f i ® s t   m ¤ ñ d @ ¥

PEER-REVIEWED JOURNAL ON THE INTERNET

The Effects of September 11 on the Leading Search Engine
by Richard W. Wiggins

Abstract

The apparent terrorist attacks of September 11, 2001 changed the skyscape of New York City, and the political and emotional landscape of the United States. The attack may have also changed how the leading search engine, Google, thinks of itself. This article examines how people used the Internet in general, and Google in particular, to seek and to deliver desperately wanted information about the lives lost and damage inflicted by the attacks.

Contents

Introduction

The September 11 attacks on the United States caused millions of people to urgently seek information about what had happened, who had been killed, what damage had been inflicted, and what new developments were taking place. The public at large wanted to learn all they could about attacks on their homeland. A smaller group -- those who had friends, family, or colleagues who might have been in the World Trade Center, at the Pentagon, or in one of the hijacked airliners -- sought information with even greater urgency.

When breaking news occurs, different people flock to different news sources. Many find a television and tune to CNN (or one of its growing rivals). Some turn to National Public Radio. Some open a Web browser and point it at a trusted newspaper site, such as nytimes.com or washingtonpost.com -- or the online version of a media outlet, such as cnn.com or msnbc.com.

Google home page

Still others head to their favorite Web portal. Many will point browsers at Yahoo or AltaVista or Lycos or Excite. Most of these

portals began their existence as robotic Web indexers. In the early days, these "search engines" in the classic sense of the term were poor places to find news of breaking events. Their crawling and indexing processes paid no special attention to news sources, and they had no mechanism to turn the spider's attention to relevant news sources. The day Princess Diana died, I spent several hours searching the then-popular search engines to see which one would first report her death. (The "winner" was Infoseek.)

the morning of the attack.
Click on thumbnail to see full-size image.

Since that time, every popular search engine morphed into a portal. Human-edited content filled the screen. News links, product links, advertisements, and every manner of special service, from translation to image searches, cluttered each new portal's page. But the overwhelming dominance of human-edited Yahoo, and the inability of the search engines to effectively deliver instantaneous access to breaking news, fueled the transformation from pure engine to portal.

One search engine, relative newcomer Google, has resisted the temptation to become an all-encompassing, one-stop-shopping, complex portal. Before the September 11 attacks, Google only offered the sparest of home pages -- a simple logo, a single search box, and a handful of links to Google's own services. Not even a single banner ad appears on the Google home page. Google resisted the temptation to become yet another search engine-turned-portal. The only event-related content one ever noticed on Google was its amusing and tastefully crafted subtle changes to its logo, in order to honor holidays. (See http://www.google.com/holidaylogos.html.) Prior to September 11, Google devoted itself to a vision of "search is king." The user is tempted to do one thing: type a search phrase into the single form on screen, and hit Search. And the evidence is that millions of users did just that, beginning just moments after the attacks.

■ ————————————————————————
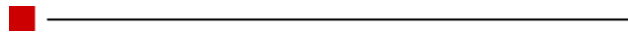
What Users Expected from Google

Google offers a window into what people are looking for week-by-week at http://www.google.com/press/zeitgeist.html. After the September 11 tragedy, Google offered a special page detailing changes in search patterns; see http://www.google.com/press/zeitgeist/9-11-search.html. The evolving patterns are fascinating. Note, for instance, Google's report of the top 10 search terms related to the tragedy used in searches the week after the tragedy:

Top 10 Google Queries Related to Terrorist Attacks - 9/11/01

1. cnn
2. world trade center
3. bbc
4. pentagon
5. msnbc
6. osama bin laden
7. nostradamus
8. american airlines
9. fbi
10. barbara olson

Overall, Google reports that on September 11 searching for news-related content

increased by a factor of 60. For the most part, the entries are not surprising. One can imagine what various users sought:

- **world trade center**: People wanted to know more about the trade center complex: its size, location, height, architectural history, structural makeup, surroundings, occupants, etc.
- **pentagon:** People sought the same kind of information about the Pentagon, as well as perhaps any official U.S. government information about the building or the unfolding disaster.
- **osama bin laden:** Bin Laden was named a "prime suspect" soon after the hijackers were identified.
- **nostradamus**: Rumors quickly spread that Nostradamus had predicted the disaster. People no doubt sought his original words and any interpretation as to how they might have applied in this modern event.
- **american airlines**: Since two of the hijacked flights belonged to American Airlines, people sought information about the airline, and perhaps sought its official Web site (which is not obvious because its domain is "aa.com".)
- **fbi**: Obviously the Federal Bureau of Investigation plays a key role in the ongoing search for links to the hijackers.
- **barbara olson**: This notorious conservative commentator was on board American Airlines flight 77, which crashed into the Pentagon; she called her husband, U.S. Solicitor General Theodore Olson, during the hijacking to seek counsel.

The other items in the top 10 are somewhat surprising. Consider, at the top of the list, "cnn". Immediately after the attack, some 6000 users per minute used Google to find CNN. Ever since the Gulf War, millions of Americans turn to CNN instinctively in time of crisis or major breaking news. It is interesting to see that that instinct translates to online quests for breaking news. But why would a user point his or her Web browser at Google.com, and do a search engine lookup, in order to find the Web site of the Cable News Network? Why wouldn't the user simply enter "cnn" or "cnn.com" into the Address field of their Web browser?

In some cases, it's possible that the user did try to go to `cnn.com`, and, encountering a timeout due to server or link congestion, tried Google to find the "correct" address. It seems more likely that Google is so effective at delivering popular sites at the top of the hit list that users trust Google as the primary locator for highly-popular sites. Many users have Google as their default home page; it is easier and more effective to hit the "Home" button and type the name of the site you are looking for in the Google search box.

Savvy Web surfers might consider someone naive for using a search engine to locate CNN on the Web. But if we count keystrokes and mouse clicks, it may be that this behavior is not so naive after all. Suppose a user tries to type in the URL for CNN into the browser Address field. They may type `www.cnn.com` or the proper form of `http://www.cnn.com`. Assuming Google is the user's default home page, the user need only type `cnn` into the search box, hit Search, and CNN will be the first site on the hit list. Entering in the full address costs 12 to 18 keystrokes and a mouse click. The Google approach costs 3 keystrokes and 2 mouse clicks. This user's application of Google as a finding aid is not only not naive -- it is quite efficient. Indeed, even if the user has CNN bookmarked (and is sitting at the computer the houses his or her bookmarks) the Google approach is faster than scrolling through a long list of favorite sites.

Google Searches for "cnn"   The user may realize that

it's possible in most modern browsers to enter `cnn` into the Address field and hit Enter. But the behavior browsers exhibit when you do this vary with the browser, the browser version, and with preference settings. Sometimes the browser will try `www.cnn.com` automatically. Other browsers may search RealNames. Others may initiate an MSN search. If instead the user goes straight to the Google search box, behavior is predictable: they will see a hit list, and the starting point they seek is usually the first item on the hit list. (If it isn't the very first item, for popular sites, the correct starting point is almost always in the first 10 hits.) Once again, the "naive" user exhibits a rational, efficient strategy for finding the site desired. And, as with American Airlines and `aa.com`, the greater the difference between brand name and domain name, the more rational the user's strategy becomes.

If this interpretation is correct, it speaks volumes about Google's primacy as an Internet resource locator. Those of us who have observed Web resource discovery tools unfold over the last decade generally argued that human-edited finding aids such as Yahoo would be the primary choice of people looking for Internet starting points, and that Web search engines would be used when people sought more specific information found deeper within Web sites.

No doubt Yahoo remains important as a finding aid; its reported traffic and continued relatively strong financial position attest to that. But when millions of people use Google to find CNN and MSNBC, it becomes even clearer that Google is a portal. Yet it is a portal with a difference. Upon visiting the home page, the user types in the name of the site, rather than drilling down a hierarchy of categorized links. Google delivers because simple but pioneering use of link analysis guarantees that popular sites bubble to the top of the hit list. (Google does offer a hierarchical drill-down list of Web sites based on the Open Directory project. I claim that the majority of Google users use the search box, whether they are searching for specific information or media company home pages; they'd visit Yahoo if they wanted to browse a drill-down hierarchy.)

