



PUSH!

By Kevin Kelly and Gary Wolf

Kiss your browser goodbye: The radical future of media beyond the Web

By Kevin Kelly and Gary Wolf, with contributions from other *Wired* staff: Erik Adigard, Andrew Anker, Ed Anuff, John Battelle, Chip Bayers, John Browning, Jim Daly, Pete Leyden, Hunter Madsen, Oliver Morton, Spencer Reiss, Louis Rossetto, and Carl Steadman.

Remember the browser war between Netscape and Microsoft? Well forget it. The Web browser itself is about to croak. And good riddance. In its place ... broader and deeper new interfaces for electronic media are being born. BackWeb and PointCast, propelled by hot young Silicon Valley start-ups. Constellation and Active Desktop, spawned in the engineering labs of the browser kings. And from the content companies, prototypes powered by underlying new technologies - Castanet, ActiveX, and Java.

What they share are ways to move seamlessly between media you steer (interactive) and media that steer you (passive). They promote media that merrily slip across channels, guiding human attention as it skips from desktop screen to phonetop screen to a car windshield. These new interfaces work with existing media, such as TV, yet they also work on hyperlinked text. But most important, they work on the emerging universe of *networked* media that are spreading across the telecosm.

As everything gets wired, media of all kinds are moving to the decentralized matrix known as the Net. While the traditional forms - broadcast, print - show few signs of vanishing, the Net is being invaded by new media species. The Web is one. Yet with each additional node, each new T1 line, the media the Internet can support become richer, more complex, more nuanced. The Net has begun offering things you simply can't browse.

Networked communications need interfaces that hop across nodes, exploiting the unique character of distributed connections. Technology that, say, follows you into the next taxi you ride, gently prodding you to visit the local aquarium, all the while keeping you up-to-date on your favorite basketball team's game in progress. Another device might chime on your wrist, letting you know that the route home is congested with traffic, and flashing the address of a restaurant where you can eat cut-rate sushi while waiting it out. At home on your computer, the same system will run soothing screensavers underneath regular news flashes, all the while keeping track, in one corner, of press releases from companies whose stocks you own. With frequent commercial messages, of course.

Sure, we'll always have Web pages. We still have postcards and telegrams, don't we? But the center of interactive media - increasingly, the center of gravity of all media - is moving to a post-HTML environment, a world way past a Web dominated by the page, beyond streamed audio and video, and fast into a land of push-pull, active objects, virtual space, and ambient broadcasting. You might not want to believe us, but a place where you can kiss your Web browser goodbye.

No, the 150 million Web pages now in existence won't disappear. They'll only proliferate, and at an increasing rate worldwide. We can expect a billion Web pages by 2000. Some of them will even be worth reading. But superseding those billion pages will be a zillion nonpage items of information and entertainment. Think video. Think text flickering over your walls. Think games at work. Think anything where a staid, link-based browser is useless.

But hang on. The good old page browser won't *disappear*. It will *migrate*. The little string of code that fetches and displays HTML documents will go forth and multiply, making what your browser does today second nature to all your other applications. The browser becomes invisible by becoming ubiquitous. It submerges inside other programs, removing itself from our consciousness. The browser becomes the intellectual equivalent of a telephone switchboard. The operator who once connected your long distance call was a selection device to find the right person at the other end. Now, when your modem dials an ISP, phone company switches are still selecting, but the switchboard - once the defining experience of telephony - is gone. It becomes a historical legacy. Just as in the new networked media, the browser - now the Net's defining metaphor - is dying as the main event, to be reborn as a subsumed function and occasional option.

Of course some kind of interface is absolutely vital to life on the screen. The design of what is emerging - what glyph sits where or which icon does what - is now neither clear nor important. All kinds of designs are being tried. The labs of PointCast, ESPNET SportsZone, and CNET buzz as 20-year-old hotshots conjure up specific manifestations. What *is* clear is that regardless of what they come up with, the outlines of a new type of media are visible. A practical interface for distributed, point-to-point media will blossom and thrive. What *is* about to disappear is the defining role of the old Web.

Push here!

Right now the Web means information framed on a two-dimensional hypertext page. It means users navigating via blind clickable links and search-engine requests, drilling down to try to find what they want. And it means content displayed within an application on a computer screen. These traits - the page, clicking, and the PC screen monopoly - are already retreating into the bowels of the Net.

