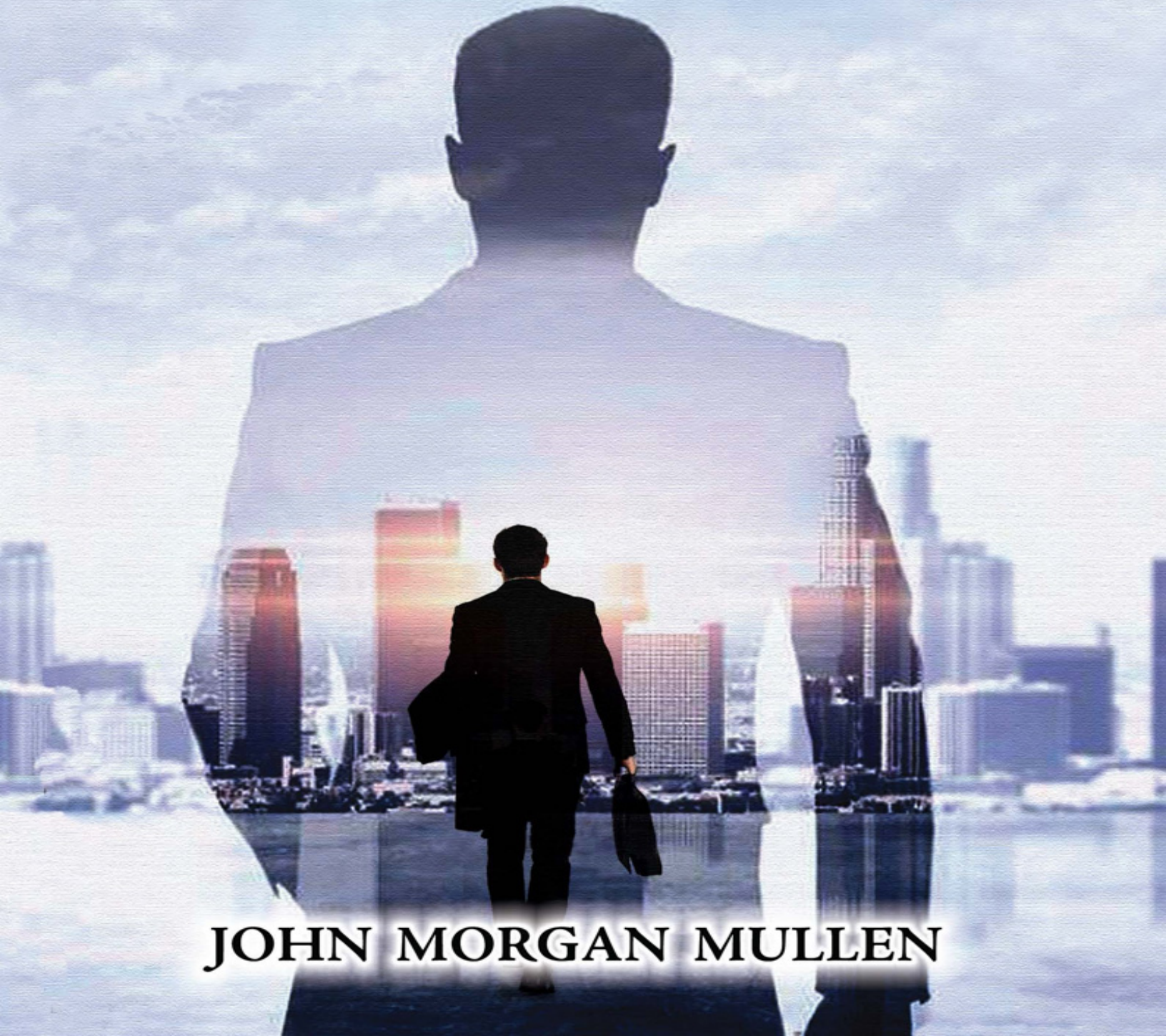
# ROAD MAP TO TOMORROW

## It´s Easier to Get There If You Know Where You´re Going



JOHN MORGAN MULLEN

# Road Map to Tomorrow

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*By*

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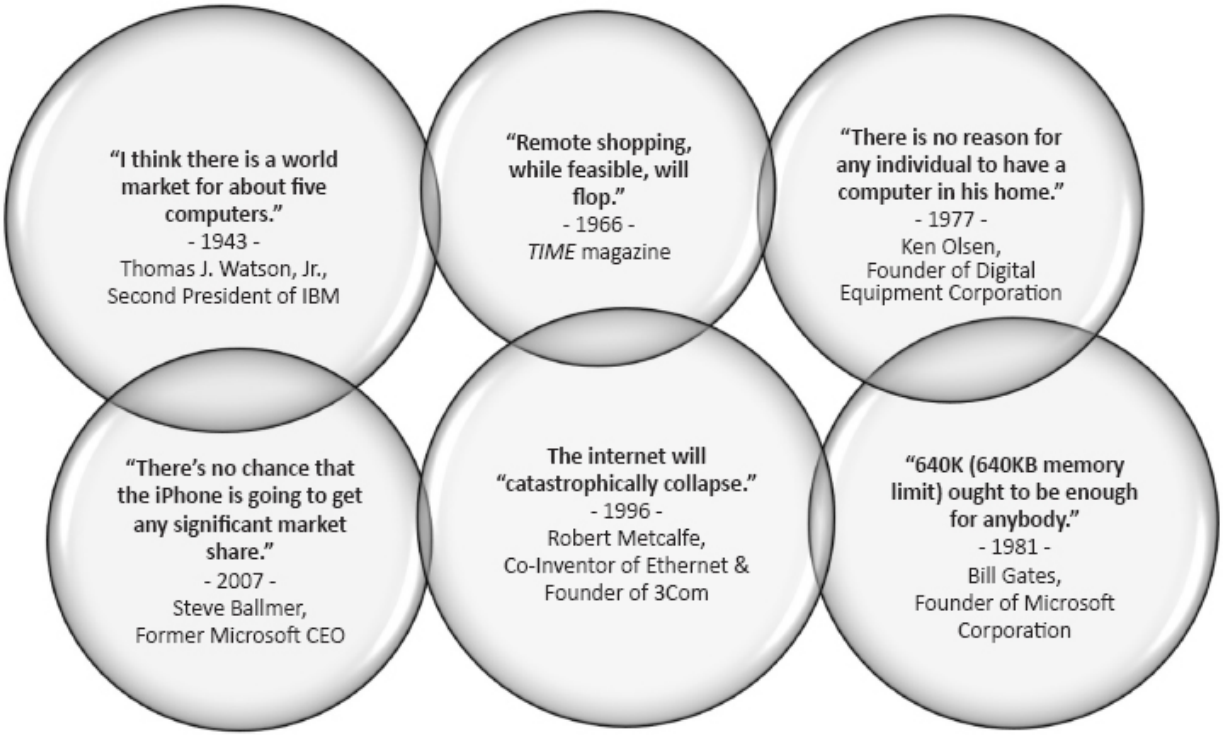
Chapter

# Technology Explosion

Technology is growing at a rapid and unpredictable rate. History has proven that our understanding of the future of technology is minuscule in comparison to the realities we will actually experience. The possibilities are limitless, and we can't fully understand the future capabilities of technology. To illustrate this point, here are past statements and predictions from some of the greatest minds the world has ever seen.




When some of the most famous scientific minds and inventors are this far off in their predictions and assumptions, it puts everything into perspective—

there is no telling where technology will take us in the future.

The accelerating trends are taking place across a wide variety of technologies, including the internet, artificial intelligence, automation, advanced robotics, autonomous vehicles, renewable energy, and nanotechnology. These advancements are just beginning.

