

NEWS.COM SPECIAL REPORT

# Mother of invention

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## How the Mosaic browser triggered a digital revolution

By John Borland, Paul Festa, David Becker and Mike Yamamoto  
April 11, 2003, 4:00 AM PT

**On April 22, 1993, a group of students at the University of Illinois released a piece of computer code designed to get information from various public networks.**

Little did they know that their pet project, a humble application named Mosaic, would fundamentally change everyday life. While Web browsers with graphical interfaces had traded hands among academics years earlier, Mosaic was the first to be widely adopted and introduce the masses to the Internet.

A decade later, we have yet to assess its full effects on everything from global economics and free speech to holiday shopping and online dating. Coinciding with the anniversary of Mosaic 1.0 next week, this News.com special report offers a historical perspective while examining the new technologies and industries the browser has spawned.



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NEWS.COM SPECIAL REPORT

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## Legacy: A brave new World Wide Web

By Mike Yamamoto  
Staff Writer, CNET News.com  
April 14, 2003, 4:00 AM PT

**To those who know Jon Mittelhauser, a founding father of the Web browser, it comes as no surprise that he labels one of the 20th century's most significant inventions as simply an "inevitable technology."**

True to his pragmatic Midwestern background, the former University of Illinois researcher assumed that it was only a matter of time before something would be created to make the Internet's trove of information available to the masses. Serendipity determined that it would be Mosaic, the browser application that he developed with Marc Andreessen and a handful of other 20-somethings in 1993.

"We wanted to work on things that we ourselves would use," Mittelhauser said. "What surprised me was the speed with which it was adopted."



WHERE ARE THEY NOW?

Ten years after Mosaic's first version was released, he is still trying to fathom the importance of the browser born in the nondescript labs of the university's National Center for Supercomputing Applications. That may be an exercise in futility, given the magnitude of the subject, for the modern concept of the Internet would not exist if the browser had remained in the exclusive realm of academia.

The unassuming piece of software revolutionized high technology akin to the way the remote control reinvented television, but in manifold more dimensions with universal consequences. In roughly six months of 1995, Mosaic transformed the Internet from the esoteric province of researchers and technophiles to a household appliance, creating a multibillion-dollar industry and changing the way society works, communicates and even falls in love--in short, affecting nearly every facet of life.

Statistics are hardly the definitive gauge of the Web's significance, but if numbers collected by the medium's leading research houses are even remotely accurate, the influence of the browser is undeniable:

- Roughly 553 million people have Internet access worldwide, according to Jupiter Research. The Harris Poll estimates that two-thirds of all adults, or 137 million, are online in the United States.
- At least 75 percent of all households connected to the Net use e-mail, Nielsen/NetRatings estimates, and more than 40 percent of the U.S. online population uses instant messaging.
- Consumers spent nearly \$13.7 billion online in the last holiday shopping season, a rise of 24 percent from the previous year, according to a report by the Goldman Sachs Group and other research firms.
- Three years after the dot-com meltdown, spending on information technology is still expected to exceed \$2 trillion this year, up nearly 5 percent from 2002, according to the Gartner Group, a figure in line with other reports.

The browser's effects can even be seen in global conflicts, including the U.S. war on Iraq. The federal government reported that more than a third of the Internet population, or 44.9 million people, visited its Web sites in February alone--a rise of 26 percent from December 2002, attributed to national and international events.

"It resulted in an incredible empowerment of the individual on a worldwide basis," said Brad Silverberg, managing partner of venture capital group Ignition Partners and formerly a key executive in Microsoft's crusade against Netscape Communications, who compared the browser to the railroad as a historical milestone. "It cut through the complexity of the PC. Previously the PC was the province of a certain class of businesspeople."

Just as important as the browser's practical role is the psychological shift it has produced. Today, people expect to be able to find all manner of information in an instant, an assumption that would have been unthinkable before the Web became a mainstream medium--a phenomenon that cybersociologists call "expectation transparency."

"No fact is ever lost. Obscure texts, not to mention musical recordings, are almost as easy to retrieve as today's local newspaper," said Andy Oram of technology publisher O'Reilly & Associates, who is a member of the activist group Computer Professionals for Social Responsibility. "Every organization has to have a Web site, and by now an organization would be considered some kind of suspicious, underground entity if it doesn't."

Despite all the achievements, however, everyone who observed or was involved in the creation of the early browsers agrees that their true legacy has yet to materialize. Any definitive historical assessment will not be possible for years if not decades, until a full generation that grew up with the Web has matured.