This interpretation is consistent with recent reports that for most users, the Web isn't a place for random surfing; most users re-visit a handful of their favorite sites as they use the Web each day. Google may be more efficient than searching one's own bookmarks for popular sites; it certainly is more efficient if one is away from the PC that houses one's bookmarks. Under this interpretation, brand name is at least as important as Web site domain name. Whether the user seeks CNN or American Airlines, if it's the first item on the hit list (as will be the case with Google) the user is happy.

The Google Zeitgeist from September 24 reflects changes in the focus of the public (or at least that portion of the public that searches for information using Google):

Top 10 Gaining Google Queries
Week Ending Sept. 24, 2001
1. nimda
2. counter strike
3. anthrax
4. tribute to heroes
5. miss america
6. infinite justice
7. david letterman
8. bill maher
9. friends

10. bush speech

Note that this is Google's list of the top 10 *gaining* queries among *all* queries, not just those with an obvious relationship to September 11. Of course, it is easy to see that most of the items on the list bear some relationship to the tragedy. For instance, the two talk show hosts made news with their programming, Letterman for his emotional support for New York City and its police, firefighters, and mayor; Maher for his insensitive remarks about American cowardice. "Infinite Justice" was the Bush Administration's ill-chosen initial choice for a moniker for the new war on terrorism. The Nimda worm, which was released in the week after the tragedy and which may or may not have been related to the tragedy, topped the list.

One assumes that a large percentage of Google users reside in the United States, but we do not have good statistics on this. Google did report that 63% of its users in August 2001 chose to use the site in English. While assuming that the majority of U.S. residents surf the Web using English-language interfaces, there are no doubt many Google users in other English-speaking countries. (Unlike its rivals, Google does not offer country-specific portals; it does allow users to specify the language used for the Google interface, and it can limit Web searches to pages encoded in specific languages.) Given the large number of Internet users outside the United States who use English for navigating the Web, perhaps only one-half of Google's users in a typical month are American. (The presence of Letterman and Maher, known primarily by U.S. television viewers, on the "gaining" list tends to indicate that American usage dominates.) It will be interesting to see if the September figures show a different breakdown in languages. In any event, no doubt the phenomenon of using Google to find information about September 11 extends far beyond U.S. shores.
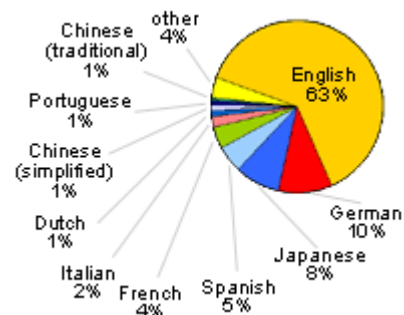
Google on September 11: To Browse, or To Search?

As we've seen, searching Google could be extremely effective for certain searches, such as looking for the CNN home page or background information on Osama bin Laden. But to the extent Google users sought real-time breaking news, a Google search is a poor place to start; Google does not currently offer a specialized index of current news sources. Moreover, many may have sought specific, authoritative sites to visit, not news per se: where to look for names of victims, Web sites for donations etc. Such users especially needed *authentic* pointers to trusted sites.

Post-September 11 demand by millions of users for real-time news and trusted Web sites may have transformed Google's vision about its role and responsibilities. Soon after news of the disaster unfolded, Google added a message to its home page informing visitors that television or radio, not the Web, was the best place to find breaking news information. Google also offered links to the Washington Post, a cached version of the CNN site, and to Yahoo News:
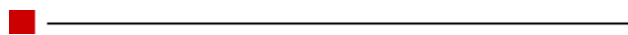
> If you are looking for news, you will find the most current information on TV or radio. Many online news services are not available, because of extremely high demand. Below are links to news sites, including cached copies as they appeared earlier today.
>
> **Breaking news:** Attacks hit US Washington Post - CNN.com (cached) - Yahoo! New

Google's advice to use a traditional broadcast medium was wise counsel. The Internet remains a narrowcast medium, not suited to millions of people flocking to a handful of media sites. People who are savvy about how the Internet works don't even try to find breaking news on the Net. I work at a major university with 1.2 gigabits/second of connectivity to the greater Internet; most of my colleagues flocked to watch cable TV in the break room, knowing that news sites would be swamped with visitors and unable to respond.