In its place, a new medium is arising, surging across the Web in the preferred, many-to-many way: anything flows from anyone to anyone - from anywhere to anywhere - anytime. In other words, a true network like the telephone system, rather than a radiating system like radio or TV. This new medium doesn't wait for clicks. It doesn't need computers. It means personalized experiences not bound by a page - think of a how-to origami video channel or a 3-D furry-muckers VR space. It means information that cascades, not just through a PC, but across all forms of communication devices - headlines sent to a pager, or a traffic map popping up on a cellular phone. And it means content that will not hesitate to find you - whether you've clicked on something recently or not.

It means, in short, a more full-bodied experience that combines many of the traits of networks with those of broadcast. The buzz phrase for this convergence is "push media." Content is pushed to you, in contrast to the invitational pull you make when you click on the Web. The push can be gentle, in-your-face, intermittent, in the background, or always on.

The 1.7 million downloaded copies of PointCast demonstrate how a gentle push works. When your computer is idle, PointCast uses the Web to push news bits (of your choice) and advertising onto your screen in a slow parade.

If your attention is grabbed, you can click to pull up an expanded version. Berkeley Systems, the outfit that has sold millions of the legendary After Dark screensaver, has a similar idea grafted onto flying toasters, so to speak. Three other start-ups - IFusion, BackWeb, and Excite - are crafting similar idle-time interfaces. Corporations, for instance, are using these push interfaces to deliver messages to employees that might otherwise get shuffled aside.

David and Goliath are at it, too. At the December 1996 Internet World, Netscape CEO Jim Barksdale delivered a keynote address on the future of the Web, without using the word *browser* once. What upstart Netscape has in mind is a wholly new interface, codenamed Constellation, which serves both pull and push content straight from the computer desktop - in other words, without having to launch a browser. The idea: to extend the Web interface beyond the borders of the browser window and onto the desktop. And since you don't have to launch an app to get info, it can be easily pushed to you.

Up in Redmond, Washington, Goliath is aiming at the same bull's-eye. The busy folks at Microsoft plan

to release, also in early 1997, their beta version of a new push interface, Active Desktop. The plan here is to turn every desktop window into a channel. Instead of a window framing a static page, it frames an ongoing stream, a 3-D space, a game, or any media manifestation you like. Like Constellation, you don't have to *launch* anything to see it; the content launches itself from the level of the OS. The way they like to think about it is that Microsoft is expanding the desktop to take over the browser.

Underlying the move from invoked to evoked content are distributed object-oriented technologies such as Java, ActiveX, and WebObject. Their central mission is to shoot every conceivable media flavor across, through, in between, and around a network that includes every conceivable hardware device. In effect, they unify the mediascape, making it possible to send a video to a phone, to push an email to a dashboard, or insert your preferred colors and body size into a clothes ad.

Most large media companies are already experimenting with networked push. Wired Ventures' online company, HotWired, and other Internet content pioneers such as CNN Interactive and Starwave's ESPNET SportsZone, all have push media of one kind or another running now. HotWired's versions use an array of the new tools, including PointCast, Castanet, Java, Active Desktop, FreeLoader, and Netscape In-Box Direct. (The latter two are interim technologies that push Web pages to your mailbox.)

Consider the near future: In the middle of wandering through a Web site on Eskimos, you suddenly switch to push and watch *Nanook of the North*. Or while doing a spreadsheet for next year's budget, you get interrupted with an on-the-spot packaged report of an oil spill in Chesapeake Bay. Or while zoning out with *ER*, you suddenly wonder if you too might have rickets, and so you click on the button in the corner of the screen to pull up an autodiagnostic questionnaire on the disease. This is push-pull media.

The essence of push media is that it will evolve literally countless hybrids: You are standing on a street corner of an unfamiliar city where you are attending a convention. On your PDA, you stare at a map of a city. It looks like rain. The weather icon starts blinking. Droplets pepper your glasses. On the map, tiny umbrella icons appear showing stores within a two-block radius that sell rain gear. This carefully tailored mix of instruction and merchandising is environmental push media. Low-intensity networked media. Always-on media.

You are in your study, answering email from the office when you notice something happening on the walls. Ordinarily, the large expanse in front of you features a montage generated by SCI-VIZ - a global news feed of scientific discoveries, plus classic movie scenes and 30-second comedy routines. You picked this service because it doesn't show any of the usual disaster crap, yet the content is very lively, a sort of huge screensaver. Which you usually ignore. But just now you noticed a scene from your hometown, something about an archaeological find. You ask for the full video. This is always-on, mildly in-your-face networked media.

You are driving your car, using the heads-up map display on the windshield to find your way around a strange city. It works wonderfully, helping you get to your appointment on time. Real-time display is expensive, but you're not paying for it. It's "free." You pay by renting a little piece of your brain to the Krakatoa HeadsUp Advertising Corporation, which beams clever poetic messages twice an hour. They are little rhymes, and no matter how hard you try, you cannot get them out of your head. But they beat getting lost, and the maps are detailed beyond belief. Including weather reports. This is ambient, low-intensity push media.

