

BY AARON WEISS

The POWER of COLLECTIVE INTELLIGENCE

Though the overall health of the tech sector may have looked bleak a few years back—at least in the eyes of financial analysts—a blend of old and new ideas, evolving technologies, and changing cultural values have recently given the online world new vigor. With content derived primarily by community contribution, popular and influential services like Flickr and Wikipedia represent the emergence of “collective intelligence” as the new driving force behind the evolution of the Internet.

Sometimes referred to as sharing, collaboration, aggregate knowledge, or community, the fast-growing vines of so-called social software are quickly overtaking the Internet. Excitement and passion are once again inspiring enthusiasts and capitalists alike. How did we suddenly get here? Not so suddenly, in fact. Like most innovations, the latest Internet evolution didn't appear spontaneously, and the forces that carried us here might just give us some clues to where we're going.

Forward Thinking

In a July 1945 essay in the *Atlantic Monthly*, Vannevar Bush, then-director of the Office of Scientific Research and Development, advocated a vision for scientists to strive toward once they were no longer needed to concentrate on war efforts.

“Consider a future device for individual use, which is a sort of mechanized private file and library,” Bush wrote, describing the personal computer only one year before the offi-

ILLUSTRATION BY PAUL ZWOLAK

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cial commissioning of ENIAC, the first-ever all-electronic computer. Although ENIAC weighed 30 tons, Bush looked ahead, envisioning this future device as part of “a desk, and while it can presumably be operated from a distance, it is primarily the piece of furniture,” complete with, “slanting translucent screens, on which material can be projected for convenient reading. There is a keyboard, and sets of buttons and levers.”

Bush described with detailed examples how this device—which he calls a “memex” (can’t win ’em all)—will supplement human memory. “Wholly new forms of encyclopedias will appear, ready made with a mesh of associative trails running through them,” he wrote, already considering their application for lawyers, physicians, and chemists for consulting not only facts and figures, but the experiences and opinions of their colleagues.

Remarkable as it is that Bush described

personal computers, hypertext, and rudimentary social software in one essay 70 years ago, he’s not entirely alone among prognosticators in computer history. Later, in 1968, head of the Advanced Research Project Agency (ARPA) Dr. J.C.R. Licklider wrote not only about computers as calculation devices or simple communication systems, but as collaboration systems. “...One must consider the dynamics of ‘critical mass,’ as it applies to cooperation in creative endeavor. Take any problem worthy of the name, and you find only a few people who can contribute effectively to its solution. Those people must be brought into close intellectual partnership so that their ideas can come into contact with one another.”

Dr. Licklider argues that these problem-solvers—who we might today refer to as the “knowledge workers”—are independent by nature, difficult to force into a team, but too valuable to let scatter into private disconnected “empires” of their own. He suggests there must be a way to use computerized communications to facilitate exchanges between remote people, harnessing the power of their aggregate knowledge without threatening their strong individual wills. While predating the Internet itself—which would later grow out of ARPA’s very research—Dr. Licklider writes in detail about group psychology and how such a collaborative communications system, were it to exist, could enhance cooperation.

When we consider a hot, buzz-worthy Web site of the new Internet evolution like del.icio.us, the social bookmarking service, or Flickr, the photo-sharing site, they are at the same time incredibly innovative and yet—not. In their own ways, Bush and Licklider (among others) described them decades ago.

But forecasting a hypothetical vision and making it actually happen are two

different things. In a longitudinal sense, today's community software has been many decades in the making. But why now? What factors have ignited in the short term to create the heat and energy surrounding the latest evolution of Internet communities?

Growing Up Is Hard To Do

The World Wide Web has always been about sharing. Ever since Tim Berners-Lee developed the software aptly named "WorldWideWeb" in 1990 to publish information with hypertext and, in 1993, when his employer CERN (the European Organization for Nuclear Research), declared that the WWW technology would be freely available to everyone, the gates to self-publishing swung open.