But millions of others do flock to news sites, and to portals -- and to Google. Any why not? Google is extremely effective at delivering relevant results for most of the kinds of searches real users perform. Without inside knowledge of how search engines work, doesn't it make sense to expect Google to come through with urgently-sought information when a national tragedy occurs?

Obviously the decision makers at Google knew that millions of people would rush to their site, either for breaking news, or for background information about the World Trade Center, the Pentagon, hikacking, terrorism, etc. If Google officers didn't realize this, real-time monitoring of queries told them very quickly that the pattern of searching for disaster-related content had emerged. As the days unfolded after the attack, users' thirst for information shifted -- and Google adapted its content to match the changing requests of users.

Google Evolves After the Disaster

Even though Google's advice to turn on the television was wise, Google belongs to the new media, not to the old. Eventually, Google changed their minds. Rather than sending visitors offline for current information on the unfolding tragedy, they sought to give site visitors what they were looking for.

By late afternoon Tuesday, Google's home page added to the list of news sources it was directly linking, as well as sources Google had cached:

> **Breaking news:** Attacks hit US
>
> Many online news services are not available because of high demand. Below are links to news sites, including cached copies as they appeared earlier.
>
> **Current:** Washington Post - Yahoo! News - CNN - ABC News - Yahoo! News Photos - NY Times
> **Earlier:** CNN.com - NY Times (1) - NY Times (2) - Washington Post

Google's caching of content raises interesting questions. Did they have permission from

CNN, The New York Times, and the Washington Post to cache their content? Even during an interval when media companies' servers and network links are strained, does Google have the right to intercept traffic that otherwise would be destined for media companies' own sites?

Offering cached versions of "earlier" content also raises questions as to how well the citizenry is being informed. When someone picks up a daily newspaper, it is obvious that the content is a snapshot of time, current as of the time the paper went to bed. The difference between "current" and "earlier" on a Web site isn't so obvious. Is "earlier" five minutes earlier? Ten minutes? An hour? Six hours?

On Wednesday, Google's home page added links to United and American Airlines -- the two airlines whose planes were hijacked and used in the attacks:

Ultimately, Google Acts Like a Portal

By late Wednesday, Google's handling of the "Breaking News" had changed yet again. Now, joining the practice of many commercial Web sites (even those with no connection to the incident or to the media), Google offered condolences to the victims. Google moved its news sources links from the home page to a new page of news and support resources.

The "new links and support information" page was far more extensive than the handful of links previously offered. Links to foreign news sources, including Arab, Israeli, and other national newspapers, were added. About this time, news broke that fraudulent donation Web sites were extracting money from an unsuspecting and malleable public. Later, we would learn that pranksters were populating some of the self-reporting "I'm okay" sites with bogus information. By offering an authoritative, human-edited list of news, donation, and rescue sites, Google provided the services one would expect of a portal. Even if Google's crawler had discovered these sites, a robotic search engine could never match the ability of a human edited list of relevant sites to separate the wheat from the chaff.

Google home page late Wednesday -- the day after the attack.
Click on thumbnail to see full-size image.

Note the links to a wide variety of news sources in the United States and abroad. Support resources include the Red Cross, the affected arlines, Web sites where survivors could identify themselves to friends and relatives, and trusted sites for giving donations. Cached links to media sites were removed; we do not know if this is because the content owners objected or because the overload on servers had diminished.

Now the transformation was nearly complete. Google moved from actually *advising its visitors to leave the Web in favor of traditional broadcast media,* to providing visitors with a set of links in a variety of topical areas. In effect, Google launched a mini-portal on the disaster. Perhaps tellingly, they named the folder google.com/news/. Here, in Microsoft Web Archive format, is a copy of the Google News links page as it existed on the Friday after the tragedy.