You are skipping through footnote links, researching the diaries of impressionistic painters, when you come across the letters of van Gogh's brother, Theo. The next link holds the documentary film *Vincent*, a feature-length saga about the painter's last years based on his accounts. You click. An hour and half (and US\$3) later, you resume surfing. This is intense networked push media - for that 90 minutes, you did not steer at all.

You sit down at your big screen and send your bot out to the DreamWorks server. Give me something 45 minutes long, you tell it. Something funny. You know what I like. Something I can interrupt while I make some phone calls. OK, start. This is in-your-face, immersive, experiential push media.

Revenge of TV?

At first glance all this looks a lot like the revenge of TV. It's back! Just when a billion Web pages are blooming, the subterranean instincts of couch potatoes rise again! After 45 years of addiction to passive media, only a handful of us turn out to be up for the vigorous activity of reaching out to engage the world. Bummer.

True, there's a little couch potato in all of us. The human desire to sit back in the EZ-Lounge and be told a completely ridiculous story is as dependable as the plot of a nighttime soap from Mr. Spelling. But when *The Wall Street Journal* trumpeted the arrival of push media by declaring that the Internet "has been a medium in search of a viable business model. Now it has found one: television," it got the story almost entirely wrong. The new networked media do borrow ideas from television, but the new media landscape will look nothing like TV as we know it. And indeed, it will transform TV in the process.

Start with HTML, the lingua franca of the traditional Web. HTML is an instantiation of SGML, a metalanguage originally developed by IBM to handle in-house documentation for mainframe computers. In other words, it's the language of an archive medium. Archive as in stacks of old books in a library. The Web is a *wonderful* library, but a library nonetheless.

On the other hand the new networked media - part instructional and part entertainment - are not archival, but immersive. The image to hold in mind is an amusement park, full of experiences and information coming at you in many forms, some scripted, some serendipitous. It may be intense, it may be ambient, but it always assumes you are available. Push media arrive automatically - on your desktop, in your email, via your pager. You won't choose whether to turn them on, only whether to turn them off. And there will be many incentives not to.

Foremost is relief from boredom. Push media will penetrate environments that have, in the past, been media-free - work, school, church, the solitude of a country walk. Through cheap wireless technologies, push media are already colonizing the world's last quiet nooks and crannies.

At the same time, networked push media can - and will - bombard you with an intensity that invitational media never muster. After a hard day at work, who wants to come home and craft an experience by prospecting for a granule of intelligence or amusement that's buried in 100 billion Web sites? There are times you want the content to steer you. It's worth paying for selections, edits, digests, synthesis, and branded creations. Or you can sit in your chair and become absorbed in a multiplayer game that has been in progress all day, that knows your skill level, can locate your friends, and is just waiting (if not begging) for your attention. Push media are "always on." And there are human agents behind the scenes, working overtime to keep the content always on target, always on top of things, always seeking you out.

The promise of push-pull media is to marry the programmed experience of television with two key yearnings: navigating information and experience, and connecting to other people. With networked media you get TV's high production values along with the intense communal experience of watching something together - virtual communities. You also get the ability to address small self-organizing audiences that broadcast could never afford to find. And you get well-crafted stories seamlessly integrated into other media, such as online conversations. This heightened ability to extract meaning, experience, or community - rare with content pushed by broadcast - is almost the rule with content pushed on a network.

There is another way to think of this. In the old digital landscape there were two extremes: pull media (the Web) and push media (TV, radio, movies). Some pros (see "Beyond Star Wars," *Wired* 5.02, page 160) adamantly believe the two poles will never cross. They suggest that while information may converge into the home, once there, the data will inevitably diverge again according to its use. Pull media - interactive media - are something dealt with sitting alone, on a chair, in a den or study, 18 inches from the screen. Push media, on the other hand, are better experienced on a couch, 6 feet from the screen, in a room often shared with others. The idea is that these two positions represent

inherently different modes of being, that the two don't - can't - happen at once. You either have stories (no interaction) or interaction (no stories), and never the twain shall meet.

All kinds of evidence suggest this notion is bunk. Not the least is this magazine. Is it push or pull? When you start to read, you invite information on your schedule, but once you dive into a story (if it is good), the author pushes you along, and the magazine steers. There are ads that push into your face, but you can effortlessly turn them off by flipping the page. Few media are purely invitational or wholly passive. Movies initially seem the paragon of push (once you're seated). That's part of their charm. You surrender to the director's manipulation of your emotion and mind. Yet when movies are played on television, in the competitive jungle of 500,000 channels, they are subject to the relentless interactive tick of the zapper.