"Technology goes in shifts of 25-year cycles. It takes a new generation of people for a medium to have its own identity," said Andreessen, long a poster boy for the Mosaic and Netscape browsers he helped create. "If someone is 20 today, that means they have been using the Web since they were 10 or 12 years old. It's like the difference between those who grew up with television, telephones and cars and those who didn't."

Evidence of this tectonic change can be seen at the earliest stages of childhood for those growing up in a household with a computer connected to the Web. Elementary games and PC-resembling toys are being marketed at toddlers 2 years old or even younger, making the computer a staple in the home from the time they begin to develop their cognitive and motor skills.

The result, behavioral psychologists believe, will be a new thought pattern influenced by the Web that was unimaginable only a decade ago but accepted as natural human development by coming generations.

"Our friend's daughter just turned 11, and I saw her playing the 'Sims' game. She created a multimedia environment by going into her Sims world, opening up a Web browser and being on the phone with a friend doing exactly the same thing," said Clay Shirky, an industry veteran and adjunct professor of new media at New York University. "Each of them had a private world to decorate but were co-surfing and sharing URLs to find new items. Instead of some totalizing futuristic environment with big video heads floating around in virtual worlds, it was a self-contained social space created out of small pieces."

**Mosaic co-developer Marc Andreessen and his cohorts at the NCSA were some of the minds behind the technology that revolutionized the Internet. What are the browser pioneers doing now?**



Andreessen, the dominant force behind NCSA's Mosaic, started the company that would become Netscape Communications along with Jim Clark in 1993. He stayed with the company until it was purchased by America Online in 1999, then served briefly as AOL's chief technology officer. After leaving AOL, he helped start Web infrastructure services company Loudcloud, which later changed its name to Opsware. He remains chairman of that company.



Bina was the first NCSA programmer to work with Andreessen and is often given full co-credit for Mosaic's creation. He coded much of Mosaic's original release and was instrumental in programming early versions of Netscape Navigator. He still lives in Illinois, staying out of the technology world's spotlight.



Totic wrote the Apple Macintosh version of Mosaic before coming to Netscape. After leaving the company, he took time off and recently joined Mitch Kapor's Open Source Application Foundation. He's still volunteering there, working on Web application, security and database projects.

It is in this type of virtual interaction that many believe the browser and its offshoot technologies will eventually have the greatest impact on society. Academic researchers have begun to identify new ways that the Web generation behaves based on its exposure to the Net. Unlike their unwired parents, for example, teenagers often rely on Web communities to socialize and even vet new acquaintances by reputation--part of the reason some have dubbed them "Generation ICQ."

"Different people use different means to socialize online. We see this as very important, especially among younger females," said Lisa Strand, chief analyst of Nielsen/NetRatings. "Sites targeted toward socialization--chat, greeting cards, matchmaking services--are growing faster than the overall growth rate of the Web."

And to companies, understanding how youths think and act is key to the future of many businesses online and off. Not surprisingly, software monolith Microsoft is on the leading edge of such efforts, targeting a teen population that is expected to reach 34 million by 2010, while accounting for up to 33 percent of all U.S. retail spending, according to retail consultancy America's Research Group.

"This customer wants to socialize instead of communicate," Tammy Savage, group manager of Microsoft's NetGen division, said in a recent interview. "They want to do things together and get things done--and they really want to meet new people. They have a way of vouching for each other as friends, figuring out who to trust and not trust."

That kind of group interaction based on Web connections will translate into a different way of doing business when these youths reach adulthood. Here again, the browser has been the catalyst for a new way of doing things, through a multimedia environment that allows detailed and elaborate collaboration on projects.

Kim Polese, an early Java developer and founder of software company Marimba, said this evolution had already begun but would become far more significant in future years with the rising use of other forms of Internet technologies such as peer-to-peer file sharing, instant messaging and media playing--all of which owe their beginnings to the browser.

"One of the most important trends--which blogging points to--is not just sharing of information but media, photos, film clips, audio, event planning. We see some early examples of this through such services as Evite and Yahoo, but we will see more dynamic, rich communities," Polese said. "For example, architects and builders can collaborate on building a house with live sketches, models, schedules, photos, video. This is a very dynamic environment that creates greater efficiencies and is an incredibly useful tool in everyday business that was not possible by just using the desktop."

Others believe that the Net generation has been influenced in even more fundamental ways where business is concerned, having been instilled with a sense of entrepreneurship and independence born from the dot-com era that continues today.

