

Hidden Threads of Technology in the Fabric of Civilization

Technology is everywhere— any application of science by human beings, built to solve a certain problem or fulfill a certain craving to improve life. It is a fluid idea, always changing to amaze people time and time again— ideas such as smartphones, “rocket science,” and artificial intelligence are emerging and evolving as our knowledge grows exponentially. But many people nowadays may not consider what really changes our life as “technology,” because these inventions are common and too well integrated into our lives. To many people, the word “technology” refers to modern, sophisticated gadgets that appear “cool” and are new to the world— powerful computers, robots, and the applications of nanosciences to medicine— but what really has the greatest impact on our lives are the fundamental technological inventions we use everyday, ones simple enough so we forget that they have an impact on us. For this reason, the most useful technologies are the ones that are so tightly wound with civilization that they become an everyday occurrence, a fact of life that goes unnoticed and taken for granted. Accurate timekeeping, firearms, and even paper used to be new technologies that changed life drastically, and now they can be found everywhere, something that we cannot and will not be able to live without. The Internet and social media are new ideas that have reached billions of people, so that the terms “iMessage,” “Skype,” and “Google” have even become *verbs* in our language and part of our culture despite being nonexistent only a few years ago.

The advent of new technologies in the great ancient civilization of China, the late Middle Ages of Europe, as well as some modern inventions of the modern superpower we live in best exemplifies this process. New technological advances always begin as insignificant desires to improve or make more convenient one small aspect of life, but the technologies quickly assimilate into a community or civilization: they become indispensable and take on a role in society, even if they weren't in existence only a few years before. They not only become items tightly wrapped into society, difficult to let go of; common technological devices can also become similar to our basic needs of food and shelter in the way that they become a requirement to surviving and thriving in a more complex society.

No matter how revolutionary or new it is, any technological invention providing a beneficial solution to a problem in society will quickly become infused so that it loses its characteristic as a new technology and gains traction in society. It becomes something that people could not imagine living without. This is especially prevalent in modern technologies, where their spread is catalyzed by the far reach of the Internet, something nearly impossible in ancient times.

Before the Middle Ages, the only ways to keep time was by the position of the sun, water clocks, or hourglasses. There was no accurate method of timekeeping, especially for the general public. After the invention of the mechanical clock, an accurate and reliable timekeeping device, in Europe during the Middle Ages, town centers started to become outfitted with a communal clock that the public could use for their daily needs. Scheduling for religious events, work hours, and even cooking improved as timing improved. The first major public clocks were placed in Paris in 1300, with bells ringing at the hours. In 1335, another major public clock was placed in Milan, and within the century they became more popular in larger cities, especially to show prestige (Johnson). However, as technology improved as clocks have become more accurate and smaller, clocks no longer are items that was regarded as “special.” With many people wearing a watch (and the new “smartwatches” that have come out this year) and the clocks that adorn most rooms, clocks are certainly not an item that we find difficult to obtain. Although they are not the most advanced or interesting technology, they are practical items, and therefore are still so widely used even today.

Another common invention that is very tightly woven into our world are gunpowder weapons. Accidentally created and first used by the Chinese, gunpowder was originally used to fend off the Mongolian invaders, and for fireworks. When China was taken over by the Mongols, the Mongols used the new firearms against the rest of Eastern Asia (Xu). Eventually, the invention spread through Arabian countries to Europe. It is still used with the same effectiveness today. The number of guns owned today by citizens in just the USA is enormous, in the hundreds of millions, with over a third of Americans owning a gun (DeSilver). The majority of the owners possess guns for defensive reasons, which they are well-built for. Any new technology that can benefit many people will quickly spread to others, within a very short time in the span of history.

Most technological inventions are created to solve a practical problem— a solution to help society in some way. Some are created by accident, such as gunpowder, but are nonetheless quickly brought into a community because of its effectiveness. Whatever the technology, its improvement of standard of living, convenience and efficiency, or cost for a community is the major reason why we can take them for granted so easily.