That almost neurotic urge to zap has falsely led people to think that what viewers want is more zapping, more control, more steering. What they want instead are more ways to zap. More ways of interrupting flow, more varieties of story and no-story, text and game, of things done together with other people and things done alone. More states that flit between steering the media and being steered by it. More ability to tweak the dial, between twirling and being twirled, so that finally you can dance with the media. Networked media offer nothing more and nothing less than this: an expanding set of possible in-between states, combinations of push and pull and the means to slide between them.

The emerging postbrowser interfaces create different ways to "play" human attention: as ambient publishing, as intensely spatial 3-D experiences, as TV you can read, as a sustained tango with an editor or director.

Web roulette

If the Web were working perfectly for everyone, we might not need to contemplate subtle new variations. But strong forces are dislodging the browser from its throne:

First is the little-uttered secret that many Web users suffer a sense of being lost and overwhelmed. That's why 50 percent of regular users in one recent survey report that they simply don't surf anymore - they hit the same sites every time they log on. The best part of the Web is its worst: it's a web. You don't know where the good stuff is, and when you land there, the signal is camouflaged by all the noise. Clicking becomes Russian roulette. Yeah, rolling your own is very rewarding, but often we'd like someone else to slip us a ready-made. Even though it may not be as nifty as the one we made. Or maybe because it *is* niftier and better made. As it is now, there is an audience of millions with high expectations, and they aren't being satisfied.

Second, push media can build community through the expectation of reliability. There is a huge difference between having your newspaper delivered to your door every morning and going out occasionally to a box down the street. Home delivery of newspapers is as reassuring as it is convenient. You are participating in a ritual that links you to thousands of other citizens. The millions of *Seinfeld* viewers know what we're talking about. There is value in common and simultaneous knowledge.

Which is why television will keep on keeping on: TV becomes just another channel on the Web. You dial it for a mainline fix of unadulterated push. It's great for that universal plunge into the Thing Larger Than Myself. Broadcast TV (over the Net) will work - for some people, anyway - forever. What network media do is liberate TV, releasing it from the chore of science shows and miniseries, and letting it do what it does best - sports and breaking news - even better than before.

Third, push has advertisers transfixed - perhaps for the wrong reasons. Many on Madison Avenue believe that Web banner ads are too lilliputian, too inert, too scattered to warrant deep spending. But those same veteran pushers will lunge at the chance to foist stiffly animated 30-second spots upon semiattentive viewers. It's worked before! They'll happily back push media in hopes that the spells that work on TV will work there, too. Zonk! Wrong! Every notch on the push-pull dial will be different, with its own distinctive ad dynamics. But in the short run, advertisers can be counted on to pile in.

Confusing that stampede is a subtle distinction: the steering that push media do can be intense, or it can be ambient. Many advertisers see push media extending TV's absorbing intensity. In some cases, it will. But television's real power isn't high-impact "realism" - it's the way TV insinuates itself into viewers' daily lives. The same with ambient push media - what will hold Madison Avenue's interest in the long run will not be intensity, but ubiquitous presence in consumers' lives.

Billions of dollars are at stake. The Yankee Group, a Boston-based market-research firm, predicts that within three years, nearly a third of the projected \$19.1 billion in annual Internet revenue - from advertising, transactions, and subscriber fees - will derive from push media. So the \$6 billion question is, Who will control it? The pervasive and distributed nature of networks works against central control. On the other hand, it works in favor of common standards. In a networked world, ubiquity conquers superiority - a widely accepted technology will overwhelm even a technologically superior rival. So the advantage goes to any company that can insure applications, content, and interfaces (the simpler the better) that work in a wide variety of environments, configurations, and versions. This might seem to favor giants, but just look where the Web sprang from. HTML and HTTP were inferior technology to, say, Ted Nelson's Xanadu, but they were also a simple, adequate hack that encouraged universality. And one that sprang from Geneva, of all places. There are likely to be giants involved in the new push media, but they won't have control.

Giants - including the original pushers, the great media giants - *will* hatch a lot of push. But initially the bulk of it will be dispensed on corporate LANs, because they have the fat pipes that let push work best. General Motors, for instance, is already using push to minicast training videos to its dealers. Those corporate LANS will eventually become the model for more neighborhood-sized networks, such as the networks being built by @Home, which will be stuffed with both push and pull media.

