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A Brief History of the Internet

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Introduction

Focusing on the story of how human cognition and culture began to merge with computers, in this concise history of the internet I recount how certain technologies and humans interact. I mean to provide a cursory background for how certain technologies are interwoven. As you navigate the timeline I lay out, I ask you reflect upon how many of history's players in this techno-cultural revolution we may have forgotten. Although perhaps forgotten, some of yesterday's players gave rise to a few of today's dominating mega-corporations. Throughout this address, I raise necessary issues of security and their threat to our personal privacy.

The Beginning of Computing and the Internet

At first, computers were expensive, complicated and difficult to use. They occupied very large rooms, sometimes even an entire floor of a building. In 1946, the ENIAC (Electronic Numerical Integrator and Computer) was the first electronic general purpose computer. It occupied about 1,800 square feet and weighed almost 50 tons (Weik, 1961). Remarkably, today we are able to hold in our hand a computer that is many times more powerful.

Let us jump from 1946 to the advent of the internet, in 1969, when computers first were hooked together in a meaningful way. This network configuration was called ARPANET. Funded by the U.S. military, four academic research centers were chosen to host the fledgling computer network: the University of California, Los Angeles, the Stanford Research Institute, the University of California, Santa Barbara, and the University of Utah.

ARPANET's technology implemented what was called the Transmission Control Protocol/Internet Protocol suite (TCP/IP) (Schneider, Evans, & Pinard, 2009) consisting of large computers able to communicate with one another over physical distance. (Incidentally, security in this day meant an armed guard at the door restricting access only to authorized personnel.)

In the 1970s, Steve Jobs, Steve Wozniak, and Bill Gates set out to develop computers small enough to be used in homes. Their efforts resulted in the invention of the GUI, or Graphical User Interface (Graphical user

interface, 2009). Called microcomputers, they became available in the 1970s and more widespread for business use in the 1980s. However, by 1990 58% of U.S. adults reported they had never used a computer. At that time the number of U.S. households that owned a computer had yet to pass 20% (McCullough, 2018, p. 3).

In 1989, Tim Berners-Lee invented the World-Wide Web while employed at CERN, the great multinational Swiss scientific research institute (Dennis, 2019). Use of the World-Wide Web did not take off until around 1995, yet "the web" would succeed in bringing microcomputers into mainstream use; soon thereafter nearly every American would want to own a microcomputer.

By 2008, computing and internet technology had become vital, indispensable tools of the average person. Technology dramatically changed human lives personally and professionally. During this time the need for tech security and technology's threat to personal privacy became apparent.

The Big Bang: the First Web Browser

You may not realize it, but your cell phone is more powerful than the combined power of all the computing technology and hardware used to land a man on the moon in 1968. But I am getting ahead of the story. Let's go back and see how this happened.

Do you know how the internet got funded? Early on, in the 1980s and 1990s, Al Gore promoted legislation that funded an expansion of ARPANET. Signed into law in 1991, the High Performance Computing Act (HPCA) played a crucial role in early internet technology experiments. Thus, Gore did indeed play a crucial role in helping the internet to flourish. (Krugman, 2007).

Did you know that the first browser, Mosaic, was initially developed by four computer-science students at the University of Illinois at Urbana–Champaign? As Mosaic took off, the four were joined by 35 others planning the next features, such as adding color and links. Mosaic designers succeeded at leaving computer scientists behind, instead appealing directly to mainstream consumers. That detour made Mosaic the most successful project in computer science history.

The Mosaic team was functioning like a software startup company in all but name. Nevertheless, the funder of this project, the National Center for Supercomputing Applications (NCSA), still considered the browser a glorified research project.

One of Mosaic's young developers was Marc Andreessen, who graduated with his bachelor's degree in 1993 from the University of Illinois at Urbana–Champaign, then moving to California where he met Jim Clark, who had just sold his first billion-dollar company, Silicon Graphics (SGI).

When they met for coffee in Palo Alto, Clark said, "You come up with something to do and I'll invest in it." (McCullough, 2018, p. 20).