"I was talking to a young guy running a fantasy baseball league as a business. Not once did he mention the Web, but it was totally clear that it was his mechanism for distribution, payment, recruitment," said Shirky, who counts venture capitalism among the many roles he has played in the Internet business. "For solo actors, the Web has been an astonishing inspiration."

Andreessen and his old colleague Mittelhauser see this as a natural outgrowth of the Heartland values shared by those who developed Mosaic, part of a geek ethos rooted in the early days of the personal computer that was popularized well beyond technology during the Internet gold rush.

"There is a long history in the Valley of practical people in engineering," Andreessen said. "It's part of the Midwest ethic of egalitarianism."

Even today, long after the so-called browser wars were presumed dead, this philosophy continues among developers. Those dedicated to "open source" software--perhaps the most egalitarian technology of all--hope to further the original Mosaic cause through their Mozilla browser project.

"The Web is becoming increasingly integrated into our lives as more and more critical financial, health and other personal information is managed through Web-based transactions. Browsers are the mechanism through which individual human beings access and manage this digital data," the Mozilla Organization states on its site. "New innovations should be judged on their own merits, on their ability to benefit human beings, and not solely by their effect on the business plans of one or even a few companies."

Then, with a utopian optimism worthy of Aldous Huxley, the site beckons, "Come join us."

*News.com's John Borland contributed to this report.* ■



Mittelhauser worked on the Windows version of Mosaic at NCSA, before moving to Netscape. He left in 1994. Since then, he's worked at Geocast, formed a start-up incubator called Switchbox Technologies, and now works at Pandora Digital Media Systems, a high-end home multimedia server company he co-founded with former Netscape staffers.



McCool worked on the NCSA HTTPd Web server team before joining Netscape. Today he's a research programmer at the Knowledge Systems Lab at Stanford University's Department of Computer Science, working on projects that include making Web and other applications understand and present data more intelligently.



Chris Houk and Chris Wilson were also among the early members of the Mosaic project. NCSA researcher David Thompson was instrumental in getting the Mosaic project off the ground. Joe Hardin, director of the center's software group, oversaw the project. Other students and researchers who participated included Tom Redman, Mike McCool, Kim Stephenson, Jae Allen, Larry Jackson, Tom Magliery, Susan Goode, Michelle Butler and Larry Smarr.

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## Victor: Software empire pays high price

By John Borland  
Staff Writer, CNET News.com  
April 15, 2003, 4:00 AM PT

**In mid-1993, Microsoft was thinking hard about how Apple Computer might still become a threat.**

The brainstorming sessions were run by then-Senior Vice President Brad Silverberg, who would ultimately head the company's Internet and Windows 95 strategies. He concluded that Apple would be dangerous in only one way: if it put all its resources behind making the company synonymous with this powerful medium called the Internet.

It was the right fear, but the wrong company. Two years later it would be Netscape Communications and its Navigator Web browser that would epitomize the young medium's explosive potential.

"Microsoft ran the risk of being made irrelevant as the technology advanced," said Silverberg, who left Microsoft in 1999 to found Ignition Partners, a venture capital group. "Netscape was a real competitive threat. Platform leadership for the PC was at stake."

As recorded by history, and the log files of every Web server, Microsoft won the war. But it paid a heavy price: well over \$100 million a year in development and marketing costs for Internet Explorer, according to federal court documents, an antitrust battle that attorneys estimate may have cost as much as \$100 million in legal fees, and shattered relationships with government and industry figures.

Was the fight worth it?

For the most part, according to industry veterans, the answer seems to be yes. Although Netscape never developed into a serious threat to Windows, it definitely had that potential.

BROWSER MARKET SHARE PERCENTAGES									
1995	1996	1997	1998	1999	2000	2001	2002	2003	
80.1	73	57.6	54	30.7	17.7	9.8	7.2	3.7	
2.9	20	39.4	39	67.5	82.2	89.9	91.5	95.9	
17	7	3	7	1.8	0.1	0.3	1.3	0.4	
<span style="color: green;">■</span> NETSCAPE <span style="color: orange;">■</span> MICROSOFT <span style="color: gray;">■</span> OTHERS									
<b>Sources:</b> Results from 1995 to 1997 compiled by Dataquest; 1999 to 2003 findings provided by WebSideStory; 1998 figures from ZD Market Intelligence.									

Directions on Microsoft. "They look at threats and take them very seriously. It's a strategy that's served them well."