Found in every school, press, and other institutions, essential for the quick and efficient reproduction of documents, the idea of printing is certainly one of the most useful tools in society. With the invention of wood-block typography and then movable type in China's Song dynasty— in which movable letters could be arranged to reproduce the same document multiple times— the creation of books and other important documents could be completed in a fraction of the time, without necessitating learned scholars to copy the text and with greater accuracy (Blackwell). Later on, the invention of the mechanical printing press in Europe again revolutionized the world, as it added much more potential to education, now printing hundreds of pages per hour, fast enough to engender the rise of periodicals and newspapers ("Printing Press")— another invention we still heavily utilize today in our everyday lives. And finally, in the last century, the "digital age" brought about new "laser" and "inkjet" printers that have the ability to print documents for any type of user, including students, businessmen, and politicians. Because of the enormous capability of even a small, household printer in the 21st century for professional reproduction of documents, printing is another example of a great technological advance that has worked its way into our lives.

Similarly, the dollar, the euro, the yuan, and other forms of paper currency are another artificial idea. Without understanding those systems of currency, the idea of bartering seems more fair and less prone to cheating— why trade a piece of worthless paper for something of real value? For this reason, bartering was the primary system of trade from the ancient days. However, as civilizations progressed, people started to use spices and other somewhat-common products to provide a more standardized and reliable trading system. This allowed more consistency throughout the people, with set prices for certain items. Next, this led to the trade of valuable metals: gold and silver coins— these added even more consistency, providing a stable monetary system. Unfortunately, there was still the problem of real value, along with the

inconvenience of weight. Eventually, as nations grew more secure with more loyal, honest members, paper currency was created. In this system, items could be bought with carefully printed, difficult-to-reproduce paper (in which again the advancement of printers can play an important role). The result is an efficient, easier monetary system that allows for convenient travel and consistency throughout a whole country or group of countries, also allowing for the creation of the credit system (Newman). Without it today, purchasing any type of product, especially expensive ones, would take a lot of effort and time to barter and argue about prices. This, like the idea of printing, was quickly absorbed into our society because of its amazing productivity.

Similarly, during the large urbanization movement of the late Middle Ages, new problems arose with city life. Fires were a prime example: with wooden houses, thatched roofs, and cramped quarters, there was much difficulty putting them out when they started. Tile roofs and the chimney sprung from that— although more expensive than thatch, it was worth the potential cost of rebuilding a house in event of a fire (Johnson). Furthermore, houses improved as a whole from mud, single-story and sometimes single-roomed houses from the Middle Ages to two-storied, wooden houses with better insulation and strength. These improvements have stuck with us also, because of their simple build and ability to withstand the elements.

Also, it is important to know that the most “important” inventions have to be complex— or simple. Whatever it is, if it is useful it will become implemented into someone’s life, whether it is synthetic insulin or the plow. Thousands of years ago, farmers had no efficient way to till land except manually, by hand. With the wedge, a simple machine, a plow is a simple tool that converts the walking of a plow animal into the turning over of the soil for easier farming, rather than breaking the backs of farmers (Frater). Many mechanical machines also have this simple concept— even scissors and door stops— but they are nonetheless essential, even in our lives today. In contrast, very complex technologies can catch on to a society quickly as well as a simpler one, especially in the field of medicine: a method was invented to create synthetic insulin that is chemically identical to our own natural insulin, that diabetic people can use in place of insulin from animals. Therefore, without killing animals (but rather using bacteria such as *E. coli*), these complex molecules (which are sophisticated organic molecules that are made up of

51 amino acids) can be obtained easily and used in humans, safely and effectively (“Synthesis of Crystalline Insulin”) (see Appendix 3: “The Variety of Useful Inventions”).

Another example of the improvement of life from an invention is consideredfacebook.com

China’s fifth greatest technological invention (after their “Four Great Inventions”: the compass, printing, gunpowder, and papermaking) is “hybrid rice” — cross-bred rice created by scientists to reduce the problem of overpopulation and starvation in China. Like most cross-breeding or genetic engineering, it was created to get the most desirable traits of different plants— in this case, it was the ability to grow more rice, faster, in a smaller plot of land, and without being too different from regular rice. People could harvest much more of the hybrid rice than regular rice, so that less acreage had the potential to feed billions more people than it had been previously. This modified strain therefore it was quickly implemented into China’s farming industry. It made possible “the feeding of 22% of the world population on only 7% of the world’s total arable land ... From 1976 to 1987, the total cultivated area of the hybrid rice developed by Yuan reached 1.1 billion mu (15 mu=1 hectares), and increased rice yield by 100 billion kg.” (“Father of Hybrid Rice -- Yuan Longping.”). It’s an amazing feat of genetic engineering that can help civilization on a grand scale, and again supports that the practicality of an invention is the reason behind quick employment.