Google's transformation reached its ultimate form when their graphic artist created a simple logo representing the red, white, and blue ribbons many displayed after the tragedy. Relying on the iconic power of the new ribbon symbol, Google made no reference to September 11 or the attacks; next to the ribbon, they offered a link simply labeled "News and Resources."

It is illustrative to compare how the set of links Google provided in its /news folder evolved over the days since the attack. For instance, note the links offered on September 14 compared to those on October 2:

Google News Resources - September 14, 2001	Google News Resou
Google™ Home - All About **Current Events** **News and information about attacks in US** Below are links to news sites and support resources related to the terrorist attacks on the US. **Current News** • ABC News • CBS MarketWatch • CNET.com • CNN.com • EuroNews • FOX News • Jane's.com • MSNBC • NPR • New York Post • New York Times • Reuters • Salon • TIME.com • USA Today • Washington Post • Yahoo! News • Yahoo! News Photos • Asahi Shimbun • BBC News • CBC.ca • CNN en Espanol • CNN Japan • Dagbladet.no **Support Resources** • American Red Cross • America's Blood Centers • American Airlines • United Airlines • Amtrak • Pentagon Updates • Report terrorist activity • Emergency Contact Info (CNN) • Report You're Safe • WTC Survivor Database • Helping.org • FirstGov **Relief Funds** • Donate via Yahoo! • Donate via Amazon • Donate via PayPal **Contact Information (Airlines & WTC Businesses)** • American Airlines: 1-800-245-0999 • United Airlines:	Google™ Home New Our thoughts are with all those a We offers these links as a way o minute information on developing them useful. **Current News** Su • ABC News • CBS MarketWatch • Christian Science Monitor • CNET.com • CNN.com • FOX News • IDG News • Jane's.com • Military.com • MSNBC • NPR • New York Post • New York Times • Reuters • Salon • SiliconValley.com • TIME.com Re • USA Today • Washington Post • Wired News • Yahoo! News • Yahoo! News Photos • Arabic News Online

- Dagens Nyheter
- De Telegraaf
- De Volkskrant
- Diario de Noticias
- Die Zeit
- elmundo.es
- El Pais.es
- Guardian.co.uk
- Ha' Aretz
- International Herald Tribune
- La Repubblica.it
- Le Monde
- Le Figaro
- Pravda
- Politiken.dk
- Saunalahti.fi
- Sky News
- Spiegel
- Svenska Dagbladet

1-800-932-8555
- AON Risk Mgmt Corp: 1-866-256-4154
- Marsh & McLennan: 1-212-345-6000
- Keefe Bruyette and Woods: 1-800-726-0006
- Cantor Fitzgerald: 1-866-326-3188
- Morgan Stanley: 1-888-883-4391
- Fuji Bank: 1-888-537-3845
- Carr Futures: 1-800-755-7620
- Lee Hecht Harrison: 1-201-782-3704
- Thacher, Proffitt, & Wood: 1-800-698-4567
- Fiduciary Trust Co: 1-800-632-2350 ext. 22578

New York Hospital Information

- Greater New York Hospital Association (List of hospitals in NYC area)

- Mayor's Hotline Center: (212) 560-2730 (For families seeking to know if their loved ones were seen by a hospital in the NYC area)

- Asahi Shimbun
- BBC News
- CBC.ca
- CNN en Espanol
- CNN Japan
- Dagbladet.no
- Dagens Nyheter
- De Telegraaf
- De Volkskrant
- Diario de Noticias
- Die Zeit
- elmundo.es
- El Pais.es
- Guardian.co.uk
- Ha' Aretz
- International Herald Tribune
- La Repubblica.it
- Le Monde
- Le Figaro
- Pravda
- Politiken.dk
- rediff.com
- Saunalahti.fi
- SME Online
- Sky News
- Spiegel
- Svenska Dagbladet

Google home page on Tuesday, September 18 -- one week after the attack. Click on thumbnail to see full-size image.