As monumental as they were, the browser was started off slowly. When Mosaic was released in 1993, only a handful



## WHERE ARE THEY NOW?

**From Microsoft's Bill Gates to Netscape founder Jim Clark, these are some of the most influential figures in the high-stakes browser battle. How are they wielding their power now?**

### Bill GATES



As CEO of Microsoft, Gates put the Internet on the company's front burner in 1995, and made Internet Explorer a key part of the software titan's Net strategy. He took center stage as a forgetful witness in the Justice Department's antitrust lawsuit against the company. He stepped down as CEO in 2000, becoming chairman and chief software architect, but remains Microsoft's most visible executive.

Today, Microsoft continues to dominate the PC software industry, holding more than \$52 billion in cash and short-term investments despite the stagnation in high-tech spending. This, analysts say, points to the Redmond, Wash., giant's ultimate success--the preservation of its leadership status and a formidable war chest to fend off any threat to the Windows empire, whether it be Web browsers, Java, Linux or any other technology.

"People laugh at how this big company might be scared of these little things, but that's how they operate," said Rob Horowitz, chief executive of analyst firm

of people at Microsoft were focused on the Internet. By the end of 1994, when Netscape released Navigator, a small Microsoft team had put together a browser strategy and licensed technology from Mosaic spinoff Spyglass to create the first version of Internet Explorer, but the company was still focused on the release of Windows 95.

That started to change in early 1995. In May of that year, Gates sent a now-famous memo to his top staff highlighting the "Internet tidal wave," ordering them to refocus much of the company's activities on the Net. Gates noted that Netscape appeared to be trying to take over Windows' role in software development, a move that could potentially "commoditize the underlying operating system."

The call to arms stemmed from Microsoft's obsession to protect the Windows operating system, which was and is the only near-universal platform on which other software developers can base their own programs. If software developers could have written their code instead for Netscape, which in turn could work with any operating system, the need to run Windows on every machine might have quickly diminished.

Maybe it was a little paranoid, but Netscape developers had the same thought.

"There was certainly discussion that, as the Web becomes mature and as the browser becomes mature, the need for the underlying operating system as it is goes away," said Jon Mittelhauser, one of the early browser developers who worked on Mosaic and later at Netscape.

#### With friends like this...

In mid-1995, a Microsoft team visited Netscape and proposed a "special relationship" that would relegate the Navigator browser to pre-Windows 95 operating systems--an offer that Netscape CEO Jim Barksdale later testified "blatantly implied that we should either stop competing" or Microsoft "would kill us."

In December 1995, Microsoft articulated its Internet strategy to the world, and Gates promised that Internet Explorer would be free of charge forever. The company was pushing employees to do everything they could to raise the browser's market share, as underscored in an April 1996 memo to top Microsoft staff from Brad Chase, then a senior executive.

"We want people to think 'Internet=Microsoft,'" Chase wrote in the memo. "This is 'make or break' time: The next six months are critical. If the industry does not see signs of success of our Internet Explorer...platform and technologies, we will lose our best chance to regain leadership."

The company threw resources at internal development. The original Internet Explorer team was just five or six people. By the time Silverberg and others decided to rewrite the browser almost completely for version 3.0, released in 1996, the team had grown to 100. By 1999, it was more than 1,000.

But Microsoft's aggressive distribution strategy eventually drew the attention of federal regulators, leading to one of the most complex and bitterly contested legal battles in corporate history. As documented later in voluminous court filings during the government's historic antitrust case, Microsoft:

- Gave the software away for free to Internet service providers and computer makers.
- Offered to pay whatever ISPs owed to Netscape if they agreed to switch from its rival.
- Paid America Online to convert subscribers to software using Internet Explorer technology.
- Provided co-marketing funds and lowered Windows pricing to PC makers that agreed to promote Internet Explorer.
- Labeled Internet Explorer an integral part of the Windows operating system, thereby prohibiting computer manufacturers from modifying or deleting it.

The multipronged strategy apparently worked. By January 1998, Microsoft executive Joachim Kempin was able to report to CEO Bill Gates that Navigator was being shipped through only four of 60 outside distribution channels, such as ISPs and computer manufacturers. Later that year, Internet Explorer's market share had caught up to Navigator by some critical measures.

Then came the official surrender: By November, AOL had agreed to purchase Netscape for \$4.2 billion. For most practical purposes, the war was over by the following year.

