History of internet

Before the internet

<https://medium.com/@ThunderPuff/life-before-the-internet-54cc03fd2451>

I was alive before the Internet so I remember it quite well. And I can’t tell you how many times I’ve been asked what it was like before there was such a thing as “cyberspace.” Mostly because I’ve never been asked.

Hence the need to write a post about it. LOGIC!

Okay. So first off, the earth was a cold, barren place. The sky was filled with darkness and a sense of foreboding hung heavy in the air. I assume you’ve seen the first ten minutes of 2001: A Space Odyssey?

Also, humans roamed in packs like wolves, but with shoes.

Yeah, we had shoes.

Actually, it was totally fine. There was a lot of really great, amazing shit happening. As a kid, I was pretty content with my Casio mini-keyboard and my backyard for entertainment. Even though we had no Internet, let alone iPads or cell phones, I was never bored because I would just go outside, talk to myself, and make pretend-tea out of dirt and puddle water. I also had Hungry Hungry Hippos so, yeah, life was pretty sweet.

And then the Internet came and shit changed. Some for the good, some I could totally do without. Like I don’t need Tumblr or Twitter in my life. But I do like Medium <insert winking whore emoji>.

**So for those of you who were born in late 90’s or some made-up decade like the “aughts,” or you older folks who’ve mostly blocked-out anything that happened prior to say, 1994\*, here’s a completely incomplete list of how the Internet changed the world:**

**1.** Listicles didn’t exist as such. Oh sure, people made lists, but mostly things like shopping lists or to-do lists. Or even list jokes that they recited live and in person. Also, there was [The Book of Lists](https://en.wikipedia.org/wiki/The_Book_of_Lists) which is literally days and days worth of entertainment that I haven’t the capacity to recommend enough.

**2.** Which brings us to Books. I don’t know about you guys, but I remember a little something called the en-sahy-kluh-**pee**-dee-uh (or encyclopedia). I also remember grabbing the L-N volume and reading nineteen pages about the Louisiana Purchase. I then proceeded to switch back and forth between the encyclopedia and the thesaurus trying to find different words to use so I wasn’t accused of plagiarism while writing my 5th grade essay entitled “The Louisiana Purchase: Turns Out You Can Sell Shit You Don’t Actually Own!”

**3.** No one shared pictures of food. The only people who took pictures of food were food photographers who got paid to take pictures of food. It was a very confusing time.

**4.** You had to look up movie times in the … newspaper! Whuuuut?!

If you didn’t have a subscription to the local paper, you might as well go stick your head in the dirt because you, sir, had no fucking idea when Back to the Future was playing. Unless, of course, you called Moviefone.

**5.** Speaking of paper, don’t forget The Great & Powerful Phone Book.

How do I find a plumber? How do I get a pizza delivered? The phone book, idiot. It’s not like there’s some series of tubes that contain this elusive information.

**6.** On the topic of phones, you either called your friend on a telephone — corded and then eventually, cordless—or spoke to them in person. Creepy, right?

And that phone had NO camera or games.

And yet, we JUST. KEPT. USING. IT.

**7.** Thanks in part to Title II of The Communications Act of 1934, and the overdue 1982 breakup of the Bell system, corporations couldn’t hold public utilities (systems of communication like telephone and radio) for ransom. Sadly, the repealing of the Fairness Doctrine in 1987 began a deterioration of the public interest standard for broadcast television, yada, yada, yada, then the Internet came along and… well, now the FCC is the official ball-cupper of the ISPs. For more info read: [Net Neutrality](https://www.savetheinternet.com/net-neutrality)

**8.** If you didn’t know if that guy who played Kojak was still alive or not, you were just left to forever wonder. Or get in your car, drive to a bookstore and buy a current Almanac (a book).

**9.** Also, libraries.

**10.** Anonymous people who wanted to write mean things to other people had to spend money on postage. Or at least take the time to find your phone number… thanks again, phone book.

**11.** You either had a paper map or you got fucking lost! And you liked it!

**12.** You had to watch what was on television when it was actually scheduled to be on television. None of this on-demand “I wanna watch it right now” whiny bullshit. If the only thing that was on was a rerun of Alf, you sat down and you fucking watched it (I didn’t have cable growing up because my parent’s didn’t love me).

**13.** “Google” was a sound a baby makes and not a terrifying data-mining overlord that knows every embarrassing thought you’ve ever been stupid enough to type into the search bar.

**14.** You didn’t have a tiny WiFi computer in your pocket to pass the time at the dentist’s office, so you were forced to read Golf Digest. Thus pain, boredom, and golf became forever linked in your psyche.

**15.** Slide projectors and photo albums were a necessity for anyone that gave a goddamn about precious memories and vacation photos. These were also considered instruments of torture.

**16.** Rotten Tomatoes and IMDB didn’t exist, so you watched Siskel and Ebert. And you genuinely liked it!

**17.** No email. You could literally be unreachable. Takes my breath away just thinking about it.

**18.** Fake news was The National Enquirer or a new weight loss diet that involved pigeon feet and vinegar (or buffalo meat and Alka Seltzer).

**19.** You PAID musicians for music. And you listened to the entire album because you just spent like $13.99 for it. And it came with artwork and liner notes and a bunch of cool stuff. And if you bought a cassette, there was a 50/50 chance the cassette player in your car would mangle it.

**20.** You didn’t “blog.” Nobody cared what you had to say. You just shoved all that creative energy down into a deep, dark place that you never acknowledged and got an accounting degree. After years of misery you started scrawling depressive poetry onto cocktail napkins and once you developed a serious drinking problem, then and only then, did you get a book deal. Or you were a journalist for money or something.

**21.** You had to buy fancy résumé paper and envelopes and actually use the US postal service to apply for jobs. Like an adult.

**22.** YouTube was known as “public access television.”

**23.** When you went out to eat, you either stared silently at your dining partner or you had a conversation. Divorce was very common.

**24.** You didn’t “post” on “social media.” You composed pretentious holiday newsletters that irritated the ever-loving the crap out of all those unfortunate enough to be on your mailing list.

PS. No one cares that Timmy’s in Aspen on a ski scholarship or that Nancy married the Ambassador to Fiji. Honestly, I think you’re hiding your unhappiness with expensive wine and lies.

Sorry. That last part has very little to do with the Internet.

**25.** If you wanted to watch that scene from The Breakfast Club where Principal Vernon says “You mess with the bull, you get the horns,” and walks away with the toilet seat cover stuck in his pants, you had to go rent it (post VHS or course) or wait until it came on TV — and then watch the lame, heavily-edited, commercial version. That’s how we learned to deal with adversity.

**26.** Jeff Bezos was just some well-off, Princeton grad with a crazy dream to someday control the means of production, food, space and time.

Two down, two to go.

**27.** I almost forgot pay phones! These were germ-infested, public communication devices for when you needed to call your parents to come pick you up from the mall. This also required that you keep a quarter in your pocket (small, round currency made of alloys).

**28 — 30.** You basically just walked around not knowing a lot of shit. But neither did anyone else, so no one really noticed.