The Mosaic Communications Corporation (subsequently renamed Netscape) was incorporated on April 4, 1994. Clark offered the original four-person Mosaic team and two additional outside engineers each $65,000 a year in salary, one week's paid vacation in Tahiti on Clark's own yacht, and 100,000 shares of stock in the new company. The four had been making $6 per hour coding (p. 20). MacIntosh, Windows, and Unix versions of the new internet browser were developed simultaneously. The browser and server codes were re-written with a focus on greater speed, greater stability, and better features. Mosaic was no longer merely a research project, but an actual product.

So what was the big deal about the world-wide web, subsequently called "the internet?" Using the internet, users could download a product, provide a company with feedback, and the company could release an update, all on the same day. An example of this was Secure Sockets Layer (SSL) technology, which Netscape pioneered, an encrypting technology that made secure transactions on the internet possible.

Mosaic's new name was the brainchild of Jim Clark. In 1995, the company name changed from Mosaic Communications to Netscape Communications in response to copyright infringement allegations. Mosaic's change of name became necessary because the University of Illinois threatened to sue on behalf of the NCSA (Lashinsky, 2005). Remember, Mosaic started as a research project; it was never meant to be a commercial product.

A browser's speed was essential. Netscape could load a web page ten times faster than Mosaic.

Do you know how Netscape made money? Individual users were allowed to download Netscape for free, but companies were not. It is important to understand that Netscape was capturing data about its users, an issue and built-in feature of internet technology that continues to plague us in the form of "surveillance capitalism" (Zuboff, 2018). By analyzing user logs, Netscape could tell precisely who was using their software. Netscape's sales and marketing team would then contact any company using their software, such as Oracle, and say to the information technology team, "You have 20,000 unlicensed copies, you owe us X dollars" (McCullough, 2018, p. 32). Through tracking the software's unlicensed use, Netscape made millions of dollars off its browser.

Netscape Communications Corporation filed papers for an initial public offering (IPO) on June 23, 1995, launching on August 9, 1995. Netscape shares were originally priced at $14 per share; but at the last minute raised to $28. The first Netscape trade did not occur until around

11:00 AM, and early buyers paid $71 per share, almost triple the IPO price. The stock's price per share subsequently reached $75 before ending the day at $58.25. The stock market valued the company at $2.1 billion (p. 7)! Why was this startling IPO not more newsworthy? Well, August 9th also happened to be the day Jerry Garcia of the Grateful Dead died. His death overshadowed business and stock market news that day.

In December 1995, Marc Andreessen appeared on the cover of *Time* magazine. The way Andreesen developed and ran his company, Netscape Communications, became the template for web-based companies that would follow.

Bill Gates "Gets" the Internet

Microsoft would come to dominate the technology industry through sales of their software, in particular Microsoft Office. While Gates had not yet developed a browser, Microsoft's unofficial motto was, "A computer on every desk and in every home, running Microsoft software" (p. 38). Instead of the term, "internet," Bill Gates preferred IAYF (Information at Your Fingertips); he sometimes used the phrase "information superhighway." The information superhighway would quickly, enthusiastically infiltrate the telephone, cable, and personal computer industries—as well as Hollywood (McCullough, 2018).

Prior to this time, television sets were speculated to be the next technology that would become interactive. More than a decade before our phones got "smart," the tech gurus and the big-money corporate executives were convinced televisions would become "smart" and smart TVs would be the innovation that changed everything about commerce. Bill Gates wanted his software on every television set. As it turned out, our televisions did eventually become smart. However, our phones became "smart" first.

Once the internet and the world-wide web became the information superhighway, the technological revolution was on, yet this revolution was being delivered not via television, but by computers. What Gates missed most crucially was how the latest iteration of the internet, the world-wide web, was different. It was, in fact, more user-friendly, and more robust than anyone realized at the time, Gates himself included.

A side note: I was working at Parks College, in Cahokia, Illinois, in a computer lab during the summer of 1993. My boss left on vacation and I had five student workers to keep busy. I had seen a small news article in *The Chronicle of Higher Education* about HTML at the University of Illinois at Urbana–Champaign, so I assigned one of the students to research HTML. A few hours later, he showed me a webpage created using HTML. You could click on a picture on this web page and be taken to another site. I was impressed. So I asked him to develop a small web site about our college.

