**Digital Revolution**

The **Digital Revolution**, also known as the **Third Industrial Revolution**, is the shift from [mechanical](https://en.wikipedia.org/wiki/Machine) and [analogue electronic](https://en.wikipedia.org/wiki/Analogue_electronics) [technology](https://en.wikipedia.org/wiki/Technology) to [digital electronics](https://en.wikipedia.org/wiki/Digital_electronics) which began anywhere from the late 1950s to the late 1970s with the adoption and proliferation of digital computers and digital record keeping that continues to the present day. Implicitly, the term also refers to the sweeping changes brought about by digital [computing](https://en.wikipedia.org/wiki/Computing) and [communication](https://en.wikipedia.org/wiki/Communication) [technology](https://en.wikipedia.org/wiki/Technology) during (and after) the latter half of the 20th century. Analogous to the [Agricultural Revolution](https://en.wikipedia.org/wiki/Neolithic_Revolution) and [Industrial Revolution](https://en.wikipedia.org/wiki/Industrial_Revolution), the Digital Revolution marked the beginning of the [Information Age](https://en.wikipedia.org/wiki/Information_Age).

Central to this revolution is the [mass production](https://en.wikipedia.org/wiki/Mass_production) and widespread use of [digital logic](https://en.wikipedia.org/wiki/Transistor-transistor_logic) [circuits](https://en.wikipedia.org/wiki/Integrated_circuits), and its derived technologies, including the [computer](https://en.wikipedia.org/wiki/Computer), digital [cellular phone](https://en.wikipedia.org/wiki/Cellular_phone), and the [Internet](https://en.wikipedia.org/wiki/Internet). These technological innovations have transformed traditional production and business techniques.

***Brief history***

The underlying technology was invented in the latter half of the 19th century, including [Babbage](https://en.wikipedia.org/wiki/Babbage)’s [analytical engine](https://en.wikipedia.org/wiki/Analytical_engine) and the [telegraph](https://en.wikipedia.org/wiki/Telegraph). [Digital communication](https://en.wikipedia.org/wiki/Data_transmission) became economical for widespread adoption after the invention of the [personal computer](https://en.wikipedia.org/wiki/Personal_computer). [Claude Shannon](https://en.wikipedia.org/wiki/Claude_Elwood_Shannon), a Bell Labs mathematician, is credited for having laid out the foundations of [digitalization i](https://en.wikipedia.org/wiki/Digitization)n his pioneering 1948 article, *A Mathematical Theory of Communication*. The digital revolution converted technology that had been analog into a digital format. By doing this, it became possible to make copies that were identical to the original. In digital communications, for example, repeating hardware was able to amplify the digital signal and pass it on with no loss of information in the signal. Of equal importance to the revolution was the ability to easily move the digital information between media, and to access or distribute it remotely.

The turning point of the revolution was the change from analogue to digitally recorded music. During the 1980s the digital format of optical [compact discs](https://en.wikipedia.org/wiki/Compact_disc) gradually replaced [analog](https://en.wikipedia.org/wiki/Analog_electronics) formats, such as [vinyl records](https://en.wikipedia.org/wiki/Vinyl_records) and [cassette tapes](https://en.wikipedia.org/wiki/Compact_Cassette), as the popular medium of choice.

By 2012, over 2 billion people used the Internet, twice the number using it in 2007. [Cloud computing](https://en.wikipedia.org/wiki/Cloud_computing) had entered the mainstream by the early 2010s. By 2015, [tablet computers](https://en.wikipedia.org/wiki/Tablet_computer) and [smartphones](https://en.wikipedia.org/wiki/Smartphones) were expected to exceed personal computers in Internet usage. By 2016, half of the world’s population was connected.

***Analog to digital transition 1986–2014***

In the late 1980s, less than 1% of the world’s technologically stored information was in digital format, while it was 94% in 2007, with more than 99% by 2014. The year 2002 is estimated to be the year when human kind was able to store more information in digital, than in analog format (the "beginning of the [digital age](https://en.wikipedia.org/wiki/Digital_age)").

It is estimated that the world’s capacity to store information has increased from 2.6 (optimally compressed) [exabytes](https://en.wikipedia.org/wiki/Exabytes) in 1986, to some 5,000 [exabytes](https://en.wikipedia.org/wiki/Exabytes) in 2014 (5 [zettabytes](https://en.wikipedia.org/wiki/Zettabytes" \o "Zettabytes)).