But push media's most revolutionary advance may be the creation of a whole universe of small-scale (and not-so-small-scale) broadcast networks. Until now, broadcast networks had to be huge to be ubiquitous. Smaller ones were proprietary and fixed. Really small ones were called mailing lists or videoconferences. Networked media, on the other hand, can create broadcasting networks of any size and shape, especially the intermediate size between TV and, say, personal mailing lists. You can push-pull broadcast to llama keepers or home schoolers, reconfiguring the shape of the network on the fly. Until now, the Net has been a place of pull-laden networks; now it will also be a Net of push-laden networks, a world of nichecasting - thousands of mini-networks, ranging from micro-TV stations to totally customized personal programming. Imagine a company that "mailed" live multiplayer interactive games to your desktop.

Abhorring vacuums

Already push media such as PointCast pop up in places where push TV would not be welcome - say, on corporate desktops. Soon we'll get media in odd mixtures of our choice: on minicell phones, on watches, on slivers of paper, and especially on computer screens. We'll have media playing off digital ink painted on walls, media coursing through telephone displays, media flickering as we drive our cars, media on our smart digital TVs. Networked push media take us one more step toward closing the gaps between existing media, toward one seamless media continuum, viewable in an infinite number of ingenious ways.

Media abhors a vacuum. It will colonize any vacant communication channel. And advertising - a type of communication - will follow. Media will also fill any possible means of communication, from pokey single-bit transmissions to industrial-strength mind melds. The communications revolution we initiated a decade ago continues to grow new habitats for media settlement. The largest so far is the low-bandwidth, still largely phone-based Internet, with some early hints of the high-band future to come. All we can say is, Let a thousand media types bloom. Soon.

Because as rapid as the arrival of networked pull media was, the second act - networked push media - is coming even faster. The Web took everyone (digerati included) by surprise; a new media materialized in the cavities of the phone system over the space of a few months. Push media will surprise again, quietly arriving under our noses, disguised as screensavers and pager messages and

new channels on old Web sites.

At the risk of repeating ourselves, the technology and social forces that make a networked push revolution likely can be reduced to this:

- 1) Increasingly fat data pipes and increasingly big disposable displays render more of the world habitable for media.
- 2) Advertisers and content sellers are very willing to underwrite this.
- 3) The ever-expanding network model that started with the postal system and telephones is being transplanted to this new ecology.

- 4) Do-it-yourself is great, but as in most aspects of life, people prefer ready-made. And when it comes to information, that means getting things from trusted sources.

Taken together, these certainties suggest we'll see a new media upswell that will make the remarkable phenomenon of 150 million Web pages created in 24 months seem slow and mild.

One large uncertainty remains. Currently in the US, networked media are mostly granted full freedom of speech. Radiated media, on the other hand, are regulated. And push content, carried by "scarce" radiated spectrum - TV - is fiercely regulated. If governments should be so stupid as to regulate the new networked push media as they have the existing push media, the expansion of media habitat could falter.

There are other less lethal uncertainties. Like all new power, network media can cut both ways. The distinguishing characteristic of the new push media is that it finds you, rather than you finding it. That means the content knows where you are and what you are seeing. When you connect to a Castanet channel and receive a Java applet, you also have a bot that knows your address. When ActiveX lands on your hard drive, you have an active stranger in your box. This is good news and bad news. The good news is that push technology increases relationships, which by definition are two-way. Information flows back up and across. But the threat to your privacy and your tranquility is hard to miss: the more media smartifacts know about you, the better they work. What is not clear is how each new variation of push-pull, ambient, ultimate media will extract their costs.

If these new media follow the pattern of other new technologies before them (and nothing we know about them indicates otherwise), the near future will see a cycle of extension and unification. Some will extend the capabilities of the old; we have PointCast extending the Web into push. Some will unify these new capabilities; we have the new Intercast chip from Intel unifying the Web with TV. Extension creates sexy new stuff, which is great but also complicated, creating opportunities for unification, to resupply warm, familiar fuzzy convenience. Extend, unify, extend further.

Each cycle of extend/unify notches up the ratchet of media complexity. Ontogeny recapitulates phylogeny, in interactive media as in biological life. All new media - including networked media - recapitulate the evolution of former media, until the new media eventually achieve their own limits. So online media have evolved from smoke signals (email) to books and magazines (the Web). We are now about to arrive at television (push media), before we finally emerge into what interactivity is really about. This next stage is at once immersive, engaging, responsive, pervasive, and always on. Smooch your cranky old browser one last time, because it's going bye-bye.

We think we "surf" the Web now, but what we really do is hopscotch across fragile stepping-stones of texts, or worse, spelunk in a vast unmapped cave of documents. Only when waves of media begin to cascade behind our screens - huge swells of unbrowsable stuff - will we truly surf.

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