"I don't think you can question that Microsoft got what they wanted out of it," former Netscape developer Mittelhauser said. "They made Netscape irrelevant, which was their goal from the start. You can question how real a threat it was, but perception is as much a key factor as reality."

#### A Windows Web



One of Microsoft's top executives throughout the 1990s, Silverberg led the Windows 95 and the early Internet efforts inside the company. He left Microsoft in 1999 and ultimately co-founded Ignition Partners, a venture capital firm focused on wireless and communication companies.



Clark started Netscape with Marc Andreessen after leaving his first company, Silicon Graphics. After leaving Netscape, he started Healthon.com, now merged with WebMD, and MyCFO.com, which was sold last year. He has continued to fund start-ups such as Neoteris.



The former CEO of McCaw Cellular, Barksdale was Netscape's chief executive officer from early 1995 through the time it was sold to America Online. He went on to form his own venture group, The Barksdale Group, which disbanded last year. He is now "special adviser" to the General Atlantic Partners venture capital group and CEO of Barksdale Management, a philanthropic investment group.



Microsoft never succeeded in making its name synonymous with the Internet, as Chase and Silverberg had hoped, but it did block Netscape from achieving the same goal. As a result, Internet Explorer is used by more than 95 percent of today's Web surfers, according to OneStat.com.

Greg Sullivan, lead product manager for Microsoft's Windows client division, says that the computing community as a whole has benefited from the Web's standardization around Internet Explorer. Competing platforms would have meant that developers would have had to duplicate their efforts more often, he said.

"There is benefit to everybody who's involved," Sullivan said. "In general, a standard is very useful, whether it's de facto or du jour. It enables a level of consistency and a level of investment and minimizes some of the redundancy that can occur."

Critics say the lack of real competition in the browser business has stopped innovation in its technology. Although software efforts with tiny market share such as Opera, Apple's Safari, and the open-source Mozilla project are evolving, they note, Internet Explorer itself has made no sweeping advancements in Web browser technology in years. The back button, bookmarks, address bar and home page button--all original Mosaic features--are still the basic tools of Web navigation.

"The features we had in Mosaic are pretty close to what we have in Internet Explorer in 2003," said Jakob Nielsen, an expert on software usability and interfaces. "It's not identical, but it's very much the same."

Microsoft employees, present and former, disagree. They contend that, under the hood, major strides were made in Internet Explorer's integration into the Windows system and the component-built model that helped win over big companies like AOL.

In a way, Silverberg said, the fact that Internet Explorer never became synonymous with the Internet can be a measure of Microsoft's success. "The ultimate compliment one can give to a piece of software is transparency," he said.

Nielsen added that Netscape never made any huge advancements either. Even Netscape co-founder Marc Andreessen says his company had slowed its pace of innovation by the end of true competition. By that time, Netscape had been forced to give away its browser for free, following Microsoft's lead.

"By the time Netscape was sold, the commercial incentive for innovation in the browser had gone almost to zero," Andreessen said.

Others contend that the little browser advances have in sum been crucial to making the Web a mainstream consumer phenomenon. "The ease of use and aesthetics are just unbelievable compared to what they were even four years ago," said one senior executive at a major PC company, who asked not to be named.

Aside from technology, perhaps Microsoft's most enduring legacy in the browser business is its public reputation for controversial pressure tactics with rivals and partners alike. Even years later, analysts say the lack of any serious punishment for Microsoft's deeds during the browser wars has left potential partners wary. Few now, as then, are willing to talk on the record about their experiences.

"Vendors realize that they have to keep working with Microsoft and try to put a good face on it," IDC analyst Roger Kay said. "They're aware that Microsoft is holding all the cards and is dealing itself all the good ones."

Mittelhauser agreed: "Now you're back to doing everything the way it was pre-Netscape, where everything goes back to Redmond."

*News.com's Mike Yamamoto contributed to this report.* ■

Colbeth was CEO of Spyglass, the technology company that had exclusive commercial rights to NCSA's Mosaic browser, and later licensed the technology to Microsoft. The company merged with OpenTV in 2000. Colbeth has since served on the board of several high-tech companies, including Webplan, OBCTV and Photowave.

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## Upstarts: Evolution creates second wave

By Paul Festa  
Staff Writer, CNET News.com  
April 16, 2003, 4:00 AM PT

**Microsoft may have won the browser wars, but a recent proliferation of challengers suggests that the software empire has a long way to go before it wins the peace.**

Two reasons are driving the development of alternatives to the ubiquitous Internet Explorer (IE). First, micro-browsers for small hardware such as cell phones and handheld Net devices are challenging Microsoft, which was never able to replicate its desktop dominance in these markets. Second, "open source" developers see new opportunities in browsers that can be customized and perform more functions, as evidenced by the release of Apple Computer's Safari this year.