For instance, note that on September 14, Google offered links to New York hospitals as well as links -- and telephone numbers -- for businesses that had had operations in the World Trade Center. By October 2 such links had been removed, replaced by links to other sites that could provide victim information. The October 2 list improved upon the list of respected international news sources.

The important point to note here is that someone at Google was playing the role of editor, selecting major, authoritative sources, and updating the content to match users' needs as they changed over time. This is an entirely new role for Google.
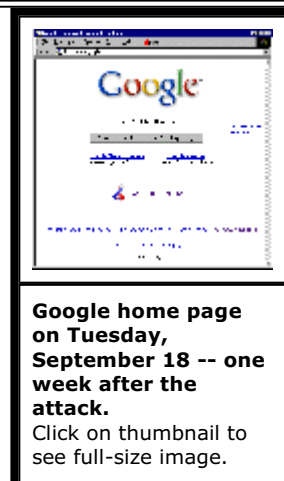
Google Use in Context

Google was by no means the only online source chosen by the American public and the world at large to learn September 11 news. No doubt millions of users pointed their browsers directly at CNN, or MSNBC, or The New York Times, or any of a growing list of foreign news sources. Indeed, as Google's list of online sources grew, many may have followed links to important news sources outside the United States.

Many were glued to the television for hours of the saturation coverage offered by broadcast and cable news outlets. Some cable channels, such as the Home and Garden channel, replaced programming with a statement of condolences. The Learning Channel substituted a BBC television news feed for its own programming.

In New York City the CBS-TV broadcast affiliate saw a surge in ratings, not only because of the nature of its saturation coverage, but also because its in-town rivals had lost their broadcast towers on the World Trade Center.

Of course, most of us get our information from multiple media. Many of us sought information from a combination of television, on radio, in newspapers, on the Internet, and word of mouth. Within a few days, many Americans suffered from an overload of information -- especially the images of the planes striking the World Trade Center and the Pentagon, repeated over and over again by the television channels.

The tragedy brought about inventive ways of using the Internet and other media to seek and to distribute information:

- Soon after the tragedy, many who had escaped the World Trade Center sought to reach family, friends, or colleagues by telephone. A major Verizon switching center had been destroyed, and long distance lines were saturated. Cell lines also were quickly saturated, so many people desperate to reach loved ones used the text-mode messaging features of their cell phones to communicate with outsiders. For many, this may have been the first practical use of text-mode instant messaging on a telephone.
- New Yorkers and those living in the D.C. area with cable modem, DSL, or direct Internet access in the workplace were able to send e-mail to others inside and outside the New York area. Some who could not get a long distance line were able to dial a local ISP to get the word out.
- Others used the venerable text mode chat tool known as Internet Relay Chat (IRC) to get the word out about their condition in particular and the news in general.
- As the various media sites became overloaded, some informal mirror sites sprang up, with individuals building their own caches of news stories and photographs. Other individuals sent emails with "deep links" to particular pieces of important content on media sites, so that their correspondents would not have to wend their way through slow-painting menu pages.

Within only a couple of days after the attacks, donations had begun surging into various charity sites. Sadly, scam charity sites and e-mails appeared as well. Various bits of disinformation and misinformation began circulating by e-mail, in chat rooms, and on Usenet. A human-edited list of authentic and authoritative sites for information, for donations, and for loved ones to learn about those missing, became critical. This is exactly what Google ultimately provided in its `/news` folder.

Google Responds

I asked Cindy McCaffrey, Vice President of Corporate Communications for Google, to comment on the evolution in the stance Google presented after the attacks. She observed:

> We did evolve our site over time as we learned about more information sources and as more sites became accessible. We began placing cached versions of articles on our website early in the day on Sept. 11. We knew that many of the popular news sites were being overwhelmed by people trying to access their sites. As we were able to capture information, we cached the articles and provided a link to the article on our home page.

McCaffrey puts a slightly different spin on Google's initial advice that site visitors turn to traditional broadcast media:

> We only recommended that people turn to TV or radio for the most updated information while we had the cached links on our home page (our intent was misinterpreted as a recommendation to not use the Internet, but instead go to the TV or radio; we merely wanted people to understand that if they wanted the most current news, they should check TV/radio). As the news sites were able to handle capacity, we began putting live links to their sites on our home page, and then on our news page linked off the home page.