\* Look, I know about ARPAnet and all that jazz, and how the web was technically around prior to 1994. But honestly, Prodigy and CompuServe subscribers were mostly just hanging out on message boards. And it wasn’t until I created my Hotmail Account in the mid-nineties that shit got real. So there.

# <https://insight.kellogg.northwestern.edu/article/what_has_the_internet_done_for_the_economy>

# What has the Internet Done for the Economy?

## The puzzling spread of the commercial Internet could explain wage inequalities

Based on the research of

Christopher Forman

Avi Goldfarb

[Shane Greenstein](https://insight.kellogg.northwestern.edu/author/shane_greenstein)

It is hard to overstate how much the business world relies on the Internet. Powerhouse retailers like Target and Wal-Mart can simultaneously manage their changing inventories, warehouses, distribution routes, and sales. FedEx and UPS can code every shipment online so that customers can find out exactly where their packages are and what time they will arrive at their doors. Buying a wedding gift? Just pull up the couple’s online registry and browse the items that have not been purchased yet. Shopping for insurance? You can get quotes quickly via secure online chats with company representatives.

Add Insight  
to your inbox.

We’ll send you one email a week with content you actually want to read, curated by the Insight team.

None of that was possible before 1995, when the large, government-controlled networks somewhat begrudgingly opened their lines for commercial use. Advanced Internet technologies spread rapidly in businesses across the country—in small cities, sprawling suburbs, and dense urban hubs. Although this sparked wage and employment spurts everywhere, the gains were far more striking in regions that were already well off, according to a study to appear in the American Economic Review.

“The tide was rising, with everyone’s boats going up, but the boats went up more in a small number of cities,” says Shane Greenstein, professor of management and strategy at the Kellogg School of Management and lead investigator of the new work. The explanation for this surprising pattern is still being worked out, but Greenstein suspects it was because more prosperous cities were home to sophisticated companies that knew how to best take advantage of the new technology. “It was enhancing the stuff they were already doing, and they got a very dramatic improvement,” he says.

Greenstein and collaborators Chris Forman, an associate professor at the Georgia Institute of Technology, and Avi Goldfarb, an associate professor at the University of Toronto, have been studying the economics of the Internet for a decade. In their early work, they analyzed how the early Internet spread through U.S. businesses. Some of their findings were wholly unexpected. For example, in the late 1990s businesses everywhere adopted basic Internet services, such as email and web browsing. This was surprising because home use of these technologies showed fairly stark urban-rural divides.

Adoption patterns were more predictable for advanced technologies, such as inventory management systems and online database sharing. Such technologies were more likely to crop up in larger cities than smaller ones, and in data-heavy industries, such as finance and wholesale distribution, than in manufacturing, mining, and social service industries. “It makes sense—you just don’t find advanced Internet at nursing homes,” Greenstein says, laughing.

Out of about 3,000 counties in the U.S., in only 163 did business adoption of Internet technologies correlate with wage and employment growth.

About three years ago, the trio began researching how this intriguing distribution of the Internet affected the economy. There is widespread optimism among media commentators and policy makers that the Internet erases geographic and socioeconomic boundaries. The Death of Distance and The World Is Flat, two books that espouse that rosy view, were bestsellers. But in the early days of the Internet, the income gap between the upper and middle classes actually began to grow. “We thought it was just a very natural question to ask: is the Internet responsible?” Greenstein says.

**Misplaced Optimism** The researchers studied trends from 1995 to 2000 in several large sets of data, including the Quarterly Census of Employment and Wages—which gives county-level information on average weekly wages and employment—and the Harte Hanks Market Intelligence Computer Intelligence Technology Database, which holds survey information about how firms use the Internet. In total, the researchers included relevant data for nearly 87,000 private companies with more than 100 employees each. Based on their older work, they focused only on advanced Internet technologies.

Out of about 3,000 counties in the U.S., in only 163 did business adoption of Internet technologies correlate with wage and employment growth, the study found. All of these counties had populations above 150,000 and were in the top quarter of income and education levels before 1995. Between 1995 and 2000, they showed a 28 percent average increase in wages, compared with a 20 percent increase in other counties (Figure 1).

Figure 1. Advanced Internet investment and wage growth by county type.

Why did the Internet make such big waves in these few areas? Greenstein believes the reason was that these areas already had sophisticated companies and the communications infrastructure needed to seize on the Internet’s opportunities. But there are other possibilities. The impact could have been due to a well-known phenomenon called “biased technical change,” which means that new technologies can thrive only in places with skilled workers who know how to use them. Or it could have been because cities brought certain advantages—denser labor markets, better communication, tougher competition—than more remote areas.

“Each one of those explanations is plausible in our data, and probably explains a piece of it. But none of them by themselves can explain the whole story,” Greenstein says. “It’s really a puzzle.”

Regardless of why the pattern crops up, it has important implications for public policy. Many lawmakers have argued for government to subsidize the expansion of the Internet into poor and isolated regions. In fact, the 2009 economic stimulus package allocated over $7 billion for broadband expansion. “In policy conversations, there’s a very common presumption that technology is good, that it will raise wages and income,” Greenstein says. “But since doing this work, I’ve become much more of a skeptic about the economic side of that argument.”

He says that these efforts could be justified for other reasons—such as strengthening education, increasing civic engagement, and promoting health and safety. And over 20 to 30 years, expanding the Internet could lead to economic gains. But in the short term, he says, “I am no longer confident it will make a big economic improvement.”

He hopes this research inspires others to analyze similar data from more recent years. It is possible that the patterns from the late 1990s will not hold up. Today almost all medium and large-size establishments use broadband and targeted Internet advertising, and the U.S. economy depends more on outsourcing and has a less robust manufacturing industry. And the last two years, of course, have seen an economic collapse that has hit the country unevenly, for reasons that are not entirely understood. “It’s just a very different economy now,” Greenstein says. “As a consequence of that, I’m really not sure what we’ll find.”

Who Created Internet

<https://www.history.com/news/who-invented-the-internet>

As you might expect for a technology so expansive and ever-changing, it is impossible to credit the invention of the internet to a single person. [The internet](https://www.history.com/topics/inventions/invention-of-the-internet) was the work of dozens of pioneering scientists, programmers and engineers who each developed new features and technologies that eventually merged to become the “information superhighway” we know today.

Long before the technology existed to actually build the internet, many scientists had already anticipated the existence of worldwide networks of information. [Nikola Tesla](https://www.history.com/topics/inventions/nikola-tesla) toyed with the idea of a “world wireless system” in the early 1900s, and visionary thinkers like Paul Otlet and Vannevar Bush conceived of mechanized, searchable storage systems of books and media in the 1930s and 1940s.

Still, the first practical schematics for the internet would not arrive until the early 1960s, when MIT’s J.C.R. Licklider popularized the idea of an “Intergalactic Network” of computers. Shortly thereafter, computer scientists developed the concept of “packet switching,” a method for effectively transmitting electronic data that would later become one of the major building blocks of the internet.

The first workable prototype of the Internet came in the late 1960s with the creation of ARPANET, or the Advanced Research Projects Agency Network. Originally funded by the U.S. Department of Defense, ARPANET used packet switching to allow multiple computers to communicate on a single network.