It’s also crucial to highlight the prominence of the technologies as they weave into society. How do they become strands of silk in that cloth of civilization, strong and woven in so tightly that they will never fall out? What makes them a necessity of life after a short time? The answer is human nature’s characteristic to continue growing: learning more knowledge, advancing in efficiency, and improving standard of living. What was once an acceptable standard becomes an easy threshold to pass after only a few short years as technology advances. Without these common technologies, people could survive, but existence difficult, simple, and meaningless as it was in ancient eras— we would still survive as living beings, but not ones of importance or intelligence like we are now. Printing and paper currency were both invented in the Song dynasty as ideas to help strive towards a better life, so that we now are stuck in a world (for the better) with these in many aspects of our lives. Without printing, newspapers, books,

schoolwork, legal documents, and religious works would not be as widespread as they are today that allow us the education and political and religious literacy that we enjoy. Without paper currency, we would be stuck in the past with trading of cumbersome and high-risk possessions for items without a set price, making life difficult and more unfair. Without clocks or glasses, both non-essential items in our lives, we could still survive— but with a strong hindrance to our lives. Without clocks, important scientific discoveries would be set off as time is estimated, and events would not start at an exact time, delaying or being too early for people who just estimate time. If glasses and lenses did not exist, people with myopia, or nearsightedness, would have much more difficult lives, especially as an increasing number of people stare at screens all day and damage their eyes. People will still survive, but that survival will be limited and greatly inconvenienced, not enough to thrive.

An additional example is the rise of the Internet in the United States. As of today, the Internet is only about a quarter of a century old, but 40% of the world's population is already using it, with over three billion people online at any given moment (Internet Live Stats). There is already an enormous range of applications of the web, most of which are to connect the people using it and share data. To many of those Internet users, especially in modernized societies, life without it would be very difficult. For us students, much of schoolwork is online, as well as main methods of distance communications besides phone calls (video chatting via Hangouts, Skype, and FaceTime; social networking; and email) require the Internet, and the constant searching of solutions and answers to everyday problems and questions are all dependent on the Internet. When I was away for vacation just a few weeks ago, the lack of Internet worried me as I could not connect to those sites that I depend on so often, and often people describe the same feeling when they are away from their smartphones. With social media and video games taking over the lives of teenagers today and over half of Americans playing video games (see Appendix 1: "American Gaming Statistics"), and new digital "smart" devices entering the market, people are lured into buying these ideas, and actually also buying a ticket to the future of technology, allowing new technologies to advance. All in all, the reason technology can become so important to us humans is because we will not accept a mediocre existence, but an exceptional one.

To say that the quick assimilation of technologies into mankind is only positive would be misleading: sometimes new inventions can be detrimental to society, even if they were created with a good intention. One of the best examples for this would be the invention of electronic cigarettes, abbreviated to “e-cigarettes.” Although its inventor, a Chinese scientist who focused his work on creating a healthier, toxin-free cigarette that does not damage your lungs, and wanted to create a smoke-free but cigarette-like experience, it did not benefit too many people (and therefore, it did not catch on too well nor become too popular). He was motivated by the death of his father due to smoking-related lung disease, and wanted to prevent it in smokers throughout the world. However, the potential health risks associated with the still-present nicotine- which the FDA and other organizations claim makes e-cigarettes as dangerous as regular cigarettes but is unproven- and the controversy that it caused over its safety fueled enormous debate globally, eventually leading to its banning in many countries and a loss in popularity (“E-Cigarette History”). Another problem with it, similar to tobacco products and other drugs, is that there is no essential benefit that it can provide to people. It might invoke a feeling of bliss (a “high” feeling), but it does not promote the advancement of society, and therefore it cannot and will not have a positive impact on people.