When my boss returned from his vacation, I shared this site with him. He, too, was impressed; however, his own boss was not!

In Gates' mind, the biggest question of all was how Microsoft could commodify the internet, turning it into profit, since seemingly everything on the internet was free. Finally, Gates began to see how Microsoft could make money off the information superhighway: by serving as gatekeeper and toll collector (p. 46). The biggest barrier was that Gates had not yet developed a web browser. With the launch of Netscape came millions and millions of downloads and all the attendant media attention. Netscape was dominant with 70% usage share, allowing Netscape to determine which network extensions caught on with users.

So Gates gave his Internet Explorer team orders: quickly develop a browser. It could be a copycat product. And it did not have to be great; it just had to be good enough (McCullough, 2018). Internet Explorer (IE) was free. The first versions of IE were poorly reviewed. However, IE's software was ubiquitous since it came pre-loaded on every Windows machine. To get a copy of Netscape on your computer, you had to search for it, download it, and install it. This cumbersome procedure led to Netscape's downfall.

America Online (AOL)

By 1995, internet service provider (ISP) Prodigy could boast only about 1.35 million members; CompuServe had 1.6 million accounts. Those were impressive numbers for the time, yet within a short time, America Online (AOL) would become marketshare leader. Across America, the 1990s sounds of a phone number being dialed, the harsh crackle and hiss of a modem connecting to the network, and a friendly AOL voice saying "Welcome! You've Got Mail," became synonymous with "going on the internet" (McCullough, 2018). Indeed, these sounds were made beloved in the hit 1993 rom-com feature film, *Sleepless in Seattle*.

The Microsoft Network (MSN) was developed to compete with existing ISPs such as Prodigy, CompuServe, and AOL. Gates decided to focus on developing computers' software at the expense of developing internet technologies. Thus, MSN would become nothing more than an also-ran. AOL became the ISP service leader.

AOL uniquely allowed users to create screen names and build online personas. The house of AOL was built on chat! An October 1996 article in *Rolling Stone* estimated that half of all AOL's chat was sexually oriented. Given the hourly "chat" fees, adult chat netted the company $7 million a month (p. 69). So, AOL conveyed a wholesome, friendly, image on the outside with all sorts of prurient stuff going on behind closed doors.

Steve Case was CEO and Chairman of AOL. When Bill Gates and Steve Case eventually met, Gates opened their conversation by saying to

Case, "I can buy 20% of you or I can buy all of you. Or I can go into business myself and bury you" (p. 60).

Case decided not to sell his company, AOL, to Gates. It turned out well. AOL embarked on a period of growth that left the rest of the industry in the dust. AOL mailed a free, start-up CD-ROM to most U.S. households. Over the next decade, AOL spent billions of dollars on its infamous "carpet-bombing" marketing campaign (p. 62). By May 1996, AOL had surpassed 5 million subscribers. Even though AOL's users were paying by the hour to dial in, AOL subscribers grew to 6 million. One of every three in the U.S. surfing the internet did so via AOL's dial-up lines.

In order to stand out from their brethren, ISPs competed on price. At first all ISP users paid by the number of hours used. Subsequently, some ISPs started to charge monthly fees instead, after which time a low monthly fee of $19.95 gave a user unlimited usage hours.

Infamously, on August 7, 1996, starting at 4:00 AM, AOL's services went down for 19 hours. The outage made front-page news and became the butt of jokes on late-night television talk shows (CBS News, 2015). While the internet itself had not crashed, America's ability to access it had. Because many people received computers as gifts for Christmas that year, and given all the free disks AOL had mailed to postal customers, too many new users tried to login at once, causing a massive outage. Jokes made the rounds about "America On-Hold" (McCullough, 2015, p. 67). Over the first few months of 1997, once the busy signals slowly went away, AOL would ultimately survive on the strength of its branding as America's internet gateway because, "It's the brand stupid!" (p. 68). But these crashes would doom AOL. New ISPs, such as cable companies and telephone companies (AT&T), loomed on the horizon.