On October 29, 1969, ARPAnet delivered its first message: a “node-to-node” communication from one computer to another. (The first computer was located in a research lab at UCLA and the second was at Stanford; each one was the size of a small house.) The message—“LOGIN”—was short and simple, but it crashed the fledgling ARPA network anyway: The Stanford computer only received the note’s first two letters.

The technology continued to grow in the 1970s after scientists Robert Kahn and Vinton Cerf developed Transmission Control Protocol and Internet Protocol, or TCP/IP, a communications model that set standards for how data could be transmitted between multiple networks.

ARPANET adopted TCP/IP on January 1, 1983, and from there researchers began to assemble the “network of networks” that became the modern Internet. The online world then took on a more recognizable form in 1990, when computer scientist Tim Berners-Lee invented the World Wide Web. While it’s often confused with the internet itself, the web is actually just the most common means of accessing data online in the form of websites and hyperlinks.

The web helped popularize the internet among the public, and served as a crucial step in developing the vast trove of information that most of us now access on a daily basis.

<https://www.computerhope.com/issues/ch001016.htm>

A single person did not create the [Internet](https://www.computerhope.com/jargon/i/internet.htm) that we know and use today. Below is a listing of different people who have helped contribute to and develop the Internet.

## The idea

The initial idea of the Internet is credited to [**Leonard Kleinrock**](https://www.computerhope.com/people/leonard_kleinrock.htm) after he published his first paper entitled "Information Flow in Large Communication Nets" on May 31, [1961](https://www.computerhope.com/history/1961.htm).

In [1962](https://www.computerhope.com/history/1962.htm), [**J.C.R. Licklider**](https://www.computerhope.com/people/joseph_licklider.htm) became the first Director of [IPTO](https://www.computerhope.com/jargon/i/ipto.htm) and gave his vision of a galactic network. Also, with ideas from Licklider and Kleinrock, [**Robert Taylor**](https://www.computerhope.com/people/robert_taylor.htm) helped create the idea of the network that later became [ARPANET](https://www.computerhope.com/jargon/a/arpanet.htm).

## Initial creation

The Internet as we know it today first started being developed in the late 1960s in California in the United States.

In the summer of [1968](https://www.computerhope.com/history/1968.htm), the NWG (Network Working Group) held its first meeting, chaired by **Elmer Shapiro**, at the SRI (Stanford Research Institute). Other attendees included **Steve Carr**, [**Steve Crocker**](https://www.computerhope.com/people/steve_crocker.htm), **Jeff Rulifson**, and **Ron Stoughton**. In the meeting, the group discussed solving issues related to getting hosts to communicate.

In December 1968, **Elmer Shapiro** with SRI released a report "A Study of Computer Network Design Parameters." Based on this and earlier work by [**Paul Baran**](https://www.computerhope.com/people/paul_baran.htm), **Thomas Marill** and others, [**Lawrence Roberts**](https://www.computerhope.com/people/lawrence_roberts.htm) and **Barry Wessler** created the IMP (Interface Message Processor) specifications. BBN (Bolt Beranek and Newman, Inc.) was later awarded the contract to design and build the IMP subnetwork.

## General public learns about Internet

The UCLA (University of California, Los Angeles) put out a press release introducing the public to the Internet on July 3, [1969](https://www.computerhope.com/history/1969.htm).

## First network equipment



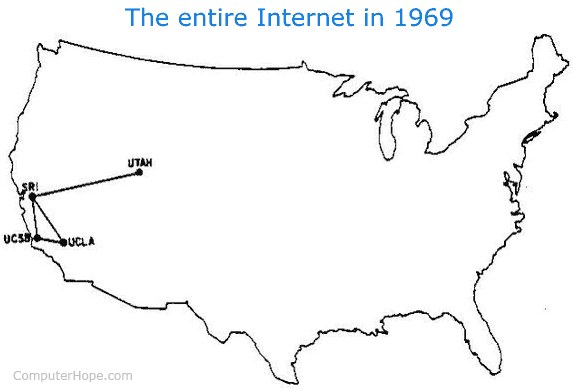
On August 29, 1969, the first network [switch](https://www.computerhope.com/jargon/s/switch.htm) and the first piece of network equipment called "IMP" (Interface Message Processor) is sent to UCLA.

On September 2, 1969, the first data moves from the UCLA host to the switch. The picture is Leonard Kleinrock next to the IMP.

## The first message and network crash

On Friday, October 29, 1969, at 10:30 p.m., the first Internet message was sent from computer science Professor Leonard Kleinrock's laboratory at UCLA, to a computer at SRI. The connection not only enabled the first transmission to be made, but is also considered the first Internet [backbone](https://www.computerhope.com/jargon/b/backbone.htm).

The first message to be distributed was **LO**, which was an attempt at **LOGIN**, by [**Charley S. Kline**](https://www.computerhope.com/people/charley_kline.htm) to log into the SRI computer from UCLA. However, the message was unable to be completed because the SRI system crashed. Shortly after the crash, the issue was resolved, and he was able to log into the computer.



## E-mail is developed

[**Ray Tomlinson**](https://www.computerhope.com/people/ray_tomlinson.htm) sends the first network [e-mail](https://www.computerhope.com/jargon/e/email.htm) in 1971. It's the first messaging system to send messages across a network to other users.

## TCP is developed



[**Vinton Cerf**](https://www.computerhope.com/people/vint_cerf.htm) and [**Robert Kahn**](https://www.computerhope.com/people/bob_kahn.htm) design [TCP](https://www.computerhope.com/jargon/t/tcpip.htm) during [1973](https://www.computerhope.com/history/1973.htm) and later publish it with the help of **Yogen Dalal** and **Carl Sunshine** in [RFC](https://www.computerhope.com/jargon/r/rfc.htm) 675, published in December [1974](https://www.computerhope.com/history/1974.htm). Most people consider these two people the inventors of the Internet.

## First commercial network

A commercial version of [ARPANET](https://www.computerhope.com/jargon/a/arpanet.htm), known as [Telenet](https://www.computerhope.com/jargon/t/telenet.htm), is introduced in [1974](https://www.computerhope.com/history/1974.htm) and considered to be the first [ISP](https://www.computerhope.com/jargon/i/isp.htm) (Internet service provider).

## Ethernet is conceived

[**Bob Metcalfe**](https://www.computerhope.com/people/robert_metcalfe.htm) develops the idea of [Ethernet](https://www.computerhope.com/jargon/e/ethernet.htm) in [1973](https://www.computerhope.com/history/1973.htm).

## The modem is introduced

[**Dennis Hayes**](https://www.computerhope.com/people/dennis_hayes.htm) and **Dale Heatherington** released the 80-103A modem in [1977](https://www.computerhope.com/history/1977.htm). The [modem](https://www.computerhope.com/jargon/m/modem.htm) and their subsequent modems become a popular choice for home users to connect to the Internet and get online.