But with rudimentary, embryonic standards in place amidst rapid evolution in computer hardware, exchanging ideas and information was still limited to those with specialized knowledge.

Until 1993, commercial use of the young Internet was prohibited. In its early years this constraint formed a protective barrier, allowing academics to develop shared standards and protocols without the competitive, proprietary interests of for-profit interference.

That walled garden also kept out much of the public and, in doing so, deprived the Internet of what was needed to form fully vital electronic communities, as Dr. Licklider described—critical mass.

When the commercial use ban was lifted, some in the academic community bemoaned the arrival of the unwashed masses. Private businesses like America Online unleashed their users onto the Internet, lending the Web popular legitimacy while bringing a culture broader—and sometimes in conflict with—that

which academics had been cultivating among themselves.

The Internet of the early '90s was brimming with promise but marginally developed. In theory the network could democratize sharing of knowledge, but the tools were still obtuse and inaccessible to most people. In theory the network could create sophisticated knowledge communities, but as a document delivery system, the World Wide Web was still too one-dimensional.

Critical mass demanded more utility and greater accessibility, creating the teeming, chaotic Internet of the mid-'90s, much like New York City at the end of the 19th century.

The browser wars between Netscape, Microsoft, and other business players extended the capabilities of the Web beyond its original specifications. Sometimes sitting on the sideline was the World Wide Web Consortium (W3C), the standards body formed in 1994 to "lead the Web to its full potential"—a neutral arbiter of standards to drive the development of the Web. The W3C coolly, calmly developed and released specifications for CSS (Cascading Style Sheets), ECMAScript (aka JavaScript), HTML versions 1, 2, 3, and 4, and XHTML.

In their rush to outdo each other, browser developers only sometimes listened to the W3C. Competition led to major instability for Web users and developers. A nightmarish mixture of standard and proprietary technologies was compounded by software rushed to market, riddled with bugs and incomplete features.

And now for the good news: The worst of those stormy times seems to have passed. Despite the warring technologies, the half-broken implementations, and the sometimes confusing user-experience, the magic of the Internet and the Web shined through it all. The masses kept on coming anyway.

In the marketplace there were winners and losers. Businesses who aggressively tried to buck standards ultimately succumbed to critical mass. Even giant and powerful Microsoft learned costly lessons, ultimately embracing (mostly) standard, open, and free technology specifications.

The Truth about Blogs

The rise of Web logs, or blogs, hit the media radar in 2000, when software such as Blogger and EditThisPage was catching on quickly. Crusty veteran technophiles will frequently note that blogs—regularly updated Web sites often featuring news, comment, and personal diaries—are really nothing more than home pages circa the early '90s.

But blogs did offer something new—ready accessibility. In the first evolution of the Web, expressing yourself—whether through political opinion or photos of your new puppy—involved a steep learning curve for the average person. Including interactive features linked to particular chunks of content stretched the thin tools of the '90s even further.

Blogs didn't invent a new kind of content, they automated what was already possible. Because blogs can be interactive exchanges between writer and reader, virtually anyone comfortable with surfing the Web could now create their own online community. Blogs shrunk the gap between consumer and producer. Although sharing ideas, facts, and opinions in electronic communities was not new, by opening the “means of production” to non-programmers everywhere, blogs introduced that highly combustible fuel—critical mass.

The Many Kinds of Sharing

The concept of “sharing” itself is exploding into multiple meanings. Blogs, of

course, represent sharing thoughts and expression. Podcasting could be called their first direct descendent, a kind of audio blog distributed (usually) in MP3 format for playback on a digital audio player.

Like blogs before it, podcasting itself contains no technological revolution—people have made digital recordings for many years. The podcast was really born from the intersection of two evolutions in accessibility. One, the development of software for organizing and “broadcasting” digital audio recordings built upon a new XML application called RSS (Really Simple Syndication). And two, the popularity of the iPod, which brought critical mass to the portable digital audio player market.