So how were companies making money off free internet browsers and ISP internet access? The web was designed to be navigated using hotlinks. A click navigated a user to another page. These corporations created a new framework for commerce based on the percentage of people who clicked on a web-based advertisement when presented with an option to do so (total number of impressions). Thus, the formula for click-through rate (CTR) was born:

Click-Through Rate (CTR) = Total Clicks on Ad/Total Impressions

In the modern internet era, a click-through rate of 0.35% to 1.91% is considered blockbuster (wordstream.com, 2019). Statistics are recorded and analyzed on how many times users click on a web page and, hence, on how many times a given advertisement is viewed. Later in this my brief history I address targeted ads.

Amazon.com and the Birth of Internet-Based Commerce

Jeff Bezos was the youngest-ever senior vice president at a Wall Street hedge fund company known as D. E. Shaw, where one of his chief duties was to help launch new business initiatives. But Bezos had a dream to develop an online commerce site (an "Everything Store") where a consumer could buy almost anything he needed. He needed to start small, so he focused on selling books. In an "everything store," books became "pure commodities," meaning a book in one store was identical to the same book carried in another store. Thus, buyers knew ahead of time exactly what they were getting.

In truth, Bezos was looking for any advantage he could leverage. At the time, a company was not required to charge state sales tax unless it had a physical presence in the product buyer's state. This technicality would become the advantage Bezos needed to triumph over brick-and-mortar bookstores.

Amazon.com was founded in the summer of 1994 in Jeff and MacKenzie Scott Bezos' Bellevue, Washington garage. The Amazon domain name was registered on November 1, 1994, and the website launched on July 16, 1995. When Bezos began selling books, he had a problem. Distributors required retailers to order a minimum of 10 books. But, distributors' systems were designed so that a commercial retail buyer was not required to receive 10 books, the commercial retail buyer merely had to order ten books. Bezos' end-user customers generally wanted to order a single copy, so Amazon would order from the distributor the one book needed and then purposefully order nine more copies of a book that the publisher's inventory showed as out of stock. The Amazon team found an obscure book about lichen that was listed in the system, but usually out of stock. They implemented their newfound work-around system, ordering the one book their customer wanted and nine copies of the lichen book. The distributor would send Bezos the one book his customer wanted and then promise to locate and ship the nine lichen books. Amazon would subsequently cancel its order of nine lichen books. Thus, Bezos had found for Amazon a systemic work-around that became a retail advantage.

Amazon's software "remembered" what a customer had ordered previously—and those items almost-ordered before abandoning their cart. So Amazon's servers stored customers' abandoned order information and prompted the returning customer accordingly. This business model and practice represents an attack on consumer privacy in a predatory practice now known as "surveillance capitalism" (Zuboff, 2018).

The turning point for Amazon was when they were featured on the front page of the *Wall Street Journal* on May 16, 1996. Just as Andreessen on the front page of *Time* helped Netscape grow, this high-visibility publicity became a bonanza for Amazon. Amazon was able to fend off big-box retail

bookstore Barnes & Noble who launched their own e-commerce business on May 12, 1997. Significantly, Barnes & Noble locked up an agreement with AOL to become that ISP's exclusive bookseller. Amazon launched its IPO on May 15, 1997, which gained them further media attention. They went out at $14 to $16 per share, but closed the stock's first day of trading at $23.50 per share.

At the time of their IPO, Amazon was recording a 900% growth in revenue, and reported turning over their inventory 150 times a year. Big-box, brick-and-mortar bookstores such as Barnes & Noble turned over inventory only three to four times a year. Amazon banked on the hunch that a physical, retail presence (and its corresponding overhead) was not necessary to attract buyers (McCullough, 2018). Unable to compete against Amazon, some bookstores, such as Borders, filed for bankruptcy and closed all stores. Barnes & Noble, however, remained in business, attempting to compete with Amazon.

So how does an e-commerce retailer get a customer continuously to return—and to purchase again? The answer is by becoming a portal, which operates as an anchor site. Portals can function either as general portals or specialized, niche portals. Initially portals' designers claimed they were only interested in delivering personalized sports scores for favorite teams (McCullough, 2018). Amazon expanded on portals' reporting function, by using software to provide customers with information on books similar to those previously purchased at Amazon. Portal use represents yet another breach of customers' personal privacy, implementing surveillance capitalism to record what customers view or purchase—and remembering it.