## TCP/IP is created

In [1978](https://www.computerhope.com/history/1978.htm), TCP splits into [TCP/IP](https://www.computerhope.com/jargon/t/tcpip.htm), driven by [**Danny Cohen**](https://www.computerhope.com/people/danny_cohen.htm), [**David Reed**](https://www.computerhope.com/people/david_reed.htm), and [**John Shoch**](https://www.computerhope.com/people/john_shoch.htm) to support real-time traffic. The creation of TCP/IP help create [UDP](https://www.computerhope.com/jargon/u/udp.htm) and is later standardized into ARPANET on January 1, [1983](https://www.computerhope.com/history/1983.htm). Today, TCP/IP is still the primary [protocol](https://www.computerhope.com/jargon/p/protocol.htm) used on the Internet.

## DNS is introduced

[**Paul Mockapetris**](https://www.computerhope.com/people/paul_mockapetris.htm) and [**Jon Postel**](https://www.computerhope.com/people/jonathan_postel.htm) introduce [DNS](https://www.computerhope.com/jargon/d/dns.htm) in [1984](https://www.computerhope.com/history/1984.htm), which also introduces the [domain name](https://www.computerhope.com/jargon/d/domain.htm) system. The first Internet domain name, **symbolics.com**, is registered on March 15, [1985](https://www.computerhope.com/history/1985.htm) by Symbolics, a Massachusetts computer company.

## First commercial dial-up ISP

The first commercial [ISP](https://www.computerhope.com/jargon/i/isp.htm) (Internet service provider) in the US, known as "The World," is introduced in [1989](https://www.computerhope.com/history/1989.htm). The World was the first ISP to be used on what we now consider to be the Internet.

## HTML

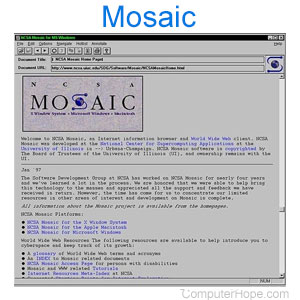
[](https://www.computerhope.com/people/tim_berners-lee.htm)In [1990](https://www.computerhope.com/history/1990.htm), while working at [CERN](https://www.computerhope.com/jargon/c/cern.htm), [**Tim Berners-Lee**](https://www.computerhope.com/people/tim_berners-lee.htm) develops [HTML](https://www.computerhope.com/jargon/h/html.htm), which made a huge contribution to how we navigate and view the Internet today.

The first website, **info.cern.ch**, is developed by Tim Berners-Lee at CERN and published online on August 6, 1991.

## WWW

[**Tim Berners-Lee**](https://www.computerhope.com/people/tim_berners-lee.htm) introduces [WWW](https://www.computerhope.com/jargon/w/www.htm) (World Wide Web) to the public on August 6, [1991](https://www.computerhope.com/history/1991.htm), and becomes publicly available on August 23, 1991. The WWW is what most people today consider the "Internet" or a series of sites and pages that are connected with links. The Internet had hundreds of people who helped develop the standards and technologies used today, but without the WWW, the Internet would not be as popular as it is today.

## First graphical Internet browser



[Mosaic](https://www.computerhope.com/jargon/m/mosaic.htm) is the first widely-used graphical World Wide Web browser, released on April 22, [1993](https://www.computerhope.com/history/1993.htm) by the [NCSA](https://www.computerhope.com/jargon/n/ncsa.htm) with the help of [**Marc Andreessen**](https://www.computerhope.com/people/marc_andreessen.htm) and [**Eric Bina**](https://www.computerhope.com/people/eric_bina.htm). A big competitor to Mosaic was [Netscape](https://www.computerhope.com/jargon/n/netscape.htm), which was released a year later. Today's Internet browsers we use today (e.g., [Internet Explorer](https://www.computerhope.com/jargon/m/msie.htm), [Chrome](https://www.computerhope.com/jargon/c/chrome.htm), [Firefox](https://www.computerhope.com/jargon/f/firefox.htm), etc.), got their inspiration from the Mosaic browser.

## Java and JavaScript

Originally known as **oak**, [**Java**](https://www.computerhope.com/jargon/j/java.htm) is a programming language developed by [**James Gosling**](https://www.computerhope.com/people/james_gosling.htm) and others at [Sun](https://www.computerhope.com/comp/sun.htm) Microsystems in [1995](https://www.computerhope.com/history/1995.htm). Today, Java is still used to create [Internet](https://www.computerhope.com/jargon/i/internet.htm) applications and other [software](https://www.computerhope.com/jargon/s/software.htm) programs.

[**JavaScript**](https://www.computerhope.com/jargon/j/javascript.htm) was developed by [**Brendan Eich**](https://www.computerhope.com/people/brendan_eich.htm) in [1995](https://www.computerhope.com/history/1995.htm) and originally known as **LiveScript**. LiveScript was released with Netscape Navigator 2.0 and renamed to JavaScript with Netscape Navigator 2.0B3. JavaScript is an [interpreted](https://www.computerhope.com/jargon/i/interpre.htm) client-side scripting language that allows a web designer the ability to insert code into their web page.

https://www.govtech.com/e-government/Who-Invented-the-Internet.html

The Internet ranks somewhere between fire and sliced bread on the world’s list of greatest inventions. But despite being a fairly recent invention, its exact origin remains a point of dispute. Recently, writers from The Wall Street Journal and Scientific American weighed in on the issue, drawing comments from Google’s own Internet forefather Vint Cerf.

### Just Ask Al

Al Gore famously blundered his way through a CNN interview in which he stated, “During my service in the United States Congress, I took the initiative in creating the Internet. I took the initiative in moving forward a whole range of initiatives that have proven to be important to our country’s economic growth and environmental protection, improvements in our educational system.”  
  
His statement was, most likely, just [a poor choice a words](http://www.snopes.com/quotes/internet.asp). While it sounds like Gore was trying to say that he partially supported the creation of the Internet through legislation along with many others, he did say the words: “I took the initiative in creating the Internet,” leaving himself the option to take credit if anyone wanted to give it to him. It is generally agreed that Gore is not personally responsible for single-handedly creating the Internet, but he may have played at least a partial role in fostering its creation through federal legislation. And many people believe that the federal government essentially created the Internet through research and legislation.

### Private Enterprise Is Responsible

But the government did not create the Internet, L. Gordon Crovitz [wrote](http://online.wsj.com/article/SB10000872396390444464304577539063008406518.html) in a recent op-ed for The Wall Street Journal. The government envisioned a World Wide Web as early as the 1940s and went on to develop the Pentagon’s Advanced Research Projects Agency Network (ARPANET). However, that network did not lead to the Internet we have today, Crovitz wrote.   
  
Crovitz contends it was Xerox that invented the Internet, though the company wasn’t quite sure what it had. Xerox used its computer networks to share copiers, because that was the company's business, but that’s where the idea stopped. When Steve Jobs visited Xerox in 1979 to borrow some ideas, he may have seen something bigger. "They just had no idea what they had," Jobs said.  
  
The government had many of today’s Internet’s integral pieces, such as TCP/IP, but never put them together, Crovitz wrote. It was ultimately private enterprise that made the connections to create the Internet we have today, Crovitz wrote – government just needed to get out of the way.

