduler, but I know an easier and more versatile way. True, it involves putting yet another auto-loading program on your PC, but in this case I think it's worth it.

Kirby Software's free Kirby Alarm utility is extremely easy to use and very thorough. You can use the program to set up alarms that recur every *x* number of minutes, hours, days, weeks, months, or years. The alarm can be a pop-up, a sound, a pop-up with sound, a program launch, or an e-mail. If your system is off when an alarm should have sounded, it will appear (and/or sound) the next time Windows loads.

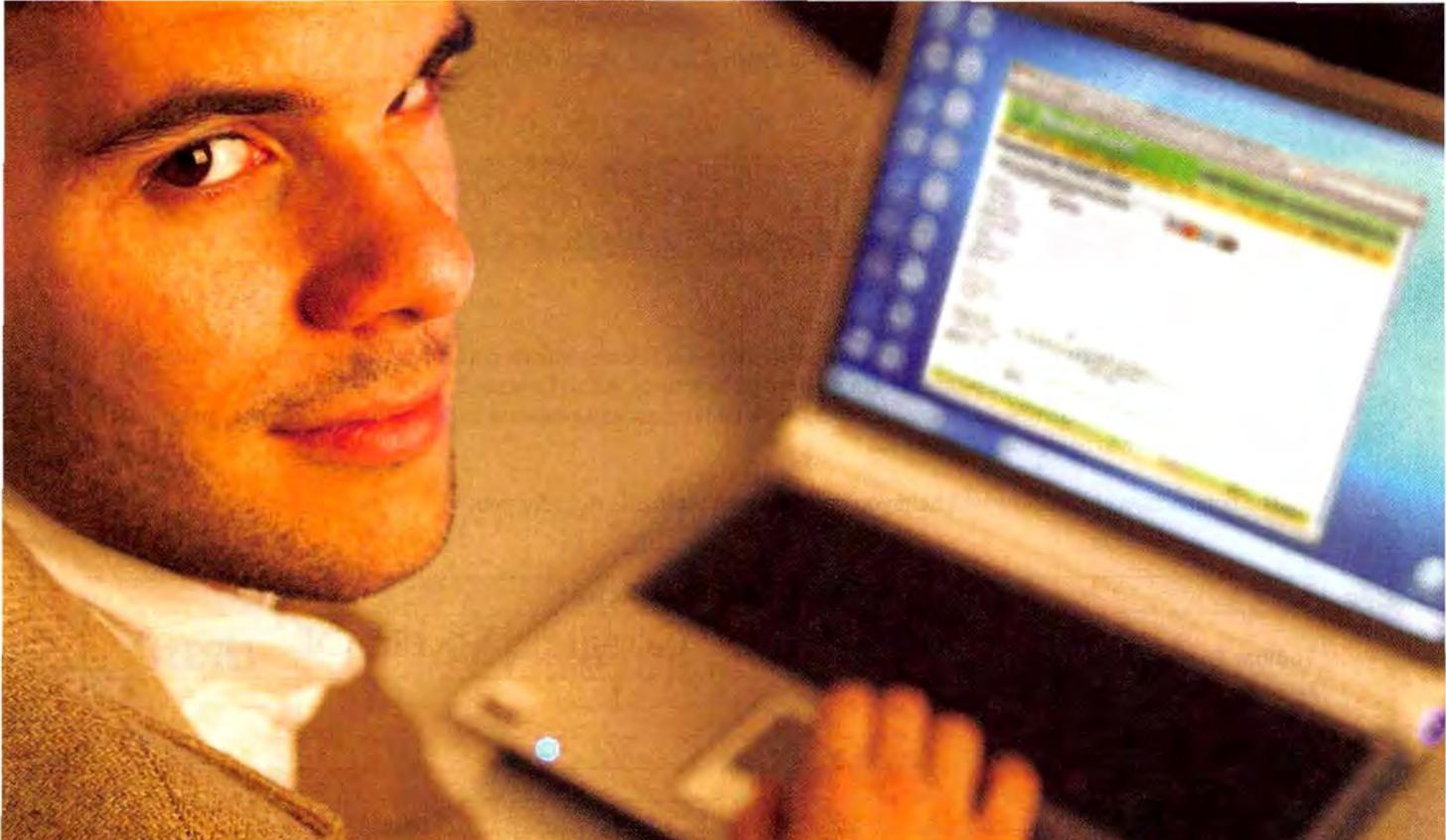
Though the program is free, it requires registration, and author Ian Cook welcomes donations. You can download Kirby Alarm by browsing to find.pcworld.com/55135. The more powerful Kirby Alarm Pro version costs \$25. ■

Send questions to answer@pcworld.com. Answer Line pays \$50 for published items. Visit find.pcworld.com/31577 for more Answer Line columns. You'll find Contributing Editor Lincoln Spector's humorous and other writings at www.thelinkspector.com.