Many say that although the browser market for small networked devices was overhyped in the late '90s, the maturation of that market is finally starting to pay off for holdouts and newcomers alike. In addition to market leaders such as Microsoft and Opera Software, a small Norwegian browser maker, competitors include Access, InterNiche Technologies, Fusion, NexGen Software, NetClue and QNX.

"Browsers on cell phones and PDAs (personal digital assistants) was a nonmarket for a long time," Jupiter analyst Michael Gartenberg said. "But now you've actually got cell phones and devices that are capable enough in terms of network connection and performance and screen size. The frustration is getting this experience that was designed for a 17-inch monitor to work on something about the size of a postage stamp."

Such technical challenges present an opportunity for smaller companies, which also benefit from a troubled legal history that make cell phone manufacturers wary of alliances with Microsoft. That reluctance is even greater among the open-source software developers, many of whom are former Netscape Communications veterans who witnessed Microsoft's aggressive business tactics firsthand.

Industry analysts and others caution that all challengers face formidable obstacles against Microsoft in any new browser realm, given the company's history of positioning its products to get into new markets and conquer them.

"If you look at the space right now, the cell phone market is very fragmented," Gartenberg said. "There is some wariness of Microsoft, so there's definitely an opportunity for the Opera folks. But lots of great technology over the years has been better than what Microsoft ever produced, and the history books are full of where those companies ended up."

Yet critics are optimistic that people will find advantages in alternatives to IE, especially because Microsoft has done little to improve browser technology since dominating the market. "Innovation stopped for a long time, but interestingly it's back now, courtesy of something that many of us had written off for dead, which is Mozilla open source," said Clay Shirky, an industry veteran who teaches new media studies at New York University.

Because the source code behind the Mozilla browser is available to all, developers can freely adapt pieces and invent new applications for the software. Although popular functions may eventually be incorporated into the main browser, people using Mozilla are free to install or create extensions that customize their own versions.

By contrast, new functions are added to Internet Explorer based on Microsoft's schedule, providing little opportunity to tailor IE's one-size-fits-all approach, which may explain why the computer-using population has become blasé about the browser.

"When something new appears, the speed with which new tools can be created is very high," said Mitchell Baker, whose title is "chief lizard wrangler" for the Mozilla open-source project. "There's a framework for people to create



Mozilla-based extensions. There's a way for Mozilla to look at these options, how does it work, and to say to our core users, 'Here's a blogging tool; if it looks good, go grab it.'"

Within the Mozilla universe alone, a plethora of projects are under way. These include K-Meleon, a Windows browser; Galeon and Epiphany, both GNOME (GNU Network Object Model Environment) browsers; and three recently released browsers for the Macintosh from AppMac. Camino, formerly known as Chimera, and Phoenix are meant to be smaller Windows browsers.

The Mozilla project, which owes its name to a combination of "Mosaic" and the marauding postapocalyptic monster from Japan, was born when Netscape and other competitors sought refuge in nascent niche browser markets after Microsoft began its steep climb in market share with IE. Spyglass--the spinoff from the National Center for Supercomputing Applications that licensed the Mosaic browser code to Microsoft for IE--concentrated on creating browsers for small networked devices such as cell phones and PDAs. Opera focused on the same area.

Netscape had broadened its business strategy to include corporate software and took the revolutionary step of releasing its proprietary browser code into an open-source development project. Mozilla set out to create a small browser that would be useful both on the desktop and in portable devices, an area in which Microsoft was thought to be vulnerable.

The task was easier said than done. After years of delays, Netscape came out with a Mozilla browser that critics called half-baked. Developers eventually improved the software but, in doing so, lost the initial goal of creating a lightweight browsing engine. Critics and project participants alike in recent months have said that Mozilla's rendering engine, called Gecko, is anything but slim, making it impractical for small devices.

However, what was bad for Netscape was a boon for the K Desktop Environment (KDE), the Unix-based open-source project whose KHTML browsing engine Apple chose for Safari. The selection also reinforced the fact that, despite Microsoft's overwhelming lead on the desktop, the Web offers no shortage of browser alternatives.