### A Misunderstanding

Actually, the government did invent the Internet and Crovitz doesn’t really understand what he’s talking about, according to a Scientific American [rebuttal](http://blogs.scientificamerican.com/observations/2012/07/23/yes-government-researchers-really-did-invent-the-internet/) written by Michael Moyer. No private company could have accomplished such a huge undertaking as the Internet, he wrote.  
  
Crovitz is confused about technology, Moyer wrote. Just because Xerox invented Ethernet, doesn’t mean it also invented “the” Internet – it didn’t, Moyer wrote. Connecting several computers together isn’t the same thing as a worldwide computer network. Robert Metcalfe, a researcher at Xerox PARC who co-invented the Ethernet protocol, [jokingly referenced](https://twitter.com/BobMetcalfe/status/227426481901559808) the idea on July 23 in a tweet that read, “Is it possible I invented the whole damn Internet?”  
  
“The most important part of what we now know of as the Internet is the TCP/IP protocol, which was invented by Vincent Cerf [sic] and Robert Kahn,” Moyer wrote. “Crovitz mentions TCP/IP, but only in passing, calling it (correctly) ‘the Internet’s backbone.’ He fails to mention that Cerf and Kahn developed TCP/IP while working on a government grant.”  
  
Moyer also pointed out that several others criticized Crovitz for his misunderstandings, perhaps most notably the author of Dealers of Lightning, a history of Xerox PARC that Crovitz used as his main source of material. “While I’m gratified in a sense that he cites my book,” Michael Hiltzik wrote, “it’s my duty to point out that he’s wrong. My book bolsters, not contradicts, the argument that the Internet had its roots in the ARPANET, a government project.”

### Actually, I Invented the Internet

In a [recent interview](http://news.cnet.com/8301-1023_3-57479781-93/no-credit-for-uncle-sam-in-creating-net-vint-cerf-disagrees/) published by CNET, Cerf, one of the creators of the TCP/IP protocol, responded to Crovitz’s piece, rejecting most his ideas, which he characterized as a “revisionist interpretation.”  
  
The Internet did start with the ARPANET project and the federal government directly funded the creation of the Internet we know today, Cerf wrote. And Xerox deserves credit for great work, Cerf wrote, including creation of the Ethernet protocol, the ALTO personal computer, the Xerox Network System and PARC Universal Packet. “XEROX did link homogenous Ethernets together but the internetworking method did not scale particularly well,” Cerf wrote.   
  
Ultimately, it was the work of researchers around the world from dozens of organizations that created the Internet. “After our initial paper was published, detailed design was conducted at Stanford during 1974 and implementation started in 1975 at Stanford, BBN and University College London. After that, a number of other institutions, notably MIT, SRI, ISI, UCLA, NDRE, engaged heavily in the work,” Cerf wrote.  
  
As for Crovitz’s declaration that the TCP/IP protocol languished for decades in the hands of government, only to be set free by private enterprise, Cerf responded, “I would happily fertilize my tomatoes with Crovitz's assertion.”

After the internet

<https://medium.com/@TribalWorldwide/what-comes-after-the-internet-7415463e6327>

Darren Savage, Tribal Worldwide’s Chief Strategy Officer, shares his insights on overcoming evolutionary deficiencies to make artificial intelligence work for humanity.

In 2015 Tim Cook, the CEO of Apple, gave an interview on the US Charlie Rose show, in which he posed and discussed the question: “what comes after the Internet?”

In many respects, Apple, and its fellow tech titan Google, are following Alan Kaye’s advice about predicting the future by inventing it.

Google’s latest move in their efforts to do this came with the announcement of Alphabet, Google’s new holding company, a key aim of which is to make “smaller bets in areas that might seem very speculative or even strange when compared to our current businesses.”

All this relentless newness is very exciting. But, in looking to answer the question of what comes after the Internet and what role will A.I. play, trying to make sense of where the relentless march of technology is taking us in the context of our current understanding of the Internet, is probably not the best place to start.

The tendency to extrapolate the next from the now has led to many predictions that sounded sensible at the time, but now look increasingly silly, such as:

Thomas Watson, Chairman of IBM in 1943 stating: “I think there is a world market for maybe five computers.”

Ken Olsen of Digital Equipment Corp in 1977 saying: “There is no reason anyone would want a computer in their home.”

And Bill Gates of Microsoft postulating in 1981 that: “640K ought to be enough for anybody.”

Just some of the Apple products available today — photo by [Julian O’hayon](https://unsplash.com/photos/Bs-zngH79Ds?utm_source=unsplash&utm_medium=referral&utm_content=creditCopyText) on [Unsplash](https://unsplash.com/search/photos/apple-products?utm_source=unsplash&utm_medium=referral&utm_content=creditCopyText).

The avalanche of new tech, platforms, media, partnerships and businesses is a significant driver of the modern condition of accelerated culture — an overload of newness that is overtaken by more newness before anyone can get to grips with the old lot of newness. To paraphrase William Gibson:

“The future is already here, but most people are really confused about the whole thing and probably wish it would go away and leave them alone, unless someone can make it much easier for them to understand, access, use and benefit from.”

Eric Schmidt of Google was right when he famously opined: “The Internet is the first thing that humanity has built that humanity doesn’t understand, the largest experiment in anarchy we’ve ever had.”

Given the fact that Google along with the Amazon and IBM are spending gargantuan amounts of money on rebuilding themselves around IA — it’s a safe bet that the post Internet future will involve some manner of machine intelligence.

Photo by [Franck V.](https://unsplash.com/photos/YKW0JjP7rlU?utm_source=unsplash&utm_medium=referral&utm_content=creditCopyText) on [Unsplash](https://unsplash.com/search/photos/machine-intelligence?utm_source=unsplash&utm_medium=referral&utm_content=creditCopyText)

My starting point about understanding the Internet, in order to define a post Internet future, would be to ignore the technology and focus, initially at least, on a human perspective; how our current evolutionary state is restricting our ability to understand the Internet now. And for similar reasons, our inability to conceive what the future may look like, so we can do an Alan Kaye and invent it.

Alan Kaye provides another useful quote to frame why this approach is necessary:

“Living organisms are shaped by evolution to survive, not necessarily to get a clear picture of the universe.

For example, frogs’ brains are set up to recognise food as moving objects that are oblong in shape.

So if we take a frog’s normal food — flies — paralyze them with a little chloroform and put them in front of the frog, it will not notice them or try to eat them. It will starve in front of its food! But if we throw little rectangular pieces of cardboard at the frog it will eat them until it is stuffed! The frog only sees a little of the world we see, but it still thinks it perceives the whole world.

Now, of course, we are not like frogs!

Or are we?”

Fortunately, unlike frogs, evolution has provided us with amazingly inventive, collaborative, problem solving brains that help us overcome our evolutionary deficiencies of seeing a little, and not perceiving the whole.

The scale of the problem and opportunity at hand, demands a significant undertaking to understand the Internet before it goes all Skynet on us; something akin to Bletchley Park meets the Manhattan Project.

