

Chapter One

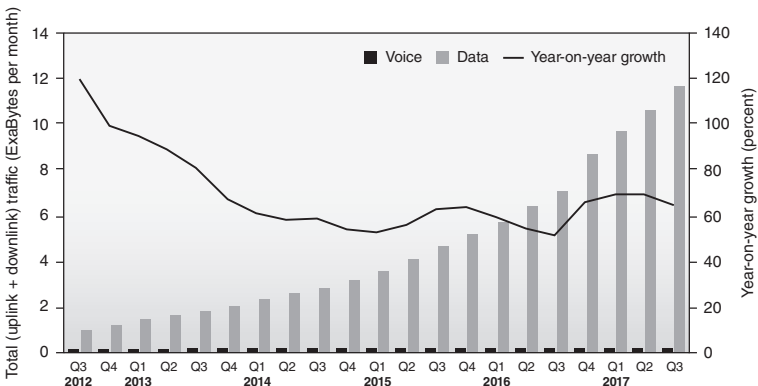
A Tsunami of Technological Transformation

The Internet and its complementary technologies—particularly smartphones and tablets—have been the biggest cultural tsunami to hit the world since the steam engine brought about the industrial revolution in the mid-nineteenth century. Billions of people are now connected to each other, as well as to a seemingly inexhaustible supply of gossip, entertainment, news, music, films, TV and more. In a scant 25 years, we’ve gone from a world in which few had heard of emails to one in which even people living in the barest of shanties are wired in. And in the time, it probably took you to read the last paragraph, eight million emails and two million messages were opened, 300 000 posts were liked on Facebook and 100 000 Snaps, 50 000 tweets and 10 000 Instagram posts were created!

IBM estimates that 90 percent of all “information” ever created by humans, starting with the first cave paintings, has been produced within the past two years!¹ According to Eric Schmidt, former CEO of Google, humans now create as much information every two days as they did during the entire span of time between the dawn of civilization through 2003—something like five exabytes of data every 48 hours.² And this is just the beginning.

New technologies are emerging at a frenetic pace—artificial intelligence, robotics, automation, blockchains and digital currencies will soon be added to the mix of new trends that already include online shopping, the streaming of film, TV and movies, social media, electronic banking, online dating, and much more. All of it is easily accessible by pretty much anyone from pretty much anywhere by smartphone or tablet. We are in the middle of an incredible transformation. A new age of connectedness that empowers individuals and breaks down barriers to make life easier, richer and fuller of possibility than ever before.

The speed with which we engage in this transformation is simply staggering: “By 2020, the number of smartphones, tablets and PCs in use will reach about 7.3 billion units,” according to Peter Middleton, research director at Gartner.³ What’s really mind-blowing is that so few people seem surprised to learn that, practically in the blink of an eye, seemingly every man, woman and child on the planet will possess perhaps the most disruptive technology ever created in the form of a smartphone or a tablet.



*Reproduced with permission. Redrawn from Ericsson Mobility Report June 2018.*⁴

Of course, the word “phone” is a misnomer when joined with the word “smart,” because these devices are being used less and less as phones and more and more as hand-held computers. The graph from Ericsson on page 18 illustrates the staggering surge in data access through smartphones over a five-year period beginning in 2012.

Imperceptible Change

While the move toward digital connectivity may be the most massive tectonic shift in human history, most of us are scarcely aware of how deeply it is affecting us at the biological and psychological level. You’ve probably heard the story of how a frog immersed in cold water that is heated up gradually will allow itself to be boiled alive rather than jump out of the pot. That’s because the change in temperature occurs too slowly for the frog’s primitive nervous system to notice. You might say that the same is happening to our brains, individually and collectively, and the true impact of digital interaction on our lives—despite being overwhelming—is going largely unnoticed.

Today, information is always at your fingertips: you can now find anything from the operating hours of your local cafe to a list of the Best Horror Movies of 1982 in a matter of seconds. On YouTube you can listen to just about any song ever recorded. You can have your extra-hot soy chai latte waiting for you at the counter at Starbucks when you arrive, thanks to the many apps that are transforming the service industry (and many other industries as well). But this ability to project our wishes across the time–space continuum through digital technology comes with a price, and it’s one that we are only now beginning to understand.