Then there is file sharing, itself a booming activity, not to mention politically, legally, and ethically controversial. The development of peer-to-peer network protocols used for KaZaa, Morpheus, and BitTorrent, combined with the irresistible temptation of getting free music, movies, and software, demonstrates the massive power of network collaboration.

In fact, peer-to-peer applications allow sharing of two very different assets simultaneously—content and resources. People are drawn to P2P to share files, typically multimedia. The P2P architecture itself does this by sharing network resources among the very users of the system—spreading the work of transferring the data across multiple machines.

Just like sharing content itself, sharing resources can be used for better or worse deeds. The increasingly popular VoIP software Skype relies on a P2P-like architecture to route telephone conversations across the Internet—providing free and low-cost phone service and competition to incumbent providers. On the other hand, spammers now send an estimated majority

of unsolicited email traffic through “zombies”—vulnerable machines infected with software for relaying spam. In effect, the spam lords have created an unwitting network of shared resources.

We Collaborate

The rush to share is driving a new evolution of exchange and realizing the possibilities for mass collaboration forecast by Dr. Licklider in 1968.

Where blogs unleashed one- and two-way conversations with the world, the “wiki” represents a collaborative cocktail party. The wiki, first developed by programmer Ward Cunningham in 1995, is a system for writing documents collectively. In some ways the wiki actually reflects Tim Berners-Lee’s original vision of the Web browser, as both a reading and writing tool.

Used mainly for specialized and experimental projects in the ’90s, it wasn’t until the Wikipedia project launched in 2001 that critical mass came to the wiki. Larry Sanger and Jimmy Wales founded Wikipedia to create a fully open encyclopedia—a kind of information utopia, aggregating the knowledge of anyone who cared to participate, and providing them the authoring tools to do so. In the Wikipedia, anyone can write or edit any article about anything at anytime, without restriction. In their belief that, with sufficient critical mass, truth would arise from consensus, Sanger and Wales have attracted many believers—the Wikipedia now contains over 665,000 articles (compared to 65,000 in the 2005 Encyclopaedia Britannica). Wales’ Wikimedia Foundation has since launched WikiNews, bringing the same open, collective authorship philosophy to daily news coverage.

Some question the authority and reliability of the Wikipedia, and recent episodes of politically-motivated vandal-

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ism suggest there may be limits to an unrestricted collective. Wikipedia’s Wales recently proposed that some articles may become “frozen”—protected from change once considered mature. It remains to be seen how the Wikipedia community will react to this new authorship model, and whether it will motivate or dampen volunteer contributions. But whatever happens moving forward, it is already clear that the Wikipedia’s popularity has propelled the wiki process into widespread use as a collaborative authoring tool.

What the wiki represents is a kind of collaborative sharing that is more finely-grained and more complex than the dialogue of a message board community or feedback blog. Rather than share their thoughts in a call-and-response interaction, wiki authors contribute pieces, chunks, fragments of knowledge which are ultimately weaved into a whole.

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The New Sharing

This aggregation of fragmented bits and pieces distributed across many people characterizes the “new sharing,” a phenomenon that is drawing new attention to the Internet from pundits and businesses alike.

At the center of the new sharing is Flickr, a photo-sharing site which debuted in 2002. Its concept is simple—users upload pictures and describe them with ad-hoc “tags”—basically, loose metadata.

As its user base has grown, Flickr has become a public database of pictures. Photos can be restricted from public view by uploaders, but fewer than 20 percent are—a telling sign that people actively want to share and receive the benefits in kind. Like the wiki, Flickr is a self-organizing community—the system imposes no structure on the users, but lets them define their own. If you upload a photo of the Eiffel tower you might tag it as “Paris” and “landmark” and “where Tom pro-

posed to Katie.” Another user may come along and search for the tag “Paris” or “Katie,” finding your picture and everyone else’s who shared the same tag.