Bezos was convinced that Amazon had a chance not only to establish e-commerce as a dominant retail force, but also that the site had the potential to disrupt the entire brick-and-mortar system of retail buying and selling. And Amazon would end up selling more than just books. In the end, Bezos made Amazon an "Everything Store."

Priceline and the Dot-Com Bubble

Priceline.com became a company that exemplified the dot-com era. This is how it worked. Every day, 500,000 airline seats were going unsold. Priceline listed online vacant seats to customers empowered to name the price they were willing to pay for a seat. Once offered, airlines could accept or reject bidders' offers. Consequently, customers bought cheaper seats; airlines sold excess inventory; Priceline got a cut. Everyone won (Nusca, 2017).

Priceline launched in April 1998. By the end of 1999, it was selling more than 1,000 airline seats per day to bidders. Emulating Amazon's "get big, fast" ambition, Priceline expanded into other markets with excess inventory, such as hotel rooms and car rentals. Their plan was to sell excess

inventory by allowing customers to obtain a low-ball price on the travel industry's excess inventory.

By the late 1990s, Amazon was selling books, toys, pet food, and furniture. What was left? Think big! The market for groceries, drugstore merchandise, and prepared meals remained open to e-commerce's expansion. E-tail without the overhead of a brick-and-mortar store was now a reality, and there was nothing but growth ahead. If companies could lock in consumers with low prices, they could raise prices later, once they had cornered and therefore dominated the market.

Consumer sentiment viewed dot-com companies as a fly-by-night, fleeting enterprise. Consumers were happy to take the deals, but did not become loyal customers in the process. Priceline hired actor William Shatner and Pets.com used a sock puppet as spokespeople. Dot coms competed to be first in their particular market in an effort to lock in customer loyalty, just as Amazon had done (McCullough, 2018).

At the end of 1999, *Time* magazine named Jeff Bezos its Person of the Year, an endorsement of Amazon's powerful marketshare and a move that seemed to make dot coms legitimate retail venues. By October 1999, the market cap of the year's traded internet stocks represented a whopping $450 billion: about the size of the Netherlands' gross domestic product. But, unlike brick-and-mortar retail, the total sales of dot-com companies came to only $21 billion. And their profits? Nothing! Instead, they reported collective losses of $6.2 billion.

Pop!: The Nuclear Winter

Around this time Netscape ceased to be an important ISP player since. rather than keeping up with innovation, it had become a lumbering, inefficient, old-style software and services firm. Each new version of Microsoft's Internet Explorer (IE) merely copied features Netscape had pioneered, but because IE was pre-loaded onto PCs with Microsoft-based operating systems, it easily usurped the browser market. Netscape released the source code to its browser, and their source code evolved into Firefox, which won a good share of the market back from IE (McCullough, 2018).

Netscape sued Microsoft for antitrust violation. Hearings were held in the U.S. District Court of the District of Columbia. Judge Thomas Penfield Jackson found Microsoft guilty of violating U.S. antitrust laws, recommending Microsoft be broken into two companies: one that developed and sold operating systems and another that developed and sold applications like web browsers. Microsoft appealed the ruling. Eventually, Microsoft agreed to a U.S. Department of Justice settlement that required them to make available Microsoft's APIs code for other companies to use (McCullough, 2018).

AOL took advantage of the market-bubble madness by cannibalizing other dot coms. AOL descended upon the dot-coms and made them offers that they couldn't refuse. But the behemoth AOL had a problem. The days of dial-up modems were numbered. The long-promised dream of broadband (at 30 times 56,000 bits per second) was just around the corner. Cable companies, rather than AOL, were in a better position to deliver customers' desired connectivity speeds. However, AOL had an ace in the hole: its soaring stock. So AOL tried to buy eBay, AT&T, Disney, and Time-Warner. The first three turned Steve Case's AOL down, but a mammoth merger between AOL and Time-Warner was announced to the world on January 14, 2000. AOL purchased Time-Warner for $165 billion. The merger allowed both companies to address weaknesses and intensify strengths. In this moment the Dow Jones Industrial Average peaked at 11,722.98. It would not return to that level for six years.