Similarly, there has been recent speculation about the negative consequences of using digital devices, especially smart-devices. Besides making some work, especially calculations, extremely simple, they also are built to be attractive to consumers and as a result use up a lot of people’s time— especially teenagers who tend to be more distracted and perhaps more susceptible— with billions of people using social media and the Internet (see Appendix 2: “Internet and Social Media Penetration Statistics”).

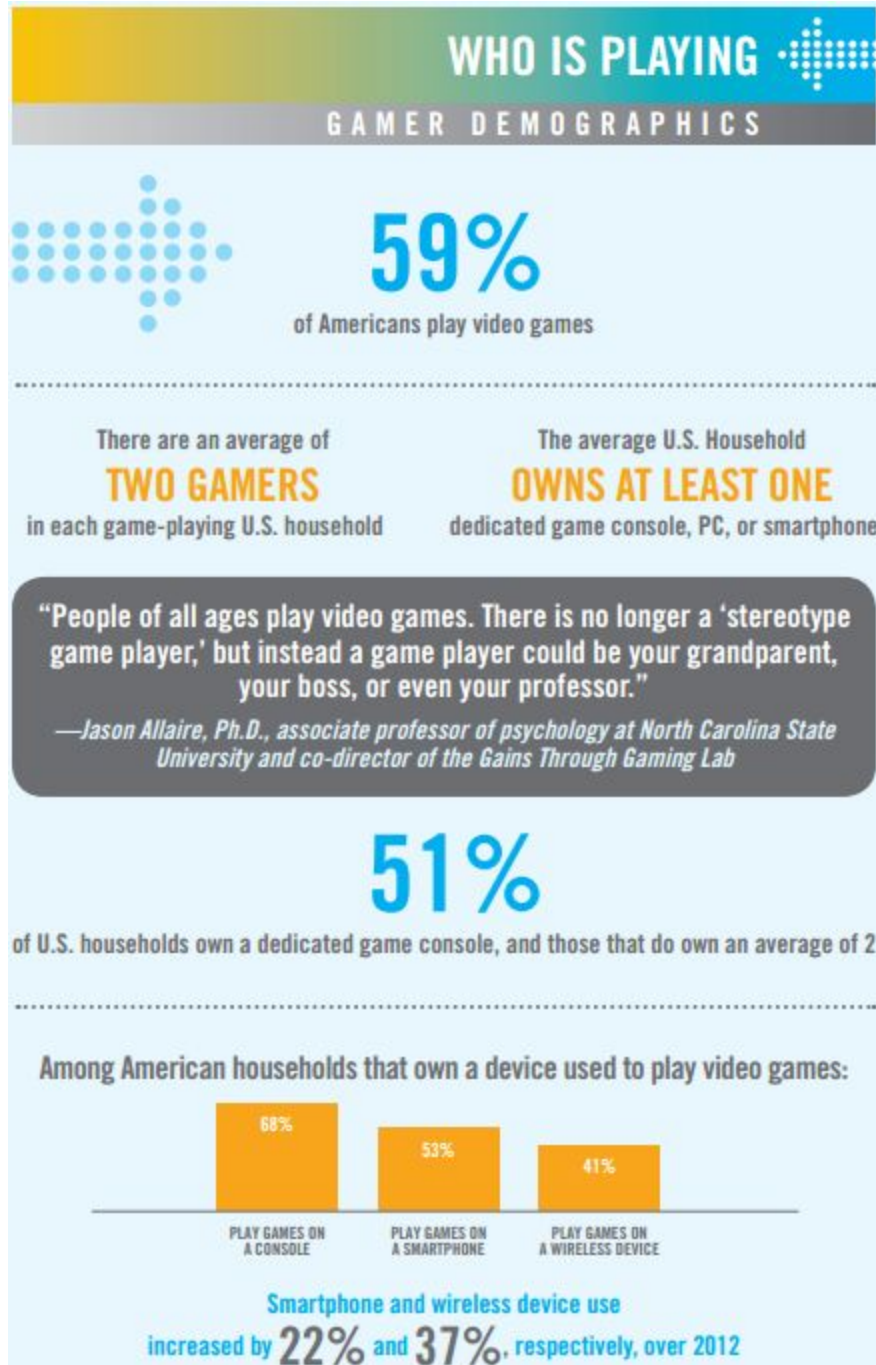
Lastly, there is also occasionally the circumstance in which an item over-accomplishes its task to an undesirable degree, one that may harm others. Guns and other gunpowder explosives are the most prominent ones, with gun violence being a significant crime issue in the United States. Although gunpowder projectile weapons are acceptable in war, for soldiers, it is very unethical to fire at civilians. This is becoming a larger issue today as guns become so easily manufactured and bought— now, as aforementioned, there are almost as many guns in America as there are people, and two-thirds of the murders in the United States were done with firearms