Think about the energy that just a visit to your favorite coffee shop demands of your nervous system. The number of choices is astonishing and choosing requires far more energy than you might realize. You might think that ordering coffee with an app is pretty cushy compared to being a hunter-gatherer who, whilst out in the forest, finds himself preyed upon by a tiger. One could argue quite handily, however, that the occasional dose of primal jeopardy (being chased by a tiger) has a way of keeping humans grounded or more focused. The importance of being able to become fully immersed in activities that require your full attention and are highly purpose-filled (such as hunting) is something we will return to in later chapters.

What is almost as amazing as all this new technology is how quickly we've come to take connectivity for granted. And yet, the technology we have now will no doubt seem laughably primitive in a few more years, when it's entirely possible that smartphones will be replaced by intelligent glasses or even devices embedded under your skin, making a search for information as simple as thinking about it. As a matter of fact many researchers are already working on direct brain-to-internet connectivity⁵ and the first practical applications have already been developed: prosthetics for lost arms or legs that operate by the power of thought! At the World Government Summit in 2017,⁶ Tesla and Space-X founder Elon Musk said:

Humans must become cyborgs if they are to stay relevant in a future dominated by artificial intelligence ... There will be fewer and fewer jobs that a robot can't do better. If humans want to continue to add value to the economy, they must augment their capabilities through a merger of biological intelligence and machine intelligence. If we fail to

do this, we'll risk becoming "house cats" to artificial intelligence.

A controversial viewpoint, but still an indication of how uncertain the future is and the level of impact some think technology will have on it. The transformation is already well underway, and the road ahead shows no sign of slowing growth—quite the reverse in fact. The near-exponential growth we have witnessed with the advent of the Internet seems set to continue for quite some time to come.

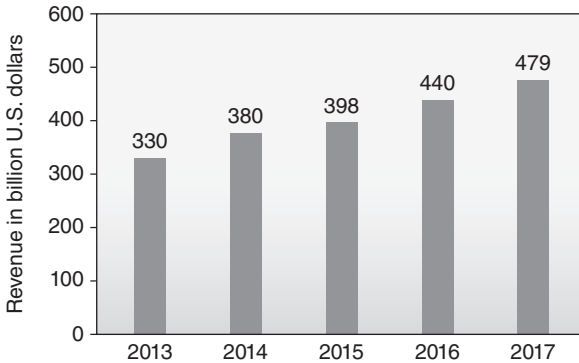
Because Your Eyeballs Are Worth It

Why would anybody want to brain-hack nice people like us? You may not be entirely surprised to learn that doing so is BIG BUSINESS. So, before we get to the "how" they do it, let's pause to consider *who* is doing this to us and *why*.

When you pick up a smartphone or tablet and interact with the web, you're not just connecting to a ubiquitous and rapidly growing layer of information: you are tapping into an infrastructure designed and managed by a new breed of behemoths. Although these companies are usually only ten or twenty years old, many have revenues that are larger than the economy of countries like Sweden, Italy or the Netherlands.

The reason companies like Apple and Amazon are currently valued at around a trillion dollars each is, in essence, because there's a lot of money to be made selling smartphones and providing access to online services—around \$500 billion a year (or a stack of hundred-dollar bills about 500 kilometers tall!).

Incidentally, that's just about the size of the annual Swedish Gross Domestic Product (GDP).



Note: Global revenue from smartphone sales from 2013–2017 (in billion U.S. dollars). Redrawn from Statista.⁷