Once assembled, this pool of mega brains need to consider what to do with these 10 key business and human impacts of the 4th industrial revolution:

**1.** The acceleration of innovation and the velocity of disruption are hard to comprehend or anticipate, and these drivers constitute a source of constant surprise, even for the best connected and most well informed.

**2.** On the supply side, many industries are seeing the introduction of new technologies that create entirely new ways of serving existing needs and significantly disrupt existing industry value chains.

**3.** Major shifts on the demand side are also occurring, as growing transparency, consumer engagement, and new patterns of consumer behaviour (increasingly built upon access to mobile networks and data) force companies to adapt the way they design, market, and deliver products and services.

**4.** A key trend is the development of technology — enabled platforms that combine both demand and supply to disrupt existing industry structures, such as those we see within the “sharing” or “on demand” economy.

**5.** These technology platforms, rendered easy to use by the smartphone, convene people, assets, and data — thus creating entirely new ways of consuming goods and services in the process.

**6.** In addition, they lower the barriers for businesses and individuals to create wealth, altering the personal and professional environments of workers. These new platform businesses are rapidly multiplying into many new services, ranging from laundry to shopping, from household activities to parking, from massages to travel.

**7.** On the whole, there are four main effects that the fourth industrial revolution has on business: on customer expectations, on product enhancement, on collaborative innovation, and on organizational forms.

**8.** A world of customer experiences, data-based services, and asset performance through analytics, meanwhile, requires new forms of collaboration — particularly given the speed at which innovation and disruption are taking place.

**9.** And the emergence of global platforms and other new business models, means that talent, culture, and organizational forms will have to be rethought.

**10.** The bottom line; business leaders and senior executives need to understand their changing environment, challenge the assumptions of their operating teams, and relentlessly and continuously innovate.

This gathering of our finest minds should aim to develop new adaptive tools, media and systems to give everyone the ability to transcend the limitations of human evolution and provide the means for us to influence and control where the Internet is going, the staggering impact of A.I. and the means to personally benefit from its potential and potency.

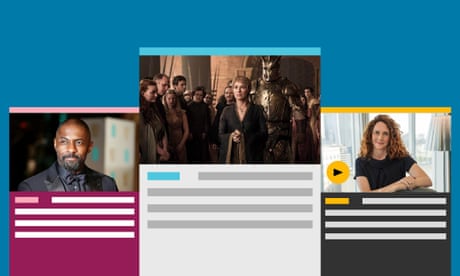
Either that, or we can kick back and await an especially bad Michael Bay version of the future triggered by malevolent AI’s and featuring killer robots stalking the earth.

https://www.theguardian.com/technology/2009/oct/23/internet-40-history-arpanet

Towards the end of the summer of 1969 – a few weeks after the moon landings, a few days after Woodstock, and a month before the first broadcast of Monty Python's Flying Circus – a large grey metal box was delivered to the office of Leonard Kleinrock, a professor at the University of California in Los Angeles. It was the same size and shape as a household refrigerator, and outwardly, at least, it had about as much charm. But Kleinrock was thrilled: a photograph from the time shows him standing beside it, in requisite late-60s brown tie and brown trousers, beaming like a proud father.

Had he tried to explain his excitement to anyone but his closest colleagues, they probably wouldn't have understood. The few outsiders who knew of the box's existence couldn't even get its name right: it was an IMP, or "interface message processor", but the year before, when a Boston company had won the contract to build it, its local senator, Ted Kennedy, sent a telegram praising its ecumenical spirit in creating the first "interfaith message processor". Needless to say, though, the box that arrived outside Kleinrock's office wasn't a machine capable of fostering understanding among the great religions of the world. It was much more important than that.

It's impossible to say for certain when the internet began, mainly because nobody can agree on what, precisely, the internet is. (This is only partly a philosophical question: it is also a matter of egos, since several of the people who made key contributions are anxious to claim the credit.) But 29 October 1969 – 40 years ago next week – has a strong claim for being, as Kleinrock puts it today, "the day the infant internet uttered its first words". At 10.30pm, as Kleinrock's fellow professors and students crowded around, a computer was connected to the IMP, which made contact with a second IMP, attached to a second computer, several hundred miles away at the Stanford Research Institute, and an undergraduate named Charley Kline tapped out a message. Samuel Morse, sending the first telegraph message 125 years previously, chose the portentous phrase: "What hath God wrought?" But Kline's task was to log in remotely from LA to the Stanford machine, and there was no opportunity for portentousness: his instructions were to type the command LOGIN.



## Sign up to the Media Briefing: news for the news-makers

Read more

To say that the rest is history is the emptiest of cliches – but trying to express the magnitude of what began that day, and what has happened in the decades since, is an undertaking that quickly exposes the limits of language. It's interesting to compare how much has changed in computing and the internet since 1969 with, say, how much has changed in world politics. Consider even the briefest summary of how much has happened on the global stage since 1969: the Vietnam war ended; the cold war escalated then declined; the Berlin Wall fell; communism collapsed; Islamic fundamentalism surged. And yet nothing has quite the power to make people in their 30s, 40s or 50s feel very old indeed as reflecting upon the growth of the internet and the world wide web. Twelve years after Charley Kline's first message on the Arpanet, as it was then known, there were still only 213 computers on the network; but 14 years after that, 16 million people were online, and email was beginning to change the world; the first really usable web browser wasn't launched until 1993, but by 1995 we had Amazon, by 1998 Google, and by 2001, Wikipedia, at which point there were 513 million people online. Today the figure is more like 1.7 billion.

Unless you are 15 years old or younger, you have lived through the dotcom bubble and bust, the birth of Friends Reunited and Craigslist and eBay and Facebook and [Twitter](https://www.theguardian.com/technology/twitter), blogging, the browser wars, Google Earth, filesharing controversies, the transformation of the record industry, political campaigning, activism and campaigning, the media, publishing, consumer banking, the pornography industry, travel agencies, dating and retail; and unless you're a specialist, you've probably only been following the most attention-grabbing developments. Here's one of countless statistics that are liable to induce feelings akin to vertigo: on New Year's Day 1994 – only yesterday, in other words – there were an estimated 623 websites. In total. On the whole internet. "This isn't a matter of ego or crowing," says Steve Crocker, who was present that day at UCLA in 1969, "but there has not been, in the entire history of mankind, anything that has changed so dramatically as computer communications, in terms of the rate of change."

Looking back now, Kleinrock and Crocker are both struck by how, as young computer scientists, they were simultaneously aware that they were involved in something momentous and, at the same time, merely addressing a fairly mundane technical problem. On the one hand, they were there because of the Russian Sputnik satellite launch, in 1957, which panicked the American defence establishment, prompting Eisenhower to channel millions of dollars into scientific research, and establishing Arpa, the Advanced Research Projects Agency, to try to win the arms technology race. The idea was "that we would not get surprised again," said Robert Taylor, the Arpa scientist who secured the money for the Arpanet, persuading the agency's head to give him a million dollars that had been earmarked for ballistic missile research. With another pioneer of the early internet, JCR Licklider, Taylor co-wrote the paper, "The Computer As A Communication Device", which hinted at what was to come. "In a few years, men will be able to communicate more effectively through a machine than face to face," they declared. "That is rather a startling thing to say, but it is our conclusion."