Several problems loomed large on the horizon. First, the Federal Reserve Bank was about to raise interest rates. Second, dot coms were being created with no realistic chance of turning a profit. The U.S. government dates the start of the subsequent dot -com recession as beginning in March 2001. The deals AOL had with all dot-com companies unwound as the dot coms themselves went belly-up. By 2003, Time-Warner dropped AOL from its company name. Eventually, AOL would cease to exist. Despite the bursting of the dot-com bubble, the trend to conduct retail online rather than in brick-and-mortar stores nevertheless persisted.

"I'm Feeling Lucky": Google, Napster, and the Rebirth

Google is a search engine developed by Larry Page and Sergey Brin. The two met at Stanford University. They were both Montessori kids, so their educations ingrained in their personalities a love of asking questions and being creative. Bill Gates feared that, one day, someone would found a company that would challenge Microsoft's tech industry dominance (McCullough, 2018). With the advent of Google, Gates' fear became a reality.

In 1997, Google made their search engine available, first on Stanford University's internal network, and then to the general public. The word, Google, is a play on the word "googol," which is a 1 followed by 100 zeros (Koller, 2004). When the bubble burst for the dot coms, the only dot-com company still hiring was Google. The dream of the '90s was still alive.

The music-sharing platform Napster was conceived as a means to allow peer-to-peer file-sharing. Many users shared music, and that sharing was done 100% free of charge, because the electronic music tracks did not come from a record store, but from some unknown internet user. Thus, Napster was accused of music pirating. On December 6, 1999, the Recording Industry Association of America (RIAA) filed a lawsuit against Napster. At the time, Napster was less than six months old (McCullough,

2018). Shawn Fanning, the creator of Napster, played up the publicity for all it was worth. He cast himself as:

> 1. The little guy getting beat up on by greedy corporations
> 2. The cutting-edge technology that the dinosaurs of old media were threatened by
> 3. The champion of everyday users who just wanted to consume their music the way they wanted (pp. 201–202)

Fanning was all of the above.

All of this activity brought innovation in file-sharing technology and file-sharing use increased dramatically. Destroying Napster did not make the intellectual-property threat posed by file sharing disappear.

iPods, iTunes, and Netflix

In 2002, Steve Jobs approached executives at five major record companies with a proposal to create an online iTunes store, where individual tracks could be sold for 99 cents per track, but record companies remained wedded to selling complete albums. Apple proposed keeping one-third, and giving record companies two-thirds of every sale. Jobs was well-known and his company was respected, therefore record companies were willing to experiment with Apple which, at the time, was a small company (McCullough, 2018). Ultimately Jobs was successful in getting record companies to sell individual songs rather than entire albums because record companies had become desperate for income.

Apple's iPod proved a technological innovation in music delivery, quickly becoming a smashing success story and radically changing the computing and music industries. The iPod is a portal device used to listen to recorded music. That iTunes crossed operating systems made iPods and iTunes available to Windows users, a development that set Apple on the path to becoming one of the biggest, most powerful, profitable companies in the world. Apple's iTunes Store and iPod hardware became so successful because consumers were delighted to purchase a single song for only 99 cents each, allowing users to create individualized music archives on their iPods.

I next turn your attention to the innovation posed by the advent of Netflix. Giving users precisely what they wanted to view when they wanted to view it was key to Netflix's success as well. Initially, subscribers paid $15.95 a month to rent four (later just three) DVD movies at a time (unlimited). delivered and returned by U.S.P.S. mail. Subscribers enjoyed an almost unlimited selection ordered via an online platform (and another company that stored customer information and preferences). Netflix flourished.

PayPal, AdWords, and Blogs

Until 1999, customers paid for online purchases either by sending a check to the company or providing credit card information via telephone. One of the first internet-based companies to go public after the dot-com bubble burst was PayPal, a company that turned a person's email address into a virtual bank-account-routing number (McCullough, 2018), revolutionizing e-tail.

Google had survived the dot-com crash and many more people were using Google to search for information. With 70 million daily launches, Google was still not turning much of a profit despite its very name transitioning from a company name to a common verb. Google's founders, Brin and Page, explained, "We want to develop services that improve the lives of as many people as possible—to things that matter." rather than bow to the quarterly whims of Wall Street's expectations (p. 234). Late in 2000, Google was in deep financial trouble.