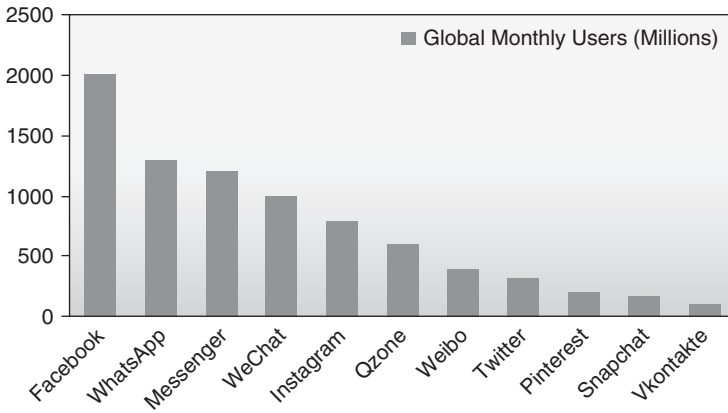
- **Apple** is the inventor of the smartphone among many other things. Its revenues totaled \$215 billion in 2017 and the company is worth around a trillion dollars. It has 123 000 employees.
- **Alphabet** (Google's parent company) had revenues totaling \$110 billion in 2017 with net profits of \$12 billion. The company is worth around \$800 billion. It has 80 000 employees.
- **Facebook** had revenues of around \$40 billion in 2017 with net profits of 15 billion dollars. It is worth around \$525 billion. The company has 2.2 billion users and 25 000 employees.

Obviously, we could keep hurtling statistics at you, but you probably already get the point: the new information economy is VERY BIG BUSINESS. Companies like Apple

and Amazon are worth about as much as the Italian gross domestic product—and the size of the entire global information economy in terms of annual revenues is now estimated to be \$2–\$3 trillion. What we are talking about here is an industry that connect literally billions of people to a wide range of web-based services. In doing so, they have built business empires that rival the economic output of the UK or Germany. And when it comes to competing for your digital dollars, these business people are not playing cricket. Not with each other, and certainly not with the rest of us!

Social Media: The Global Village

Social media, anyone? No, make that social media, *everyone*—according to Statista there are around 3 billion users of social media globally. Facebook is, of course the largest, with around 2 billion users a month.⁸ According to Statista, the average global social media user spends more than two hours a day connected to their social media platforms, and Google now processes more than 40 000 searches a second—that’s 3.5 billion searches a day or 1.2 trillion searches annually. What is unprecedented is that more people than ever existed cumulatively before the year 1800 now use the most advanced technology ever created *without paying a penny for it!* How does that work? The equation is actually very simple if you look at it as a reversal of the traditional vendor–consumer relationship. Your attention is the commodity that Google, Facebook, Instagram, Snapchat, Tinder and their peers buy and sell, and user interfaces (social medial and other apps) “bottle” your attention and resell it to advertisers.



The fact of the matter is that we all *do* pay for using these platforms—with our attention! Sadly, many if not most of us are completely unaware of how valuable the power of attention and the ability to concentrate and focus is to our quality of life. Of course, attention in this respect has always been a commodity on some level; it precedes everything else your employer pays you for. Unfortunately, never in history have there been so many demands for attention made on the human brain, nor has brain and behavioral science ever been so powerful in the hands of MBAs (Master of Business Administration). All of which have huge ramifications for human society.

And now we're at the crux of our first chapter: The global market for buying and selling human attention online is worth nearly a *trillion* dollars a year—obviously every player in the market will go a very long way to ensure that you remain interested in their offerings—and, just as obviously, your choice of smartphone or tablet is worth a lot of money to tech manufacturers.

Netflix CEO Reed Hastings has claimed that the streaming giant's biggest rivals aren't Amazon, YouTube or even traditional broadcasters. According to Hastings, our need for

sleep is actually its main barrier. “You know, think about it, when you watch a show from Netflix and you get addicted to it, you stay up late at night,” he has said. “We’re competing with sleep, on the margin. And so, it’s a very large pool of time.”⁹

Meanwhile Google aims to make its services increasingly ubiquitous and to remove the barriers caused by the use of a device. “Looking to the future, the next big step will be for the very concept of the ‘device’ to fade away,” Google CEO Sundar Pichai says. “Over time, the computer itself—whatever its form factor—will be an intelligent assistant helping you through your day. We will move from mobile first to an AI first world.”¹⁰