*The World Economic Forum* has an annual meeting to engage some of the top leaders in the world. Its focus is to shape the global, regional, and industry agendas. At the 2016 meeting, expert scientists from all around the world projected that we will experience a few of the following advancements and disruptions in the next ten to twenty-five years:

- 75 percent of universities around the world will go out of business.
- 50 percent of supermarkets will close their doors.
- Robots will be the soldiers of the future.
- DNA sequencing will personalize medicine.
- Autonomous cars will revolutionize and disrupt oil, auto, and insurance industries.
- 10 percent of the wealthiest industries will be "virtual corporations".
- Medical devises will scan and predict 95 percent of diseases.
- 70–80 percent of jobs will disappear over the next twenty years.
- 5 percent of consumer products will be produced with 3-D printing.
- The first 3D-printed liver transplants will take place.
- 10 percent of cars on US roads will be self-driven.[2]

Do I have your attention yet? Not all of these will happen, but with the rate that technology is advancing, many of these are entirely possible. In fact, we might not even be thinking big enough!

We've already seen its massive impact on the world, and as it continues to evolve exponentially and our predictions can only begin to explore the

potential of technology in our world. Michael Baxter aptly makes this point in his book *iDisrupted*.

***"If we play it right, the result of the technological innovations that are afoot will be a kind of economic utopia...Technology does not have to replace us; it can enhance us."***[2]

—Michael Baxter, *iDisrupted*

When significant innovation takes place, new markets are created and it has the potential to turn an existing and previously dominant market completely upside down. This is called disruptive innovation.

Subscription-based television, such as Netflix and Hulu, is an example of this. It's completely changing the television market. The cable market is diminishing, becoming less and less popular, especially among the younger generation, and it is entirely within reason to expect it to become obsolete in the near future.

Uber is another excellent example of disruptive innovation due to the ease and cost efficiency of its ride-hailing app that adversely impacted the taxi industry.

The disruptions caused by new technology have the power to destroy existing industries, eliminate jobs, and ultimately shift our economic markets. With the rapid technological changes taking place and much more to come, I am expecting that we will see and will be required to prepare for several more major market disruptions over the next twenty to twenty-five years.

## Technologies That Will Disrupt Markets

*Artificial Intelligence*

Improvements to artificial intelligence and other machine learning are shifting the workforce from human-operated tasks to machine-operated tasks. Autonomous machines are now doing work that once seemed impossible for a machine to do. As improvements continue, autonomous machines will find ways to perform highly skilled tasks. Many jobs that have forever been performed by humans could become fully automated. This will completely change the job market and workforce as we know it.

*Computers and Advanced Robotics*

For years we have seen robots in the manufacturing field doing some of the difficult, grueling, and reasonably low-skilled jobs in production. However, recently we have seen significant advancements in the qualities of robots such as the intelligence, sensors, vision, and communication. This makes the potential of the work that robots can achieve, limitless.

Their abilities in manufacturing will continue to improve, meaning they can be given more responsibilities and even work alongside humans. We are also beginning to see their capabilities in industries other than production, such as service jobs, cleaning, and maintenance. They are even impacting the medical field with research, diagnostic skills, and robotic surgery. It will be exciting to see how computers and robotics continue to impact our world.

*Genetic Modifications*

According to Wikipedia, human genome sequencing is the ability to determine the sequence of the base pairs that make up human DNA.[3] This helps us to understand the makeup of diseases and mutations. Human genome sequencing initially took thirteen years at the cost of $2.7 billion.

Today, with rapid human genome sequencing using powerful computers, genetic variations can be specifically tested to understand what brings about specific traits and diseases. Now, this can be done in several hours at a relatively cheap cost, something that seemed impossible just a decade ago. As advancements continue, treatment of diseases will greatly improve. There is even the possibility we'll be able to customize and edit

DNA, which could remove diseases altogether. These possibilities would have a huge impact on medicine, health care, and agriculture.