In order to generate income, Google decided to allow product ads to appear on their website, a decision Google's founders set out to avoid. During the dot-com era, online advertisers had paid per viewer, but this shift at Google changed ad-revenue possibilities dramatically. Advertisers paid Google per consumer click; therefore advertisers "paid per performance." Instead of a company spending the most money to rank highly in ad placement, a company's ad now had to be clicked on the most in order to rise up the rankings. Successful advertisers paid for ads that had less clicks (per click), but ranked higher. Over time, Google came to see that more ad revenue came in from a 5-cent ad clicked on twenty-five times than from a dollar ad clicked on only once (McCullough, 2018).

Blogging represented the vanguard of the web as an interactive medium. A new world of content was being created on the web, and the creators were the web users themselves. And there was no editor! Matt Drudge became famous in January 1998 for spreading rumors about Bill Clinton's affair with a White House intern. In another technological revolution, one man's digital soapbox nearly brought down a sitting U.S. President (Shin, 2018).

Web 2.0: Wikipedia and YouTube

The era of Web 1.0 classified webpages as static, viewable only. The Web 2.0 era reclassified web pages as dynamic, meaning users could interact with webpages through such activities as buying merchandise or uploading content. The Web 2.0 era centered the sharing of information between users.

Two examples of Web 2.0-era content are weblogs, later called "blogs," and Flickr. Blogging represented the inevitable migration of publishing into the digital arena. Readers' posted comments received feedback from

other readers. Likewise, digital cameras were becoming popular in the early 2000s. Flickr allowed users to "tag" photos with keywords which enabled other users to search by keyword on this open-access platform.

Ward Cunningham installed a sub-page on the WikiWikiWeb site. "Cunningham's Law" asserted that "the best way to get the right answer on the Internet is not to ask a question, but to post the wrong answer" (McCullough, 2018, p. 246). Someone would most likely respond and correct the error. This was the premise that launched the open-sourced Wikipedia.

YouTube innovated by providing push-button video uploading. On YouTube, users could share a link to their uploaded video. On October 9, 2006, Google announced it would purchase YouTube, paying $1.65 billion in Google stock, and becoming the savior Napster never had. YouTube thrived because:

1. Google had the infrastructure to allow YouTube to scale up
2. Google had the technical sophistication to keep YouTube on the right side of the law
3. Google had the money to contest legal battles
4. Google provided YouTube with a business model that allowed it to thrive (p. 257)

Google was willing to share advertising revenue with the rights holders. Better to take what you could get and embrace new distribution models than fight them like the music industry did with Napster.

The Social Network: Facebook

In 2004, "TheFacebook" was an online directory that linked users into a social network, first at Harvard, and later at other Ivy-League institutions. When Marc Andreessen started Mosaic, he sought help from his fellow students; when Shawn Fanning started Napster, he sought help from his fellow hackers. Mark Zuckerberg turned to his fellow dormmates for help in developing TheFacebook. To them starting a website, or even a web company, was not a crazy notion, but an established industry (McCullough, 2018).

Zuckerberg managed the early growth of TheFacebook by cloning the site and spreading it to other college campuses beyond the Ivy League. TheFacebook constructed a digital social web that directly paralleled students' social reality (McCullough, 2018). One of TheFacebook's first advertisers was MasterCard, a company that was looking for a way to reach the coveted university-student demographic. Sean Parker, who had been involved with founding Napster, urged Zuckerberg to develop long-range goals. During the summer of 2004, the user base for TheFacebook doubled

to 200,000 users. By September 2004, that number doubled again. It turned out "People wanted to know stuff about other people" (p. 281).

TheFacebook dropped the "The," becoming Facebook on September 20, 2005. According to McCullough, "Zuckerberg's great insight was 'Humans are nothing more or less than highly social primates'" (p. 283). By 2006, Facebook had 8 million users; by 2007, Facebook had 50 million users; by 2009, 145 million users; by 2010, there were 350 million users in 180 countries (p. 293).