The inherent danger, obviously, is that when technology becomes too much of a crutch, it makes you “lazy.” Before the advent of smartphones, most of us could hold 20 or even 50 phone numbers in our head. The same goes for how GPS kills your ability to find your way using a regular map. In other words, relying on technology to do sorting and reasoning tasks that you can do on your own will eventually decrease your own ability to do them. This digital outsourcing of our cognitive skills is actually described in the “extended mind theory,” which is an idea in the field of philosophy of mind often called “extended cognition.” The theory holds that the reach of the mind need not end at the boundaries of skin and skull. Tools, instruments and other environmental props such as our beloved smartphones can under certain conditions also count as proper parts of our minds.¹¹

But unfortunately, the old bodybuilder adage goes for your brain as well: “use it or lose it.” Daniel Wegner, a Harvard professor and senior author of a recent study on how being

online affects human memory, believes that the Internet has become “part of a transactive memory source, a method by which our brains compartmentalize information.” According to Wegner, transactive memory exists in many forms, as when a husband relies on his wife to remember a relative’s birthday. “[It is] this whole network of memory where you don’t have to remember everything in the world yourself,” he says. “You just have to remember who knows it.” Now computers and technology as well are becoming virtual extensions of our memory.^{12,13}

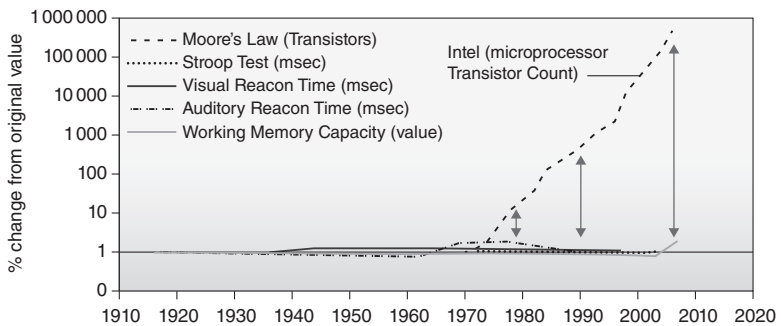
It is important to remember that one main distinction from former “mind extension tools” like phone books, maps or text books from the past is that they were simple tools for set purposes, requiring a specific amount of mental resources. You didn’t get distracted by your phone book or led astray on purpose by your map.

Tackling the Onslaught of Information

Most people have heard of Moore’s Law—the idea that the speed and capacity of computers doubles roughly every 18 months. But what about Amdahl’s Law, a formula used to calculate the theoretical speedup of a computing system when using multiple processors to do calculations? As it happens, Amdahl’s law can also be applied to interactions between humans and computers. According to researchers Randolph Bias, Douglas Gillan and Clayton Lewis,

Amdahl’s Law demonstrates, algebraically, that increasingly the (non-parallelizable) human performance becomes the determining factor of speed and success in most any

human-computer system. Whereas engineered products improve daily, and the amount of information for us to potentially process is growing at an ever quickening pace, the fundamental building blocks of human information processing (e.g., reaction time, short-term memory capacity) have the same speed and capacity as they did for our grandparents. Or, likely, for the ancient Greeks.¹⁴



Note: Human-information processing variables compared with Moore's law data. Reproduced with permission. Redrawn from Bias et al. (2014)¹⁵

The graph shows Moore's law (the dash line) versus the overall human ability to process information (the other lines). As should be readily apparent, computers may help provide access to more information, but they do not make us better at processing information and we can't seem to keep up the pace.¹⁶

This poses a challenge: If you can only absorb and respond to a certain amount of information every day and you're constantly confronted with a much larger amount of information than you can digest, how do you decide where best to invest your capacity to absorb information?

Obviously, the providers of social media and smartphones want you to spend as much time as possible online because that's how they make their money. But just because social media providers want it doesn't mean you have to give it to them. The choice is yours and maybe there are better things you could be investing your time in. On top of that you might be surprised to learn that time spent online may also diminish your power to concentrate and reason— even when you're *not* online.

In other words, even though we now get more information thrown at us faster and faster, we do not automatically get better or faster at absorbing or interacting with this information. To make things worse, when people's jobs and careers increasingly depend on using this fairly limited information processing ability to process ever increasing amounts of information, it may explain why mental health problems are on the rise in most of the Western world.

Notes

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