Still, even without deliberately trying to foil its browser competitors, Microsoft stands to do considerable damage to their chances by virtue of IE's popularity. That's because, although IE and other major browsers have vastly improved their adherence to industry standards as defined by the World Wide Web Consortium (W3C), substantial discrepancies remain.

Because of IE's overwhelming share of the desktop market, Web authors often code their pages to work with IE, rather than with standards. That requires competing browsers to implement nonstandard workarounds for those IE-tailored pages--which, in turn, causes code bloat, the proliferation of underlying code in an application.

"Gecko was written, partially, as an entree into embedded systems," eMarketer analyst Ross Rubin said in an interview. "But although these developers have companies like carriers and set-top developers in the back of their minds, where in theory broad compatibility may not be as important, they find their way into devices where users demand access to a broad range of specialty sites, which forces support for all kinds of variations. They need to work in all kinds of improvements to handle things built without regard for a world outside Internet Explorer."

While KHTML is small, he warned, Apple's KHTML-based Safari browser--now in test stages--might grow once Apple engineers are able to properly render IE-specific pages.

Even so, others say it is too early to discount any contenders because today's browser market is a mixed bag. One free software advocate said entries such as KHTML and Mozilla's lightweight Phoenix have brightened a landscape otherwise darkened by a nonstandard monopoly.

"What if we had kept the Web open rather than having a zillion proprietary extensions from companies like Microsoft? Wouldn't a standards-compliant Web be a better place?" asked Bruce Perens, who helped develop the Debian version of Linux.

"We have a sick market--an unhealthy market--because most of the Web is browsed with a single vendor's browser. That's not a free market," he said. "A free market would have genuine competition. A free market would never have allowed a single vendor to become so dominant."

*News.com's David Becker contributed to this report.* ■

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## Future: Is there life after the browser?

By David Becker  
Staff Writer, CNET News.com  
April 17, 2003, 4:00 AM PT

### Have you hugged your Web browser today?

Probably not. It's been years since the browser was new and exciting for the average Web surfer. Browsers have become a bland commodity, dominated by Microsoft's sturdy but stodgy Internet Explorer. Internet innovation, meanwhile, is increasingly shoved off to specialized, new applications such as instant messaging clients, media players and Weblog viewers.

"It has become abundantly obvious that the Internet does not only consist of the browser," said Kim Polese, one of the early evangelists for the Java programming language, which was key to browser innovation. "Now people are very actively using IM, music jukeboxes, video players, online games, alternative interfaces. While the browser is as important as ever, it's not the be-all end-all."

It's not surprising, therefore, that the role of the browser is being pared back to the essential but none-too-exciting function of reading HTML code. During the heady years of the browser wars, Netscape and Microsoft competed partly by trying to offer browsers that did everything, from e-mail to coding. The result was bulky, confusing applications that didn't handle the basics properly.

Today, the browser wars are history, and innovation has moved to other fronts, with the development of applications specialized for Internet tasks ranging from XML (Extensible Markup Language) news feeds to the sharing of music files.

"It's beginning to look like people have finally figured out the browser ought to be a browser, and if you need other tools, you can build other tools," said Barry Parr, an independent Internet media and e-commerce consultant. "Instead of trying to make the browser a Swiss Army knife, why not get a screwdriver and a wrench and other tools designed for the job?"

Those tools include applications such as GuruNet, a Web-based program that allows PC users to click on any word in an active document and get relevant information such as a definition of the word or background on a business. Bob Rosenschein, the inventor of GuruNet and CEO of parent company Atomica, said he developed the software when it became clear that search engines might not be the ideal way to retrieve the quick bits of information often sought through the PC.

"There's not a single thing with GuruNet you couldn't do in eight or nine clicks with your favorite search engine, but people don't want to have to go through that routine every time they need a little piece of information," he said. "You can go to a Web site for a company, and if you want to find out how many employees they have, it'll take you a lot of clicking and navigating. We've got it with one click."

Stephen Klein, CEO of software maker ActiveBuddy, saw similar limitations in the browser. His solution was to develop "interactive agents" for expanding the functions of instant messaging software.

Using such tools, for instance, you can type "weather" into the window of an IM program and instantly get a brief forecast for your hometown. At work, you can type in "vacation days," and a business version of the software quickly shows how much paid time off you have available.

"I don't like to waste time," Klein said. "For things that aren't crucial to my life and I don't need a lot of depth on the information, why should I have to type in a URL, have it load and render a page, then figure out where to go on that page? I think it makes a lot more sense if I can type in the word 'weather,' the software knows who I am and tells me what I want to know."