On the other hand, the breakthrough accomplished that night in 1969 was a decidedly down-to-earth one. The Arpanet was not, in itself, intended as some kind of secret weapon to put the Soviets in their place: it was simply a way to enable researchers to access computers remotely, because computers were still vast and expensive, and the scientists needed a way to share resources. (The notion that the network was designed so that it would survive a nuclear attack is an urban myth, though some of those involved sometimes used that argument to obtain funding.) The technical problem solved by the IMPs wasn't very exciting, either. It was already possible to link computers by telephone lines, but it was glacially slow, and every computer in the network had to be connected, by a dedicated line, to every other computer, which meant you couldn't connect more than a handful of machines without everything becoming monstrously complex and costly. The solution, called "packet switching" – which owed its existence to the work of a British physicist, Donald Davies – involved breaking data down into blocks that could be routed around any part of the network that happened to be free, before getting reassembled at the other end.

"I thought this was important, but I didn't really think it was as challenging as what I thought of as the 'real research'," says Crocker, a genial Californian, now 65, who went on to play a key role in the expansion of the internet. "I was particularly fascinated, in those days, by artificial intelligence, and by trying to understand how people think. I thought that was a much more substantial and respectable research topic than merely connecting up a few machines. That was certainly useful, but it wasn't art."

Still, Kleinrock recalls a tangible sense of excitement that night as Kline sat down at the SDS Sigma 7 computer, connected to the IMP, and at the same time made telephone contact with his opposite number at Stanford. As his colleagues watched, he typed the letter L, to begin the word LOGIN.

"Have you got the L?" he asked, down the phone line. "Got the L," the voice at Stanford responded.

Kline typed an O. "Have you got the O?"

"Got the O," Stanford replied.

Kline typed a G, at which point the system crashed, and the connection was lost. The G didn't make it through, which meant that, quite by accident, the first message ever transmitted across the nascent internet turned out, after all, to be fittingly biblical:

"LO."

**Frenzied visions of a global conscious brain**

One of the most intriguing things about the growth of the internet is this: to a select group of technological thinkers, the surprise wasn't how quickly it spread across the world, remaking business, culture and politics – but that it took so long to get off the ground. Even when computers were mainly run on punch-cards and paper tape, there were whispers that it was inevitable that they would one day work collectively, in a network, rather than individually. (Tracing the origins of online culture even further back is some people's idea of an entertaining game: there are those who will tell you that the Talmud, the book of Jewish law, contains a form of hypertext, the linking-and-clicking structure at the heart of the web.) In 1945, the American presidential science adviser, Vannevar Bush, was already imagining the "memex", a device in which "an individual stores all his books, records, and communications", which would be linked to each other by "a mesh of associative trails", like weblinks. Others had frenzied visions of the world's machines turning into a kind of conscious brain. And in 1946, an astonishingly complete vision of the future appeared in the magazine Astounding Science Fiction. In a story entitled A Logic Named Joe, the author Murray Leinster envisioned a world in which every home was equipped with a tabletop box that he called a "logic":

"You got a logic in your house. It looks like a vision receiver used to, only it's got keys instead of dials and you punch the keys for what you wanna get . . . you punch 'Sally Hancock's Phone' an' the screen blinks an' sputters an' you're hooked up with the logic in her house an' if somebody answers you got a vision-phone connection. But besides that, if you punch for the weather forecast [or] who was mistress of the White House durin' Garfield's administration . . . that comes on the screen too. The relays in the tank do it. The tank is a big buildin' full of all the facts in creation . . . hooked in with all the other tanks all over the country . . . The only thing it won't do is tell you exactly what your wife meant when she said, 'Oh, you think so, do you?' in that peculiar kinda voice "

Despite all these predictions, though, the arrival of the internet in the shape we know it today was never a matter of inevitability. It was a crucial idiosyncracy of the Arpanet that its funding came from the American defence establishment – but that the millions ended up on university campuses, with researchers who embraced an anti-establishment ethic, and who in many cases were committedly leftwing; one computer scientist took great pleasure in wearing an anti-Vietnam badge to a briefing at the Pentagon. Instead of smothering their research in the utmost secrecy – as you might expect of a cold war project aimed at winning a technological battle against Moscow – they made public every step of their thinking, in documents known as Requests For Comments.

Deliberately or not, they helped encourage a vibrant culture of hobbyists on the fringes of academia – students and rank amateurs who built their own electronic bulletin-board systems and eventually FidoNet, a network to connect them to each other. An argument can be made that these unofficial tinkerings did as much to create the public internet as did the Arpanet. Well into the 90s, by the time the Arpanet had been replaced by NSFNet, a larger government-funded network, it was still the official position that only academic researchers, and those affiliated to them, were supposed to use the network. It was the hobbyists, making unofficial connections into the main system, who first opened the internet up to allcomers.

What made all of this possible, on a technical level, was simultaneously the dullest-sounding and most crucial development since Kleinrock's first message. This was the software known as TCP/IP, which made it possible for networks to connect to other networks, creating a "network of networks", capable of expanding virtually infinitely – which is another way of defining what the internet is. It's for this reason that the inventors of TCP/IP, Vint Cerf and Bob Kahn, are contenders for the title of fathers of the internet, although Kleinrock, understandably, disagrees. "Let me use an analogy," he says. "You would certainly not credit the birth of aviation to the invention of the jet engine. The Wright Brothers launched aviation. Jet engines greatly improved things."

The spread of the internet across the Atlantic, through academia and eventually to the public, is a tale too intricate to recount here, though it bears mentioning that British Telecom and the British government didn't really want the internet at all: along with other European governments, they were in favour of a different networking technology, Open Systems Interconnect. Nevertheless, by July 1992, an Essex-born businessman named Cliff Stanford had opened Demon [Internet](https://www.theguardian.com/technology/internet), Britain's first commercial internet service provider. Officially, the public still wasn't meant to be connecting to the internet. "But it was never a real problem," Stanford says today. "The people trying to enforce that weren't working very hard to make it happen, and the people working to do the opposite were working much harder." The French consulate in London was an early customer, paying Demon £10 a month instead of thousands of pounds to lease a private line to Paris from BT.

After a year or so, Demon had between 2,000 and 3,000 users, but they weren't always clear why they had signed up: it was as if they had sensed the direction of the future, in some inchoate fashion, but hadn't thought things through any further than that. "The question we always got was: 'OK, I'm connected – what do I do now?'" Stanford recalls. "It was one of the most common questions on our support line. We would answer with 'Well, what do you want to do? Do you want to send an email?' 'Well, I don't know anyone with an email address.' People got connected, but they didn't know what was meant to happen next."

Fortunately, a couple of years previously, a British scientist based at Cern, the physics laboratory outside Geneva, had begun to answer that question, and by 1993 his answer was beginning to be known to the general public. What happened next was the web.