A BETTER WAY TO SEND LARGE E-MAIL 'ATTACHMENTS'

WANT TO SHARE photos with friends and family? Or send a great video of your daughter's ice-skating performance to a dozen or so of your nearest and dearest? Fight the temptation! E-mail messages with large attachments can really gum up some people's systems. If a recipient has dial-up Internet access, the download can take hours, and block other e-mail for all of that time. In some cases the download will fail, and fail again,

effectively breaking the recipient's ability to receive mail at all. Also, Internet e-mail clients add considerably to the size of the file being sent. For example, saving an Outlook Express message with an attachment adds up to 40 percent to the file's size. If you want to share files larger than 1MB, use a service like the free Dropload (www.dropload.com) that allows your recipients to download the files from a Web server at their leisure.



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Toolbar Review

There has never been a better time to use a toolbar with your Internet browser. Toolbars can provide users with numerous features such as Pop-up Blocking, Driving Directions, Adult Content Filtering, Security Features, Spyware Detection, Games and more. Toolbars are a convenient and powerful addition to your browser, making it easier than ever to navigate the Internet.

The comparison chart below will help you decide which toolbar is right for you.

Toolbar Comparison Chart				
Toolbar Features:	Advanced Toolbar	Google	YAHOO!	msn
Search Engines	100+	1	1	1
Search Tabs	✓			
Blocks Pop-Up Ads	✓	✓	✓	✓
Calendar Application	✓			
RSS News Reader w/Ticker	✓			
Auto Form Filler	✓	✓		✓
Adult Content Blocker	✓			
Spyware Remover	✓		✓	
Homepage Protector	✓			
Browser Tracks Eraser/Cleaner	✓			
File Shredder	✓			
Add Buttons for Software	✓			
Add Buttons for Webpages	✓	✓	✓	
Screensaver Launcher	✓			
Games Links	70	0	10	10
E-mail Provider Links	52	0	1	1
News Provider Links	88	0	1	0

With its vast array of features and incredible ease of use, the Advanced Toolbar stands out from the competition. It's a powerful web tool that allows you to choose from over 100 search engines, 80 plus news sources, 50 plus email providers and can be completely customized to meet your needs. The Advanced Toolbar does not record any user data, has a very straight forward privacy policy and is totally spyware and adware free. You can get a free copy of the Advanced Toolbar at <http://www.advancedtoolbar.com> and take advantage of everything this incredible toolbar has to offer.