*Autonomous Vehicles*

Driverless cars are no longer just a science fiction concept. We now have the technology, and it will turn our transportation world upside down. Cars, trucks, aircraft, and watercraft can now be run entirely or partly autonomously. The technology that makes autonomous vehicles possible is rapidly growing, so the advancements we've seen in recent years is likely nothing compared to what we are about to see in the years to come.

We've seen autonomous cars already make road transportation much safer, with driving assistance such as steering, braking, and collision avoidance. In the future, we will see other autonomous vehicles, such as trucks and drones, invade the trucking and shipping industries. This will significantly improve productivity and shift the market altogether.

*Renewable Energy and Energy Storage*

Solar, wind, water, and nuclear power are all examples of renewable energy. Not only are they renewable but they are also clean sources of energy, making them much better for our earth. As technology improves, accessing these sources of energy will become easier and cheaper, and because of the benefits of renewable energy, they will soon control a large portion of the energy market. Fossil fuel has long dominated this market, but we are quickly running out of it, and we have seen the harmful effects it has on our world, such as global warming. As renewable energy sources become more accessible, clean energy will begin to replace fossil fuel energy completely.

Energy storage allows for batteries and other systems to store energy for later use. Lithium-ion batteries are currently powering electric and hybrid vehicles. As the performance of Lithium-ion batteries increases and their price reduces, we should see electric cars become cost competitive with fuel-run cars. This will make electric vehicles available to a much larger market, not just the upper class as we have mostly seen up to this point.

This is only one example, but the same concept follows with other sources of stored energy.

Industries that once dominated a market will become nonexistent, along with the jobs within the industry. With these and other potentially disruptive innovations on the horizon, we'll be required to adapt the way we live and work. But disruptive innovations are not bad. We have seen time and time again that innovation typically creates more jobs than it destroys. We are looking at incredible new technologies that will solve problems, make our lives easier and more efficient, and lower costs for consumers because of increased production efficiency. But nonetheless, change is frightening, and it will require continuous adaptation in areas such as business, politics, health care, transportation, jobs, and nearly every aspect of our economy.

We aren't just interested in the potential technological advancements we'll be facing in the future. The reason we look at these predictions is to better understand how the world will change and how our lives as individuals will be impacted. We don't know exactly where technology will take us, but now that you see a glimpse of the potential impact, I hope you realize how important it is to try and prepare for this future world as best we can.

Many great career choices will be presented throughout this book with the hope of helping you find potential paths you can take in the ever-changing world. Not just potential jobs but fields of study and industries as well. Because who's to say these jobs will even still exist in the future? Regardless, this book is more about providing you a menu of options for you to consider so you might find what you are most passionate about.

Please understand I'm not here to lay out your life plan for you. That will be up to you, both now and over the course of your life. My goal is to gather facts, analyze and evaluate the scientific research performed by experts, and inform you of their findings so that you're able to see how these discoveries are anticipated to affect everything around us exponentially.

The information presented here is meant to assist you in making good career decisions and choosing your potential areas of interest. So prepare

yourselves accordingly—study hard, find your passions, and pursue those areas with a road map and an informed mind.

Chapter

# The Intelligence of Artificial Intelligence

Artificial intelligence (AI) has proven itself to be the most incredible and powerful tool mankind has ever seen. No other technology is gaining more momentum, seeing more progress, or inciting more fear than the rise of intelligent machines. So what exactly is it? Let's break the two words up. *Artificial* is defined as something that does not occur naturally but rather is produced by human beings.[3] *Intelligence* is defined as the mental capacity to learn, reason, and understand.[4]

So what does it mean when we put these two words together? Well, if natural intelligence is the ability of the human mind to cognitively think, adapt, learn, reason, respond, problem solve, etc., then artificial intelligence is this same process occurring outside the human mind. Wikipedia defines *artificial intelligence* as intelligence exhibited by machines rather than humans. An intelligence that mimics the cognitive functions of a human mind, such as learning and problem solving.[5]

Most of us see and use artificial intelligence in our daily lives, with devices like Alexa and Siri. We ask a question or make a request, and the device intelligently responds to the best of its ability. Over the last several years, we have seen this intelligence improve drastically to become more cognitive and natural.