(Agresti). However, when the power of gunpowder and other explosives is abused, disaster can result. Therefore, even “positive” technological inventions can be harmful to society, even if it was originally intended to improve society.

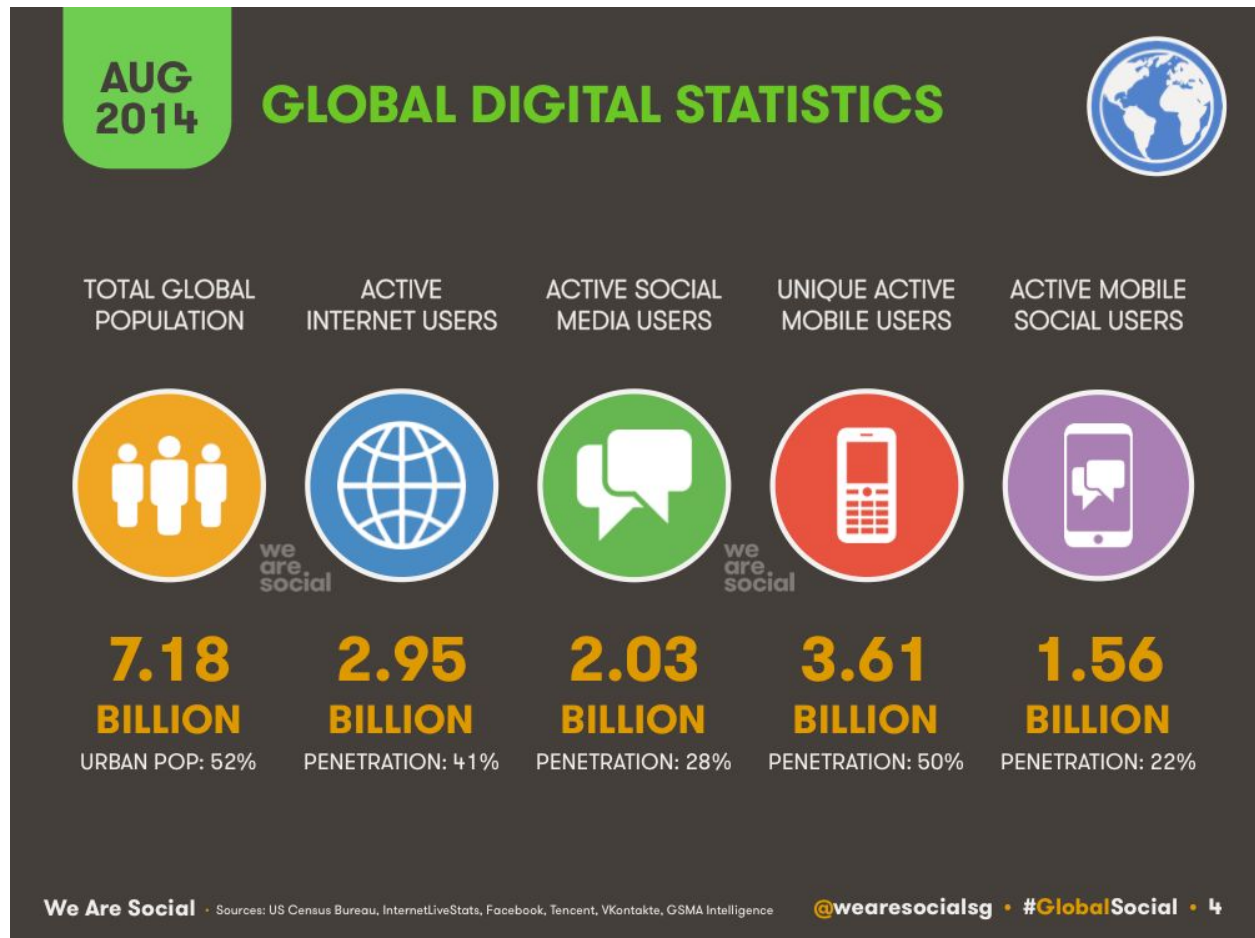
Mankind is continuously advancing, but only because they keep their technology updated. Whether it is a clock, printing press, or gunpowder, the result is always the same: they get placed into the human culture, fitting in seamlessly. Many times there is no evidence of a new technology, so that one could assume it has always been there. This is because the invention of new technology is always dependent on our demand for them, but more on the utility that they possess— after an invention is established, people could not imagine life without them and accept life as it is with them. The constant, progressive nature of mankind drives this process; the result is the continuous knitting of the strands of technology into the core of the ever-growing fabric of civilization.