**Technological basis**

Underlying the digital revolution was the [development of the digital electronic computer](https://en.wikipedia.org/wiki/History_of_computing_hardware), the [personal computer](https://en.wikipedia.org/wiki/Personal_computer), and particularly the [microprocessor](https://en.wikipedia.org/wiki/Microprocessor) with its steadily increasing performance (as described by [Moore's law](https://en.wikipedia.org/wiki/Moore%27s_law)), which enabled computer technology to be [embedded](https://en.wikipedia.org/wiki/Embedded_system) into a huge range of objects from [cameras](https://en.wikipedia.org/wiki/Digital_photography) to [personal music players](https://en.wikipedia.org/wiki/Digital_audio_player). Equally important was the development of transmission technologies including [computer networking](https://en.wikipedia.org/wiki/Computer_network), the [Internet](https://en.wikipedia.org/wiki/Internet) and [digital broadcasting](https://en.wikipedia.org/wiki/Digital_audio_broadcasting). [3G phones](https://en.wikipedia.org/wiki/3G_phones), whose social penetration grew exponentially in the 2000s, also played a very large role in the digital revolution as they simultaneously provide ubiquitous entertainment, communications, and online connectivity.

**Socio-economic impact**

Positive aspects include greater interconnectedness, easier communication, and the exposure of information that in the past could have more easily been suppressed by [totalitarian](https://en.wikipedia.org/wiki/Totalitarian) regimes. [Michio Kaku](https://en.wikipedia.org/wiki/Michio_Kaku" \o "Michio Kaku) wrote in his books [Physics of the Future](https://en.wikipedia.org/wiki/Physics_of_the_Future) that the failure of the [Soviet coup of 1991](https://en.wikipedia.org/wiki/1991_Soviet_coup_d%27%C3%A9tat_attempt) was due largely to the existence of technology such as the [fax machine](https://en.wikipedia.org/wiki/Fax_machine) and computers that exposed classified information.The [Revolutions of 2011](https://en.wikipedia.org/wiki/Revolutions_of_2011) were enabled by social networking and smartphone technology; however these revolutions in hindsight largely failed to reach their goals as hardcore Islamist governments and in Syria a [civil war](https://en.wikipedia.org/wiki/Syrian_Civil_War) have formed in the absence of the dictatorships that were toppled.

The economic impact of the digital revolution has been large. Without the [World Wide Web](https://en.wikipedia.org/wiki/World_Wide_Web) (WWW), for example, [globalization](https://en.wikipedia.org/wiki/Globalization) and [outsourcing](https://en.wikipedia.org/wiki/Outsourcing) would not be nearly as feasible as they are today. The digital revolution radically changed the way individuals and companies interact. Small regional companies were suddenly given access to much larger markets. Concepts such as [On-demand](https://en.wikipedia.org/wiki/Software_as_a_service) services and manufacturing and rapidly dropping technology costs made possible innovations in all aspects of industry and everyday life.

After initial concerns of an IT [productivity paradox](https://en.wikipedia.org/wiki/Productivity_paradox), evidence is mounting that digital technologies have significantly increased the productivity and performance of businesses.

Negative effects include [information overload](https://en.wikipedia.org/wiki/Information_overload), Internet predators, forms of social isolation, and media saturation. In a poll of prominent members of the national news media, 65 percent said the Internet is hurting journalism more than it is helping[[34]](https://en.wikipedia.org/wiki/Digital_Revolution#cite_note-34) by allowing anyone no matter how amateur and unskilled to become a journalist; causing information to be muddier and the rise of [conspiracy theory](https://en.wikipedia.org/wiki/Conspiracy_theory) in a way it didn't exist in the past.

In some cases, company employees' pervasive use of portable digital devices and work related computers for personal use—email, instant messaging, computer games—were often found to, or perceived to, reduce those companies' productivity. Personal computing and other non-work related digital activities in the workplace thus helped lead to stronger forms of privacy invasion, such as keystroke recording and information filtering applications ([spyware](https://en.wikipedia.org/wiki/Spyware) and [content-control software](https://en.wikipedia.org/wiki/Content-control_software)).