Asked if Google noticed an overall increase in traffic after the disaster, or if there were any negative effects on performance. McCaffrey replied "[There were] no performance issues. Google currently handles about 120 million searches every day. Traffic was not significantly impacted by Sept. 11's events." It is possible that Google has a large body of regular users who simply turned their attention from whatever they normally search for to topics related to September 11. It would be very interesting to know how many of the 120 million queries on September 11 came from occasional users and how many from regular Googlers.

Finally, asked if Google is now committed to populating its `/news` folder, McCaffrey commented: "We don't have any definite plans at this time. We've received positive feedback from people who have indicated that this resource has been helpful to them, but we have not made any decisions on what we'll do with this page longer term."

Where Does Google Go from Here?

Where does Google go from here? Will this disaster set a precedent for the world's leading search engine? Is the "breaking news" section permanent? If so, will Google hire a 24 X 7 staff of editors, enter into content sharing and syndication deals with old and new media partners, and transform themselves into a portal?

Perhaps coincidentally, by early October Google had made a basic change to its front page interface. Tabs appeared, allowing users to switch among basic Web search, image searches, Google Groups (the window to Usenet News built after Google's acquisition of Deja.com), and the Google Directory:
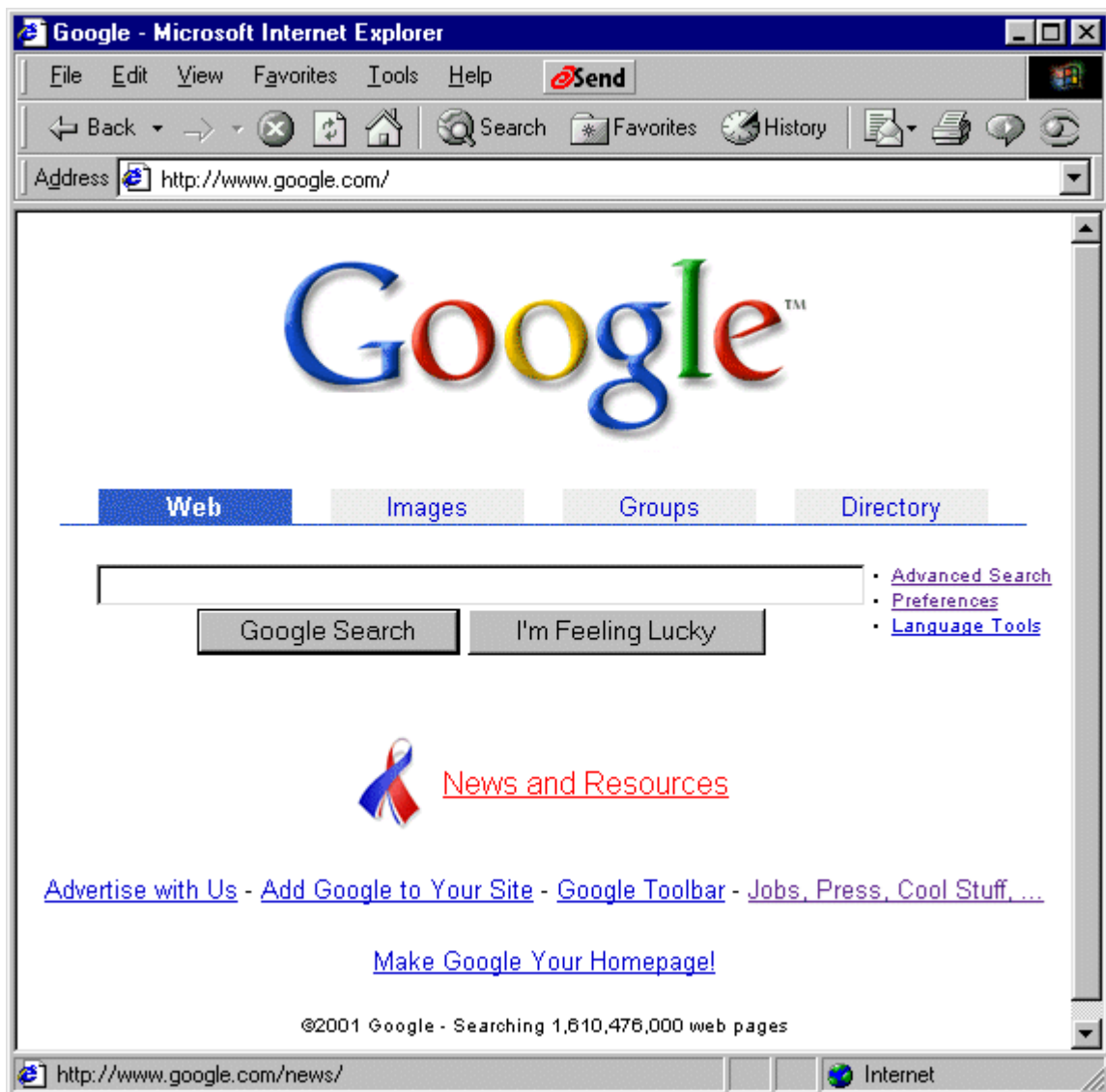
After performing a search, the user can click on one of the other tabs to re-execute the same search in one of the other Google indexes. It's easy to imagine Google building a nearly-real-time index of major news sources, and offering a fifth tab that allows users to search or to browse those sources. The cross-source real time news search concept was pioneered by Totalnews.com and later implemented by Infoseek and Northern Light as specialty searches. Will Google extend its role as the first place millions of Internet users turn to for relevant answers by adding a permanent news section? The answer depends on how well the company understands what people now expect from Google post-September 11.