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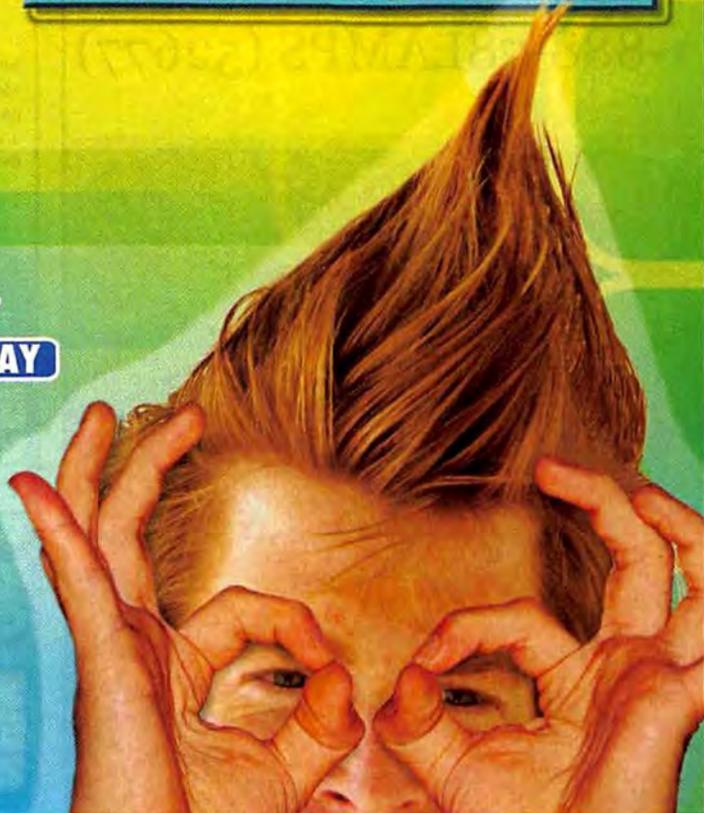
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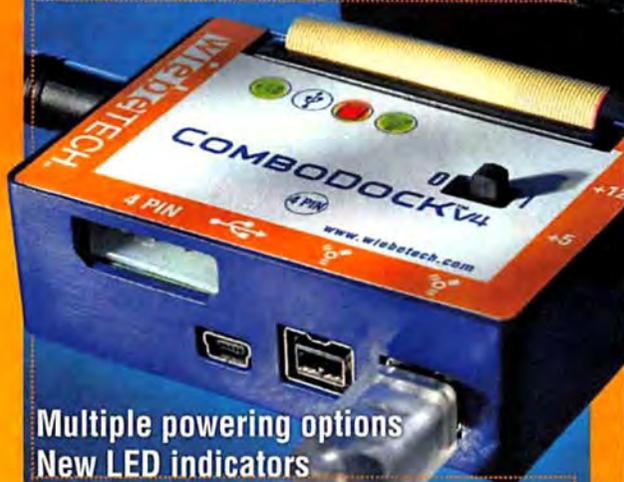
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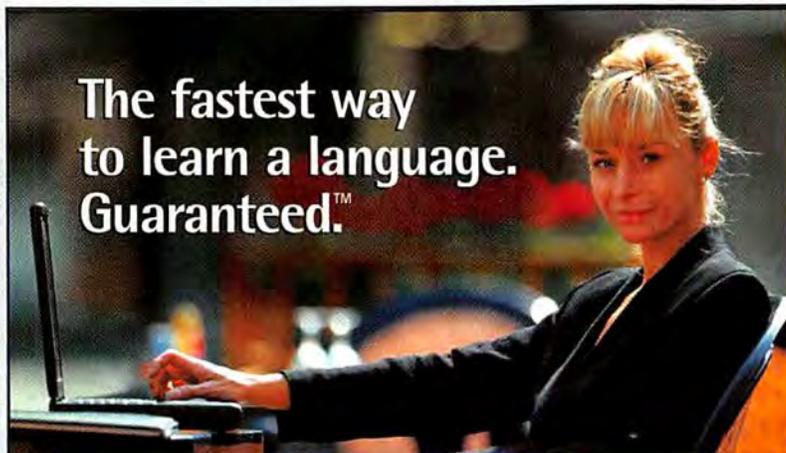
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Incredible Future Technology: Lies Ahead

EIGHT-CORE PROCESSORS! Super-smart browser-based apps! Ubiquitous high-speed wireless! Personal robotics! You may find the glimpses of the future in this special issue thrilling, but remember: What matters isn't the technology. It's the way that gee-whiz digital stuff will truly change our lives. Just look at these innovations due to arrive any day now:

In-control advertising. Think endless pop-ups are bothersome? You ain't seen nothin' yet! Thanks to Microsoft's new Hyperactive Y Chromosome technology, your browser will be able to assert complete control over your machine no matter how much you try to overcome it.

Want to mute that loud ad? Don't bother—the advertiser will own your volume control! Think you can skip past that 2-minute commercial? Not until you take a quiz that shows you've watched it. New industry research proves productivity soars when the browser decides when and how often you need a break from mundane chores. (The optimal schedule is remarkably like the ad cycle in a sitcom.) You'll spend the day in the thrall of clever advertising executives rather than boring colleagues—and will work better because of it! How great is that?

Refreshing new interfaces. Why bother spending loads of time with tricky interfaces that Microsoft is just going to be changing with the next release? Thanks to multicore CPUs and new graphics engines, interfaces can change on the fly every 15 minutes. Will you work with menus, icons, or voice recognition? Yes, yes, and yes, depending on the results of a clever randomization technique designed to keep you guessing. A new Intermittent Interface of the Month is



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Speedier calls. When there's so much VoIP bandwidth at the ready, why should you listen to your caller a moment longer than you have to? Special compression algorithms will accelerate speech on both ends without a trace of that "chipmunk" effect. Skeptics may scoff, but experts say you'll be able to finish conversations in half the time. Works with texting too: "Sp dg?" It's a productivity miracle!

Neural word processing. Who has time for typing? As our machines are crammed with formerly unimaginable power, you'll just think the word and it'll appear on the screen. Gee, I wonder if it's time for lunch: Is that eBay auction for the vintage Barry Bonds bat still going on? I bet the boss is going to call one of those endless meetings. Have I got enough words to fill out this page? Some 500 words per minute—and more! What an amazing productivity booster that will be! ■

Contributing Editor Stephen Manes is cohost of PC World's Digital Duo (www.pcworld.com/digitalduo) on public TV. Visit find.pcworld.com/31595 for more Full Disclosure columns.



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