***Information sharing and privacy***

[Privacy](https://en.wikipedia.org/wiki/Privacy) in general became a concern during the digital revolution. The ability to store and utilize such large amounts of diverse information opened possibilities for tracking of individual activities and interests. [Libertarians](https://en.wikipedia.org/wiki/Libertarianism) and privacy rights advocates feared the possibility of an [Orwellian](https://en.wikipedia.org/wiki/Orwellian) future where centralized power structures control the populace via automatic surveillance and monitoring of personal information in such programs as the CIA's [Information Awareness Office](https://en.wikipedia.org/wiki/Information_Awareness_Office).

Consumer and labor advocates opposed the ability to direct market to individuals, discriminate in hiring and lending decisions, invasively monitor employee behavior and communications and generally profit from involuntarily shared personal information.

The [Internet](https://en.wikipedia.org/wiki/Internet), especially the [WWW](https://en.wikipedia.org/wiki/WWW) in the 1990s, opened whole new avenues for communication and information sharing. The ability to easily and rapidly share information on a global scale brought with it a whole new level of [freedom of speech](https://en.wikipedia.org/wiki/Freedom_of_speech). Individuals and organizations were suddenly given the ability to publish on any topic, to a global audience, at a negligible cost, particularly in comparison to any previous communication technology.

Large cooperative projects could be endeavored (e.g. [Open-source software](https://en.wikipedia.org/wiki/Open-source_software) projects, [SETI@home](https://en.wikipedia.org/wiki/SETI@home" \o "SETI@home)). Communities of like-minded individuals were formed (e.g. [MySpace](https://en.wikipedia.org/wiki/MySpace), [Tribe.net](https://en.wikipedia.org/wiki/Tribe.net)). Small regional companies were suddenly given access to a larger marketplace.

In other cases, special interest groups as well as social and religious institutions found much of the content objectionable, even dangerous. Many parents and religious organizations, especially in the United States, became alarmed by [pornography](https://en.wikipedia.org/wiki/Pornography) being more readily available to minors. In other circumstances the proliferation of information on such topics as child pornography, building bombs, committing acts of terrorism, and other violent activities were alarming to many different groups of people. Such concerns contributed to arguments for censorship and regulation on the WWW.Copyright and trademark issues

**Concerns**

While there have been huge benefits to society from the digital revolution, especially in terms of the accessibility of information, there are a number of concerns. Expanded powers of communication and information sharing, increased capabilities for existing technologies, and the advent of new technology brought with it many potential opportunities for exploitation. The digital revolution helped usher in a new age of [mass surveillance](https://en.wikipedia.org/wiki/Mass_surveillance), generating a range of new [civil](https://en.wikipedia.org/wiki/Civil_rights) and [human rights](https://en.wikipedia.org/wiki/Human_rights) issues. Reliability of data became an issue as information could easily be replicated, but not easily verified. The digital revolution made it possible to store and track facts, articles, statistics, as well as minutiae hitherto unfeasible.

From the perspective of the [historian](https://en.wikipedia.org/wiki/Historian), a large part of human history is known through physical objects from the past that have been found or preserved, particularly in written documents. Digital records are easy to create but also easy to delete and modify. Changes in [storage formats](https://en.wikipedia.org/wiki/File_format) can make recovery of data difficult or near impossible, as can the storage of information on obsolete media for which reproduction equipment is unavailable, and even identifying what such data is and whether it is of interest can be near impossible if it is no longer easily readable, or if there is a large number of such files to identify. Information passed off as authentic research or study must be scrutinized and verified.

These problems are further compounded by the use of [digital rights management](https://en.wikipedia.org/wiki/Digital_rights_management) and other [copy prevention](https://en.wikipedia.org/wiki/Copy_prevention) technologies which, being designed to only allow the data to be read on specific machines, may well make future [data recovery](https://en.wikipedia.org/wiki/Data_recovery) impossible. The [Voyager Golden Record](https://en.wikipedia.org/wiki/Voyager_Golden_Record), which is intended to be read by an intelligent [extraterrestrial](https://en.wikipedia.org/wiki/Extraterrestrial_life) (perhaps a suitable parallel to a human from the distant future), is recorded in [analog](https://en.wikipedia.org/wiki/Analog_(signal)) rather than digital format specifically for easy interpretation and analysis.