My guess is that Google will retain a breaking news component on their site -- either on their own devices, or by working with one or more of the major media outlets whose Web searches are "powered by Google." I expect (and hope) that Google will resist the temptation to follow portal failures such as AltaVista, Time's Pathfinder, and Disney's go.com. Google will not clutter their home page -- nor will they lose sight of their vision that search is king. Still, I suspect we have not seen the last "Breaking News" content on Google's site. By meeting user demand for trusted information sources relating to September 11, Google has trained millions of people to expect Google.com to deliver breaking news.

Footnote: A Sadly Ironic Death

September 11 brought tragedy in many ways: the loss of thousands of lives, the loss of an American landmark, the shocking demonstration of how open the United States is to attack. As we have seen, the Internet played an important role in the dissemination of urgently-sought news about the unfolding events. Some aspects of the design of the Internet make it very effective in crisis. An important example is the inherent ability of TCP/IP to re-route and deliver data when important communications links are broken, as in war, or as in the September 11 tragedy. This robustness is not surprising, given that TCP/IP was born out of DoD-funded research.

But in other ways, the Web and the Internet function poorly when millions of people flock to a handful of trusted media sites. Television or radio broadcast distribution is unaffected when CNN's audience goes from 100,000 to 10,000,000. By contrast, nytimes.com can't deliver content when traffic increases a hundredfold: the communications links and the Times' servers are overwhelmed. The Net is still a narrowcast medium, not suited to "mass attention" events.

But the Net is far better at handling millions of users visiting a small number of sites than it was in 1993, thanks in no small part to technologies from a company called Akamai. The problem of mass Web audiences was recognized in the early 1990s, and solutions such as distributed caching and "multicast" streaming were tested. Akamai was the first company to commercialize products aimed at solving the problem. Akamai's products automate what Google did by hand with its cached copies of NY Times articles. Akamai customers include major media companies with Web presences, including CNN. It is sadly ironic that one of the founders of Akamai, Daniel C. Lewin, died in one of the hijacked planes. ■

About the Author

Richard Wiggins is a Senior Information Technologist at Michigan State University. He writes frequently about Internet topics for national publications. http://richardwiggins.com.

Editorial history

Paper received 18 September 2001; accepted 20 September 2001; revised 3 October 2001.

Contents Index