Like the Wikipedia, what appears to be a system ripe for disarray becomes naturally structured as critical mass is reached. From chaos comes order—when you enter the tag “Paris” for your photo, Flickr itself suggests some additional tags to consider—maybe “Europe” and “France” and “tourist trap.” Flickr infers its knowledge from the tags entered by every other user in the system—creating a so-called “folksonomy,” a group intelligence derived by association.

Both through collected photos and community-defined tags, Flickr demonstrates how aggregate sharing of fragments can create value, ultimately becoming more useful than the sum of its parts. Not content to stop there, Flickr has also become a poster child for the new sharing with one more twist: its API.

The API, or Application Programming Interface, is a set of technical documentation which tells a developer how to interact with a software engine. The Windows operating system includes multiple APIs which allow programmers to use built-in features like windows, menus, and so on.

Flickr published its API so that Web developers anywhere could write their own applications to leverage the Flickr photo and tag database. For example, Jim Bumgardner’s “Color Fields” is a Flash-based application which finds photos from Flickr tagged by color. Using a visual color picker, you can call up all Flickr photos tagged as blue, for instance.

By opening its API, Flickr shares not just the content inside its database, but how it can be used. Flickr is a triple play, sharing objects, knowledge, and resources.

API’s have now been published by Yahoo, Google, and other social software

sites. The result has been an explosion in development activity that injects sharing and collaboration throughout the Web. So-called “mash-ups” like Housingmaps.com combine real estate listings from Craigslist with Google Maps to make a visual house hunting guide. Williamsburger.com combines a Google Map of hipster hangout Williamsburg, Brooklyn with superimposed, color-coded bar and eatery ratings, menus, and reviews drawn from other sites.

Generation Next

Parents are liable to complain that kids take everything they have for granted. But when it comes to stewarding the evolution of the Internet, habituation may be the younger generation’s most vital asset.

These kids today—and teens and young adults (and everyone younger than me)—are Internet natives. They are no more impressed that the Internet exists than they are about cars, electric light, or indoor plumbing. They’ve never heard of Vannever Bush and, most likely, don’t care.

All of which is great news for anyone who wonders where the next Internet evolution will come from. Isaac Newton famously borrowed the humble saying, “If I have seen further, it is by standing on the shoulders of giants.” Whether we are giants or not, each generation enjoys the benefit of the work and vision that came before it.

Video games are more popular today than ever, a \$10 billion-a-year industry in the US alone. The most popular of these games are both increasingly non-linear and collaborative. Players share virtual worlds, virtual goods, and/or virtual currencies in games like EverQuest, World of Warcraft, Halo, and The Sims.

The growing evolution of sharing on

the Web and in game play becomes mutually reinforcing, shaping this generation’s expectations and influencing the tools they design now and in the future. For today’s young generation, sharing and collaboration on the Internet isn’t a new evolution at all. It’s what they know.

Share the Road (Ahead)

Nobody can predict the future, a fact lamented every week when the lottery draw is called. Strong indications suggest that the Web is rapidly evolving into an application platform, albeit in cycles of fits and starts as old standards mature and new standards are born.

The distance between the interface (the browser) and the logic (the server) is shrinking, particularly as new Web development strategies mature. One of the most popular, known as AJAX (Asynchronous JavaScript and XML), combines existing technologies to support asynchronous communication between browser and server. Web pages can react to information from the server without a refresh-reload cycle—introducing state to the otherwise stateless Web.

With ever more sophisticated APIs and Web services being shared, attracting a critical mass of developers to build tools on those services, and a critical mass of users contributing to the services’ value by aggregating shared knowledge and content, we have the makings of a truly collaborative, self-organizing platform. Viewed most optimistically, the new sharing driving today’s Internet evolution could lead the way to a truly democratic network, where producers and consumers are one and the same. Which may ultimately be what Vannevar Bush and Dr. Licklider had in mind so long ago. ~

Aaron Weiss is a technology writer and Web developer in upstate New York: www.bordella.com.

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