**The birth of the web**

I sent my first email in 1994, not long after arriving at university, from a small, under-ventilated computer room that smelt strongly of sweat. Email had been in existence for decades by then – the @ symbol was introduced in 1971, and the first message, according to the programmer who sent it, Ray Tomlinson, was "something like QWERTYUIOP". (The test messages, Tomlinson has said, "were entirely forgettable, and I have, therefore, forgotten them".) But according to an unscientific poll of friends, family and colleagues, 1994 seems fairly typical: I was neither an early adopter nor a late one. A couple of years later I got my first mobile phone, which came with two batteries: a very large one, for normal use, and an extremely large one, for those occasions on which you might actually want a few hours of power. By the time I arrived at the Guardian, email was in use, but only as an add-on to the internal messaging system, operated via chunky beige terminals with green-on-black screens. It took for ever to find the @ symbol on the keyboard, and I don't remember anything like an inbox, a sent-mail folder, or attachments. I am 34 years old, but sometimes I feel like Methuselah.

I have no recollection of when I first used the world wide web, though it was almost certainly when people still called it the world wide web, or even W3, perhaps in the same breath as the phrase "information superhighway", made popular by Al Gore. (Or "infobahn": did any of us really, ever, call the internet the "infobahn"?) For most of us, though, the web is in effect synonymous with the internet, even if we grasp that in technical terms that's inaccurate: the web is simply a system that sits on top of the internet, making it greatly easier to navigate the information there, and to use it as a medium of sharing and communication. But the distinction rarely seems relevant in everyday life now, which is why its inventor, Tim Berners-Lee, has his own legitimate claim to be the progenitor of the internet as we know it. The first ever website was his own, at CERN: info.cern.ch.

The idea that a network of computers might enable a specific new way of thinking about information, instead of just allowing people to access the data on each other's terminals, had been around for as long as the idea of the network itself: it's there in Vannevar Bush's memex, and Murray Leinster's logics. But the grandest expression of it was Project Xanadu, launched in 1960 by the American philosopher Ted Nelson, who imagined – and started to build – a vast repository for every piece of writing in existence, with everything connected to everything else according to a principle he called "transclusion". It was also, presciently, intended as a method for handling many of the problems that would come to plague the media in the age of the internet, automatically channelling small royalties back to the authors of anything that was linked. Xanadu was a mind-spinning vision – and at least according to an unflattering portrayal by Wired magazine in 1995, over which Nelson threatened to sue, led those attempting to create it into a rabbit-hole of confusion, backbiting and "heart-slashing despair". Nelson continues to develop Xanadu today, arguing that it is a vastly superior alternative to the web. "WE FIGHT ON," the Xanadu website declares, sounding rather beleaguered, not least since the declaration is made on a website.

Web browsers crossed the border into mainstream use far more rapidly than had been the case with the internet itself: Mosaic launched in 1993 and Netscape followed soon after, though it was an embarrassingly long time before Microsoft realised the commercial necessity of getting involved at all. Amazon and eBay were online by 1995. And in 1998 came Google, offering a powerful new way to search the proliferating mass of information on the web. Until not too long before Google, it had been common for search or directory websites to boast about how much of the web's information they had indexed – the relic of a brief period, hilarious in hindsight, when a user might genuinely have hoped to check all the webpages that mentioned a given subject. Google, and others, saw that the key to the web's future would be helping users exclude almost everything on any given topic, restricting search results to the most relevant pages.

Without most of us quite noticing when it happened, the web went from being a strange new curiosity to a background condition of everyday life: I have no memory of there being an intermediate stage, when, say, half the information I needed on a particular topic could be found online, while the other half still required visits to libraries. "I remember the first time I saw a web address on the side of a truck, and I thought, huh, OK, something's happening here," says Spike Ilacqua, who years beforehand had helped found The World, the first commercial internet service provider in the US. Finally, he stopped telling acquaintances that he worked in "computers", and started to say that he worked on "the internet", and nobody thought that was strange.

It is absurd – though also unavoidable here – to compact the whole of what happened from then onwards into a few sentences: the dotcom boom, the historically unprecedented dotcom bust, the growing "digital divide", and then the hugely significant flourishing, over the last seven years, of what became known as Web 2.0. It is only this latter period that has revealed the true capacity of the web for "generativity", for the publishing of blogs by anyone who could type, for podcasting and video-sharing, for the undermining of totalitarian regimes, for the use of sites such as Twitter and Facebook to create (and ruin) friendships, spread fashions and rumours, or organise political resistance. But you almost certainly know all this: it's part of what these days, in many parts of the world, we call "just being alive".

The most confounding thing of all is that in a few years' time, all this stupendous change will probably seem like not very much change at all. As Crocker points out, when you're dealing with exponential growth, the distance from A to B looks huge until you get to point C, whereupon the distance between A and B looks like almost nothing; when you get to point D, the distance between B and C looks similarly tiny. One day, presumably, everything that has happened in the last 40 years will look like early throat-clearings — mere preparations for whatever the internet is destined to become. We will be the equivalents of the late-60s computer engineers, in their horn-rimmed glasses, brown suits, and brown ties, strange, period-costume characters populating some dimly remembered past.

Will you remember when the web was something you accessed primarily via a computer? Will you remember when there were places you couldn't get a wireless connection? Will you remember when "being on the web" was still a distinct concept, something that described only a part of your life, instead of permeating all of it? Will you remember Google?

## As 2020 begins…

… we’re asking readers, like you, to make a new year contribution in support of the Guardian’s open, independent journalism. This has been a turbulent decade across the world – protest, populism, mass migration and the escalating climate crisis. The Guardian has been in every corner of the globe, reporting with tenacity, rigour and authority on the most critical events of our lifetimes. At a time when factual information is both scarcer and more essential than ever, we believe that each of us deserves access to accurate reporting with integrity at its heart.

More people than ever before are reading and supporting our journalism, in more than 180 countries around the world. And this is only possible because we made a different choice: to keep our reporting open for all, regardless of where they live or what they can afford to pay.

We have upheld our editorial independence in the face of the disintegration of traditional media – with social platforms giving rise to misinformation, the seemingly unstoppable rise of big tech and independent voices being squashed by commercial ownership. The Guardian’s independence means we can set our own agenda and voice our own opinions. Our journalism is free from commercial and political bias – never influenced by billionaire owners or shareholders. This makes us different. It means we can challenge the powerful without fear and give a voice to those less heard.

None of this would have been attainable without our readers’ generosity – your financial support has meant we can keep investigating, disentangling and interrogating. It has protected our independence, which has never been so critical. We are so grateful.

As we enter a new decade, we need your support so we can keep delivering quality journalism that’s open and independent. And that is here for the long term. Every reader contribution, however big or small, is so valuable. **Support The Guardian from as little as $1 – and it only takes a minute. Thank you.**

#2,

1,Ocean of games : <https://oceanof-games.com/>

2, Quora : <https://www.quora.com/What-is-the-best-site-to-learn-how-to-code>

3, Stackoverflow : <https://stackoverflow.com/>

4, instructables :https://www.instructables.com/

5, Youtube : https://www.youtube.com/