Such expediency would be especially useful on cell phones and other small hardware. Just because these devices are connected to the Internet doesn't require them to use a traditional Web browser, which was invented for relatively large PC monitors.

"Putting the Web on a cell phone is kind of a questionable idea. I think there's going to be a lot of experimentation around what's the best means to deliver information to these devices," Parr said. He added that technologies such as "rich site summary" (RSS) news feeds, an increasingly popular Web publishing format, may be one solution for mobile devices.

Norm Meyrowitz, president of Macromedia Products, agreed that it makes sense to look beyond the PC-type browser for these markets. "We're doing a lot of stuff on mobile devices, which aren't really browsing devices," he said. "I don't think a phone is a great navigation device, so you need a paradigm that doesn't require a lot of navigation work."

Like other manufacturers of specialized Internet tools, ActiveBuddy's Klein makes no claim that his product will replace the browser. Instead, he envisions people using many tools for different tasks, such as ActiveBuddy for quick data and browsers for other jobs.

"I don't think interactive agents, because they're less of a rich experience than the Web can deliver, will satisfy that core experience for the things people really care about," he said. "I think it'll be like TV: People have their favorite channels where they watch whole shows, but they also flip around. They check the Weather Channel, check in at CNN for a minute or two."

The question for the browser then becomes what form it will take as the Internet is used increasingly for functions that go beyond simply reading Web pages.

"The big challenge is does it get more specific in the foreground or expand to include all these background news-scanning functions," said Clay Shirky, new media professor at New York University. "As Weblogs move from being interesting to important, do RSS newsreaders like NewsMonster become a separate application?"

Macromedia, creator of widespread browser add-ons such as the Flash and Shockwave animation players, is one application maker no longer content to toil in the background and is seeking "first-class citizen" status for its products. The company recently announced plans for software that will allow Flash applications to run on their own.

"The message is that the Web browser isn't designed for applications; it's designed for documents," said Kevin Lynch, Macromedia's chief software architect. "I think developers have done an amazing job of stretching what the browser is capable of doing. But we think there's a need for an environment specifically designed for hosting applications."

Macromedia expects developers to create myriad Flash applications that will prove equally valuable regardless of whether they are connected to the Internet, by providing an optimized environment for viewing and storing data.

"One of the disadvantages of the browser is that there aren't very good ways of organizing information," Meyrowitz said. "Bookmarks just don't do the whole job. There's no real sense of place for the information you want to come back to."

Because browsers are passive, applications that take at least some of the initiative to find information relevant to the user are likely to gain ground. "One of the problems with the browser is that you're going out to find information; the user has to fetch everything," Meyrowitz said. "Sometimes people want to just have the information on their desktop. We think there's a real need for applications that do that intelligently."

Polese echoed that sentiment, saying the browser's limitations have become increasingly clear. "In the first couple of years, everyone thought you'd do everything in a browser. Companies were trying to deliver very complex applications like bond-trading services, and it became clear that it wasn't going to work," she said. "Sometimes you don't want to use a browser because constant fetching of information back to a Web page is not appropriate."

None of this means that the browser will disappear anytime soon. It's likely to remain the all-purpose workhorse for viewing Web content for the foreseeable future. And it can do a lot more with a little work.

"It may be that, for a set of people, the browser is a commodity. But a lot of people are still focused on the browser and have definite ideas about how they want it to work," said Mitchell Baker, leader of the project behind the open-source Mozilla browser, which allows for more customization because its code is open to anyone. "Those people who come to Mozilla and try it are often quite happy to find a different experience. People who think of the browser as a commodity may not be aware of what's out there."

Yet Jon Mittelhauser, a member of the team that created the seminal Mosaic, said the browser has achieved its original goals and may be reaching maturity.

"If you want to draw an analogy to humans, it's past its adolescence, it's definitely got its driver's license, it's probably

old enough to drink at 21," he said. "You hit a point where you say, yeah, it's an adult--and that's where the browser is."

That, of course, doesn't mean that Internet innovation will stop there. Mittelhauser colleague Marc Andreessen says it is impossible to predict what the Web will look like in the future because its infrastructure is so different from previous technological breakthroughs in history.

"Highways and railroads are fixed in hardware limitations like gauges. One hundred years later, that hasn't changed," Andreessen said. "Software is based on its own carrier and has no limitations."

*News.com's Mike Yamamoto contributed to this report.* ■

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