Even though the general understanding is that artificial intelligence is technically unnatural, the argument is that intelligence is intelligence no matter what form it takes, whether generated by a human, or by means like

a computer or device. Look at what Albert Einstein had to say about intelligence.

***"The measure of intelligence is the ability to change."***

—Albert Einstein

Artificial intelligence is clearly a form of intelligence, and we are starting to see its ability to change and adapt. There is no doubt that machines will continue to improve in this area. A common belief is that as computer systems get smarter, they will become capable of examining themselves to make modifications to their software to improve their intelligence. In other words, they would be able to design their own hardware, removing any need for human intelligence at all.

It is unknown whether this is possible and just how intelligent these machines can eventually become, but there is the belief among many of the smartest people in the world who fear the possibilities of artificial intelligence. Can they develop a mind of their own? Can they create their own goals? Yes! However, we aren't exactly sure to what extent and how that will impact our future.

There are some earnest discussions taking place as to when artificial intelligence will surpass human intelligence, if it hasn't already. This is referred to as singularity. It could create a "runaway reaction" of self-improvement cycles, with each new and more intelligent generation appearing more and more rapidly, causing an intelligence explosion and resulting in a powerful superintelligence that would far surpass all human intelligence.

We are already seeing computer systems such as Watson and all its current relatives, (Siri, Alexa, and friends) not only having the ability to

absorb information at unimaginable speeds with retentions that humans are incapable of but also be intelligent enough to ask clarifying questions to help find the appropriate answers. Furthermore, they have proven to be correct in more instances than human research.

AI has made great strides in recent years, and its current pace of breakthrough is stunning. We've seen crucial progress in fields such as medicine, where it has spurred breakthroughs in disease diagnosis and the development of treatment plans. It's given transportation new capabilities, such as self-driving vehicles, which we will discuss later. It's opened new opportunities in manufacturing, where it optimizes productions and can detect product defects. We're just now starting to scratch the surface of where AI can take us.

Machines have shown to be highly effective, exceeding human performance in most areas. Therefore, they are replacing the work of humans in many fields. For example, with machines having an increased role in manufacturing, human labor is no longer needed, which cuts down on jobs and reduces costs. As these machines continue to improve their ability to learn, respond, and adapt, they'll continue to replace the work currently performed by humans.

IBMs Watson is an example of an artificial intelligent system that is disrupting multiple industries, including bookkeeping and accounting. Call center agents respond to your call in a lifelike voice that can often be difficult to detect if you're speaking with a live agent or an intelligent system. In the future, even legal assistants will utilize intelligent systems. Virtual lawyers will be accessible as large law firms will begin to use intelligent agents to take on legal cases at a lower cost than traditional firms. This is just the tip of the iceberg.

While this is great for the world's overall efficiency, it will cut out many jobs people have always relied on. I think, when looking at the whole picture, our world will significantly benefit from the growth of artificial intelligence, but this will create new challenges that we have never dealt with. We must learn to adapt while looking for new solutions.

Artificial intelligence will only continue to improve with advancements in computers that will create faster data and more sophisticated algorithms. We're in the midst of a computing platform revolution that is primed to change every aspect of the world as we know it. Throughout this book, I will attempt to project how these advancements may affect our lives and how we can adjust to prepare for the future.

## Examples of Jobs in Artificial Intelligence

**Machine Learning Engineer**
**Research Scientist**
**Computer Vision Engineer**

*See more in Chapter 9, "Help Wanted"*

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