Appendix

1: American Gaming Statistics

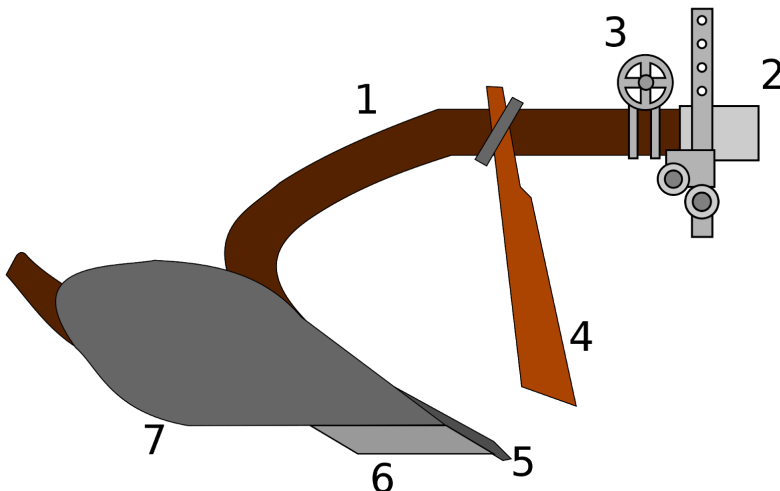


2: Internet and Social Media Penetration Statistics

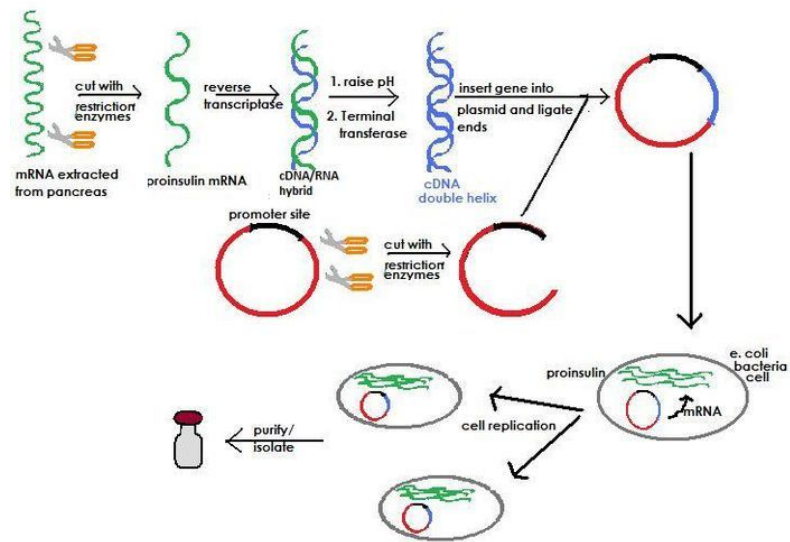


3: The Variety of Useful Inventions

The Relative Simplicity of the Moldboard Plow



The Sophistication of Synthetic Insulin



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