The Rise of Mobile Cellular Technology

In 1997, Palm created the Palm Pilot, which sold 1 million units in 18 months. It was a pen-based, touch-screen gadget; there was no physical keyboard. In 1999, the Blackberry device was unveiled. Blackberry was the first mobile device that synced reliably with email systems, sending and receiving emails from anywhere the user happened to be. Complete access to the internet instantly became available. Thus, a person would always be connected to information (and to work). Subsequently, electronics manufacturers developed "smart" phones.

The first cellular phone with an integrated GPS was released in 1999. By 2005, there were 3.5 million smartphone owners. As late as 2006, only around 6% of people had the 150 million "smart" phones shipped to North America (p. 302). Today, worldwide, there are 3.3 billion people (43% of the population) who own "smart" phones (Oberlo, 2020).

iPhone Takes on Android

Prior to July 2007, people walked around with a slew of mobile devices that each had a unique function. Among those functions were scheduling appointments, checking email, listening to music, and making and receiving phone calls. All that changed when Steve Jobs decided to design one electronic device that would conduct all these functions. Apple engineers subsequently designed one mobile device that allowed a user to listen to music, check e-mail, and keep a calendar. The drawback was connectivity: Apple was not a telecom carrier, so they had no way of providing phone service. In response, Apple signed a contract with Cingular/AT&T so their newly created device could be used as a telephone. This device would be called the iPhone. On New Year's Day 2007, Apple launched the iPhone with great fanfare at San Francisco's Moscone Center. The first iPhone went on sale June 29, 2007. In essence, it was a computer! With the introduction of the multi-function iPhone, smartphone ownership went from 3% worldwide in 2007 to more than 80% in 2017, a decade later (McCullough, 2018, p. 319). Today the iPhone can be used with various telecom carriers. As Steve Jobs predicted in 1998, reported in BusinessWeek, "A lot of times, people don't know what they want until you show it to them" (p. 303).

Conclusion

But are we better off?

Some people argue we *are* better off given the many conveniences the internet and the tools it uses offer. Humans can now accomplish many tasks and functions on a small, portable device stored in our pocket. We can check on the well-being of our kids or pets. Surveillance cameras capture deliveries being made to our doors. If someone tries to steal our delivery, the camera records the thief.

Others argue we are *not* better off, since humans are now connected 24/7. We are tied to our work! Some employers require employees to be on call around the clock. We no longer get a break from work when we're not physically at the office. And then there's our privacy: "Smile, you are on camera." As we move through the world carrying our small electronic devices, retailers capture, store, and monetize our every movement, from the parking lot into the store and back. Online purchase data are captured, even those items we viewed but did not purchase. Our data is used by those companies capturing it, and is oftentimes sold to other companies. Many of us feel this is a significant invasion of our privacy. After all, what right does a company that we may not have done business with have to our data? Is it not time we stand up for our privacy (Cook, 2019)?

This brief history of the internet would not be complete without a reference to the ethical concerns young people express nowadays about the surveillance practices and surveillance capitalism practices by most tech companies. College graduates who once embraced employment by Facebook or Google now look elsewhere because they disapprove of practices they believe undermine users' liberty and privacy (Goldberg, 2020).

Where will all of this lead us? Given the ways in which technology has changed our lives so rapidly, what will life look like for us in 10 years? … in 20 years? Will there still be brick-and-mortar stores? Will we spend time with friends and family in the flesh or mostly over broadband using our tech devices? Indeed, will people still sit down with one another to share a meal? How might our notions of civil behavior change? And what about ourselves will remain private? Will any entity have access and be able to capture—and monetize—anything they wish to know about us? Maybe we won't carry devices in our pockets anymore; perhaps they will be implanted in our bodies. Maybe we will talk to ourselves—that is, to our devices—much as Joaquin Phoenix did in the movie *Her* (Jonze, 2013). Do you worry about things like that?

I do.

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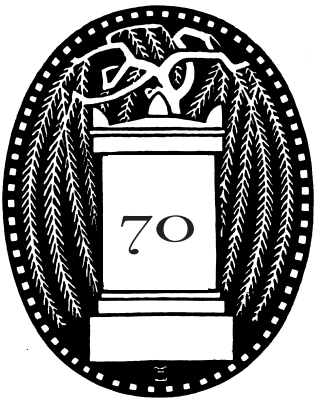

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